



A New Maturity Model for AI & Blockchain Implementation within the UAE Public Sector

By: Ahmad Al Graibeh

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Abstract

Despite of technological advancements being adopted within UAE (Federal & Local Governments), there is a significant gap in the existing literature which provides, insights on the real impacts of AI & Blockchain solutions/technologies (within UAE Federal Government, Abu Dhabi Local Government, Dubai Local Government and Ajman Local Government). and a comprehensive business model to effectively implement these technologies for efficient digital services/transactions in the UAE (Federal & Local Governments). Considering the above mentioned gap and necessity of comprehensive business model for implementation of these technologies, the study aimed to analyze how AI & Blockchain solutions/technologies can effectively contribute to improve the efficiency of government digital services/transactions to be an effective digital services/transactions that enhance the customer journey & experience of getting the government services, and that totally aligned with UAE (Federal & Local Governments), digital transformation agenda for fast-growing economy using the 4th Industrial revolution technologies. and surpass the main challenges, pillars that should be considered in adoption, implementing and deployment of AI & Blockchain solutions/technologies within public sector organizations/entities. and setting up a new framework that evaluate/assess the main stages of adoption, implementing and deployment of AI & Blockchain solutions/technologies to deliver a clear roadmap for public sector organizations/entities, how to reach an advanced and mature level of implementing/deploying AI & Blockchain solutions/technologies.

The study provides a literature review which explored Artificial Intelligence (AI) and Blockchain (BC) technologies individually, highlighted conceptual and architectural structure of these technologies, their benefits, applications, challenges and subsequently delved into joint approach of AI and Blockchain, along with associated applications and challenges. Based on literature review, the provisional conceptual framework is proposed which depicts the potential factors (which are regarded as dimensions of this framework) that could influence the acceptance and implementation of AI and BC in government digital services/transactions. This conceptual framework/model comprises of four dimensions which include strategy & governance, technology, people, and process, and five stages of change, which included initial, development, defined, managed, and optimized stages. The conceptual model provides the primary frame of reference and direction to empirical research for in depth investigation of factors affecting the successful deployment of these technologies. Based on provisional conceptual framework, maturity model is proposed which support the successful implementation of AI & blockchain technologies in public sector of UAE by providing comprehensive assessment tool to assess efficacy of organization to successfully deploy these technologies. The maturity model is validated by combining "Expert reviews with User Feedback & Survey" and its use case is discussed in context of one case study (Dubai Digital Authority-DDA) of research. The holistic validation of model highlights both the strengths and challenges associated with proposed model.

Significance & Contribution: The results of analysis and evaluation of conceptual framework provides comprehensive understanding of primary drivers and applications of these technologies, accompanied by detailed exploration of challenges associated with their deployment. Building upon these conceptual insights, a maturity model is formulated to assess the organizational readiness to effectively implement these technologies. Moreover, to harness the full benefits of maturity model, the study furnishes implementation guidelines which have been categorized into four key areas including preparation for assessment, conducting the assessment, setting improvement goals, and progress tracking. The validation of maturity model underscores its substantial advantages in facilitating seamless technology integration and transformation, providing strategic implementation roadmaps, bolstering risk mitigation as well as in evaluating and enhancing organizational capacity and resource optimization. Hence, the research fills a significant gap in literature by scrutinizing the underlying drivers and challenges of implementation of these technologies in public sector of U.A.E, while providing a maturity model tailored to support the public sector of U.A.E in successfully embracing and implementing these technologies. This would also aid public sector of U.A.E in adhering to embracing the digital



transformation initiatives of both local and federal governments of the country, which significantly involve the adoption and integration of these technologies.

Author's Declarations

I declare that the work in this thesis was carried out in accordance with the regulations of the University of Gloucestershire and is original except where indicated by specific reference in the text. No part of the thesis has been submitted as part of any other academic award. The thesis has not been presented to any other education institution in the United Kingdom or overseas. Any views expressed in the thesis are those of the author and in no way represent those of the University.

Signed Date ...**Feb. 2024**...

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Chapter One: Introduction

1.1: Introduction

This chapter provides an overview of Blockchain technology's pivotal role in transforming e-government systems worldwide, particularly in context of UAE's AI & blockchain initiatives. In Section 1.2, the chapter delves into the background of the project, elucidating the implementation of blockchain in government services, existing gaps and risks associated with deployment of such technology, and UAE's ground-breaking efforts for a detailed examination of blockchain's efficiency and effectiveness in public transactions. Section 1.3, then addresses the primary aim of study along with four key objectives, providing a roadmap for subsequent research endeavours. The following section 1.4 provides discussion on how this study would contribute to generation of new knowledge within the field. Section 1.5 outlines the structure of the thesis, giving readers an overview of the content covered in upcoming chapters. Wrapping up the introductory discussion on undertaken research study, and setting up stage for subsequent analysis and exploration, the chapter is concluded in section 1.6.

1.2: Project Background

Blockchain technology and crypto currency has proven its significance in better implementing e-government systems all around the globe, the cities are heading its journey to be the smart cities indeed another initiative of SMART governments. Nonetheless different challenges including privacy threats were made the dealings insecure, in fact the blockchain has come up with a more efficient framework and being considered as a saviour in many aspects. In the smart governments the blockchain is used for notary services, digital identity, digital certificates and records and cryptocurrencies (Datta, 2019). Though, Department of Homeland Security (2018) highlighted blockchain technology as secure in transactions and being remarked as the sole elegant technology can be truthful as it is, certain remark about the higher cost is always a challenging concern. A similar conclusion was made by Tama, Kweka, Park, & Rhee (2017), blockchain has many applications and it is considered to be a secured platform however it has not been yet considered as a cure from all sorts of economic risks, legal issues and security threats. So, the literature considered it as a promising option to further innovate significant solutions for the identified challenges. In one of the remarkable studies, Department of Information Technology and Electronics & PWC (2018) identified the challenges of blockchain technology through a survey, the descriptive analysis is resultant in revealing 45% of users lack trust in blockchain technology, 7% of companies globally hindered blockchain projects and inability to integrate the blockchain technology over departments and segments. The survey identified 7% of companies implemented blockchain technologies have paused its operations. Other challenges in successful implementation of blockchain technology are the inadequacy in skilled professionals, improper stakeholder collaboration and lack of knowledge about the returns and efficiency of implementing the same. From the available studies, both published and non-published works, in blockchain technology, Atzori (2016) has done one of the most detailed examinations of the same. He raised questions towards the efficacy of the blockchain technology, the role of blockchain in decentralized government, citizenship and democracy. The blockchain is considered as a disruptive technology with serious risks and cons of bitcoins in public administration. The most highlighted aspect is one to one direct transaction can split the power among the provider and the customer, where the public is termed as a customer and not a citizen for government services. It can invite social, technical and financial costs, and deregulation, may be the result, according to (Atzori, 2016). In yet another recent study Kossow & Dykes (2018) come in parity with the statements of (Atzori, 2016), deliberated with the expected threats in illegal and illegitimate transactions which may lead to corruption. Therefore, to avoid the misuse of crypto currency, both the studies demand for a polished legal and technological framework in blockchain technologies. The innovative studies on efficient management of government service transactions are being conducted in different parts of the world. The blockchain technologies could be able to successfully gain the hearts of administrators, IT professionals and policy makers in terms of gaining the sense of security, sense of trust and effectiveness of cost (Noor, et al., 2018). The management research paper aims at analysing the scope of research that is dealing with the role of blockchain in increasing efficiency of government



services. Besides that, the thesis reviews the appropriateness of different research paradigms and theoretical philosophy of underlying concepts which are adopted in this research (Jonker & Pennink, 2010). This research paper addresses three research questions proposed in this research, whether the block chain technology can be used as a secure, cost efficient and reliable method of public service transactions, if it is good whether it will accelerate efficiency in UAE, also till what extend it will be able to boost efficiency if the research proposes a model. Nonetheless the study intends to explore extensively the research gap and further modifies the research questions. The research process would distinctly inquire the different facets of implementing the block chain technology in a general environment and use public service transactions, while the research paradigm guides the research with appropriate research methodology. However, the current research, to enhance its credibility would like to opt for pragmatism research paradigm as the research follows the mixed approach, in formulating research methodology.

As the world is being digitalized, the personal account information and transactions are being secured and decentralized through blockchain technology (Zheng, et al., 2017). The pioneers like Crosby, Nachiappan, Pattanayak, Verma, & Kalyanaraman (2015) considered the blockchain as “digital asset transaction exchanged online” in which each transaction is represented as unique block. Further these blocks are being linked through blockchain, further applications to the initial crypto currencies have been modified to smart contracts, insurance and public transactions along with various nonfinancial applications in different industries. Therefore, the study demands higher significance in the present technological era (Crosby, et al., 2015).

1.2.1 Scope of Discussion – Implementation of Blockchain in Government Services

The United Arab Emirates (UAE), after the federation of nation, undergoes histrionic growth in the implementation of blockchain technology among the Arab nations. The changeover of the UAE to a professional and knowledge hub was reasonably swift and evolutionary, the business heritage was incubated in UAE from pearl diving; however, the contemporary advancement in technology, innovation, creativity and professionalism is unparalleled by any other developing nations. The advanced approach of the UAE government could increase the business opportunities in the nation in 2018; Warner (2018) reported the issuance of more than 500,000 business license in UAE, indeed reflects the boom in the economy. The affluence of the nation, the strategic location, the infrastructure, the liberalized norms of investment and the convivial climate make UAE one of the most sought business destinations and technical hub of multicultural professionals with diversified knowledge.

The government, in different parts of the world, looks forward to make public service transaction efficient and effective; blockchain is considered as the most reliable innovations in saving data and processing information. The most updated technologies like blockchain and artificial intelligence are the recently celebrated terms in the scientific world. When considering the introduction of blockchain, the unique propositions such as security, efficiency, and speed always remain as the main point of difference. The unique set of applications based on blockchain technology have been already set to go after pilot testing in government services of more than a dozen countries, even three years ago. Another highlighted estimation is that the implementation of the blockchain helps to save \$15–20 billion a year in the financial services sector. Similarly, it can help the government operations in reduced cost with high end information security and efficient dealings without any waiting time (Killmeyer, et al., 2017). Killmeyer, White, & Chew (2017) explained the three key areas where blockchain technology can help government are in case of value transfer, smart contracts and record keeping (see Table 1.1). However, the blockchain has inexplicable power on the business models and even in generating and maintaining stakeholder value.

Table 0.1 Blockchain business value in primary areas (Killmeyer, et al., 2017)

Value transfer		Examples
	· Low-cost and near real time	Domestic and international remittance
	· Without an intermediary	Internal payments settlement
	· Beyond “money”	Clearing and settlement of securities
		Exchange of low liquidity assets
	· Software protocols	Examples
	· Based on ledger content	Digital cheques/IOUs



Smart contract	· Execute when the conditions are	Automatic financial instruments
		Parametric insurance contracts
		Automated market making
Record keeping	· Create immutable record	Examples
	· Under agreed consensus protocol	Digital certificate of ownership for physical
	· Without reliance on a trusted third	Transaction validation of digital assets
		Financial accounts

Following this introduction, the next section of the assignment deals with the research problem and explanation of the prevailing gap in both UAE and globally published literature. Next section deals with the research objectives and then the feasible research paradigms. Finally, the research paper winds up with conclusion.

1.3: Overall Aims & Research Objectives

1.3.1 Research Problem

The story of blockchain starts from the introduction of bitcoin and every new transaction is being recorded in a dispersed way, with a unique node. Therefore, the role of blockchain can no longer be limited to any sector as it diminishes information irregularity (Garbuio & Lin, 2019). Dinh, Zhang, Chen, Ooi, & Wang (2018) discussed the need of an organization to identify the exclusive features of blockchain and in which way it would be beneficial for the organization. Along with that the firms should cross verify the challenges it may come across in future if they implement the technology. The blockchain is categorized to public blockchain and private blockchain; the bitcoin is the most used technology in public blockchain. Though bitcoin can resist Sybil attacks, it is “non-deterministic and computationally expensive” according to Dinh, Zhang, Chen, Ooi, & Wang (2018) and not fit for large scale banking and financial transactions in a deterministic manner.

Though technologists are continuously coming up with innovative solutions, certain issues are occurred related to security and privacy issues. The partnership of AI and blockchains have boosted the public sector economy in terms of effective service delivery in UK, according to Mikhaylov, Esteve & Campion (2018). Blockchain is considered as the safest method on money exchange between two individuals with no intermediaries. Still many known barriers are there, cyber threats are one of the most discussed issues recently, though blockchain technologies have immense power to get rid of it and the disadvantages can pop out once it is handled improperly. Nevertheless, Parn & Edwards (2019) pointed out the necessity to augment the current blockchain technology to improve efficiency. Though the blockchain has many benefits it cannot yet be considered as a silver bullet in all sectors as the issues prevail and continuously pop out even in technological and managerial sides. Despite many technical problems associated with it, often the managers are perplexed with the drift in business model transformation, incentive structure, transaction scale and maturity (Killmeyer et al., 2017).

The blockchain in public services are one of the most discussed scenarios globally these days; Jun (2018) revealed the plans of different nations soon using blockchain, by a minimum of 10 governments completely introduced blockchain project by 2018. Estonia used it to reissue the e-ID with verification; other nations like Ukraine and Australia introduced it for conducting fair elections; Georgia finds it useful in managing land resources and the private ownership of lands; US implemented it in complete automation of medical field for providing credible and reliable services; UK conducts various studies on implementing it efficiently in various government services, not to the least, China has planned to construct a blockchain township. In government services the blockchain services are used to ‘communicate, cooperate, compromise, and make consensus with other people’ (Jun, 2018). Other blockchain implementation globally includes the introduction of digital passport and instantaneous ship tracking and logistics management are already there on track (Jun, 2018). Furthermore, Carter & Ubacht (2018) contributed a review with a list of usages of blockchain in the government services ranging from applications in the health care, smart cities, B to G business support applications, governing public issues, and government ledger technology. The authors even reviewed the negative aspects and challenges of blockchain can be categorized into three main challenges, technological, organizational and environmental, as



depicted in the Table 1.2. Rather blockchain is reported to bring out feasible solutions for many problems in different nations similar to Vehicle Wallet in Denmark, BenBen in Ghana, Project Ubin in Singapore (OPSI, 2018).

Table 0.2 : Challenges of blockchain adoption(Carter & Ubacht, 2018)

Aspects	Challenges
Technological	Security
	Scalability
	Usability
	Interoperability/ Compatibility
	Reliability
	Flexibility
	Cost Effectiveness
	Computation Efficiency
	General Application Platform
	Storage Size
	Immaturity
	Design Variable
Organizational	Organisational Readiness
	Acceptability
	Business Model
	Organizational Transformation
	Risk of error for Complex
	Business Rules
	New Governance Model
	Implications
	Trust
	Auditing
Environmental	Laws and Regulations Support
	Support Infrastructure
	Accessibility (the matter of the digital divide)

UAE is far ahead of many nations in terms of blockchain technology. Banks have introduced the same for error free reliable transactions, besides that UAE planned to implement complete automation of document processing and controlling through blockchain technologies. By 2020, UAE plans to transform the nation to “world’s first block-chain powered government” (D'Cunha, 2017); accordingly, all visa process, license renewal, bill payments and all other public services can be transacted through block chain. On the journey to the first smart city in the globe, Dubai had turned up to be the first city on blockchain and had faced many challenges, however the Dubai government could introduce performance management system through blockchains, all the service processes in the smart government works well with the reduced transaction cost and transaction time (Smart Dubai, 2019). The extensive potential of blockchain technology in the service transactions which can redefine the relationship between government and citizens by creating a decentralized direct connection. It even enables complete transparency, and trust with the efficient



delivery of government services (NASCIO, 2017). When the INDRA & World Government Summit (2017) considered the scope of blockchain in introduction stage, Smart Dubai (2019) is confident enough to consider its significant growth in government fields in Dubai, inclusive of agriculture, education, retail, healthcare, energy, government, manufacturing, telecommunication, tourism, logistics and retail. The government along with the regulatory bodies identified the three phases of blockchain implementation in the nation; pre-implementation, implementation and post-implementation phases; each phase has its own significance and challenges. In the post-implementation phase the government must find out solution for the two more challenges; Interoperability- the problem with insufficient communication and transparency between systems; along with that the governance and regulations to monitor the implementation. The UAE government expedited forward optimistically with the framework to deal with both the issues, with real understanding of the persisting problems. In summary fraudulent activities, non-transparency and lack of worldwide regulatory system are considered to be greatest challenges of blockchain technology these days (Crosby *et al.*, 2015). To date, at the best of researcher's knowledge the academic research publications on the UAE public sector has not completely explored the segment. The researcher can find gap in the existing literature in exploring the challenges of the blockchain adoption in service transactions and the efficiency of the implementation of blockchain in the public transactions. Along with that there is a need for a business model specifically dealing with the public service transactions through block chain technology. However, in the academic research publications and particularly in context of United Arab Emirates, there are very few studies which have proposed the solution. Therefore, this study identified a persisting relevance as it empirically tests the efficiency of the blockchain technologies which are introduced in service transactions in the nation. Consequently, the present study can fill the prevailing gap by postulating a business model in effective implementation of service transactions.

1.3.2 Research Aim and Objectives

Based on the problem discussed, the study demands reconsideration of the main challenges and barriers in effective implementation of the AI & Blockchain solutions/technologies within public sector/government services. Nevertheless, researcher had to assess the adoption implementation and deployment of AI & Blockchain solutions/technologies within UAE public sector through assessing many implanted/deployed digital transformation projects that used AI & Blockchain solutions/technologies (within UAE Federal Government, Abu Dhabi Local Government, Dubai Local Government and Ajman Local Government). Thus, the researcher framed the following research questions

1. Does the AI & Blockchain solutions/technologies can be used to improve government services, reducing transactions time, improve the efficiency of government services/transactions within UAE public sector?
2. Does the adoption of AI & Blockchain solutions/technologies require an improvement steps within each organization and either these steps should be customized based on the government entities mandate and based on customer categories?
3. Can we assess the implanted AI & Blockchain solutions/technologies cases, to evaluate the current situation and design the main future steps through a clear roadmap to be a mature organization?

The aim of the current study is to analyze how AI & Blockchain solutions/technologies can effectively contribute to improve the efficiency of government services/transactions to be an effective digital services/transactions that enhance the customer journey & experience of getting the government services, and that totally aligned with UAE agenda for fast-growing economy using the 4th Industrial revolution technologies, and to surpass the main challenges, pillars that should be considered in adoption, implementing and deployment of AI & Blockchain solutions/technologies within public sector organizations/entities, and then setting up a new framework that evaluate/assess the main stages of adoption, implementing and deployment of AI & Blockchain solutions/technologies to deliver a clear roadmap for public sector organizations/entities to reach an advanced and mature level of implementing/deploying AI & Blockchain solutions/technologies.

The key objectives include:



1. To critically identify and analyse the main drivers behind effective AI & Blockchain solutions/technologies deployment of public sector services/transactions, and determine the associated challenges involved within such deployment.
2. To critically conduct a systematic literature review to determine the current literature related to adopting, implementing and deployment of AI & Blockchain solutions/technologies, within public sector, and critically reviewing research studies which provide guidelines to make adoption/implementation journey of these technologies successful .
3. To identify the main pillars that should be considered from public sector organizations/entities, through their journey of adopting, implementing and deployment AI & Blockchain solutions/technologies.
4. To design an applicable New Maturity Model / framework assessment tools, including the main critical pillars/sub pillars, and defining the level of maturity, to assess and evaluate the public sector organizations/entities maturity according to their journey of adopting, implementing and deployment AI & Blockchain solutions/technologies, and then validating new maturity model.

1.4 Contributions to the New Knowledge Generation

The study would contribute to generation of new knowledge by:

- Offering comprehensive insights into the primary challenges and opportunities surrounding the implementation of Artificial Intelligence (AI) and blockchain technology within the unique context of the United Arab Emirates (UAE).
- Illuminating the main drivers that facilitate the successful integration of these technologies, while also identifying and dissecting the internal and external barriers that U.A.E.'s public sector organizations face throughout the implementation process of these technologies.
- Developing a pioneering maturity model tailored specifically to assist organizations in assessing their readiness and capacity to embrace and implement these technologies.
- Empowering effective implementation of these technologies in public sector of U.A.E via maturity model (practical assessment tool).
- Providing a roadmap or guidelines for deploying maturity model to assess the efficacy of organizations for successfully deploying these technologies.

1.5 Thesis Structure

This study offers an in-depth exploration of the aim & objectives, project background, literature review, methodology, data collection and analysis, discussion of findings, limitations, and recommendations for the successful implementation of AI and blockchain technologies in public sector of U.A.E. The thesis is structured into eight chapters whereas breakdown for these chapters is as follows: **Chapter 1** provides a project/research background along with discussion on implementation of AI & Blockchain technologies in government services. Then, it provides clear statement for Aim of the research and outlines its objectives. Consequently, it provides contributions of the study to new knowledge generation, thesis structure and chapter summary. **Chapter 2** provides comprehensive literature review to better understand AI & blockchain technologies along with its potential challenges and benefits. It also provides elaboration on integration of blockchain with AI and value creation of these technologies in public sector of U.A.E. In **chapter 3**, provides a conceptual framework is proposed which depicts the potential factors that could influence the implementation of these technologies in public sector of U.A.E. This framework also provides a primary frame of reference and direction to empirical research for in-depth investigation of such factors. **Chapter 4** focuses on research detailed design including discussion on philosophies of research paradigms, research approaches, and selection of appropriate research paradigms, and research approach. It also discusses various data collection and data analysis techniques. **Chapter 5** provides introduction to case studies selected for research, along with organizations and entities of these case studies. It also addresses data collection techniques, justification for selection of particular data analysis technique and systematically presents data analysis results. **Chapter 6** presents the new maturity model which can be used as comprehensive assessment tool to assess organization's capacity to implement AI & blockchain technologies in their operations. This chapter also provides the capability level definitions for newly identified dimensions



from data analysis, which have been added in new maturity model. Consequently, chapter also discusses the applications of this maturity model. In **chapter 7**, validation process is addressed, and the new maturity model is validated. Finally, **chapter 8**, provides discussions and conclusions on undertaken study. It also discusses limitations of the study and provides recommendations and suggestions for future work.

1.6 Chapter Summary

The research paper examined the introduction and background of block chain technology, the efficiency of implementing the technology in service transactions both globally and in UAE perspective. The various challenges and benefits of introducing block chain technology is discussed in the paper. Though the implementation of blockchain technology is partially done in UAE, the academic literature is sparse to examine the efficiency and the extend of challenges in the nation. Therefore, the researcher needs to do an in-depth analysis to explore the real impact, moreover, to fill the gap in the existing literature through this research paper. The findings of the research can give significant contributions to the existing knowledge, society, policy makers and future researchers as well.



Chapter Two: Literature Review

2.1 Introduction

This chapter shows used methodology for exploring the potential integration of Artificial Intelligence (AI) and BC technologies within the public sector. This method includes a systematic literature review (SLR) for both technologies and their alignment with existing maturity models. SLR provides a structured approach for identifying, evaluating, and analysing relevant studies related to the research topic. Thus, SLR supports the assessment process for adopting a mature and appropriate model for use in the public sector, independent of country-specific factors.

SLR process ensures consistency through having a detailed and transparent methodology to review academic databases such as Scopus, IEEE Explore, Springer Link, Web of Science, PubMed, and Science Direct. These sources were searched to retrieve peer review studies by using specific keywords, including "maturity model," "artificial intelligence," "BC," and "public sector," and the combination of these keywords.

The inclusion or studies based on the result of aforementioned research strategy relies on several criteria to include all recent published studies between the time period, 2014-2024. Furthermore, only those studies, in English, with the aim of studying the maturity models of AI, BC, or their applications in the public sector were included. However, all the gray studies or literature such as reports, blogs, and opinion pieces, as well as unrelated studies were excluded, as they are irrelevant resources for conducting such SLR. In this regard, the selection process follows PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines by involving article titles and abstracts to identify relevant or irrelevant studies. Then, the review conducted on the full text of listed relevant studies.

2.2 Maturity Pillars of Artificial Intelligence Adoption

Radu (2021) critically analyses national strategies for the governance of artificial intelligence, with a focus on the adoption of hybrid frameworks that combine the roles of the public and private sectors. This recent study underlines a global trend for ethics-oriented governance, in which flexibility and inclusiveness are prioritized over rigid regulatory regimes, and which thus fits very closely with the principles of the "Strategy & Governance" pillar. This approach underlines an integrated collaborative approach in which the stakeholders should work in relation to effective governance, bearing in mind that AI technologies are still changing at a disruptive speed. However, the review indicates major limitations regarding exclusivity to highly technologically advanced countries, missing out on challenges and perspectives from developing ones. This would guarantee equity and inclusiveness of problems in the governance of AI at the global level. The study further notes the dominance of the private sector in drafting and oversight processes, often causing power imbalances that may potentially hamper the ability of the public sector to ensure ethical and equitable outcomes. While the model of hybrid governance creates room for innovation and efficiency, such imbalances carry risks for accountability and transparency. Any more representative governance framework would need to balance weight on the level of representation among public, private, and civil society actors with the needs and constraints of developing nations. This could be a path toward more balanced, ethical, and efficient governance approaches to the deployment of AI and BC technologies through wider involvement of stakeholders and a commitment to international cooperation.

The AI adoption and governance study by O'Shaughnessy et al., 2023, indicated a wide divergence in the attitudes of the general public and experts: experts were very supportive of the use of AI but less supportive of government regulation. This chasm in the public-expert divide comes in tandem and is supported by the first pillar in the proposed model, aiming at a coherent understanding and integration of various stakeholder views to support AI governance. Emphasizing context-specific governance frameworks, the proposed model is also strengthened by the fact that the focus of the research has been on the differential levels of support for AI



use within varied contexts, such as in autonomous vehicles and predictive policing. This shows that regulation should be nuanced and dependent on the application of AI, in tune with the proposed model's second pillar: tailored, adaptable governance. More importantly, the present study on cultural values and risk perceptions underlines the imperative of inclusivity in shaping AI policies and reinforces the proposed model of participatory governance in terms of public involvement in AI decision-making. While the study provides many valuable insights into expert-public dynamics, it does not consider how such continuous, transparent engagement with the public over time will be important in building trust in AI governance—a field that is in constant flux. This omission brings to the fore the relevance of the fourth pillar of the proposed model: dynamic, ongoing dialogue, and responsive regulatory frameworks that move with the times. The inclusion of such continuous feedback would further strengthen the results of this study and make governance frameworks flexible and effective as new challenges arise.

Neumann, Guirguis, and Steiner (2024) give a good overview of how AI could be adopted in public organizations through the technological pillar, which has had significant overall advantages, business cases, and integration within business processes. Using comparative case studies will, in practical terms, provide insights into incremental improvements AI can bring to public sector efficiency and decision-making. The analysis, however, needs to consider key factors. For example, whereas the study discusses the implementation of technologies, it does not clearly articulate the preparedness of infrastructure such as a strong IT system, scalable platforms, and secured networks necessary for AI integration. While touching on business cases, it has not delved into the crucial role of data governance frameworks—which involves ensuring that the data is of quality, secured, and ethically used—foundational to the successful adoption of AI. The transformative potential of AI regarding organizational structures and workflows is another area that remains underexplored.

AI might automatize routine tasks, enable complex decision-making, and drive innovation with predictive analytics, significantly changing the operational way of public organizations. The paper also fails to address how external factors, such as the role of vendor ecosystems in supplying tailored AI solutions or the effect of evolving regulatory technologies on AI adoption, influence public organizations. While the report emphasizes the need to adopt AI for incremental improvement, it misses the opportunity to discuss how AI could really drive disruptive innovation—for instance, in reimagining citizen engagement and service delivery models. A more inclusive analysis of technological readiness indicators, such as employee skill level, digital literacy, and adaptability to change, would show the issue in a more realistic light with respect to challenges for AI adoption. Furthermore, the interplay between technological issues, organizational culture, and external pressures—public expectations and policy mandates—would be better understood in greater depth. This would create a holistic approach that could provide public organizations with actionable strategies on how to adopt AI effectively and leverage it as a transformative tool in accomplishing long-term strategic goals.

Broadly, the implementation of AI in the public sector has recently emerged as one of the priority areas of focus by numerous public organizations in their pursuit of efficiency and modernization. The same approach to integrating AI within the context of public administration, however, was conducted very often in the spirit of technological determinism. That would imply a tendency for experiments on AI adoption to be in-lab testing of new tools and algorithms, not part of live administrative routines, as Mergel et al. (2024) underlined. It is more likely the driver is provided by the availability of the technology itself, not because certain implementations addressed an expressed organizational need or problem. This can create a mismatch between the technological solution and the real-world challenges of the public sector institutions. The research criticizes this technology-driven approach; it points out that such an implementation model may not take into consideration the specific context and processes that were in place within the public organizations.

Since most of the public sector AI projects focus more on technological capabilities than on solving organizational problems, the outcomes might not be achieved. Furthermore, due to such a lack of alignment, there could be low acceptance of AI solutions because they may be perceived as yet another form of administrative modernization rather than real change. Mergel et al. (2024) believe that what is needed is more process-oriented thinking: how to integrate AI technologies into the traditional processes and align them with needs of the public organizations, which would imply a focus on real-world organizational problems; this way, AI



solutions enhance efficiency and decision-making within public administration and result in higher success levels of AI implementation.

The fourth pillar of AI adoption in public administration and industry is "people," emphasizing human-centered approaches and sustainability in the process of AI integration. A recent study by Martini et al. (2024) presents the concept of human-centered AI as critical for the further advancement of AI technologies in a way that is consistent with human values, societal needs, and sustainability. This paper is going to propose that AI, combined with the newest form of the IoT-5G/6G networks-additive manufacturing, will be able to create a more agile, human-centered production system, especially in the scenario of Industry 5.0. Regarding the manufacturing context, according to this review, HCAI integrates AI into different levels of the production stages, ensuring that human workers are actively included in the process and improving worker well-being.

Inclusion of human-centered approaches within AI manufacturing also targets optimization, as there will be less harm to the environment due to promotion of sustainable practices—for instance, reducing material wastes or enhancing efficiency. Also, the technologies create cooperation between human beings and AI to ensure the processes of decision-making are driven by human inputs, values, and social issues. A major concern that this study has pointed out is the role of policymakers in regulating AI. Furthermore, the study urges an even more integrated approach to AI research by encouraging cross-disciplinary collaborations across different sectors such as engineering, social sciences, and environmental studies so that it could address the broad and varied challenges thrown up by AI integration. Human-centered AI strategies can ensure that AI technologies add to the betterment of society, improvement in human well-being, and are aligned with the principles of sustainable development.

Adoption of BCT in the European public sector is positioned as a force of transformation toward the realization of a number of public values internally, externally, and relationally. In this line, the study of Rodriguez et al., 2024, made a systematic analysis of 165 BCT use cases across European governments and investigated how these technologies will change the face of public administration.

These results further indicate that externally transformative has remained the dominant adoption focus of BCT, focusing on enhancing public service delivery, enhancing transparency, building trust, and promoting citizen engagement. This is concurrently informed by the general purpose of improving efficiency and accountability within the public services. This study underlines how ambitions related to rebuilding trust in public administration are growing, especially in those contexts where it has been partly undermined due to inefficiency or lack of transparency. In fact, as Maragno et al. (2021b) have underlined, the BCT capacity to streamline administrative processes is crucial for developing trust and responsiveness within the public sector.

Internally, priorities of the public sector organizations revolve around security, efficiency, and being more cooperative. As a part of intrinsic strengths of BCT, the data immutability and decentralization have been viewed as very important for the improvement in the integrity of the public data and enhancing the efficiency in operation. This is in line with Batubara et al. (2018), who highlight the role of BCT in fraud prevention and enhancement of transparency. It also probes into how BCT has the potential to enhance internal governance and compliance with legal frameworks but also faces challenges in terms of security and scalability.

Adoption is less focused in terms of relational values, however. In particular, there was limited emphasis on citizen involvement and democratic participation, suggesting that the relational applications of BCT to governance and civic engagement are at a nascent stage. It also noted that for the relational public values to be achieved through BCT, major regulatory, legal, and ethical challenges will have to be overcome. However, with the development of BCT, the study indeed forecasts more applications that will increase citizen engagement, like BC-based voting systems and community engagement platforms.

The study by Wang, Chen, and Xu 2016 has provided a comprehensive BC maturity model adoption, basically focused on technological aspects. This model partly coincides with some pillars of the proposed framework, particularly the Technology pillar, as it addresses issues like network load, integration with legacy systems, architecture, and storage efficiency. These issues form part of the core technological infrastructure that will lead to successful BC implementation. Also, upgrading and integrating BC systems is indirectly pointing at the Process pillar, since the workflow should be upgraded and integrated for operation. It also has a number of points that reflect on the Legal & Regulation Framework pillar in discussions around governance issues of BC upgrades and



decision-making. However, the mentioning of legal and regulatory aspects is minimal and not deeply discussed. The same goes for the stage of "Optimizing" within the model, which meets the Impact Evaluation pillar according to the suggested framework: here, too, one notices a strong emphasis on the importance of continuous improvement and refinement of BC systems.

Despite these alignments, the focus of the study lies predominantly with technological maturity, thus limiting its scope. Noticeably, there is no inclusion of Strategy & Governance, People, and Collaboration and Coordination. Also, by excluding strategic alignment, leadership roles, and stakeholder engagement, this maturity model does not easily fit into a wider public sector scenario. Besides, there has been no discussion about the financial considerations of the proposed framework presented by the Finance pillar. The financial issues related to the costs and distribution of resources represent important challenges to be faced in any BC adoption project. However, the narrow scope of this study into the technical aspects of BC technology shows the urgent need for a multidimensional maturity model.

The model proposed in this study was developed based on data collection and analysis, specifically addressing the unique challenges of AI and BC implementation in the UAE public sector. The key pillars identified in this model involve Finance, Customization, and Collaboration and Coordination. These make for a comprehensive approach, hence integrated into technical, strategic, and human aspects for a more holistic and effective maturity assessment.

2.3 Maturity Pillars of Blockchain Adoption

While the proposed model for the BC technology application maturity model, suggested by Yang, Shi, and Wang in 2021, focused on basic key indicators relating to data safety, technical performance, and ecologism completion, this suggested model is more general in proposing long-lasting knowledge about AI and BC maturity within public organizations. The contribution of such a study provides important insights into technological and organizational issues related to BC maturity but often ignores the broader institutional issues, including a legal framework, data management, and human factors, which are also very important in the successful execution of digital government projects. The proposed new model will include six pillars in developing a model based on data collection and analysis: a Legal & Regulation Framework, Data, Finance, Customization, Impact Evaluation, and Collaboration & Coordination.

These pillars give perspective to a broader context in which the AI and BC solutions are deployed, especially within the public sector. Previous models, such as that by Yang et al., focus on technological performance and data security. The literature review identified other factors that should be considered, like legal and regulatory requirements, data governance, and financial considerations—all factors important in implementing the solution within the public sector. Besides, the fact that Collaboration and Coordination form one of the pillars underlines interdepartmental and intersectoral collaboration, which is quintessential for successful implementation in large-scale public projects.

Ibrahimi et al. (2023) discuss how the application of BC will add transparency and contribute toward combating corruption in governance. Their review identifies that BC transactions, since they cannot be altered, will make public institutions much more accountable. Yet, on another side, they show the complications concerning the adoption of BC—legal obstacles, a reluctance towards organizational changes, or in the necessity of skilled professionals to maintain the BC systems. The key takeaway is that, while BC can enhance transparency, it requires strong regulatory frameworks and efforts at building the necessary expertise.

Sung and Park (2021) throw light on BC-based identity management in the public sector. According to the authors, BC can create tamper-proof identity records that reduce fraud and enhance the delivery of public services. They also present some challenges of adoption within administrative environments and raise some privacy concerns with regard to sensitive data. Their study recommends the need to start with pilot projects before scaling up BC deployment in public services.

AI and BC have also influenced those areas that require great transparency, security, and trust, such as auditing and insurance. Abu Huson et al. (2024) review how such technologies will continue to reshape the landscape of auditing; BC changes the game for auditors by introducing real-time, immutable records of transactions, while AI provides fraud detection and anomaly identification.



They mention a variety of challenges, including the lack of standardization in BC protocols and the need for AI models to interpret BC data autonomously.

Nimmagadda (2021) further explores how AI and BC are being used in insurance to improve security and reduce fraud. It also brings an integration of BC transparency and AI's data analysis capabilities to improve risk management and claims processing. Yet, the article underlines very important challenges: BC scalability and regulatory uncertainties with respect to the use of AI in insurance.

2.4 Integration of Artificial Intelligence and Blockchain

The diversity of provided services, by the governmental or public sector allows the integration of AI and BC technology a demand. This integration provides innovative solutions that improve security, transparency, and efficiency of these services including major services in education, healthcare, finance, energy, and governance. Kumar et al. (2024) assured that the integration of AI and BC supports network and communication systems by providing a decentralized structure with AI's predictive abilities that strengthen security, transparency, and privacy in communication networks in public sector services, i.e. of critical application on education, finance, energy, and governance, or even public security.

The integration of AI, and AI technologies is helping to increase innovation in various fields, especially in higher education. These technologies enable the adoption of modern practices that include providing personalized learning experiences, increasing data security, and improving management efficiency. According to Chaka (2023), AI-based tools, such as conversational bots, offer personalized and cost-effective solutions to educational challenges. Bots also help in providing interactive teaching methods that enhance teaching and learning outcomes.

Even the concept of BC often linked with cryptocurrencies, is also making a significant influence in education. It plays a key role in securing processes such as digital credentialing, grading, and certification, creating a transparent and reliable system for tracking academic progress (Chaka, 2023). However, challenges like high resource demands and technological complexities still limit its widespread adoption.

Beyond education, the convergence of AI, BC, and IoT has great potential in cloud computing and cybersecurity. In this regard, an interesting study by Ganesh et al. (2022) looks into how AI can enhance data analysis, fraud detection, and prevention of security breaches. This is further enhanced through BC, which ensures records cannot be tampered with and are very useful in forensic investigations.

AI and BC in healthcare are integrated to change the system into a system with privacy and security as the core concerns. Gamiet al. (2023) presented a comprehensive state-of-the-art review on how AI applications based on BC technology can help safeguard patient data. They described how the decentralized ledger of BC, integrated with the processing capability of AI, addresses all the privacy concerns while managing healthcare in improved ways. Also, Tsai et al. (2023) provide evidence on how these emerging technologies bring scalable and secure solutions for the betterment of healthcare delivery. BC storage enables AI to be much confident in diagnosing, predicating any disease, controlling a pandemic, and as a result, the productivity in the health care systems would yield much better results.

Haddad et al., conducted an extensive and detailed review in 2022 on the integration of emerging technologies—artificial intelligence and BC—into electronic health records. Their detailed study addressed critical issues and challenges mostly confronted by traditional Electronic Health Records (EHRs), including critical concerns of security, privacy, and scalability. Moreover, authors have suggested that the integration of BC could emerge as a robust and effective solution to such pressing problems. The nature of BC is inherently decentralized and immutable, which significantly avoids many risks related to data management, such as data breaches or unauthorized access to sensitive information, and even tampering with vital records. It also represents how AI can enhance data processing, decision-making, and analytics with the power of machine learning. They have also categorized the BC-based EHR systems as conceptual, prototype, and fully implemented, thus showing clear stages on which the future studies should focus. While emphasizing the potential for a combination of AI and BC to secure EHR systems, it also outlines challenges—like



scalability and integration within the current healthcare infrastructures—thus opening a path in future developments (Haddad et al., 2022).

AI integrated with BC significantly enhances the security features and general functionality of the EHRs. In this regard, Wehbe et al. (2018) have suggested a hybrid framework that could facilitate seamless integration and enhance the security measures for the healthcare systems operating in the Abu Dhabi region. This includes the predictive power of AI, integrated with immutable storing by BC to enhance EHR integrity, privacy, and access. The proposed framework is not a question of any maturity model; this is but an architecture based on purely a technical integration/security enhancement approach. These frameworks may also inform maturity model development through the identification of key dimensions that underpin readiness and progress in the adoption of emerging technologies in health, such as interoperability, compliance, and scalability.

Moreover, the COVID-19 pandemic accelerated the movement toward a digital economy in the United Arab Emirates and underlined the rising importance of AI, BC, and the Internet of Things in developing smart economies and opening up new frontiers for business sectors that have not been tapped into yet (Aloulou, 2024).

The role of AI and BC technology in power distribution and automation processes transformation is of great importance in the context of smart grids. In the broad review, Khan et al. (2023) considered how these advanced technologies contribute to enhancing the security and overall efficiency of operations related to smart grids. Their wide research outcome shows that the integration of AI with BC technology would greatly improve power flow monitoring, optimize grid management practices, and make the energy networks resilient against potential vulnerabilities. While BC ensures the integrity of data, AI examines the real-time data to predict failures for improving the system's reliability and hence creating the much-needed security in an energy infrastructure given by Khan et al., 2023.

Abdulrahman et al. (2022) took a deep dive into how, in this dynamic and fast-evolving aerospace industry, AI and BC technologies are effectively overcoming many challenges arising in maintenance, repair, and overhaul operations. This review gave a lot of insight and underlined a great potential of BC technology for enhancing security and transparency of record management systems. It has also brought into sharp focus the critical role AI is playing in improving predictive fault detection, optimizing the efficiency of flight paths, and refining the overall effectiveness of navigation systems used in aviation. While these are indeed promising technologies, their application in this sector remains experimental and a long way from being able to satisfy regulatory requirements. A final deduction from the work is that AI and BC would transform aerospace operations, although an understanding of how to reap the full benefits of such technology needs further research forwarded by Abdulrahman et al., 2022.

The integration of AI and BC in healthcare has considerable benefits, especially in securing medical data and safeguarding the AI models against attacks. The combination helps in solving some problems like data breaches and ensuring the security of AI use in clinical settings. Beyond healthcare, the transparency availed by these technologies is also growing consumer trust in online reviews, especially within the hospitality industry, which relies on authentic feedback (Rajaguru, 2024).

Emerging technologies like AI, BC, IoT, and nanotechnology have brought about some breakthroughs in the diagnosis and treatment of diseases. For example, the unique properties at the nanoscale have allowed the formulation of nanocarriers that deliver chemotherapy drugs with pinpoint accuracy, sparing healthy tissue and improving treatment outcomes (Pandurangan et al., 2024). In the same vein, deep learning techniques using AI have transformed healthcare by processing volumes of data, enabling real-time clinical decision-making, and informing personalized care approaches.

In healthcare, the integration of BC and AI is improving data security, patient care, and medical research. Kumar et al. (2023) review the applications of AI-powered BC systems in EHR management, telemedicine, and genomics. Their research discussed the underlying algorithms of these applications, ranging from machine learning to deep learning. It also talks to the challenges of data privacy and how difficult it is to integrate these technologies into existing healthcare systems.

Yang, Du, Gupta, and their colleagues (2024) investigated the use of AI and BC in smart packaging systems for combating food fraud, which has become one of the fastest-growing problems in consumer trust and food safety. Their research highlighted that BC could



enhance supply chain security and make it more transparent, while AI would support fraud detection by analyzing vast volumes of data.

Tamper-proof features are helpful with smart packaging; however, this does not guarantee that every supply chain has been tested for full traceability. In addition, AI with BC technology gives more comprehensive answers with its capabilities in real-time product authenticity verification. However, the challenges related to broader diffusion have been identified, referring to costs, safety issues, and scalability problems (Yang et al., 2024).

Groundbreaking technologies like AI, BC, and big data influence many sectors in healthcare, governance, and education. These are very important in the development of digital healthcare systems in the Gulf region and Asia. De Pablos (2024) discusses how these technologies help in creating healthier aging populations and more inclusive societies. Her work, *Digital Healthcare in Asia and the Gulf Region for Healthy Aging and More Inclusive Societies*, explores how AI and BC are being mobilized against the challenges posed by ageing populations, drawing on the experiences of the COVID-19 pandemic to show the effects on healthcare delivery and societal resilience.

BC, known for safe and decentralized data storage, will also be a key player in cybersecurity. Shamsan Saleh (2024) explains how BC strengthens decentralized AI systems through a secure framework that protects sensitive information. This increases trust by guaranteeing data privacy in sensitive areas like healthcare.

AI and BC together are transforming the way several businesses work in faster ways today. In the case of accounting, BC brings an extra layer of transparency and credibility, especially with the incorporation of AI audits. The immutability, decentralization, and consensus validation aspects of BC inherently ensure the truthfulness of financial records. This collaboration overcomes many of the intractable challenges so far, such as data integrity and fraud prevention that have made the auditing process insecure and inefficient (Han et al. 2023). Besides this, AI and BC in the context of Industry 4.0 are changing Six Sigma practices concerning enhanced decision-making and process management.

AI and BC will help increase efficiency in the performance of smart grid operations for more active involvement in the processes not only for the energy consumers but also for its producers. BC provides decentralized energy transaction platform facilities whereas AI operates on these facilities with great accuracy. This combination makes it easier to integrate renewable energy sources and supports global goals for net-zero emissions (Hua et al., 2022). Such adoption in these technologies, across disparate industry verticals, resolves many pressing challenges of security, scalability, and operational inefficiency. They indicate the potential to help induce sustainable changes (Ressi et al., 2024). Thus, integrated AI with BC has marked a sea change for the traditional approach that Six Sigma used conventionally when process efficiency and innovation achieved unparalleled heights. Because AI can do complex and large-scale data analytics, the new breed of AI can help pinpoint patterns, detect inefficiencies, and predict outcomes of organizations with unprecedented accuracy. This enhances decision-making capabilities, thereby providing actionable insights for further continuous improvement.

AI, IoT, and BC solve long-standing problems afflicting the construction industry: productivity, time management, and quality control. Prabhakar et al. 2023 recommend implementing Industry 4.0 and 5.0 strategies to smoothen the processes and enhance efficiency. Integrating IoT, BC, and AI improves data flow, automates complicated processes, and secures transactions, a massive development in construction project management.

AI and BC integration are crucial in cybersecurity to IoT network security. Attkan and Ranga (2022) discuss the role of integrated technology in developing key management, authentication, and authorization in IoT systems. Decentralized BC architecture with AI adaptability enhances resistance against cyber threats and information breaches in IoT networks.

bu Huson, Sierra-García, and Garcia-Benau (2024) have performed a bibliometric analysis that shades light into how AI and BC technologies are currently used in auditing. Among others, it shows that current trends involve the role of AI in analyzing accounting data and challenges to the adoption of BC in audits, the capacity of these technologies to enable enhancements in audit quality and independence, and pinpoints areas in which further research should be undertaken.



Taherdoost (2022) also presents a critical review on the use of BC in combination with AI. The paper has indicated how these two technologies complement each other: BC for security and decentralized systems and AI for human-like decision-making. Such an integration has ensured value in cryptocurrency and the secure exchange of data. Drawing from 121 articles spanning 2012 to 2022, the research explores real-world applications, challenges, and gaps in using those technologies, focusing on automation and smart contracts.

With the continuous development of AI and BC, there is likely to be an industrial transformation in terms of security, transparency, and efficiency. However, as indicated by the literature, several technical and regulatory challenges still remain, thus requiring interdisciplinary research to be able to fully realize the potential of these technologies.

Most of the governments in the Middle East, especially the UAE, have embraced digital transformation initiatives such as "smart government." Hujran et al. 2023 proposed a smart government maturity model combining AI, BC, and machine learning for assessing and improving digital service delivery. The authors showed that these technologies made public services more agile and personalized, which has demonstrated the efficiency of the model in improving digital governance.

Dhar Dwivedi et al. (2024) discussed how the integration of AI with BC in 5G-powered IoT networks could be applied for enhanced security, scalability, and efficiency in IoT systems. While BC provides decentralized trust and security, AI brings automation and decision-making. However, the research also points out some of the challenges in managing vast networks of interconnected devices and the high computational demands that AI algorithms impose on BC systems. The authors propose an integrated approach for issues such as data privacy, scalability, and network management.

Governance frameworks are a pre-condition for emerging technologies such as BC and AI, according to Kalenzi 2022. While the two technologies have great transformational potential, their governance is still largely underdeveloped. Their respective regulatory bodies need to come up with policies that promote innovation with ethical, privacy, and security standards. One of the major challenges is how BC, which is by nature decentralized, aligns itself with national regulations and governance structures.

2.5 Maturity Model for Artificial Intelligence and BC

AI and BC have also gained much interest in the public sector's operations to find ways to better the efficiency, security, and transparency of government processes. AI can analyze vast volumes of data and deliver insightful results that will lead to better decision-making, citizen service, and overall effectiveness. In implementing AI, there should be a structured approach; hence, the importance of AI maturity frameworks.

Indeed, Desouza 2021 proposes an AI maturity model for the public sector focused on main issues such as data governance, infrastructure, and readiness of the staff. This model is, therefore, meant to measure different stages of AI adoption within public institutions with the view to enabling these institutions to progress their AI initiatives in a structured manner. It emphasizes that appropriate data governance mechanisms should be in place to ensure data quality, privacy, and security, being one of the critical enablers for AI implementation. Infrastructure is another critical component of this model; infrastructure looks at technology platforms, tools, and systems required for supporting AI solutions. This model also emphasizes the readiness of staff for the right competencies and skills among employees to effectively adopt and manage AI technologies.

In the framework of Desouza (2021), the maturity model is usually conceptualized in a number of stages, from an initial awareness stage where the organization has poor AI knowledge and infrastructure to the advanced stage where AI is integrated into the core operations and decision-making. In moving through these stages, an organization can constantly enhance its artificial intelligence capabilities and make service delivery more efficient, data-driven, and innovative. It helps public institutions understand what is missing along their AI journey and directs them toward concrete steps that increase their general maturity in AI for the improved delivery of better public services.

Yang et al. (2021) recommend a BC maturity model that is a structured approach that determines readiness related to the adoption and implementation of BC technology at public agencies. A BC application needed key criteria, namely, data protection, process



complexity, and technological infrastructure upon which a BC maturity model may be designed. The primary aim of the model is to guide organizations in understanding their current state of BC readiness and to offer a roadmap for improvement (Yang et al., 2021). The model is typically divided into stages that reflect the progressive adoption and integration of BC technology. These stages range from the initial awareness stage, where organizations are exploring BC possibilities, to the advanced stage, where BC is fully integrated into operations. The model emphasizes several core components, including data protection, process complexity, technological infrastructure, and adoption readiness. These components work together to assess an organization's preparedness for BC adoption (Yang et al., 2021).

The data protection criterion would depict the level of security and privacy required to protect sensitive data. It will be useful in understanding if an organization can securely store and process data on a BC network or not. Process Complexity Criterion: This would evaluate the complexity of the business processes that get integrated on BC. It helps identify processes suitable for BC adoption and assesses whether they are mature enough for integration. Technological infrastructure, on the other hand, evaluates whether the organization's existing technological infrastructure is sufficient to support the deployment of BC solutions, including the adequacy of hardware, software, and network capabilities. Finally, adoption readiness assesses the readiness of the organization's staff, culture, and leadership to embrace and manage BC technology (Yang et al., 2021).

The model of Yang et al. (2021) works by assigning maturity levels based on these criteria, with organizations moving from lower levels of maturity—that is, limited knowledge and infrastructure—to higher levels—that is, full adoption and integration. This model helps public agencies identify gaps in their readiness and develop strategies for improvement in each of these areas, thus facilitating a smoother transition to BC technology.

However, further improvement of the model may be done by adding other dimensions related to regulatory compliance, organizational change management, and scalability. These factors would offer a more holistic view of the readiness about BC implementation in the public sector. Moreover, a non-static model will be more suitable to adopt the rapid evolution of BC technology. Therefore, in continuous view, especially while the solutions of BC are developing further and new challenges or opportunities may arrive along the way, updates of the framework should be done (Yang et al., 2021).

2.5.1 Assessing the Maturity of AI and BC Integration in the Public Sector

The use of Artificial Intelligence (AI) and BC (BC) in the public sector is gaining traction due to their ability to significantly improve service delivery, increase transparency, and tackle important challenges like data security and integrity. It is vital to assess the maturity of AI and BC applications for successful implementation. The table below gives an overview of different models and frameworks to evaluate how well AI and BC are integrated. These models focus on technological readiness, data governance, process optimization, and security needs. The table also focuses on assessment methods and criteria of the models mentioned herein, therefore serving as a useful guide to these technologies for any effective adoption by public organizations.

Table 2.2 frameworks used to assess the maturity of AI and BC integration

Assessment Framework	Key Benefits	Main Challenges	Evaluation Criteria	Source
Desouza's AI Maturity Model (2021)	Helps governments make better decisions, streamline processes, and improve how they serve citizens.	Requires robust strategies and infrastructure; it's critical to get data governance right from the start.	Looks at how prepared an organization is in terms of leadership, tech infrastructure, and the skills of its workforce to use AI.	Desouza, 2021



BC Maturity Model (Yang et al., 2021)	Makes operations more transparent, secures digital transactions, and adds a layer of trust.	Integrating BC is tough—costs can be high, and scaling it up is a complex process.	Evaluates the readiness of organizations by looking at how secure their data is and how complex their processes are.	Yang et al., 2021
AI and BC Combined Model (Wamba et al., 2024)	Offers better protection against fraud and improves overall service efficiency by connecting AI's decision-making with BC's transparency.	There are still privacy concerns, and setting this up requires a lot of collaboration and a hefty initial investment.	Looks at how well AI and BC complement each other to create more secure, transparent systems.	Wamba et al., 2024
Nimmagadda's AI and BC Integration (2021)	Boosts transparency in government operations, helping to detect fraud in real-time and improve service delivery.	Struggles with data privacy concerns, privacy laws, and the technical difficulty of combining both technologies.	Assesses how effectively AI's insights are integrated into BC systems to create a secure and transparent government system.	Nimmagadda, 2021
BC for Digital Government Framework (Bhumichai et al., 2024)	Builds trust by enhancing transparency, especially in public finance, and curbs corruption.	The technology is still difficult to adopt on a wide scale, and there are issues around training and integrating new systems.	Looks at how BC can be used to support digital government systems, with an emphasis on reducing fraud and increasing transparency in financial transactions.	Bhumichai et al., 2024

2.6 Benefits and Challenges of AI and BC Integration

There's a greater chance of a change in the style of functioning of the Public Sector Institutions with an integration of Artificial Intelligence and Blockchain technologies. This would relate to bringing in strengths of AI on data analytics, decision support, and predictive capabilities, amidst security, transparency, and accountability ensured by BC, enabling governments to achieve efficient, secure, and more transparent public services. While integration offers a number of advantages, there are also numerous challenges that must be overcome for the implementation of these two technologies. Key benefits and challenges regarding the integration of



AI and BC have been listed in Table 2.1: improved security, enhanced fraud prevention, better governance are some of the advantages, whereas scalability, data privacy, and complexity of system integration are some of the major challenges.

Table 2.1 The benefits and challenges of integrating Artificial Intelligence and BC

Benefits of Combining AI and BC	Challenges of Merging AI and BC	Source
Enhanced Security and Privacy: BC's immutable ledger safeguards data, while AI's predictive capabilities help identify fraud before it happens.	Limited Scalability: Large-scale implementation across public institutions can face performance and scalability hurdles.	Wamba et al. (2024)
Increased Accountability: BC's decentralized nature ensures transparent, tamper-proof records, which improves trust in public services.	Concerns Around Data Privacy: The transparency of BC may clash with privacy needs, especially in handling sensitive information.	Bhumichai et al. (2024)
Better Decision Support: AI's ability to analyze vast amounts of data allows for quicker, more informed decisions, benefiting public sector operations.	Cost of Implementation: The initial setup and integration of both AI and BC systems require significant financial and technical investment.	Nimmagadda (2021)
Streamlined Processes: Automation via AI, combined with the verification power of BC, can lead to more efficient governmental functions.	Complexity of Integration: Merging these two technologies requires overcoming different technical challenges, complicating the integration process.	Kumar et al. (2023)
Improved Fraud Prevention: AI can continuously analyze transactions for anomalies, while BC ensures those transactions remain unaltered.	Coordination Among Agencies: Effective deployment across different sectors demands collaboration, which can be challenging.	Yang et al. (2021)
Stronger Governance: The combination of AI's insights and BC's accountability can enhance decision-making and oversight in the public sector.	Skill Gaps: Government employees might lack the required expertise to effectively implement and manage these technologies.	Desouza (2021)
Reduced Corruption: BC's transparency, when paired with AI's ability to detect irregularities, reduces the chances of corrupt activities in public services.	Regulatory and Legal Barriers: Navigating the legal frameworks for BC integration in government operations can be complex and time-consuming.	Kalampokis et al. (2020)

2.7 UAE as a Smart and Secure Case

In the UAE, the education sector has started embracing various technologies in the area of accounting education. Qasim, El Re fae, and Eletter (2022) investigate how AI, BC, and data analytics are integrated into undergraduate programs to prepare students for the digital business world. The focus of this trend is on updating teaching methods to keep pace with rapid technological changes.

Aldabousi 2022 discusses the contemporary use of smart contracts, increasingly powered by AI and BC, which are destined to change the legal paradigm. While such contracts hold the promise of revolutions in commercial transactions, the challenge of their gaining legal recognition faces the complexities of integrating artificial intelligence into legal systems.

Within the UAE, BC technology is finding increasing application in supply chain management and brings transformational solutions that make the processes of many industries much more efficient, transparent, and trustworthy. A very good example is Carrefour UAE, using BC in addition to smart contracts to transform its food supply chain processes. It is through BC that Carrefour ensures every stage in the supply chain—from production to transportation, storage, and finally distribution—is traceable in a secure yet accessible way.

This integration allows for real-time traceability of products, making it possible for consumers and stakeholders to track the origin and shipments of goods with supreme accuracy. Smart contracts automate the agreements between parties and thus reduce



disputes and delays, increasing operational efficiency. The BC applications help with improvement in transparency to aid in building consumer trust with regard to product authenticity and safety. This is in conjunction with the larger vision of the UAE to adopt new technologies in an effort to achieve innovation and excellence (Eletter et al., 2022).

BC and AI also restructured the real estate industry in smoother and more effective ways. The transparency, immutability, and trust of property transactions are achieved with the assistance of BC, while AI optimizes the various processes that range from the valuation of a property to predictive analytics and targeting customers. According to Gudimenko et al. (2024), there are emerging digital real estate ecosystems, which provide companies with competitive advantages and enhance operational efficiency. The integration, in my view, is not only in terms of efficiency but also in the creation of new business models. BC can facilitate secure and faster property transactions, reducing paperwork and delays, while AI can offer deep insights into market trends that could help companies make better investment decisions. Also, AI, having the ability to analyze big datasets, can provide a more personalized customer experience that will enhance decision-making for both buyers and sellers. As these technologies continue to evolve, the effect on real estate will likely go beyond operational improvement to actually reshape the fundamentals of the industry—to make it far more transparent and agile in its business processes.

In the financial industry, AI is being applied to improve cybersecurity. Anayrat et al. (2023) explore how AI secures fintech organizations in Dubai, detects and prevents cyber threats, and improves the cybersecurity infrastructure of the financial industry.

2.8 Summary

This chapter offers a broad analysis of the AI and BC applications in the Public Sector, with an emphasis on the positive changes connected to those technologies in terms of transparency, efficiency and security. It presents a new specific maturity model conceived for measuring and guiding the implementation of these technologies, which takes into account the features of public administration. The methodology herein involves a Systematic Literature Review that involves the literature between the following years – 2014 to 2024—hence offering a well-structured framework and case study assessment of the frameworks.

With regard to AI adoption, the study shows that it will require ethical governance future proof technological frameworks, and human-centred processes respecting for inclusiveness, sustainability, and values systems. This brings out a perspective of how AI can act as a powerful tool to enhance decision making and even carry out some processes, only that there is need for organizations to foster trust in AI and masters the capability in a way that fulfils the existing organizational objectives.

Regarding BC, the paper seems to reveal its advantages for the development of trust, increase of transparency and creation of tamper-proof documents within the operations of the public sector. However, issues like legal and compliance issues, scale and technological issues need to be managed deliberately. It is presented as a revolutionary solution combined with BC and is illustrated by its usability in various fields as education, health care, energy, and government. AI helps perform smart analysis and decision making while BC helps review the data yielded for validity and refines the system clarity. Combined, they solve important problems such as fraud, privacy concerns, and internal business processes' imperfection.

The chapter also addresses the implementation issues such as high implementation cost, skills required and difficulties in aggregating these technologies. Despite these odds, the value proposition is significant ranging from the effectiveness of service delivery to trust from citizens. Hence, the offer of a structured maturity model helps public sector organizations precisely measure their current state, close existing gaps, and provide more effective and sustained implementation of AI and BC technologies.

Overall, this work greatly contributes the growing literature on digital transformation in governance by proposing a research agenda that considers both technological and strategic horizon as well as human factors. It creates the foundation for further evolution and policy advancement; prescribes how AI & BC should be applied to solve key public sector problems and make a difference across various sectors, domains and countries.



Chapter Three: Conceptual Model Framework

A new Framework for Artificial Intelligence & Blockchain Technology Integration in the Public Service Sector in UAE

3.1 Introduction

The objective of this chapter is to build a conceptual model that will be progressed through primary research to develop a maturity model for the deployment of Blockchain and Artificial Intelligence in the UAE public sector. The model has four dimensions: Strategy and Governance, Technology, People and Process and five stages of deployment: Initial, Repeatable, Defined, Managed and Optimized. There are six sections in this chapter. The proposed conceptual model is illustrated in Section 3.2, which also describes how it works and labels the various maturity stages. Following it, the basis for model development is explained and discussed including a detailed description of the model's dimensions and stages in sections 3.3 and 3.4 respectively. The dimensions, together with their variables and factors, were taken from the literature. Finally, section illustrating on theoretical perspectives of blockchain, and a summary of the key points are covered in section 3.5 and section 3.6 respectively.

3.2 Conceptual framework

Processes as being fundamental to functioning of organization, are adopted to achieve organizations objectives, manage risks, and to deliver value to stakeholders. Majority of organizations also adopt process management strategies which include various methodologies, frameworks, and techniques to optimize and improve organizational processes to yield better outcomes. From literature review, it can be found that, various process management maturity models have been proposed such as capability maturity model (CMM), Business process maturity model (BPMM), Seven tenets of process management and many more, to ensure that processes are efficiently applied, managed and controlled across the organization. The CMM developed by Software engineering institute (SEI) for software implementation processes, consists of five levels of maturity (initial, managed, defined, quantitatively managed, and optimized), where each level has its own capabilities. The CMM evolved into capability maturity model integration (CMMI), which used same five levels of maturity of CMM with focus on five main factors which included: goals, commitment, ability, measurement, and verification. BPMM is another process management maturity model, which focuses on improvement of business process management. This model used the same five levels of maturity of CMM and focuses on three main factors/elements related for enhancing process management which include culture of performance, improvement and management excellence (Curtis, Bill and John Alden, 2007). To assess the maturity of blockchain adoption, Blockchain maturity model (BCMM) is proposed. This model also adapted five stages of maturity of CMM to measure the level of adoption of blockchain. This is a 4x5 grid model, which presents five stages horizontally and four crucial elements of blockchain adoption are presented vertically. The four main elements considered for blockchain adoption include Networks, information systems, computing methodologies, and security & privacy. This model provided a roadmap for assessing the adoption of blockchain corresponding to its four main elements, where the progress of adoption of these elements can be measured/marked according to five stages (initial, repeatable, defined, managed, optimizing) adopted (Wang et al. (2016).

Considering the underlying structures of above discussed maturity models, it was noticed that maturity models assess or analyze the progress of specific elements/factors of subject matter according to some specific levels or stages of maturity. Based on



literature review, the researcher proposed a provisional conceptual framework to assist the organization in determining their capacity to use AI and Blockchain and make relevant future decisions. The framework as illustrated in figure 3.1, consists of a 5 by 4 grid, illustrates the relationship between the organizational dimensions and the five stages of maturity that businesses go through. Because AI and Blockchain technologies are intricate and multifaceted, applying them calls for an understanding of the interdependence of many organizational components. Four interrelated change dimensions along with their variables and factors were identified from literature. Strategy & Governance, Technology, People, and Process are the dimensions that an organization must assess and manage for successful AI and Blockchain deployment. The five levels/stages of change titled as Initial, developed, defined, managed and optimized stages would be used to determine the level of maturity of these dimensions. The maturity of AI and BC is reflected in these four organizational dimensions, where each dimension would evolve/progress step by step from initial to optimized stage as indicated by arrow. On the other hand, the five stages are key points in the development and evolution of these dimensions (Figure 3.1) and filled ellipse under each stage indicate the progress of dimension corresponding to that stage. For instance, filled ellipse next to Strategy & Governance dimension and under initial stage, indicates that strategy & Governance are at initial stage of development. After progressing/satisfying requirements of initial stage, this dimension would progress to developed stage (as indicated by arrow) and then so on.

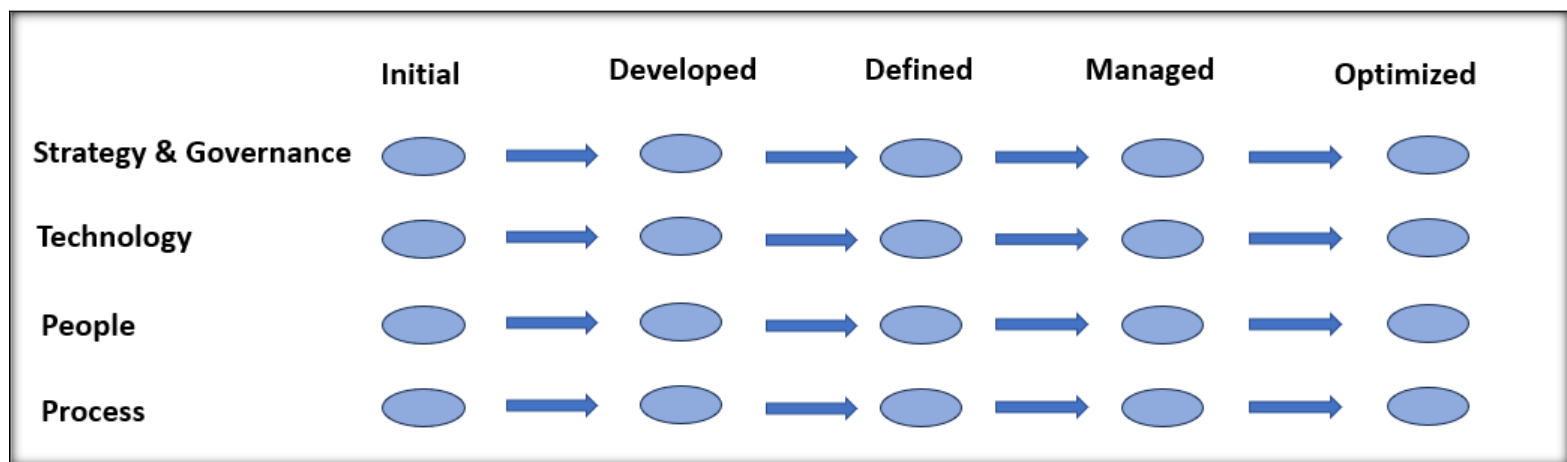


Figure 0.1: Stages and Dimensions of the Provisional Conceptual Framework

The new conceptual framework/model will be used to derive staged definitions for each dimension, which will then be applied. Figure 3.2 illustrates the factors that need to be considered in the proposed conceptual framework. Also, table (3.2) illustrates all factors definitions.

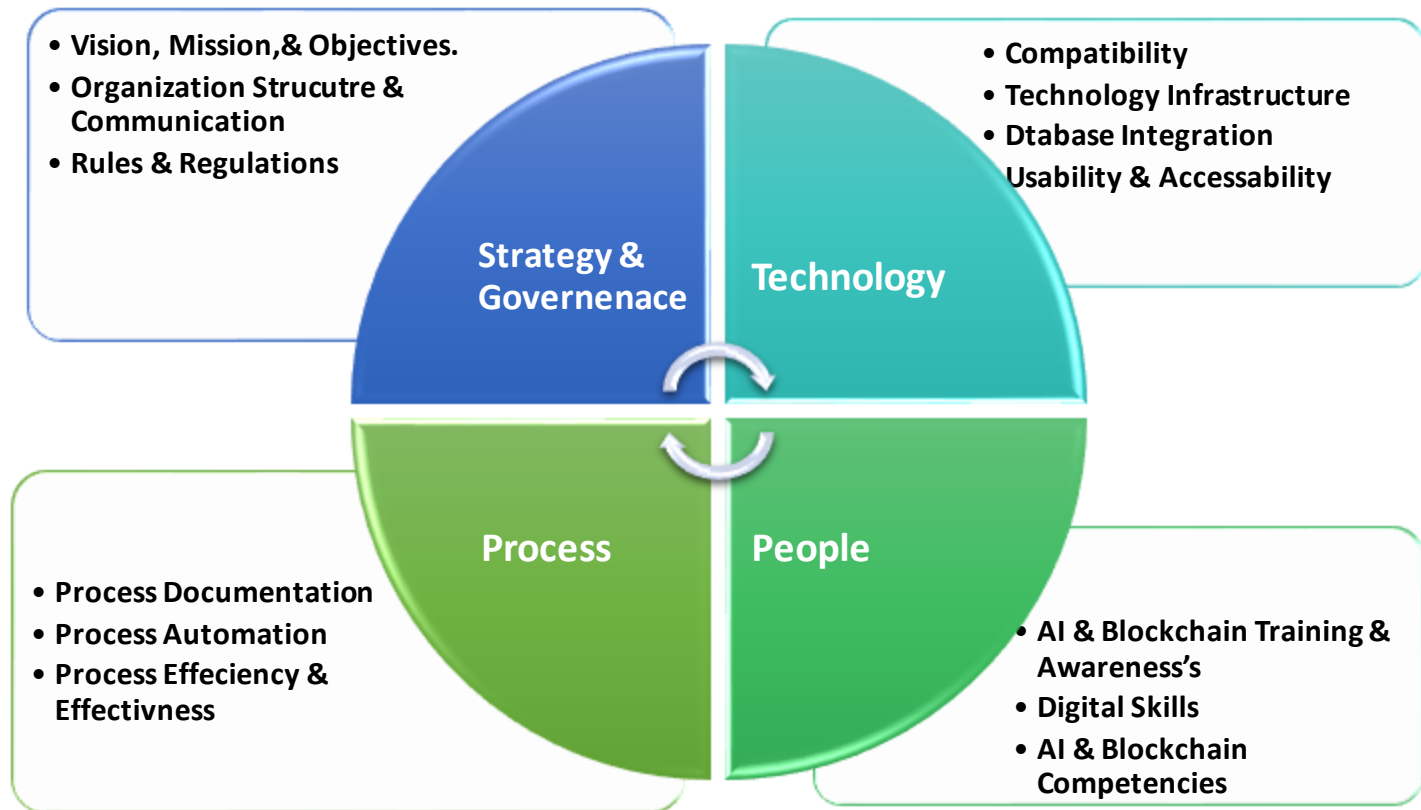


Table
0.1: Factors
Definition

Figure 3.2: Conceptual Framework

Main Dimension	Factor	Definition
Strategy & Governance	Vision, Mission, & Strategic Objectives	A vision states what the organization aspires to become in the future (Lead to adopt AI & Blockchain). A mission reflects the organization's approaches and philosophy and resources that will utilize it to achieve the vision. Strategic Goals are the more specific aims that organizations pursue to reach their visions and missions.
	Organization Structure & Communication	Organizational structure determines the manner and extent to which roles, power, and responsibilities are delegated, controlled, and coordinated, and shows how information flows between the levels of management. Organizational structure can boost coordination of communication, decisions, and actions
	Rules & Regulations	Organization / Government Rules and Regulations that related to Define, accept, adopt and enhance the implementation and control of use cases of Artificial Intelligence & Blockchain within UAE Public Sector. because governments and companies use AI & Blockchain to take decisions that can have a significant impact on our lives.
Technology	Compatibility	Compatibility is the capacity for AI & Blockchain systems to work together without having to be altered to do so. Compatible software applications use the same data formats. For example, if word processor applications are compatible, the user should be able to open their document files in either product.



	Technology Infrastructure	Blockchain infrastructures are components or systems that help to operate the running and functioning of blockchain technology. AI Infrastructure is the technology that enables machine learning. It signifies the combination of artificial intelligence and machine learning solutions to develop and deploy reliable, scalable, and specific data solutions.
	Database Integration	Database integration is the process used to aggregate information from multiple sources, like social media, sensor data from IoT, data warehouses, customer transactions, and more, and share a current, clean version of it across an organization.
	Usability & Accessibility	Usability refers to the quality of a user's experience when interacting with AI and Blockchain products, including systems, software, devices, or applications. Accessibility means that everyone can use the exact same AI & Blockchain technology as anyone else.
Process		
	Process Documentation	Process documentation is the act of capturing or documenting all of the steps in a particular task. Ideally, it should happen in real time. As employees perform a task, they document each step they take.
	Process Automation	Process Automation is the use of software to automate repeatable, multistep business transactions. In contrast to other types of automation, BPA solutions tend to be complex, connected to multiple enterprise information technology (IT) systems, and tailored specifically to the needs of an organization.
	Process Efficiency & Effectiveness	Process efficiency is essentially “the amount of effort or input required to produce your public sector transactions that lead to provide customers with government services “The ability to accomplish transactions with the least amount of wasted time, money, and effort”. Process Effectiveness is defined by achieving public sector targets, such as Customer Happiness, Positive Impact of Government Services, and fully Integrated Digital Services.
People	AI & Blockchain Training & Awareness's	The Training & Awareness Sessions provided from Government entity to their employees, that clearly describe the important to understand the processes of effectively collecting, developing, and testing data as it helps to unleash the full potential of AI or Blockchain
	Digital Skills	Digital Skills is the Government Entities Employees ability to find, evaluate, use, share, and create content using digital devices and technologies.
	AI & Blockchain Competencies	The AI & Blockchain Competencies are the basis of knowledge, skills and abilities in AI and Blockchain technology.



3.3 Model Dimensions

For organizations to benefit from the combination of BC and AI, they must alter the ways that they think, act, and learn. Each of these dimensions must evolve separately and jointly in order to properly raise an organization's overall stage of maturity for AI and BC. The weakest link prevents advancement overall. Business leaders can expedite their overall organizational maturity and unlock progress for AI and BC projects by enhancing capabilities in less developed dimensions.

3.3.1 Strategy and Governance Dimension

This will assess to what extent there is a well-defined strategy and vision that act as a road map for achieving organizational goals. It provides a broad frame of reference for all plans and choices made across all organizational departments (Forti et al., 2021). An organization strategy should always be clear about the broad goals it pursues. Finding out what the organization's goal should be is the next step. Organizational objectives must consider Usability, Accessibility and Effectiveness (Hassler, 2021).

3.3.2 Technology Dimension

The success of AI and BC deployment is determined by the technological environment including technology infrastructure, software and hardware. The research work should be conducted empirically to ascertain the technological factors (Compatibility, Databases Integration, and Technology infrastructure) that have been identified as influencing the adoption of both AI and BC technologies (Hasibuan and Dantes, 2012; Ramdani et al., 2009; Wang et al., 2016)

3.3.3 People Dimension

The People dimension focuses on coordinating change management and leadership to make sure that people are capable of using AI and BC technologies. If people are not organized and encouraged to use them, even the cleverest AI and BC solutions will fail. Executive leaders must assist business and technical teams in delivering these technologies and utilizing them successfully. Therefore, in order to always provide people with the best guidance and make decisions when necessary, leaders themselves must have a solid understanding of the implications of AI and BC for their organization. Staff members also require awareness, training, competencies and even certification Courses in the process of building and deploying AI and BC solutions if they are to successfully construct and work with these technologies (Woods, et al., 1987; Sellen et al., 2009).

3.3.4 Process Dimension

When redesigning a process, it is important to consider how activities and tasks are managed on a daily basis, including how they are planned, communicated, organized, monitored, and controlled. Another body of literature examines how processes become more sophisticated and mature as an organization matures. The Capability Maturity Models describe many stages of process maturity that an organization goes through as it develops, beginning off without process disciplines and ending up as a developed organization where all processes are documented, automated, optimized, measured and controlled (Harmon, 2009; Curtis and John, 2007).

3.4 Model Stages

Decisions are driven by AI and Blockchain throughout the enterprise, assisted by networked systems that evolve over time. Additionally, integrating and expanding Blockchain and AI across the organization through implementing AI and Blockchain in internal processes as well as in goods, services, and other relationships with clients and suppliers. Proposed five stages of maturity were adopted for AI-Blockchain deployment (Wang et al., 2016) (Table 3.1).

Table 0.2: Model stages of dimensions' deployment

stage	Definitions
Initial "Feasible"	At this stage, organization's main objective is to understand and explore AI & blockchain technologies. The organization also explore the areas/process of organization where these technologies can be implemented and what would be the impact/benefit of implementation



	of these technologies to organization. To understand their feasibility and use-cases, organizations might conduct pilot projects or proof of concepts. The organization does not have proper AI & Blockchain model at this stage and the implementation is confined to only specific department or use-case.
Repeatable “Functional”	The organizations begin to integrate AI & blockchain technologies into existing systems and processes. The entities also begin to expand the implementation across various departments or process and enhance their foundational infrastructure and resource allocation to successfully implement these technologies for various purposes such as automating routine tasks, enhancing data analytics capabilities and predictive analytics. There are more sophisticated AI-powered applications and blockchain networks leveraging distributed ledger technology, used in organization.
Defined “Operational”	Organizations have clearly defined process or use-cases for implementing AI & blockchain technologies. The implementation of these technologies expands to cover more business functions or systems which facilitates complex human-based interactions, provision of personalized services, optimized business processes and enhanced transparency and efficiency of business transactions. Putting AI & Blockchain solutions into production at a larger scale still requires significant organizational work at this stage.
Managed “Stable”	The organizations intend to scale AI & Blockchain Solutions deployment efficiently as the number of Deployed AI & Blockchain models increases. The organization is approaching a factory of standardized AI & Blockchain model production, with a focus on optimizing the processes to maximize efficiency, security and reliability. Organizations implement robust monitoring and management systems to track performance, ensure compliance of implementation with regulatory policies and frameworks, and mitigation of risks. Organizations focus on continuous improvement in management of these technologies, emphasizing transparency and accountability of these solutions.
Optimized “Scalable”	Organizations have innovative level of implementation of AI & blockchain technologies and intends to drive new business models by leveraging highly advanced and collaborative AI & blockchain systems. Highly advanced AI & blockchain systems facilitate interoperability across multiple sectors and jurisdictions. The organizations focus on continuous learning and adaptation of emerging trends and technological advancements in these technologies, striving for sustaining competitive advantage and long-term success.

3.5 Theoretical Perspective

This section deals with the theories and revelations headed on the topic blockchain analysis; of which the most anticipated terms are

- Security
- Transparency
- Complexity
- Privacy preserved

Along with that the limitations of the same have been discussed in the literature mentioning

- The cyber threat
- Higher initial cost
- Economic and social aloofness



The blockchain technology is correlated with digital ledger software; which was aimed to make a protected money transfer, secure the assets and the information with least interruption and support from an external agent. The philosophy behind blockchain is referred to by Swan & Filippi (2017) is the transformation from simple to transfer of values using smart network and smart solutions. The value transfer happens here without any degradation of value. In the initial period, the ontological philosophy is limited to the definition and characteristics of blockchain technology, the epistemological philosophy started to explain its background knowledge and can even help to attain more new knowledge in the segment, thereafter, axiology philosophy discusses about its role in promoting or degrading value, aesthetic and behavioural attributes of it, the way it should be taken forward, the effectiveness of implementing such technologies and so. Importantly, Santos (2017) closely examined the introduction and growth of blockchain from the new form of money to virtual persistence. Moreover, it has been mentioned as the most resilient, reliable and irreversible blockchain that keeps unique blocks for each single transaction or dealing, where safety is being highlighted tremendously. Despite its safety and security, World Government Summit & INDRA (2017) considered the blockchain technology in its pilot phase, which enjoys a grand success ever, deliberated successful integration of blockchain to its e-government systems in Estonia. In Estonia e-health foundation the blockchain enables to keep and maintain the health records successfully and helped them to achieve the title “leader and a visionary in the scope of e-Government” (World Government Summit & INDRA, 2017). The one single case itself reveals the potential and efficacy of the blockchain technology.

Elisa, Yang, Chao, & Cao (2018) explained the benefits of public services segment after implementing blockchain. The researcher explained the proximity of cyber-attacks in a higher level, similarly, cost efficiency is always the discussion point in the matter. Therefore, the government should propose and finalize the authentication framework that is common to the public, in the citizen portal. Other than the privacy and security issues; the blockchain technology could be able to achieve efficiency in reducing human interference and error, reliability, credibility, ownership, data quality, lesser operations cost, improved efficiency and speed in e-government services. Therefore, the introduction of blockchain technologies from multiple point of view often supporting trail. The digital identity concern and its decentralization are the issues faced with blockchain in many nations. The opportunities of blockchain technologies in the public services are enhanced by the blockchain knowledge in the service transactions through academic and non-academic research and by the blockchain applications in public sector. The challenges of the blockchain technology in the service transactions has to be reduced or nullified along with solving complexity, cost, non-compatibility and ease in handling the heterogeneity issues in the service catalogues (Guggenmos et al., 2018). The generalizability of challenges related to blockchain have been illustrated by Kossow and Dykes (2018), through different cases. It is proved that the blockchain technology is efficient enough to secure the government data, secure land data and smart contracts, financial institutions, healthcare and supply chain management. Nevertheless, the need to protect the efficient system with the help of proper legal and regulatory framework is indeed a global requirement. Remarkable contributions were made by Alessie, Sobolewski, & Vaccari (2019) after thorough examination of different cases, concluded their study without highlighting the contributions of blockchain to the business models in service transactions as its not utilized to its fullest. However, it boosts the self-sustainable form of democracy, and efficiency gains with high rate of data integrity and security. The legal and regulatory frameworks are said to be modified according to the requirements of blockchain, as it offers a space to modify and unlock its potential. Therefore, the requisite of the present study is highly relevant in the UAE public service segment as the implementation of blockchain technology has its advantages and disadvantages. Besides that, the study would contribute to the academic research in filling the gap, the study can be taken as the point of reference for policy makers, professionals and administrators in understanding the feasibility and extend of prospective efficiency of implementing the technology. Finally, the study can contribute to the society and other governments for understanding the technology in a wider scope and its applications along with the challenges.

3.6 Summary

This chapter attempted to address the theoretical framework for digital government services for the implementation and adoption perspectives of the integrating AI and Blockchain framework in U.A.E. It provides a conceptual model that depicts the potential



factors that could influence the acceptance and implementation of AI and BC in digital government services. The conceptual model provides the primary frame of reference and possible direction of inquiry for the empirical research that will be conducted in this study to examine the factors.

Chapter Four: Research Methodology and Design

4.1 Introduction

Chapter four aims to discuss the research methods and detailed research design for the undertaken research study. This chapter is divided into five main sections which are further divided into sub-sections. The first section "Introduction" introduces research paradigms and different phases of the undertaken study. The second section explains the philosophy of research paradigms and selection of suitable research paradigm for undertaken study. In third section, research approach, and justification for selection of particular approach is given. Following that the fourth section provides detailed research design including case study, discussion on data collection techniques and justification for selection of particular technique along with brief discussion on data analysis techniques. Then, ethical commitments of research are presented, and chapter summary is provided finally concluding the chapter in last section.

The research paradigms share the combined thoughts of ontology and epistemology of doing the research. The research paradigm itself is being characterized as ontology which investigates the reality, the epistemology asks for substantiation of happening something and in what way it has been impacted in the role of research, and the methodology that deals with the research process and enables the researcher to systematically collect the appropriate data required for undertaken study and process this data to yield the information acquired by research objectives to draw final conclusions. In other words, the research begins by considering some natural phenomenon, then adopting specific research methods to collect the data to validate the truthiness of undertaken hypothesis which then leads up to final conclusion or construction of knowledge systematically.

The study is planned to be conducted as a multi-phase exploratory study. The initial phase of study would identify the challenges by performing literature review and adopting qualitative methods. At this stage the researcher would draw out the persisting challenges and the feasibility of implementing AI & Blockchain technologies in UAE public service segment. The second phase the study adopts the qualitative approach to collect and analyse the data required for the case study. In the 3rd and last phase of study, the researcher seeks expert opinion to validate the proposed maturity model. The flowchart of whole study is given in image below with following sections of the chapter providing justification on selection of particular research paradigm, research approach, data collection methods, and data analysis techniques.

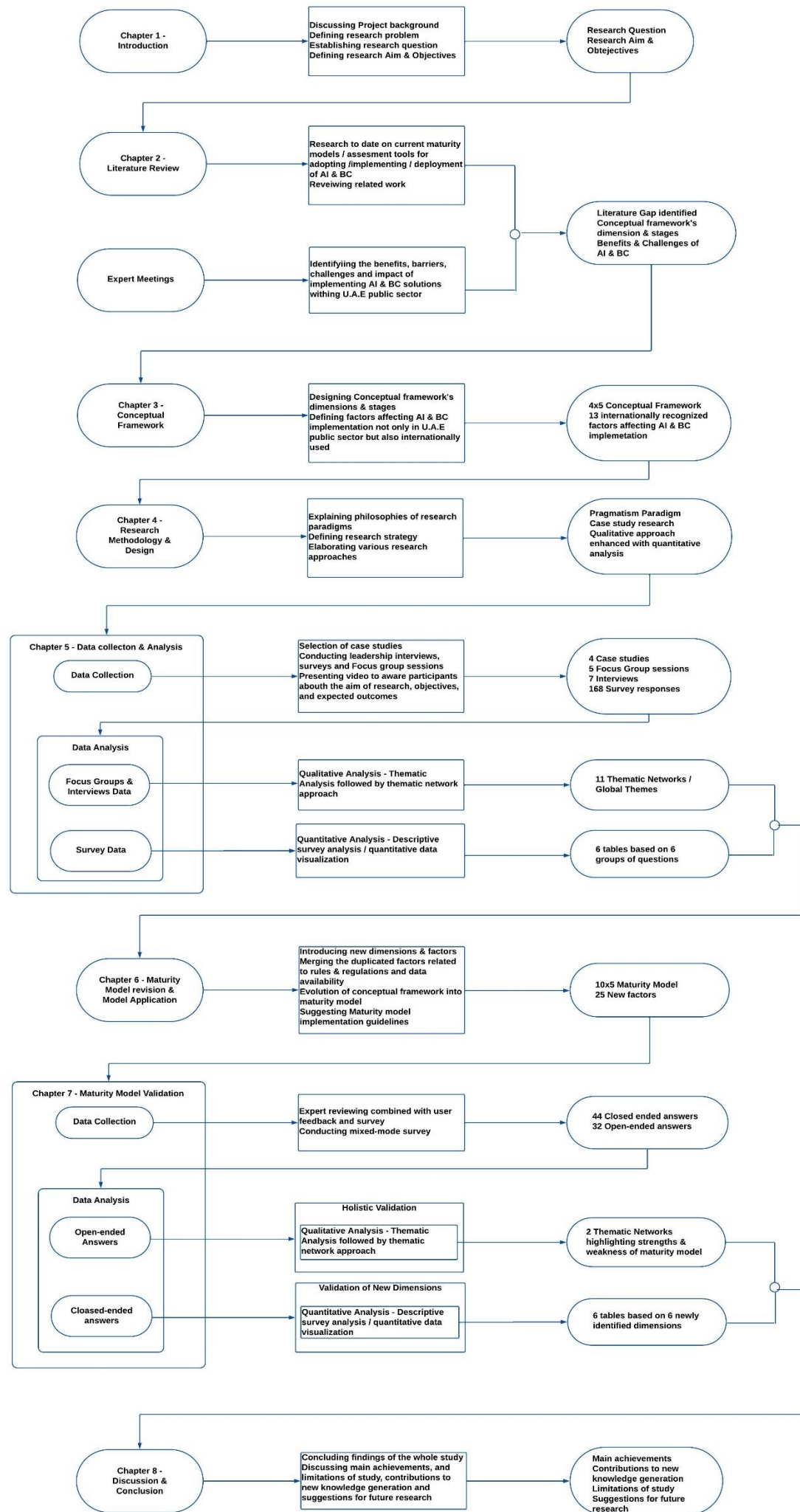


Figure 4.1: Flowchart of whole study



4.2 Philosophies of Research Paradigms

Research paradigm reveals the researcher's outlook of the research problem and research scenario. (Saunders, 1999) defines research philosophy as the method to build the knowledge. The researchers can develop knowledge on the basis of their beliefs and assumptions, on the basis the researchers can opt for the best suitable research philosophies that match with the research objectives, and finally the researcher can opt the desirable research design. One might choose the research paradigm based on the four elements such as ontology, epistemology, methodology and methods. (Rehman & Alharthi, 2016) considers ontology and epistemology as the foundation of any research. Ontology is the researcher's belief about the reality while epistemology is the accurate relevant body of existing knowledge, and the best epistemology approach helps in new theory development. The different epistemological approaches include positivism, critical realism, interpretivism and pragmatism (Saunders, 1999). Saunders, Lewis, Thornhill (2009) highlighted the importance of each paradigm: positivism is the objective external approach that can provide reliable data from probability sampling techniques; realism is similar to that of positivism, but the results are evaluated on the basis of its social existence. Interpretivism is more of subjective qualitative approach concentrated on a small sample. Pragmatism is considered as the multiple method design with more reliable results. Saunders, et al. (2009) further remarked that no research philosophy is better than the other, but each one has different purposes, and it can meet diverse needs of the researcher. Therefore, the researcher is free to fix the research philosophy according to the research objective and the respondents. Pragmatism is the research philosophy where the researcher can combine different philosophies according to the research objectives. But often pragmatists prefer the amalgamation of positivism and interpretivism to make the study credible, reliable and relevant.

4.2.1 Key Paradigms

The research paradigms share the combined thoughts of ontology and epistemology of doing the research. The research paradigm itself is being characterized as ontology which investigates the reality, the epistemology asks for substantiation of happening something and in what way it has been impacted in the role of research, and the methodology that deals with the research process that can be able to find a solution and impact of items in the research problem. In other way the research starts by understanding reality, later it moved to the next step indicating the different situations where the researcher can review or how to understand the problem. As the final step, the research deals with the construction of knowledge.

Here in this research, the researcher aims at satisfying all the three epistemological factors; from which all sources the data should be collected for doing such research on the efficiency of blockchain technology in service transactions. Thus, the researcher would like to compare the blockchain technology and the scope of it from different nations to that of UAE in the literature. Further the researcher identifies the challenges from the prevailed gap which can be able to answer the first concern of epistemological research. Another concern of epistemology is the reliability and credibility of the data sources; of which the researcher relies on published articles in internationally accepted journals and publications; along with that the researcher will seek the support of public service department in getting the credible secondary data; and on the time of data collection. Epistemological paradigm even tries to find and answer from the researcher about the appropriateness in choosing research method. Nonetheless, no one can claim that a specific pragmatic approach is correct; rather it is subject to the researcher, and its desirably correct as the researcher has the justification in opting the method (Chilisa & Kawulich, 2012).

The study is planned to be conducted as a multi-phase exploratory study, where the challenges are first identified by adopting qualitative methods by the researcher, the researcher first sits with the blockchain experts to record their opinion on the research question whether the block chain can be considered as a reliable, cost effective and secure method in service transactions in UAE. Along with that the experts will be requested to explain the various challenges the technology is facing now and the possible challenges in future; in UAE perspective. Later, based on the thematic analysis, content analysis and sentimental analysis the researcher would be able to draw out the persisting challenges and the feasibility of implementing such technology in UAE public service segment. In the second phase the study adopts the quantitative method, the validity and reliability of the framed questionnaire will be analysed through pilot study and the final data will be collected with the research instrument. Here the



researcher comes up with an empirical model using structural equation modelling to effectively implement the service transactions. Further in the phase three, Delphi method the researcher sits with the blockchain experts and administrators to evaluate the appropriateness of identified results. The research seeks expert opinion to identify the feasibility of adopting the empirical model in booting the efficiency of service transactions in the UAE. Therefore, study can probably be able to do justice to the pragmatism research paradigm.

Constructivism / Interpretivism

Constructivism paradigm is used to subjectively examine the experiences of the participants, normally experts. Although the study has greater significance in the current era, the perception and sentiment analysis of the respondents can be better finished with qualitative analysis where the researcher can conduct the study with a subjective approach.

In this study the challenges of blockchain technology that hindered the expedition of the technology can even be retrieved through even word cloud; by adopting constructive or interpretative paradigm, thus the segment of the study will adopt the qualitative design. To identify the challenges in the blockchain technology in service transactions should be identified by the experts in the field itself; thus the researchers like Guggenmos, Lockl, Rieger, & Fridgen (2018) highlighted the role of interviews for estimating the challenges; and the interviews can be conducted from 'the public sector, blockchain development, blockchain advisory, and academia'; where they can contribute from their personal reflection. In the current research the researcher is planning to do the initial qualitative word cloud analysis and word frequency test; and from which the challenges will be retrieved.

Through the constructivism paradigm, the researcher can be able to do in depth analysis of the expert's statements in identifying the challenges, and in the latter stage of the study the suitability of results. Constructivism offers freedom of thoughts; and the researcher can better understand the mind-set of the respondents if the researcher prepares with a right questionnaire. So, in constructivism the researcher can create contents which has practical relevance than theoretical relevance. Consequently, constructivism examines the complexities and multiplicities of research topic (Adom, Yeboah, & Ankrah, 2016). Correspondingly if the researcher can even lead the respondents' mind according to his prejudices, is considered as the main limitation of constructivism.

Positivism

The epistemology paradigms are based on the assumptions about name and the ability to deal with the situations. The research estimating the efficacy of service transactions by implanting blockchain technology can follow positivism, and this the quantitative approach can be followed, thus the study can be experimental and casual. The positivism paradigm stands for the objective scientific examination, here the researcher aims to analyse the challenges on implementing blockchain technology and its impact. Nevertheless, the productivity of public services is often discussed by many administrators, where UAE is many steps ahead in terms of public happiness and adopting m-services and e-services; with the earnest effort to update with time. However the efficiency of such technologies and services cannot holistically assessed in single study; therefore Simpson (2006) had mentioned about the practical difficulties in gauging effectiveness of service transactions. UAE has implemented blockchain technologies even before 2017, and thereafter all the successive formations like smart government till smart city is based on the innovative technology. Alketbi (2016) has already commented about the lack of studies concentrating on improving the security, efficiency and cost effectiveness of blockchain technology. However the positivism gives a peripheral estimation alone and it can help in generalizing the results and to create empirical theory (Purnamasari, 2016); however positivism is neutral and helps to state objective opinion about the theory, however positivists believe that the data is impartial and does not have any subjective influence. But the most highlighted limitation of positivism is that it cannot evaluate the sentiments and emotions of respondents and it can only be estimated in quantity or scales. These days administrators give higher significance to emotions and sentiments of the users; thus, the positivism cannot alone satisfy the requirements of the research field.

Pragmatism



Both positivism paradigm and constructivism paradigm have certain limitations, in order to expand the scope of research the current research would take up pragmatism paradigm which is participatory research that includes the combination of both qualitative and quantitative methods. Thereafter continuing with the initial phase of research deals with qualitative methods, following to that quantitative methods will be adopted to bring a model, finally the study deals with Delphi method to analyse the feasibility of the model. Thus, the research is a three-tier approach interchangeably using the positivism and constructivism; cause to follow the pragmatic approach. Yet another fact is that the researcher has the sole authority to choose research paradigm according to his or her research intention, and no research paradigm cannot even be highlighted as it is wrong (Chilisa & Kawulich, 2012).

4.2.2 Selection of Research Paradigm

This study is considered to follow the pragmatism paradigm which is also called as participatory research; the combination of qualitative and quantitative techniques will be appropriate for this philosophy. For the undertaken study, the researcher aims at satisfying all the three epistemological factors; from which sources the data should be collected for doing research on the efficiency of blockchain technology in service transactions. Thus, the researcher would like to compare the scope of blockchain technology in different nations as compared to UAE, in the literature. Further the researcher identifies the challenges from the prevailed gap which would answer the first concern of epistemological research. Another concern of epistemology is the reliability and credibility of the data sources; of which the researcher relies on published articles in internationally accepted journals and publications; along with that the researcher will seek the support of public service department in getting the credible secondary data at the time of data collection. Epistemological paradigm even tries to find and answer from the researcher about the appropriateness in choosing research method. Nonetheless, no one can claim that a specific pragmatic approach is correct; rather it is subject to the researcher, and its desirably correct as the researcher has the justification in opting the method (Chilisa & Kawulich, 2012).

4.3 Research Approaches

Once the researcher sets with the research philosophy, the next aspect is to finalize the approaches to accomplish the research objectives. The scientific research can be carried out by adapting various reasoning approaches such as induction, deduction and abduction. Deductive approach is always used to test the reliability of the existing theory, whereas inductive approach is used to generate theory after proposing the conceptual framework. Abductive approach is the combination of the deductive inductive approaches.

A combination of inductive and deductive reasoning approach will be employed to analyses the data, the first objective of this research is to find out the challenges in UAE Public Sector, while implementing the combination effectively, therefore the researcher adopts inductive approach to generate a theory which is relevant in the public sector in UAE.

The current research would adopt deductive reasoning approach using pragmatism paradigm, to evaluate the effectiveness of the combination of blockchain technology and artificial intelligence with respect to the efficiency and productivity of public services in the UAE.

4.3.1 Qualitative Approach

In order to enable researchers to examine social and cultural phenomena, the qualitative research approach was established in the social sciences. The term "qualitative" denotes an emphasis on the nature of things as well as actions and meanings that cannot be quantified or quantified scientifically in terms of quantity, amount, intensity, or frequency. The term "techniques" refers to a variety of interpretative practices that aim to explain, decipher, translate, and otherwise comprehend the meaning (Queiros et al., 2017).

Instead of collecting data in a numerical format, qualitative research collects information via documents, interviews, or focus group sessions. The method is chosen when the phenomenon of interest usually necessitates a study of in-depth, thorough data, as qualitative methods emphasize the values of rich descriptions of the social world (Queiros et al., 2017; Johnson and Harris, 2002; Robson, 2002). The researcher in this case conducts the research in a "natural setting," as opposed to the controlled environment of the quantitative technique. The qualitative sources of information can be interviews, records and texts. It is exploratory and aims



to shed light on "how" and "why" a certain social phenomenon, or programmed, functions in a given environment. It aims to aid academics in comprehending the social environment in which we live and the reasons behind why things are the way they are (Mohajan, 2018; Myers and Avison, 2002).

As was previously established, qualitative research does not involve statistical or empirical computations. The key tool for gathering and analysing data is the researcher. It frequently involves fieldwork. To monitor behaviour in its natural environment, researchers must visit the participants, environment, place, and institutions. Instead, than testing an existing theory, it creates abstractions, notions, hypotheses, or theories. The following traits are shared by several qualitative research types (Mohajan, 2018; Hammersley and Atkinson, 1993):

- The researcher has the option of gathering information directly from the respondents through one-on-one or group interviews, face-to-face interactions with individuals, or through observation.
- Concepts and hypotheses that aid in our understanding of the social world are developed using data.
- It is concerned with how people's experiences, feelings, and opinions influence the production of subjective data.
- It is undertaken outside of controlled or laboratory environments, in everyday situations.
- It aims to develop a comprehensive understanding of a particular circumstance.
- The researcher has the ability to use their own motivation and interests to motivate the study.
- The results are typically presented as themes, categories, concepts, or speculative theories or hypotheses.
- It emphasizes discovery and comprehension, necessitating flexibility in the study design.

4.3.2 Justification for selection of qualitative Approach

This research adopts pragmatic research philosophy, thus employs a qualitative research method supported by some quantitative data analysis tools. From the qualitative phase is the focus group discussion with the blockchain and AI experts from both private & public sector in UAE, Interview with top management "Public Sector Leaders" for the government entities who implemented Artificial Intelligence & Blockchain Technologies to their transactions, and also running a survey for all Project Managers, Experts, specialized technical Government Employees and Private Sector who worked with Public Sector Digital Transformation Projects. In order to retrieve the challenges in practical implementation of the same, which enables the researcher to come up with valid constraints in the quantitative phase.

With regards to the effectiveness and productivity of public services in the United Arab Emirates, the integration of blockchain technology and artificial intelligence is still relatively new, and there is scant empirical study data on its application in underdeveloped nations. However, a qualitative technique is the ideal methodology for this study because of the type of data that is needed and the research topic. This enables the examination of the entire situation, and the researcher will be able to communicate with respondents and gather data while speaking to them face-to-face or over Skype. In conclusion, the following list summarizes the primary arguments in favour of the qualitative approach:

- The adoption of blockchain technology and artificial intelligence in developing nations within the context of governmental organizations is the subject of scant empirical research. The development of ideas is thus made possible by the qualitative approach, which allows for a greater knowledge of the implementation process.
- In-depth empirical data are required due to the complexity of the application of blockchain technology and artificial intelligence in government organizations. Using qualitative data entails giving the researcher a level of richness that will enable them to carry out a thorough inquiry.
- This research study is appropriate for the qualitative approach since it uses inductive, particular examples that can be used to draw broad generalizations. It would also be crucial in the creation of a conceptual model, which is unsuitable for a quantitative method that focuses on testing hypotheses.



- There are few empirical research resources on the maturity of the blockchain technology and artificial intelligence integration that evaluate the prior adoption of the blockchain technology and artificial intelligence integration in developing countries, particularly the focus on the integration at the back office. Deeper comprehension of government procedures is made possible by the qualitative method, which also makes it possible to evaluate the back office and introduce maturity levels.

The researcher was confident that the qualitative approach was suitable based on the information that was provided. The qualitative analysis's key components are outlined in Table 4.1 below:

Table 0.1:Qualitative Analysis Characteristics

Characteristics	Qualitative Analysis
Approach	Inductive
Purpose	Describing multiple realities, developing deep understanding, theory building, capturing everyday life.
Research Focus	Examines full context, interact with respondents, collects data via face-to-face interactions with respondents.
Research Strategy	Unstructured and open
Research Plan	Begins with initial idea that evolves as researcher learns more about respondents and setting flexible, tentative proposal.
Research Methods	Action research, case study research and ethnography. Qualitative data sources include interview and questionnaire, documents and texts, and researcher's impression and reaction.
Nature of Data	Rich, deep and complex
Data Analysis	Mainly interpretive, descriptive

4.4 Research Detailed Design

The nature of the study problem will determine which approach to choose (Noor, 2008). Research strategies give the research direction and describe how the research is carried out. It is also regarded as the researcher's overall strategy for addressing the research questions or a basic overview of how to do research (Saunders et al., 2009). Academics have regarded choosing an acceptable research methodology as a crucial component of a research study (Bryman, 2012; Saunders et al., 2009). According to Yin (1994), there are just a few viable research methods for conducting social research, including case studies, experiments, surveys, histories, and the examination of archive data. Six research designs were highlighted by Orlikowski and Baroudi (1991), including surveys, case studies, laboratory experiments, field experiments, action research, and others. These papers may be practitioner-oriented, non-experimental, or descriptive/argumentative. But there are numerous primary research methods that can be used in practice, including case studies, historical research, survey research, and experimental studies (Galliers, 1991; Yin, 1994; Klein and Myers, 1999). Case study, ethnography, grounded theory, biography, and phenomenology are among the five research methodologies that Creswell (2013) listed as belonging to the qualitative approach. Robson (2002) only identified case study, grounded theory, and ethnography. Different research methods are displayed in Table 4.2 together with the kinds of issues they address.



Table 0.2: Research methods (Yin, 1994)

Research strategy	Question Type
Case study	How, why and what
Survey	Who, what, where, how much, and how many
Focus Groups	How, why and what
Interviews	How, why and what

The studies analysed to expose the methodology which is followed in similar studies, according to table, majority of the related studies are following the qualitative research methodology to analyse the challenges, impacts and benefits of the blockchain technology and artificial intelligence and the combination of two technologies within the UAE public sector.

4.4.1 Case study

A case study is defined as a collection of substantial details drawn from several sources concerning a specific contemporary phenomenon occurring in its actual environment, where the borders between the phenomena have not always been obvious. To examine fundamental concepts, this kind of research study typically involves in-depth contextual analysis of a particular person, group, or event. The case study investigation typically draws support from a variety of sources (Yin, 2009).

4.6.1.1 Multiple Case Studies

Case studies continue to be a very effective methodology for researchers and the most popular qualitative method. They are especially well suited to be employed in information systems research, which is relevant to the current research study (Ponelis, 2015).

Case studies have been divided into single, or holistic, and multiple, or embedded, unit of analysis by academics. The number of fieldworks to be conducted is not specified in a uniform manner. As a result, the selection of cases would primarily depend on the types of notions that are acknowledged; however, some researchers have suggested one to three situations (Yin, 2009; Dul and Hak, 2008). Due to the fact that several case studies allow for full exploration of the phenomenon and the ability to strengthen the findings through pattern-matching, The researcher has chosen multiple case studies, specifically four types of cases (UAE Federal Government Case, Abu Dhabi Local Government Case, Dubai Local Government Case, And Ajman Local Government Case). These four entities would be studied and analysed separately, and the results would be compared to draw some conclusions.

4.6.1.2 Justification for the Selection of Case Study

Both single and numerous case studies within UAE Public Sector are available. A single case study offers insightful data on the research issue from a single Federal & Local Government Entity/organization, and it may also contain in-depth knowledge of the organizational setting. On the other hand, by repeating pattern-matching over several case studies, the findings can be strengthened (Yin, 1994). A case study is an empirical inquiry that examines a current phenomenon in its real-life environment, particularly when the borders between phenomenon and context are not readily visible, according to Yin (2009, p. 18). He also contends that conducting many case studies is more beneficial if a researcher has access to enough cases for replication. Thus, case studies are an effective method that let the researcher thoroughly analyse the phenomenon.

The research was conducted within the parameters recommended by Yin (2003), which are based on the research questions to be answered (described in Chapter One) and the research setting, which is UAE public sector Government entities/organizations. However, the researcher plans to emphasize the elements impacting of Artificial Intelligence & Blockchain technologies implementation and their impacts on productivity, efficiency, and effectiveness of public sector transactions due to the research aims for this study, which pertain to creating a conceptual model/framework for Assessing the main/sub factors and levels of implementation for the Artificial Intelligence and Blockchain technologies within UAE Public Sector.



The case study approach is the ideal approach because there hasn't been much research done in UAE/ MENA Region on this subject and because it needs to be subjective.

In order to explore and analyse the Problems, Challenges, & Benefits of Implementing Artificial Intelligence & Blockchain Technologies, and their impact to UAE public sector transactions from a productivity, efficiency and effectiveness perspectives, a case study is the most suitable research methodology for this subject. Case study can also be used in Validating the suggested conceptual framework, with all Main/sub factors and levels of implementation in order to design the New Maturity Model for Artificial Intelligence & Blockchain.

Based on the discussion above, it is anticipated that using a case study as a research technique will considerably aid in understanding the Challenges, & Benefits of Implementing Artificial Intelligence & Blockchain Technologies, and their impact to UAE public sector transactions from a productivity, efficiency and effectiveness perspectives. Therefore, the researcher claims that it is an appropriate strategy for this study because it requires a thorough assessing the main/sub factors of suggested conceptual framework including: Strategy & Governance, Technology, Process & People Factors and their related sub factors and the level of implementation of the new technologies and their impact on the suggested factors. After conducting the second sessions of interview, the suggested framework would be presented as maturity model, depending upon the analysis of data collected in interview.

On the basis of the discussion above, the researcher has decided to look into and assess the phenomena, utilizing case studies as a platform for empirical research and the model that has been created to aid in data collection.

4.6.1.3 Selection of Organizations / UAE Government Entities

The researcher considered the UAE Federal & Local Government Organizations when deciding on the best organizations to consider for this study, since they would make it possible to identify the aspects related to a full implemented project in Artificial Intelligence & Blockchain Technologies.

Four Main Digital Transformation Organizations were chosen for this study for the following reasons:

- They are fully responsible about Digital Transformation Strategy within UAE Public Sector.
- They have a lot of successful case studies implemented in Artificial Intelligence and Blockchain technologies.
- They Assess the Impact of the new technologies within their Federal or Local Government transactions.
- They have a clear strategy and governance models to implement the new technologies.
- They have the right ITC infrastructure to adopt and implement the Artificial Intelligence and Blockchain technologies.
- They have the competent/ skilled and trained employees who can adopt and implement the Artificial Intelligence and Blockchain technologies.
- They have the full automated/optimized Processes & integrated databases to be capable for adopting and implementing the Artificial Intelligence and Blockchain technologies.

The four organizations selected for case study are given in Table 4.3 below.

Table 0.3: Organizations Selected for Case Study Research

No.		Organization Name	Federal or Local	Main responsibilities and the Number of Entities who reported to the Digital Authorities
1		UAE Federal – Telecommunication and Digital Government	UAE Federal Government	35 Federal Entities - Federal Government organizations reported to TDRA, who are leading the Digital Transformation and also responsible of:



		Regulatory Authority - TDRA		• UAE Federal Government ITC Infrastructure. • UAE Federal Government Digital Transformation agenda and Strategies. • UAE Federal Government rehabilitation and upskilling Digital Transformation Training Program to government employees. • UAE Federal Government Process, Re-engineering, optimization and automation. • UAE Federal Government database integration. UAE Federal Government Digital services & Transactions.
2		Abu Dhabi Digital Authority - ADDA	Abu Dhabi Local Government (AD Local Government)	33 local entities reported to ADDA, and ADDA responsible about all projects within Abu Dhabi Local Government that related to Digital Transformation and also responsible of: • AD Local Government ITC Infrastructure. • AD Local Government Digital Transformation agenda and Strategies. • AD Local Government rehabilitation and upskilling Digital Transformation Training Program to government employees. • AD Local Government Process, Re-engineering, optimization and automation. • AD Local Government database integration. • AD Local Government Digital services & Transactions.
3		Dubai Digital Authority – DDA or Smart Dubai	Dubai Local Government	31 Dubai Local Government entities who are reported to Smart Dubai, who are leading the Digital Transformation and also responsible of: • Dubai Local Government ITC Infrastructure. • Dubai Local Government Digital Transformation agenda and Strategies. • Dubai Local Government rehabilitation and upskilling Digital Transformation



				Training Program to government employees. • Dubai Local Government Process, Re-engineering, optimization and automation. • Dubai Local Government database integration. Dubai Local Government Digital services & Transactions.
4		Ajman Digital Government – Department of Digital Ajman – AJDG or DDAJ1s	Ajman Local Government	17 Ajman Local Government entities who are reported to Digital Department Ajman, who are leading the Digital Transformation and also responsible of: • Ajman Local Government ITC Infrastructure. • Ajman Local Government Digital Transformation agenda and Strategies. • Ajman Local Government rehabilitation and upskilling Digital Transformation Training Program to government employees. • Ajman Local Government Process, Re-engineering, optimization and automation. • Ajman Local Government database integration. • Ajman Local Government Digital services & Transactions.

4.4.2 Data Collection Techniques and justification for selection of particular technique

The choice of data collection technique depends on the underlying research approach and significance of reliability and validity in collected data. In case of present research study, which adopts a qualitative research approach, meticulous consideration is given to selecting appropriate data collection methods. The fundamental categorization of data into primary and secondary sources also guides the selection process. The primary data is data which is collected directly from individuals, and it is a first-hand information, which has not either been published or nor been modified by any other person. According to (Taherdoost, 2021), this data can be collected from different sources such as experimental method, diaries, questionnaires, interviews and focus groups sessions and is subject to be more reliable, valid, objective, and authentic. Conversely, secondary data is data/information which is collected from online repositories, or any other published resources, such as e-journals, books or records. Before adopting a particular data collection method, it is important to analyse that what kind of data the undertaken research study requires, i.e., primary data or secondary data. Figure 1 shows various data collection methods both for primary and secondary data.

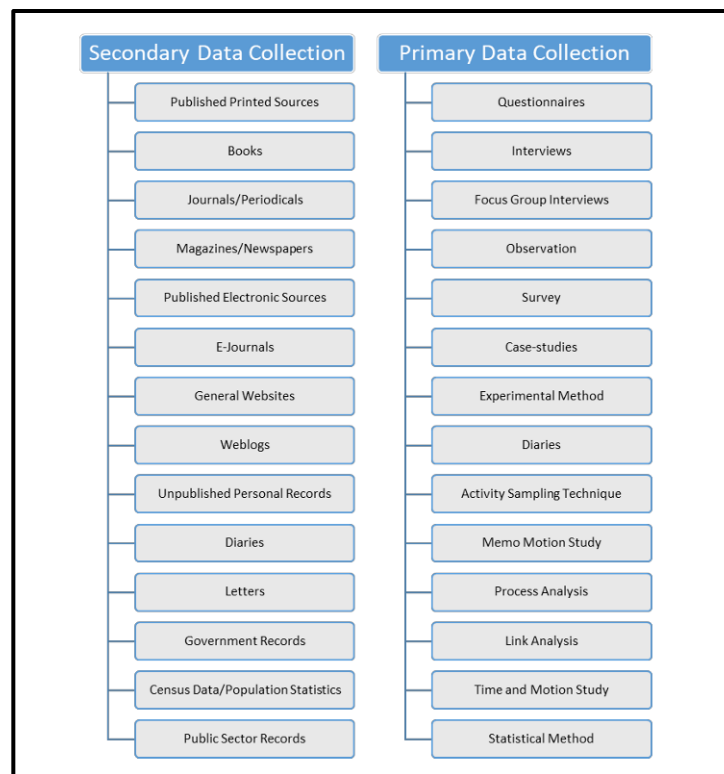


Figure 0.2: Primary & Secondary data collection sources (Taherdoost, 2021)

As the qualitative research studies require rich data to deal with complex research questions, and understand human experiences and behaviours, so these studies generally require primary data. This emphasis on primary data stems from its intrinsic ability to provide depth and richness to qualitative analysis. According to (Hurst, 2023)

“For the qualitative research studies, generally, primary data collection techniques are leveraged in form of triangulation or for increasing the reliability of study.” Since the undertaken research is qualitative which intends to explore participants’ experiences and perspectives regarding the implementation of AI and blockchain technologies, which primarily involves gathering first-hand data, primary data collection techniques employing survey, focus group sessions and leadership interviews have been chosen. Each of these techniques, offers a unique advantage in eliciting rich, nuanced data crucial for understanding participants’ experiences and perspectives in depth and facilitating comprehensive analysis and interpretation.

4.6.2.1 Survey

In a case study, survey is used to collect information from people about their thoughts about a particular phenomenon or situation using a questionnaire. Survey studies help document existing community conditions, population characteristics, and community opinions. This research use question-based surveys or statistical surveys to gather information about how people specially “experts and specialist in AI & Blockchain implementation” think and behave. This type of survey is one of the most important areas of measurement, asking respondents questions. Scholars have explained it in many ways. For example, Rates (2004) defines it as a means of identifying and explaining real phenomena (McClure, 2002; Mohajan, 2018). The questionnaire to be used in survey is designed to meet the RO1. This questionnaire consists of 4 main sections of Introduction, Demographic data, Research objective questions and Project related questions respectively. For the survey, the questionnaire would be published online via Google Forms for one month. The main participants for this survey are professionals from the “four main entities” of the case study.

4.6.2.2 Focus Group Sessions

In order to discuss factors, challenges, impact and benefits from implementing the advance technology to public sector transaction by using Artificial Intelligence & Blockchain Technologies the focus group sessions are considered. For the focus group sessions in these case studies, subject matter experts, specialist, and digital transformation project managers from UAE public and private sector who worked and managed implementation projects of Artificial intelligence & blockchain technologies are considered .

In these sessions the Groups Team Members will be from Technical & Leadership backgrounds who have worked and managed projects successfully with UAE public sector in implementation of Artificial Intelligence & Blockchain Technologies. The members of the group would be encouraged to talk openly about their opinions and respond to other members (The Moderator, sometime will



be the researcher, and also 4 to 5 Subject matter experts are also willing to run the focus groups session on behalf of researcher because these sessions will be taking place at different locations, Such as: Dubai, Abu Dhabi, Ajman, Jordan-Amman, Egypt Cairo, And Online Sessions through Global Platforms).

4.6.2.3 Leadership Interviews

For the undertaken research study, the leadership interviews would be conducted twice to collect the required information. Once, the interviews would be conducted at the beginning of study to meet the RO1 and then, at later stage of study, the interviews will be conducted to meet the RO4. For this purpose, the researcher plans to conduct structured interviews with open-ended questions. For conduction of structured interviews, all the questions are prepared in advance and asked in sequential order as conditioned by structured method of interview. The “leadership Interview Questions Form” (a form consisting of list of questions for interview) is designed to meet both RO1 and RO4. This form consists of 5 main sections of introduction, research approach, Artificial Intelligence & Blockchain Maturity Models, Suggested Conceptual Framework, and Main challenges, Drivers, barriers behind implementing AI+BCT technologies section respectively. The fifth section of the form deals with RO1 and the first four sections of the form are designed to deal meet the RO4.

In the first session of interview, the researcher first sits with the blockchain experts to record their opinion on the research question whether the blockchain can be considered as a reliable, cost effective and secure method in service transactions in UAE. Along with that the experts will be requested to explain the various challenges the technology is facing now and the possible challenges in future; in UAE perspective.

The second session of Interviews will assess the whole journey of implemented projects and the overall impact of new technologies (The integration of Artificial Intelligence & Blockchain Technologies). For this purpose, the leadership interviews would be conducted with Director General, CEOs, and Digital Transformation project sponsors from UAE public and private sector who have worked and managed implementation projects of Artificial intelligence & blockchain technologies.

4.4.3 Data Analysis Techniques

The primary methods for the data analysis include

- Qualitative data analysis approach
- Quantitative data analysis approach

The qualitative and quantitative approaches can be used independently or in combination to help the researchers acquire insights from the data depending on the individual’s/researcher’s requirement. The selection of data analysis approach mainly depends on the research approach and the data collection approach used for the study. The undertaken research study follows the qualitative approach systematically but for the analysis of survey which uses Likert-scale questions, some quantitative data analysis tools would be used. Thus, for the undertaken research study, the qualitative data analysis approach supported by some quantitative tools would be more suitable. As there are various data analysis techniques for both quantitative and qualitative approaches, such techniques have been discussed and justification for selection of particular data analysis technique is discussed in following chapter in section 5.5.

4.5 Ethical Commitments

To uphold the credibility of the research, ethical standards have been diligently followed throughout its course. The data collection process, employing a diverse range of methodologies including questionnaires, interviews, and focus group sessions, was conducted with a steadfast commitment to ethical principles. The foremost of these principles was the preservation of confidentiality and privacy which was promised by meticulously anonymizing the personal information of interviewees and focus group participants. Whereas no personal information was collected through questionnaires, abstaining from collecting any identifiable information to reinforce commitment to privacy. Moreover, comprehensive written and oral overview of research elucidating its aim, objective, and potential social benefits, was provided to participants. Participants were also assured of voluntary nature of their involvement



and providing freedom to withdraw from the study without facing any penalty or harm. The interviewer or facilitator clearly communicated the procedural framework and schedule of interviews and focus group sessions. Throughout the research journey, the researcher diligently handled and stored data to ensure security, integrity, and confidentiality of information.

4.6 Chapter summary

This chapter has elucidated on research methodology and design by initially providing introduction to research paradigms and different phases of study, as the study is going to be conducted as multi-phase exploratory study. The initial phase of study aimed at conducting literature review, whereas in second phase data would be collected and analysed for the case studies. In the 3rd and last phase of study, the researcher seeks expert opinion to identify the feasibility of adopting the maturity model in booting the efficiency of service transactions in the UAE. The chapter also addressed different philosophies of research paradigms, including discussion on key paradigms such as constructivism, interpretivism, positivism, and pragmatism. For undertaken research study the pragmatism paradigm is followed which is also known as participatory research. To accomplish the research objectives, the qualitative research approach is adopted, whereas justification for selection of this approach is also provided in chapter. The research detailed design elucidated on case studies, data collection and data analysis techniques. For undertaken research study, multiple case studies have been selected which include, Abu Dhabi, Ajman, Dubai and U.A.E federal government case, and data collection techniques for these case studies include questionnaires, interviews and focus group session. The overall research and data collection has diligently followed ethical standards such as commitment to privacy & confidentiality, voluntary participation and many more.



Chapter Five: Data Collection, Presentation & Analysis

5.1 Chapter Structure

The aim of this chapter is to present the results of qualitative data analysis, which has been conducted on data collected from four main case studies of UAE. Section 2 provides introduction to U.A.E's government structure, elucidating local and federal governments as case studies have been selected from these government categories. **Section 3** deliberates on case studies and their organizations, from which data was collected. In **Section 4** data collection tools & techniques used for subject study are discussed. **Section 5** provides a justification for selection of particular data analysis approach, which has been used for analysis. In **section 6**, results of data analysis are given, with final conclusions of analysis given in its sub-section. Finally, chapter summary is given in **section 7**.

5.2 United Arab Emirates (UAE)

United Arab Emirates is a country located in Middle East, Southwestern Asia. UAE is a federation of seven states/Emirates named as emirates of Abu Dhabi, Dubai, Ajman, Sharjah, Umm al-Qaywayn, Ra's al-Khaymah, and Al-Fujayrah. UAE is located on eastern coast of Arabian Peninsula, having approximately 9,264,000 population and 71,024 sq km of landmass. Abu Dhabi is the capital of UAE and Dubai is known to be a significant business & tourist hub. UAE is a country, rich in natural reserves of petroleum & natural gas deposits, which make up of one-tenth of the world's petroleum reserves. These resources contribute to a significant portion of national budget, and many other businesses like date production, livestock herding and fishing, play vital role in driving economic growth of UAE (Peterson and Crystal, 2023). UAE is also committed to drive digital transformation in its businesses and processes and is taking many initiatives to make UAE global leader in digital & Technological transformation. "The UAE Digital Government Strategy 2025" is the example of one of those initiatives. This strategy aims create cross-sectoral government commitment & buy-in to embed digital aspects into overall government strategies (UAE Government Portal, 2023a).

5.2.1 Governmental Structure of UAE

UAE has a federal system of government in which the power is divided between a central national government & local state government and these state governments are connected to one another by national government. The highest governmental authority of UAE is Federal Supreme Council which comprises rulers from the seven emirates of UAE. H.H. Sheikh Mohamed bin Zayed Al Nahyan is the current president of UAE, since May 2022 and H.H Sheikh Mohammed bin Rashid Al Maktoum is vice-president & prime minister of UAE. In UAE, both federal and local governments work in conjunction with federal entities, ministries, Ruler's courts, Executive Councils & Consultative Councils at local government level respectively (UAE Government Portal, 2023b).

5.2.2 UAE Federal Government

In UAE, government's operations are divided between federal & local government of each emirate separately. The federal and local governments have different authorities and various independent levels of freedom in their operations. The federal government constitutes of five main federal authorities which are as follows:

1. The Supreme Council
2. The President & his deputy
3. The Council of Ministers
4. The Federal National Council
5. The Federal Judiciary

The UAE's federal government has exclusive legislative & executive jurisdiction in an assigned list of matters, from which education, health services, federal passports, immigration, & air traffic control are to name few of such matters (UAE Government Portal, 2023b).



5.2.3 UAE Local Governments

According to local Government structure of UAE, each emirate of UAE has its own local government. Each emirate has crown prince & executive council, and executive council is subordinate to Ruler's court of that emirate. At local government level, certain areas of authority may also be given to federal government by the Ruler of that state. These local governments have authoritative powers in all those matters which are not exclusively undertaken by Federal government. The size and mechanism of local government depends on area, population & development phase of that emirate (UAE Government Portal, 2023c).

5.3 Introduction to Selected Case Studies

The undertaken research aimed to conduct case studies to develop and validate the new maturity model for assessing the implementation of Artificial Intelligence & Blockchain technologies, within UAE Public Sector. In order to explore and analyse the research problem, the researcher selected to undertake four cases from UAE, from which one case belongs to UAE's federal government, and remaining three cases are from UAE's local government. The four cases studies selected are UAE Federal Government, Abu Dhabi Local Government, Dubai Local Government, And Ajman Local Government, and particular organizations corresponding to each case are UAE Federal – Telecommunication and Digital Government Regulatory Authority (TDRA), Abu Dhabi Digital Authority (ADDA), Digital Dubai (DD), & Ajman Digital Government/Department of Digital Ajman (AJDG/DDAJ) respectively. Each of these entities are introduced in the following section.

5.3.1 Case Study Organizations/Entities

For case studies, four organizations were selected from each of these cases: 1) UAE Federal government, 2) Dubai Local government, 3) Ajman local government, 4) Abu Dhabi local government. The organizations corresponding to every case are shown in Figure 5.1, with their details given in following sections.

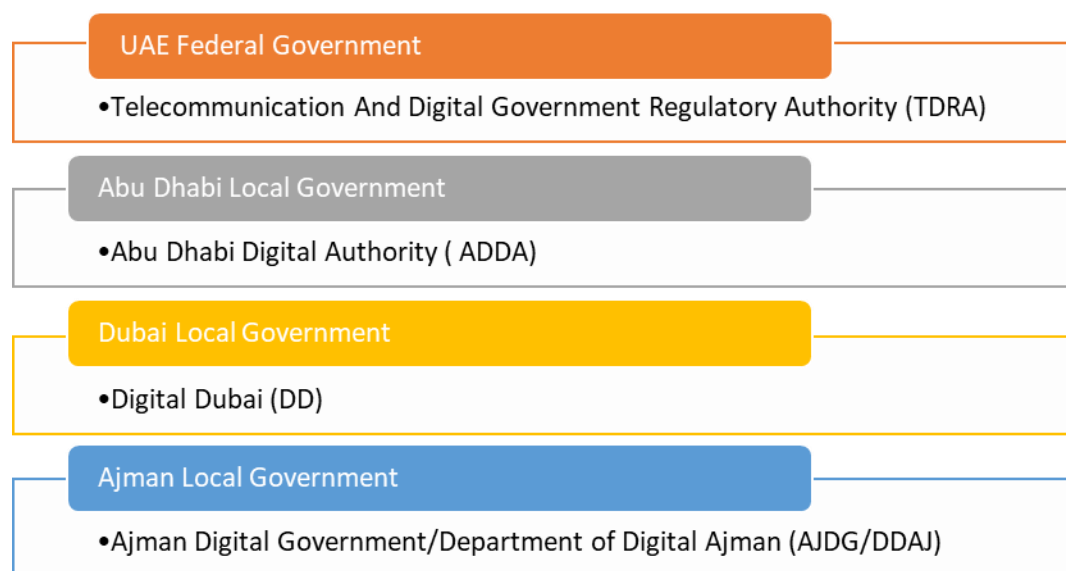


Figure 5.1:Case Study organizations

5.3.1.1 UAE Federal Government Case

Telecommunication and Digital Government Regulatory Authority (TDRA)

The TDRA is a Federal Authority which responsible for driving digital transformation in UAE government's operations. TDRA's sole aim is to enable and regulate the telecommunications & digital government sector to provide smart, efficient & viable services to citizens of UAE. TDRA consists of three main sectors where each sector consists of several departments (TDRA ,2023a). These sectors are:

- Information and Digital Government Sector



- Telecommunication Sector
- Support Service Sector

TDRA predominantly focuses on “regulating the telecommunication sector” and “enabling government entities in field of smart transformation”. According to (TDRA ,2023b), TDRA aims to

- Provide telecommunication services throughout the country.
- Develop & promote the “Information & communication Technology” in the country.
- Enhance the use of ICT in government entities.
- Formulate e-government environment within country.
- Help various government entities in developing smart transformation programs.
- Encourage e-participation in government organizations & operations.

5.3.1.2 Abu Dhabi Local Government Case

Abu Dhabi Digital Authority (ADDA)

ADDA - Abu Dhabi Digital Authority is responsible for Digital Transformation of Abu Dhabi Government Entities. H.E. Dr. Mohamed Abdelhameed Al Askar, is the current Director General of Abu Dhabi Digital Authority. ADDA provides digital strategies and tools, platforms & channels, and aims to deliver innovative digital services. In (ADDA,2019), ADDA states its mission as

“We enable, support and deliver a digital government that is proactive, personalised, collaborative and secure.”

Proactive:

By proactive mean, it aims to enable proactive government by providing solutions in advance to future problems, needs or changes, of government organizations. For decision making, it utilizes Artificial Intelligence to yield data driven insights from government & customer data.

Personalized:

ADDA aims to provide personalized, smooth & coherent government services for great customer experience in all traditional & digital services, through integrated platforms, services and channels.

Collaborative:

To establish an innovative digital government, it believes in joint initiatives and promotes partnerships and collaboration among government entities & private sector organizations. This can enhance government efficiency in providing digital services & procurement by utilizing shared opportunities from the collaborated organizations/entities.

Secure:

ADDA utilizes advanced artificial intelligence and cyber-security solutions to ensure, the security & protection of digital infrastructure, systems and data from frauds, cyber-crimes & breaches. It enables the authority to protect data privacy & transactions of government services.

ADDA promotes government-wide digital leadership via local & universal partnerships, and innovation programs. For enhanced government performance, ADDA provides support via strategies, policies, standards and enterprise architecture which stimulates exceptional digital society in Abu Dhabi. It applies artificial intelligence and provides shared government and cybersecurity solutions for government entities to protect digital infrastructure, systems and data for a strong & powerful digital society (ADDA,2019).

5.3.1.3 Dubai Local Government Case

Dubai Digital Authority/ Digital Dubai (DD/DDA)



Digital Dubai authority was established in 2021 by Vice-President of United Arab Emirates, by Sheikh Mohammad Bin Rashid. The entity was established to develop policies and strategies which rule all matters related to Dubai's information technology, digital transformation, data handling, usage and cyber security. This entity is also responsible to administer the practical implementation of these policies. Digital Dubai aims to digitalize life in Dubai, which utilizes expertise of four entities:

- Dubai Electronic Security Centre
- Dubai Statistics Centre
- Dubai Data Establishment
- Smart Dubai Government Establishment

According to (Digital Dubai,2013a), Digital Dubai is held responsible to perform four key tasks given in figure 5.2.

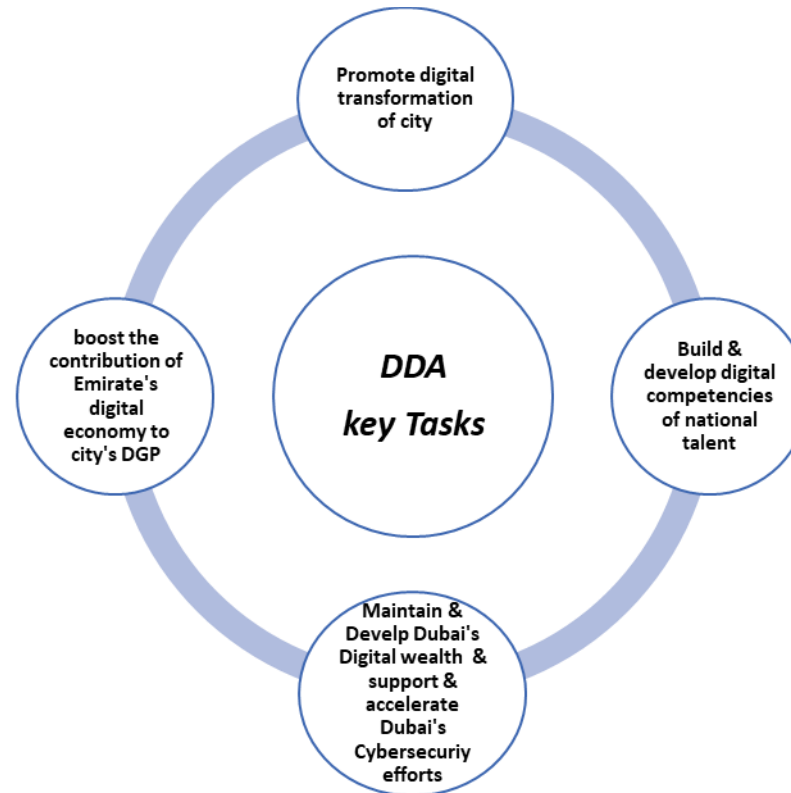


Figure 0.2:Digital Dubai Authority's Key Tasks

Digital Dubai has established partnership with both government & private sector entities and has setup more than 130 initiatives to accelerate the digital transformation of city. According to (Digital Dubai, 2013b), some of these initiatives are shown in figure 5.3.

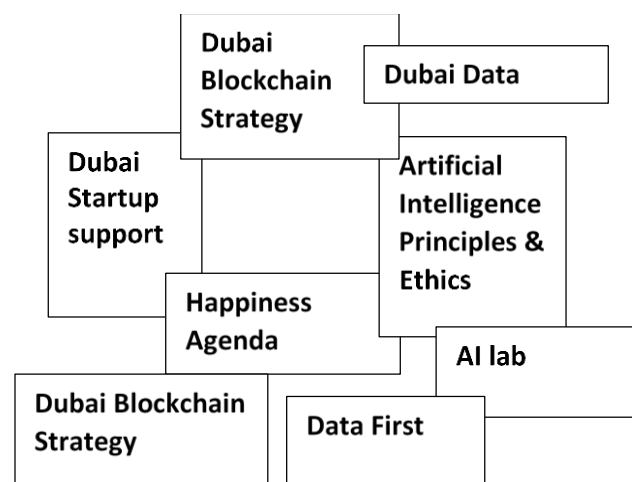


Figure 5.3:Initiatives of Digital Dubai Authority



Dubai Data is ambitious initiative of Digital Dubai which enables city-wide seamless sharing of data to establish a huge data platform to support the future developments of smart cities, providing solutions to businesses and social problems based on data analytics, which will result in enhance the quality of life. Under this initiative, city-wide model of Dubai 'data is being developed which defines organizations who can hold data and how to utilize data to provide smarter services. Dubai Data Lab comprises of data engineers, organizational representatives and data experts who are responsible to implement advanced expertise like data science, machine learning, & data analysis to come up with data-driven insights to solve real world problems (Digital Dubai, (2013c). In order to practically digitalize the lives of citizens, Digital Dubai has been hosting a vast number digital mobile/desktop applications which are built using advanced technologies & tools to provide great citizen services and enable seamless exchange of data between users and various collaborating entities. Some of these applications include DUBAINOW APP, UAE PASS, HAPPINESS METER, DUBAI PULSE and many more (Digital Dubai, 2013d). These apps have really transformed the user experience and satisfaction level. DUBAINOW APP is example of one of such apps, which is the sole Dubai Government application to provide at least 120 services of both Government and private sector organizations. Some of great services offered include paying different bills like DEWA, FEWA, municipality bills, dealing all matters related to driving such as paying traffic fines, purchasing parking's, renewing vehicle registrations, managing health, residency, education, travel and Islam (Digital Dubai, (2013e).

5.3.1.4 Ajman Local Governments Case

Ajman Digital Government/Department of Digital Ajman (AJDG/DDAJ)

Ajman eGovernment was established in 2012 which was evolved into Ajman Digital Government in 2017 and is now an authority responsible for driving digital transformation in Department of Digital Ajman. The authority is also in charge of providing regulatory & legislative tools to support the digital transformation process which are undertaken by government entities of Ajman. The entity also coordinates & collaborates with other government agencies and aims to provide high quality, responsive, integrated & innovative government services by utilizing various latest technologies. The entity strives for providing smart government services to Ajman's residents anytime & anywhere. The authority's objectives include enhancing the information security, digital services, efficiency of joint support services, & enhancing the information technology capabilities in human resources (Government of Ajman, 2023a). The Department of Digital Ajman is providing digitalized services in distinct areas of life including health, finance, tourism, immigration, vendor renewal services, bills payments, License or ID cards amendments/renewals, & Transport authority. Department of Digital Ajman has also established Ajman Open Data Portal, which is a portal from where different datasets can be accessed, used, or reused to gain data insights & data visualizations according to personal need and desire. These datasets can be used by different businesses or organizations to get data driven insights and based on these insights; organizations might decide that in which businesses /sector they should invest. Besides this, the datasets can also be used in research or answering everyday questions or driving insights based on need / interest of organization (Government of Ajman, 2023b). The Open Data Portal consists of datasets of different sectors like business & industry, economics & finance, education, housing, health, leisure & culture , environment, transport & infrastructure.

5.4 Data Collection Techniques

The case studies were undertaken to evaluate the impact & implementation of AI / Blockchain Technologies in UAE public sector. For this purpose, the data was collected using the following approaches.

- Survey/Questionnaire
- Focus Group Sessions
- Leadership interviews (First Session Interviews only)



5.4.1 Survey

This research intended to seek participants views on challenges, key issues and impacts that their organization faces as a result of technological advancements in area of AI & Blockchain. The questionnaire used in this research consisted of 4 main sections of Introduction, Demographic data, research objective questions section and project related questions respectively. This questionnaire was designed based on literature review, requirements of study and proposed conceptual framework. The researcher conducted few meetings with subject related experts and utilized his own technical expertise gained from mega digital transformational projects to design the best suitable questionnaire for the study.

In both questionnaires of the study, focus group sessions and interviews, the researcher collected the demographic information of participants considering that this information can be used to identify the trends and social shifts in participant's feedback based on different government styles, their educational and professional background and seniority level. As the main aim of the study was not to find the trends and social shifts in feedback and study was already delayed a lot due to COVID-19 pandemic, the researcher decided to propose/suggest this idea/information for more advance research study such as for post-doctoral project. This questionnaire was approved by research supervisors and various subject matter experts before publishing it online. The main participants for this survey were professionals from the four main organizations of case study. The survey was published online via Google Forms for 30 days. This questionnaire was sent to 5286 all employees working in all four case studies, via email or phone number, out of which 336 responses were recorded.

5.4.2 Focus Group Sessions

The focus group sessions were conducted with subject matter experts to discuss and define the main and sub-factors affecting the impact and implementation of Artificial intelligence & Blockchain Technologies in undertaken case study organizations. In total, **five focus group sessions were held** with experts from UAE Public Sector 1) UAE Federal Government, 2) Abu Dhabi Local Government, 3) Dubai Local Government, 4) Ajman Local Government) and 5) private sector respectively. To narrow down the participants pool, the focus group sessions were conducted only with project managers, subject matter experts, specialists and strategic advisors in UAE public sector working on future foresights, digital transformation projects and agendas focusing on leveraging AI & Block chain solutions. In each focus group session there were about 3 to 6 participants, where the duration for these sessions was around 90 to 120 minutes. As all the participant of focus groups were not comfortable being audio / video recorded, so all responses were typed as the sessions proceeded. The moderator of focus group sessions was the researcher itself, and these sessions were conducted in Dubai, Abu Dhabi, and Ajman. The proposed conceptual framework was presented to participants of focus group sessions and five main stages of change (Initial, Developed, Defined, Managed, Optimized) and four dimensions of change (Strategy, Technology, People, Process) of conceptual framework, were discussed. The participants were asked with different questions related to each stage of change & dimension, and their opinions were recorded for further analysis. In focus group sessions, the participants view on main challenges, drivers, barriers/obstacles behind implementing AI & Blockchain Technologies were also recorded.

5.4.3 Leadership Interviews

This research study intends to conduct Leadership Interviews twice (First Session interviews & Second Session interviews) in its journey. At this stage, **seven "first session interviews"** were conducted with Artificial Intelligence & Blockchain experts from 1) UAE Federal Government, 2) Abu Dhabi Local Government, 3) Dubai Local Government, 4) Ajman Local Government) and 5) private sector. The participants of interviews were Director General's or senior leaders of four case studies and private sector who were leading digital transformation projects and Agendas leveraging AI & Blockchain solutions. These participants did not allow to record their interviews due to their excellency, so their responses were typed alongside the interview. The duration for each of these interviews was around 25 to 45 minutes.

The "first session interviews" were structured interviews with open-ended questions and all the questions were prepared before conducting interviews and questions were asked in sequential order. For this purpose, the "leadership Interview Questions



Form/document” (a form consisting of list of questions for interview) is designed and used. The interview document was divided in 5 main parts, the first part was the “Introduction” to the research aim and the proposed conceptual framework, second part “Research Approach” presented and discussed the proposed Maturity Model/Conceptual framework, including the main and sub factors formulating the proposed framework. The 3rd section presented the Artificial Intelligence & Blockchain Maturity Models & frameworks from literature reviews. The fourth section presented the five main stages of change and four dimensions of change of the proposed framework. This section also included questions regarding suitability of the given stages and dimensions. In last, questions regarding main challenges behind implementation of AI & Blockchain, main drivers to enhance the implementation, internal & external challenges that organization faces when deploying these technologies were included. This section also requests the participant to provide their experienced based opinion/suggestion to improve the adoption, implementation & deployment of these technologies within UAE public sector entities.

5.5 Justification for selection of Data Analysis Technique: Thematic Analysis followed by thematic Network Approach

Qualitative data analysis is performed to understand the concepts, opinions or experiences of people on subject matter, in greater depth to yield data driven insights for answering the research question. The qualitative data analysis approach is undertaken to analyse the data which is non-numeric in its nature and is available in formats like text documents, audio, & images etc. This data can be collected from primary or secondary resources. The qualitative approach for data analysis as being completely different from quantitative approach offers many different techniques which can be adopted depending on the nature & subject matter of study. Some of the well-known qualitative data analysis methodologies include content analysis, thematic analysis, thematic network analysis, narrative analysis, discourse analysis, thematic analysis aided by thematic network analysis, grounded theory and many more. In qualitative analysis, as there are a lot of methods to choose from, but selection of particular method depends on what the researcher intends to find. According to (Braun and Clarke, 2008),

“However, nor do we think there is one ideal theoretical framework for conducting qualitative research, or indeed one ideal method. What is important is that the theoretical framework and methods match what the researcher wants to know, and that they acknowledge these decisions, and recognize them as decisions.”

As, the goal of this study was to study and understand the participants view and experiences of implementing & using AI & BC in their work environment and update the proposed conceptual framework according to insights gained from dataset, so **thematic analysis followed by a thematic network was the suitable approach** to be considered. Thematic analysis is a systematic process of organizing & interpreting the open-ended responses of research participants, to yield meaningful insights, patterns & information from data of interview or focus group sessions. According to (Braun and Clarke 2008), “Thematic analysis is a method for identifying, analysing and reporting patterns (themes) within data”. This approach supports in understanding the participants views on subject matter, their experiences and opinions. According to (Braun and Clarke 2008) “A theme captures something important about the data in relation to the research question and represents some level of patterned response or meaning within the data set”. From a dataset, the researcher can recognize themes via inductive, or deductive approach of reasoning. The **Inductive approach** of reasoning, which is also known as bottom-up technique can be used where the researcher aims to find the themes based on the data/content of data or the themes are linked to data itself. This approach is useful when the research objective is to develop a theory, or a framework based on findings of data. Inductive analysis is therefore a process of coding the data without trying to fit it into a pre-existing coding frame, or the researcher’s analytic preconceptions. Contrarily, the **deductive approach**, which is also known as ‘top down’ method, can be used where the researcher has predetermined themes in hand, which are built on basis of what researcher is trying to find from the data based on his established theory (Caulfield, J., 2022). This method can be considered as approach which is based on researchers theoretical or analytic interest in the research area. **As, the undertaken research study aimed to find answers to some predetermined questions so to perform thematic analysis, deductive approach was undertaken.** In order to identify themes or patterns from a data, another important consideration to make is that at which level of data (semantic



or latent) the themes should be identified. In a **semantic or explicit approach**, the researcher considers only surface meaning of data and no other considerations beyond the explicit meanings of the data are made. This approach only considers what the participant has said or written in its response to the questions. Whereas the **latent approach** tries to find out the hidden meaning from the data considering the context and the way the participant responded. This approach also considers the expressions of participants like body language or tone of voice for analysis. **For the undertaken analysis, semantic level analysis was performed.** According to (Braun and Clarke, 2008), “thematic analysis is not wedded to any pre-existing theoretical framework, and therefore it can be used within different theoretical frameworks (although not all) and can be used to do different things within them.” According to (Stirling, J., 2001), “thematic analyses can be usefully aided by and presented as thematic networks: web-like illustrations (networks) that summarize the main themes constituting a piece of text”. Thematic analysis aims to identify themes within data set and thematic network provides a way to organize, structure and depict themes of a thematic analysis. In other words, thematic analysis can be systematically organized via a thematic network. To represent thematic analysis as a thematic network, the themes are divided into three main classes/ categories which are 1) Basic themes, 2) Organizing themes and 3) Global themes. *Basic themes* are the lowest order themes of thematic network. These are the themes which alone do not say much about the text of a data set, but when these themes are grouped or combined with several other similar themes, they can provide broader understanding of the topic. *Organizing themes* are the middle order themes, in which basic themes are combined or organized into different groups, where each group represents themes that are coherent to each other. Organizing themes can be considered as clusters of those basic themes which represent the same idea. *Global themes* are the super order or macro themes which comprises of several organizing themes which together represent a concept, claim, assertion, assumption, argument or give information about what text as a whole is about. These themes summarize & make sense of the underlying sub-ordinate (middle order & lower order) themes. As these themes represent a single conclusion and provides more detailed & structured information, so these themes are less in numbers than organizing & basic themes.

Thematic analysis followed by thematic network approach has been used widely where the intended aim is to understand the participants views and experiences provide some suggestions, arguments or make some decisions based on those insights. The same approach was adopted by (Jung et al., 2022), to explore the user experiences and determine their needs for kitchen appliances and the problems the users face while utilizing these appliances. For this purpose, the data was collected via semi-structured interviews with nine participants for four types of kitchen appliances, to collect their experiences, opinions & suggestions. The data was analysed using thematic analysis and design principles for kitchen appliance were represented via 3 main themes of Usability, Affect & User Value. The results of these analysis described in detail, that for each main theme followed by sub-theme, what kind of problems user face and what is pattern for discussing similar problem by other participants, and thus main problems being faced were highlighted & based on this analysis, suggestions were made to improve the appliances according to results of analysis. To put it in a nutshell, the common problems being faced by different users while utilizing kitchen appliances were determined and conclusions were drawn that what improvements users want to see in these appliances. The designers of such appliances can use these results to consider the factors that the consumers of their products are looking for in their products.

Similarly, in order to investigate the academics (teachers, professors) experience in regards of using “Recorded Audio Feedback (RAF) in Higher Education”, thematic analysis followed by a thematic network approach was adopted. RAF is a method, in which teachers/professors provide the recorded feedback to their students on their submissions of any assignments or academic work. The study aimed to investigate user experiences regarding use of RAF, and to identify any challenges associated with its usage via thematic analysis. For this study, data was collected using semi-structured questionnaires, from the four academics. The participants were allowed to provide their feedback in recorded or in-written form. The responses were transcribed, and data was broken down into clusters of patterns & themes. From the data, basic themes, organizing themes & global themes were identified and represented as a network. This analysis produced two global (Dialogue diversification, Load Reduction), 9 organizing & 45 basic themes. Each network corresponding to global network represented its organizing & basic themes. In dialogue diversification, participant’s



experiences regarding communication style and tone of voice were highlighted. The global theme/ network also highlighted the guidance that learners needed to use RAF such as facilities they would need to listen this, validity of RAF (for how long RAF would be available) and instructions of making notes out of this feedback. The second network/global theme (Load Reduction) shed light on how the cognitive & physical load of academics was reduced by using RAF. This reduction in workload was represented and discussed via organizing themes (physical load, cognitive load, time, scalability, flexibility). In short, from this study, the overall attitude of academics was concluded which was positive in many aspects but with a discomfort in participants feeling in regards of sensitivity of using human voice (Heimbirger et al., 2018).

5.6 Data Analysis & Presentation

For this study, data collected from all case studies via interviews & focus group sessions was amalgamated to investigate different case studies collectively and put the analysis into common frames which provide broader & generic information. However, for each case entities' particular challenges or its capacity in terms of various dimensions & factors of maturity model can be analysed at later stage by leveraging maturity model. The amalgamated / combined dataset was analysed by following six main stages of thematic network which include 1) coding dataset, 2) identifying themes, 3) constructing thematic networks, 4) Describing & exploring thematic networks, 5) summarizing thematic networks, and 6) interpreting patterns / drawing final conclusions. The first step of study (coding dataset), aim to disassemble and organize the whole text/dataset into manageable and insightful text segments. This process is further divided into two stages of a) Devising a coding framework b) Dissecting text into text segments using a coding framework. For undertaken study, the researcher constructed a coding framework which covered both theoretical interests of study as guided by interview questions and salient issues/topics raised in text itself. During this stage the researcher initially extracted and wrote codes based on objectives of the interview. During the second stage of process, the whole dataset was thoroughly read and disassembled into codes devised during the first stage. During the second stage of process themes were abstracted from coded text segments. This was done by re-reading the coded text segments within context of codes, which have been assigned in earlier stage, to find/extract more common or significant themes. During the 3rd stage of process, the already extracted themes were organized into 3 main groups known as basic themes, organizing themes and global themes. *Basic themes* are the lowest order themes of thematic network. These are the themes which alone do not say much about the text of a data set, but when these themes are grouped or combined with several other similar themes, they can provide broader understanding of the topic. *Organizing themes* are the middle order themes, in which basic themes are combined or organized into different groups, where each group represent themes that are coherent to each other. *Global themes* are the super order or macro themes which comprises of several organizing themes which together represent a concept, claim, assertion, assumption, argument or give information about what text as a whole is about. After organizing the themes, the thematic networks were constructed which during the later stage of analysis were explored within context of original dataset. The final steps of the study included summarizing these networks, interpreting patterns and drawing final conclusions. These steps of the study are detailed in following sections of this chapter.

For interview analysis, researcher utilized MAXQDA 2022 (tool for analysis), for coding dataset, identifying & organizing themes, and after analysis, for creating data visualizations such as code clouds, which have been presented and explained in the following section. MAXQDA is a qualitative and mixed method data analysis tool which provides an efficient and systematic way of organizing, coding & analysing datasets. It also offers advances tools for creating different data visualizations such as concept maps, word clouds, document/dataset comparison charts. Once the whole dataset was fully analysed, the researcher created thematic networks in Microsoft Word, as it was the most efficient tool for creating these networks and adding them in thesis word document. As creating these networks in some other tools / programs required to create their pdf/images and then adding these into thesis but that was not making the content of networks clearly visible, easy to read and understand.

The analysis **resulted in 11 global themes/networks** which are illustrated following the last three stages of thematic network analysis which includes describing each thematic network, summarizing all thematic networks & interpreting patterns. Each of these networks is represented and described as follows:



5.6.1 Summaries of thematic Networks

5.6.1.1 Network of Main Drivers behind AI & BC Deployment/implementation

The thematic network for global theme titled as “Main Drivers behind AI & BC Deployment/implementation” has been illustrated in the figure 5.4.



Figure 0.4: Main Drivers behind AI & BC Deployment



This network is composed of 8 organizing themes which have been composed of 39 basic themes. The code cloud represented in figure 5.5, illustrates the codes and their frequency throughout the global theme. The solidness of colour of code and the font size of the code corresponds to its frequency, meaning that for higher frequency, colour of code will be denser with larger font size. For example, the code “Cost-Saving”, is appearing larger in font and the colour is dense, meaning that this code has appeared very frequently as compared to “job-creation” code, which is appearing very light in colour and also have smaller font size as compared to cost-saving code.



Figure 5.5: Code cloud of Main Drivers behind AI & BC Deployment

Six out of 7 Interview participants and participants of 2 out of 3 focus groups have illustrated that **Data management & utilization** can be performed effectively if AI & BC are employed in its operations. These participants have discussed that Blockchain has the potential to provide immutable record of transactions, identity verification & record management. They have also discussed that AI & BC technologies have the capabilities of analysing very large volumes of data, and can manage data very effectively, as a result of which, the reliable data can be provided to targeted organization/ entity on a demand. According to one of the participants:

“AI and Blockchain technologies can provide better data management capabilities, ensuring the accuracy, reliability & security of data used in public sector services.”

The organizing theme **Optimized operations & resource allocation** has been discussed by 4/7 Interview participants & participants of 2/5 focus groups. The have discussed that AI & Blockchain technologies have the potential to optimize the performance of business/industrial operations. By leveraging these technologies, the business resources can be utilized very effectively and with the help of AI, these resources can be allocated very wisely for different purposes, which would improve the overall productivity of business. According to participants, AI & Blockchain technologies can be used for automation of routine tasks, reduce administrative burden which would result in reduced errors & inefficiencies in work, fraud detection & prevention, and would improve the users trust in business activities. According to an interviewee:

“AI & Blockchain technologies can help address complex challenges facing the UAE public sector, such as cybersecurity, fraud & corruption. By leveraging these technologies, the public sector can better protect itself & its citizens from these threats.”

The Effective **Decision Making** has been discussed by 5/ 7 Interview participants & participants of 3/ 5 focus groups. This theme illustrates that AI & Blockchain technologies can be used to gain very useful insight from the data. AI algorithms can be used to systematically analyse the data, discover underlying patterns, and predict trends, which would enable organization to take decisions,



develop & update policies based on data insights, and such decisions can play a vital role to yield better outcomes. According to the participant:

“AI & Blockchain technologies can provide real-time, data-driven insights that can inform better decision-making within the public sector.”

Economization is one of the main factors that enhance the implementation of AI & BC, on which 5/ 7 Interview participants & one focus groups participants have shared their views. According to these participants, the use of AI & Blockchain technologies to solve real life problems in industries & business can greatly boost up the economy of the business. These technologies can yield fine return on investments by improving & automating the services of businesses, reducing redundancies, reducing labour, reducing errors, preventing fraud, and increasing the overall productivity which will lead to financial growth & economic diversification. Adopting & implementing solutions based on AI & Blockchain technologies can result in remarkable benefits such as cost savings in areas like labour, infrastructure & maintenance and job creation. According to interviewee:

“Implementing AI & Blockchain solutions can result in cost savings by reducing manual labour and errors, optimizing resource utilization, and improving decision-making.”

The implementation of AI & Blockchain technologies in business/industry can enable the public sector of UAE to provide **Upgraded Services** to its citizens. All interviewee’s and focus groups have shed light on the importance of AI & Blockchain technologies to upgrade the quality of services for citizens. The participants have addressed that use of these technologies can provide faster, more accurate & personalized services by streamlining the process, providing personalized & citizen centric services, enabling the interoperability between systems and enhancing the security of systems, data & information and transactions. These technologies can also greatly improve the transparency & accountability of government services for its citizens by providing immutable and transparent platform for data storage & transactions. The participant stated it as:

“AI and Blockchain solutions can enable the delivery of personalized & citizen-centric services. Chatbots and virtual assistants powered by AI can provide instant support and information to citizens, improving their experience.”

According to another interviewee,

“Blockchain technology, with its inherent transparency and immutability, can enhance accountability in the public sector. By recording transactions and data in a tamper-resistant manner, blockchain can increase transparency, reduce fraud, and improve trust among citizens.”

The implementation of these technologies is also capable of providing **Transparent & citizen-centric government** by enabling tamper-proof record keeping, streamlining auditing processes and allowing the citizens to monitor government services. The participant stated that

“Blockchain technology can enable greater transparency & accountability in government operations, allowing citizens to track the flow of information and funds across the government’s systems.”

Derivation of Innovation is another key driver, which has also been addressed in all focus group sessions and by all interviewees. The UAE government is committed to position UAE as a global hub for technology & innovation and has started many initiatives like UAE Strategy of Artificial Intelligence, Dubai Blockchain strategy, to digitally advance it’s public & private sector organization’s services. By embracing these cutting-edge technologies, both public and private sector organizations can position themselves as innovative leaders, and UAE can enhance its competitiveness & reputation worldwide and can also yield significant economic growth.

“The UAE has set an ambitious goal of becoming a world leader in AI and Blockchain technologies. By investing in these areas, the public sector can support innovation and drive economic growth.”



The implementation of these technologies would also result in significant *industrial benefits* such as job-creation, targeted marketing, attracting tech-companies & start-ups and many more, which have been discussed in almost all focus group sessions. Using predictive modelling customers can be segmented based on their interest and marketing initiative can be designed to target the specific audience. The implementation of these technologies, would also enable the organizations to upgrade the infrastructure of organizations, improve interoperability, enable seamless integration across different systems and create new business models. According to participant of focus group,

“AI-powered analytics and machine learning algorithms provide insights for customer segmentation, behaviour analysis and targeted marketing.”

5.6.1.2 Main Challenges behind AI & BC Implementation in UAE Public Sector

The network “Main Challenges behind implementing AI & Blockchain” discuss the main challenges behind implementing AI & Blockchain in UAE public sector. This network is deep & broad in its nature, being composed of 7 organizing themes & 27 basic themes. The 2/7 organizing themes named as “Internal barriers” and “External barriers” encapsulate sub-networks of “main challenges” network. These sub-networks discuss barriers that organisations face internally & externally when implementing AI & Blockchain in their organization. These sub-networks are discussed in detail, in next section separately. The “Main Challenges behind implementing AI & Blockchain” is illustrated in figure 5.6.

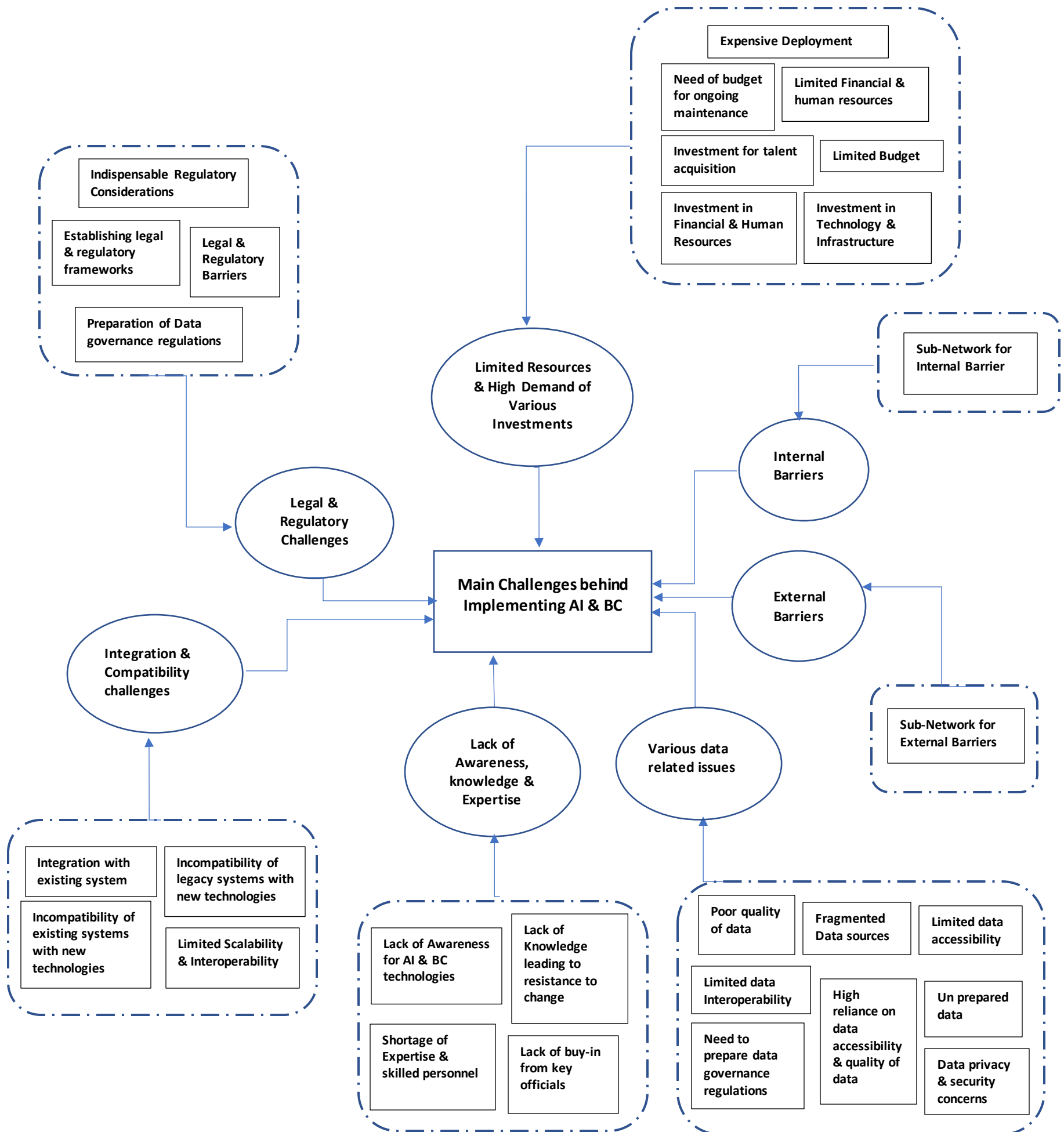


Figure 0.6: Main Challenges behind Implementing AI & BC



The figure 5.7, represents the cloud of codes according to their occurrence frequency in a whole dataset. Higher the frequency of code is, larger is font size of code with dense colour.



Figure 5.7: Code cloud of Main Challenges behind Implementing AI & BC

The organizing theme **Limited Resources & High Demand of various Investments**, has been discussed by 4/5 focus group sessions & all interviewees. Availability of limited resources is the important financial challenge faced when implementing AI & Blockchain solution in UAE public sector. According to participants, the development & implementation of AI & Blockchain based solutions is very costly, which requires significant financial and human resources for its successful implementation. The implementation of such solutions also requires specific & latest technology and infrastructure, so the organizations require significant investments for technology & updating its IT infrastructure such as hardware & software. According to Interviewee,

“Implementing AI & Blockchain technologies can require significant investments in technology, infrastructure, and human resources. This can create challenges around funding and resource allocation, particularly in the context of competing priorities and limited budgets within the public sector.”

Besides, AI & Blockchain technologies are complex which require specific knowledge and skills to deploy them successfully but there is shortage of personal with desired skills, so there is a need to invest in training & development programs for employees and in academia to acquire more talented & skilled workforce. Due to availability of limited resources & budget, UAE public sector might face hinderance in the adoption & implementation of these solutions. According to Interviewee,

“Developing & Implementing AI/Blockchain solutions can be expensive, and public sector organizations may face budget constraints that limit their ability to invest in these technologies.”

Legal & Regulatory Challenges, is the most important organizing theme which has been discussed by all interviewee’s and by all focus group sessions. According to participants, the implementation of AI & Blockchain in UAE public sector is contingent to legal & regulatory frameworks which depends on the applications of these technologies and the sector in which they are being implemented. As these technologies, use data which might also include personal or sensitive information of users, so protecting this information is another serious legal challenge which should be addressed when implementing AI & Blockchain solutions. There are also complex regulatory & legal frameworks in UAE and these solutions should obey the existing local laws & regulations and



specially should comply with data protection frameworks, intellectual property rights, & cybersecurity standards, liability, interoperability, and ethical considerations standards. According to participant,

“AI and Blockchain technologies raise complex legal and regulatory issues that need to be addressed. Ensuring compliance with existing regulations and developing new regulations that adequately address the unique challenges of AI & Blockchain deployment can be a significant challenge for UAE public sector.”

So, the implementation of such solutions requires the establishment of suitable legal & regulatory frameworks and standards which should govern the use of AI & Blockchain in public sector.

The **Integration & compatibility challenges** theme has been discussed by 5/7 interview participants and by all focus groups. According to participants, when implementing AI & Blockchain, in organization, challenges of integration of AI & BC with existing systems or processes, and compatibility issues arise. There are many other factors like fragmentation of systems, interoperability issues, resistance to change, compatibility with diverse systems & platforms etc, which hinder the seamless integration of AI & Blockchain solutions. The UAE public sector might use legacy systems or traditional databases but integration of these solution with such systems is complex & time-consuming process. On the other hand, the technology being used might also not be compatible with new technology required for AI & Blockchain, which would also limit the scalability of these solutions in industry. According to Interviewee,

“Integrating new AI & Blockchain solution with existing systems and processes can be a challenge, especially if the existing systems are outdated or not compatible with new technologies.”

Lack of Awareness, knowledge & expertise, is the other main challenge which has been discussed by 6/7 interviewee’s and by 3/5 focus groups. According to participants, key officials such as stakeholders, government officials and decision makers might have lack of knowledge related to AI & Blockchain technologies, their applications, advantages and disadvantage. This lack of knowledge results in lack of buy-in and interest from these officials, to invest their time & resources in these technologies. The implementation of these technologies also requires specialized skills & expertise such as AI algorithms, machine learning, data analytics, and experience of utilizing AI & blockchain technologies & Blockchain development. But there might be a shortage of personnel with such skills & expertise, and it might become difficult to find & recruit such professional in public sector of UAE. According to participant,

“Building & implementing AI and Blockchain solutions require specialized technical skills and expertise. There might be a shortage of professional with the necessary knowledge and experience in these technologies. Organizations need to invest in training programs, attract talent, and collaborate with universities and research institutions to bridge the skills gap.”

Various data related issues, theme has been discussed by 4/5 focus groups and 6/7 interviewees. According to the participants, as the AI & Blockchain technologies heavily rely on data, so the implementation of AI & BC solutions also faces various data related issues such as poor data quality, fragmented data sources, unprepared data for AI & BC applications, and limited data interoperability & accessibility, inconsistent data formats, data privacy concerns etc, and addressing such issues is quite challenging. They have addressed that, the quality and availability of data affects the performance of AI & BC, but accumulating the relevant and high-quality data can be very challenging and accessing reliable data from multiple sources, might become even more difficult, if it has been disseminated across different departments, systems, or agencies. According to participant,

“AI and blockchain solutions heavily rely on accurate and reliable data. The public sector often faces challenges related to data accessibility and quality, including fragmented data sources, inconsistent formats, and data silos across different government entities. Establishing data governance frameworks and mechanisms to ensure data sharing, integration, and quality control is necessary for successful implementation.”



The data might include sensitive information of citizens, so the data privacy concerns arise and addressing such concerns is a challenge. To address data privacy and security concerns adequately, data governance regulations should be established which should define the policies for protecting citizens information. According to interviewee,

“AI and Blockchain solutions involve handling sensitive and confidential data. Ensuring data privacy and security can be challenging, and breaches can lead to significant consequences, including legal and reputational damage.”

Internal Barriers of AI & BC Adoption, deployment and Implementation

Apart from the main challenges, Internal Barriers network illustrated in figure 5.8, represents the barriers/hurdles that organizations face internally, when adopting, deploying or implementing AI & Blockchain technologies and their related solutions. This network is composed of three organizing themes, which are further composed of 12 basic themes. The code Cloud representing the frequency of most repeating codes is given in fig 5.9.

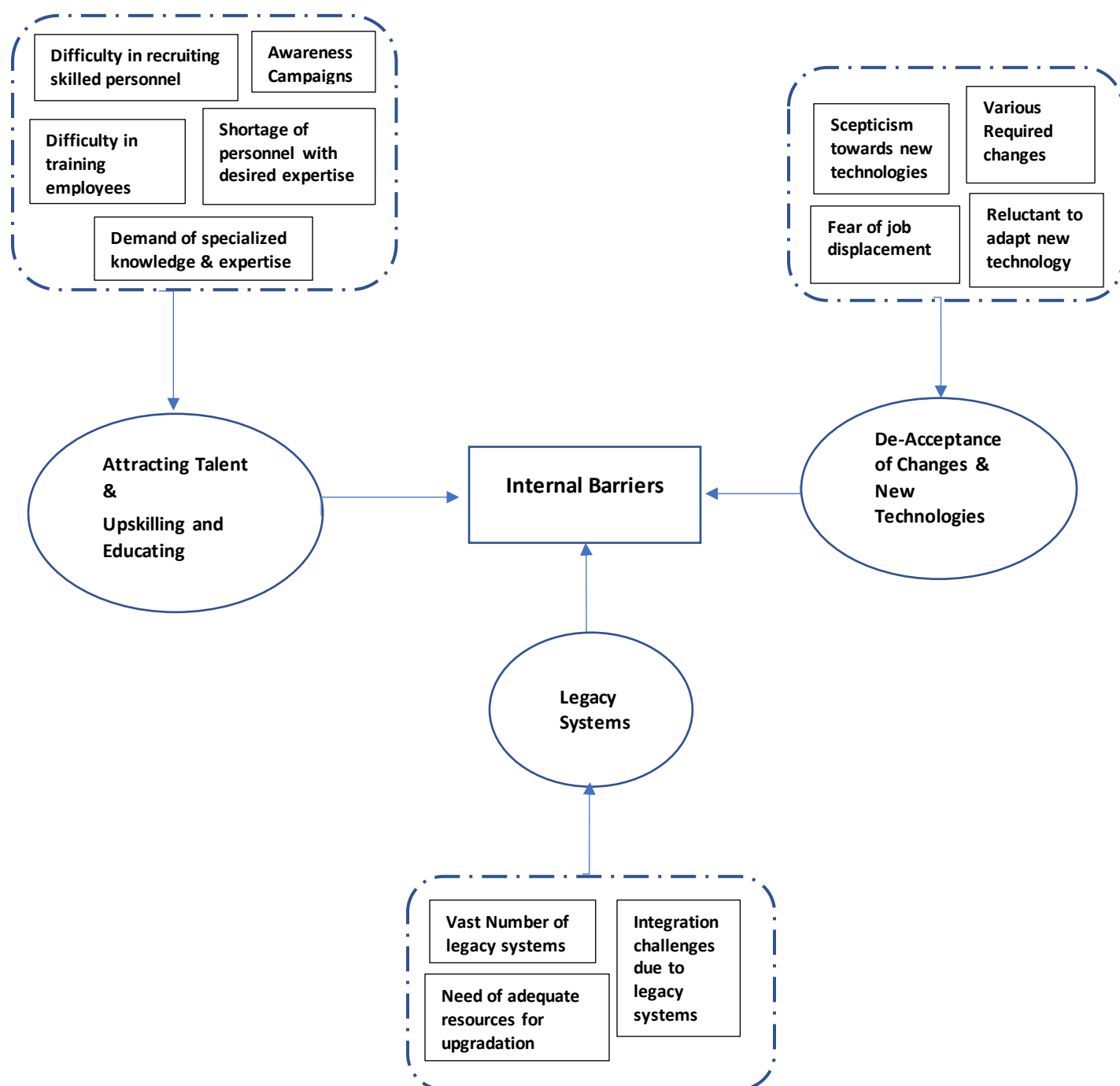


Figure 5.8: Internal barriers



The organizing theme **Attracting Talent & Upskilling and Educating**, has been discussed by four out of 7 interviewee's and four 4/5 focus group sessions. According to participants, the successful implementation of AI & BC technologies and their related solutions require very skilled workforce who are experienced in operations & maintenance of these technologies. But, due to shortage of personnel with required skills, it becomes very difficult and challenging to attract/recruit and retain talent or skilled workforce in this area. For instance, if the organizations have few people with proper skills related to AI & Blockchain deployment, there are chances that these people will switch their jobs in different organizations, wherever they get better job offers/opportunities, so retaining such employees can also become difficult. According to participant,

"The shortage of skilled professional with expertise in AI & blockchain is a common challenge. Organizations may struggle to find or train employees with the necessary skills to implement and manage these technologies effectively."

To prevail over this barrier, there is need of training/upskilling existing staff/employees. For this purpose, organizations need to arrange training workshops, programs, and they also need to collaborate with academia to prepare skilled workforce. But these organizations may also face difficulty in training their existing staff or new employees due to various reasons including lack of technical resources, shortage of time, limited budget and lack of interest from employees and many more. There is also needed to arrange awareness campaigns that should lighten up the key officials such as stakeholders, government officials, employees and decision makers about the potential benefits of these technologies, to gain their support and interest in these technologies.



Figure 5.9: Code cloud of Internal barriers

In **De-Acceptance of changes & New Technologies** theme, which is addressed by 4/5 focus groups and 4/7 interviewee's, participants have discussed that the implementation of AI & blockchain technologies requires many changes in organizations which might include, change in organizational processes and workflows, organizational operations, workforce capabilities and a change in mindset regarding the use of new technologies. According to participant,

"Implementing AI and blockchain solutions often requires significant changes in organizational processes, roles, and responsibilities. Public sector organizations may face challenges in managing the cultural and workforce transformations necessary for successful"



implementation. Upskilling employees, addressing resistance to change, and ensuring the workforce is ready to leverage new technologies can be complex.”

Due to lack of experience and knowledge of these technologies, the stakeholders and employees be afraid of losing jobs, and feel scepticism towards new technologies which results in their reluctance to adapt these technologies. These factors might also serve as hurdle for implementation of AI & blockchain solutions in organizations. To deal with such barriers, there is a great need to establish effective change management policies, and awareness campaigns.

The **Legacy systems** theme has been discussed by 4/5 focus groups and 3/7 interviewees. In this theme, participants have addressed that there are many legacy systems, IT infrastructure and databases in UAE public sector. These legacy systems might not be compatible with new technologies required for AI & Blockchain implementation. So, the integration of these technologies in presence of legacy systems can be very challenging and may require significant alterations in existing legacy systems or a complete overhaul, which can also raise compatibility and interoperability issues. As a solution, the legacy systems need to be replaced or upgraded but the upgradation can itself become challenging because it might also demand various technical resources, time, money and expertise for the upgradation. According to participant,

“Integrating AI and blockchain solutions into existing legacy systems and infrastructure can be complex and challenging. Public sector organizations may have outdated systems that lack the necessary capabilities to support new technologies. Upgrading or replacing legacy systems and ensuring interoperability can require significant time, resources, and coordination.”

External Barriers of AI & BC Adoption, deployment and Implementation

The External Barriers Network represents the difficulties/hurdles that organizations face externally, when implementing AI & Blockchain technologies in their operations. This network is composed of five organizing themes and 19 basic themes which are represented in figure 5.10 with its code Cloud in figure 5.11.

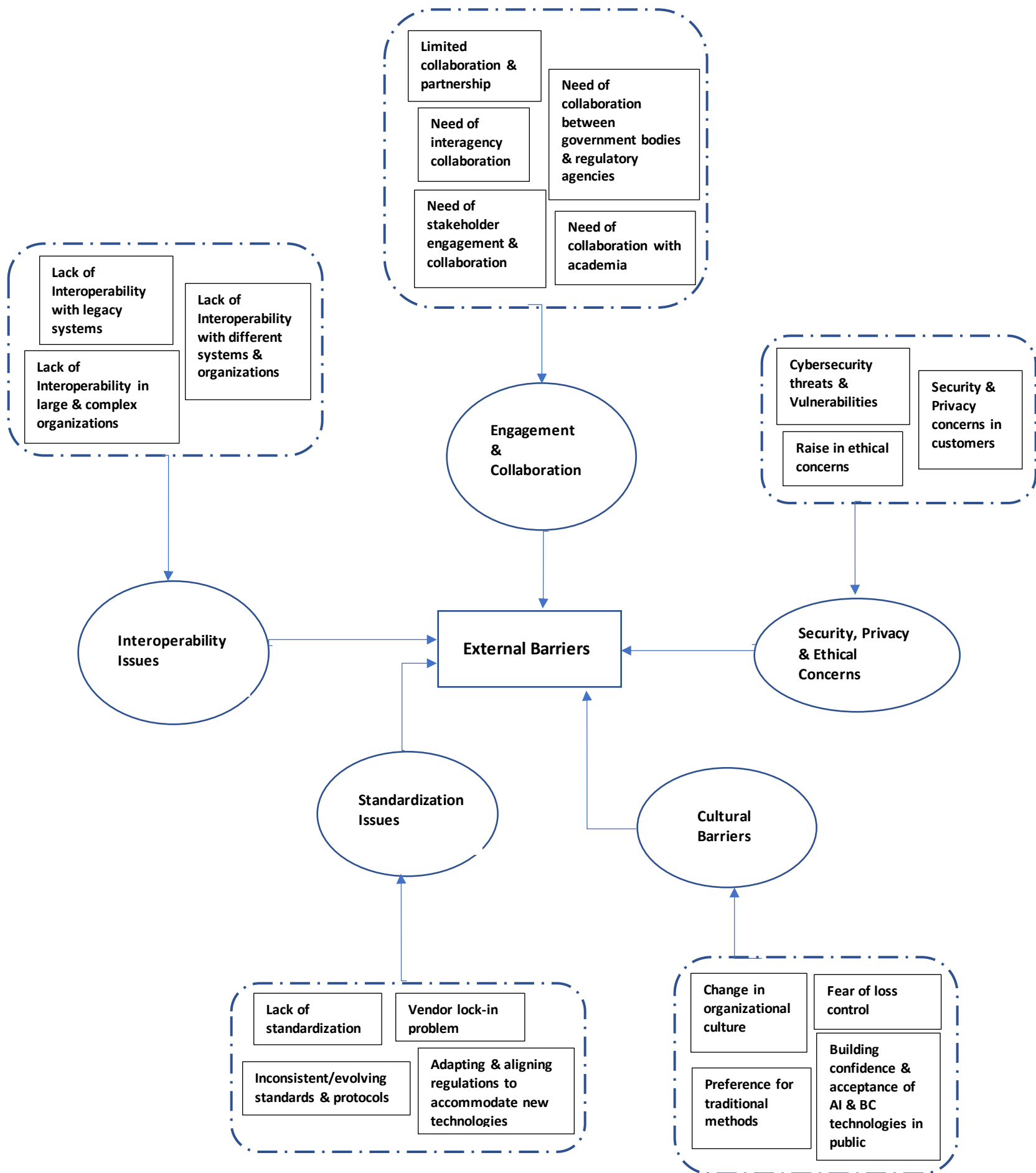


Figure 5.10: External barriers

“Implementing AI and blockchain solutions in the public sector often involves multiple government entities and stakeholders. Achieving collaboration, coordination, and alignment of objectives across different departments can be challenging. Establishing clear governance structures, communication channels, and coordination mechanisms is crucial for successful implementation.”

“Lack of coordination, siloed approaches, and limited collaboration can impede progress. Establishing partnerships, sharing best practices, and fostering a collaborative ecosystem are important for overcoming these barriers.”



Security, Privacy & Ethical Concerns, theme has been discussed 4/5 focus groups and 6/7 interview participants. In this theme participants have discussed that the implementation of AI & blockchain technologies leads to rise in data security and privacy concerns among users as these technologies use citizens sensitive information and due to this sensitivity, public sector organizations may be reluctant to adopt these technologies. So, user's information needs robust security measures to be fully protected against any unauthorized access, data breaches or misuse. Thus, ensuring the privacy and security is crucial and challenging. The implementation of these technologies also give rise to ethical concerns such as fairness, biasness, transparency and accountability, in AI algorithms and blockchain networks. According to participant,



“AI solutions raise concerns related to ethics, fairness, and bias. Ensuring that AI algorithms and models are transparent, explainable, and free from biases is crucial in the public sector. Developing governance frameworks and ethical guidelines to address these concerns can be challenging.”

If these technologies are not implemented and managed adequately, these can also face cybersecurity threats & vulnerabilities, and the systems might get hacked or exposed to attackers. So, these technologies should be implemented and managed with cybersecurity concerns in mind.

Cultural Barriers, theme has been discussed by 4/7 interview participants and two focus groups. In this theme participants have addressed that there are some cultural factors such as change/shift in organizational culture, fear of loss control over the processes & data, and preference for traditional methods, which can also hinder or slow down the implementation process of these technologies. The employees may also prefer the old/traditional method of working, to which they are already used to, such as preferring paper-based processes may also impede the progress. Due to various concerns raised by AI & blockchain technologies, building confidence & acceptance for these technologies in citizens and stakeholder is paramount, and achieving this public trust in UAE public sector organizations is very challenging. According to interviewee,

“AI and blockchain technologies are often seen as complex and opaque, which can lead to concerns around trust and acceptance. Ensuring that stakeholders understand the benefits and risks of these technologies, and are willing to use them, can be a significant challenge.”

The UAE public sector organizations might also face standardization Issues, which has been discussed by all focus groups and 4/7 participants in **Standardization Issues** theme. These participants have discussed that integration of these technologies require standardized protocols and frameworks for seamless communication and interoperability. They have addressed that there is a lack of common standards & protocols for AI & BC technologies, and legal & regulatory frameworks of AI & blockchain technologies are still under-development and evolving, so the unavailability of standardized policies and adaption & alignment of evolving regulations to accommodate new technologies is very challenging which can be a barrier in successful implementation of these technologies in UAE public sector. According to interviewee,

“The regulatory environment and legal framework surrounding the use of AI and blockchain technologies are still developing, which can create uncertainty and hinder adoption.”

They have also discussed that as the implementation of AI & blockchain technologies require collaboration and partnership with other stakeholders such as technology providers, so organizations might become dependent on specific technology vendor or platform, which will create a situation of vendor lock-in, and it is very essential to ensure vendor neutrality for standardized implementation of these technologies.

The **Interoperability Issues**, theme has been discussed by 4/5 focus groups and 6/7 interview participants. The participants have discussed that organizations might also face interoperability challenges when integrating AI & blockchain solutions with existing systems and processes. To avoid fragmentation, implementation of these technologies should ensure the interoperability of systems and information between different departments, systems, agencies or organizations and technologies, and ensuring this interoperability is very challenging particularly in large and complex organizations. As there are many legacy systems and databases in UAE public sector, so ensuring the interoperability of AI & blockchain technologies with legacy systems is very complex and time-consuming process which requires careful planning, coordination & investments. According to participant,

“Interoperability between different systems and platforms is essential for seamless data exchange and functionality. However, achieving interoperability can be challenging due to the presence of diverse systems, standards and protocols within the public sector.”



5.6.1.3 Evaluation network of “Provisional Model for evaluating the implementation and impact of AI & Blockchain Technologies in UAE Public Sector”

The participants were requested to provide their views on “provisional model/conceptual framework suggested” to evaluate it. The framework was purposed to evaluate the implementation and impact of AI/Blockchain technologies in UAE public sector. The provisional model is shown in figure 5.12, which horizontally represents 5 stages of change named as Initial, Repeatable /Developed, Defined, Managed, Optimized, and vertically it represents four dimensions of change called as “Strategy, Technology, People, and Process respectively.

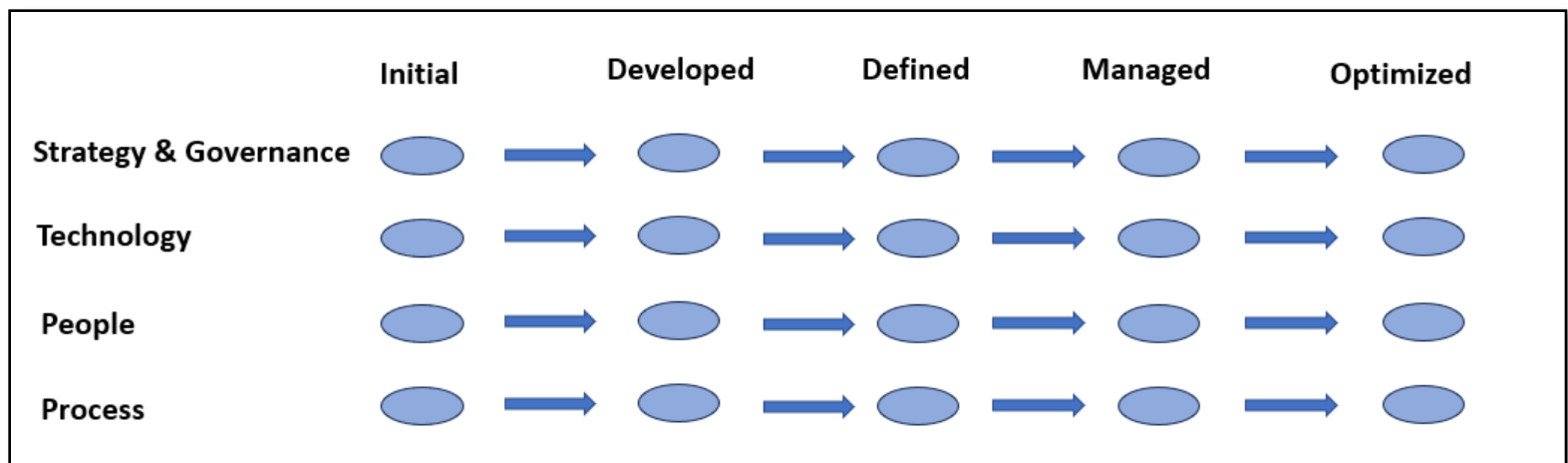


Figure 05.12: Provisional Model

The participants feedback on this purposed provisional model has been summarized and presented in Evaluation of provisional framework’s network. This network is composed of two organizing themes, which are further composed of 11 basic themes. The network is represented in figure 5.13 with its code cloud given in figure 5.14.

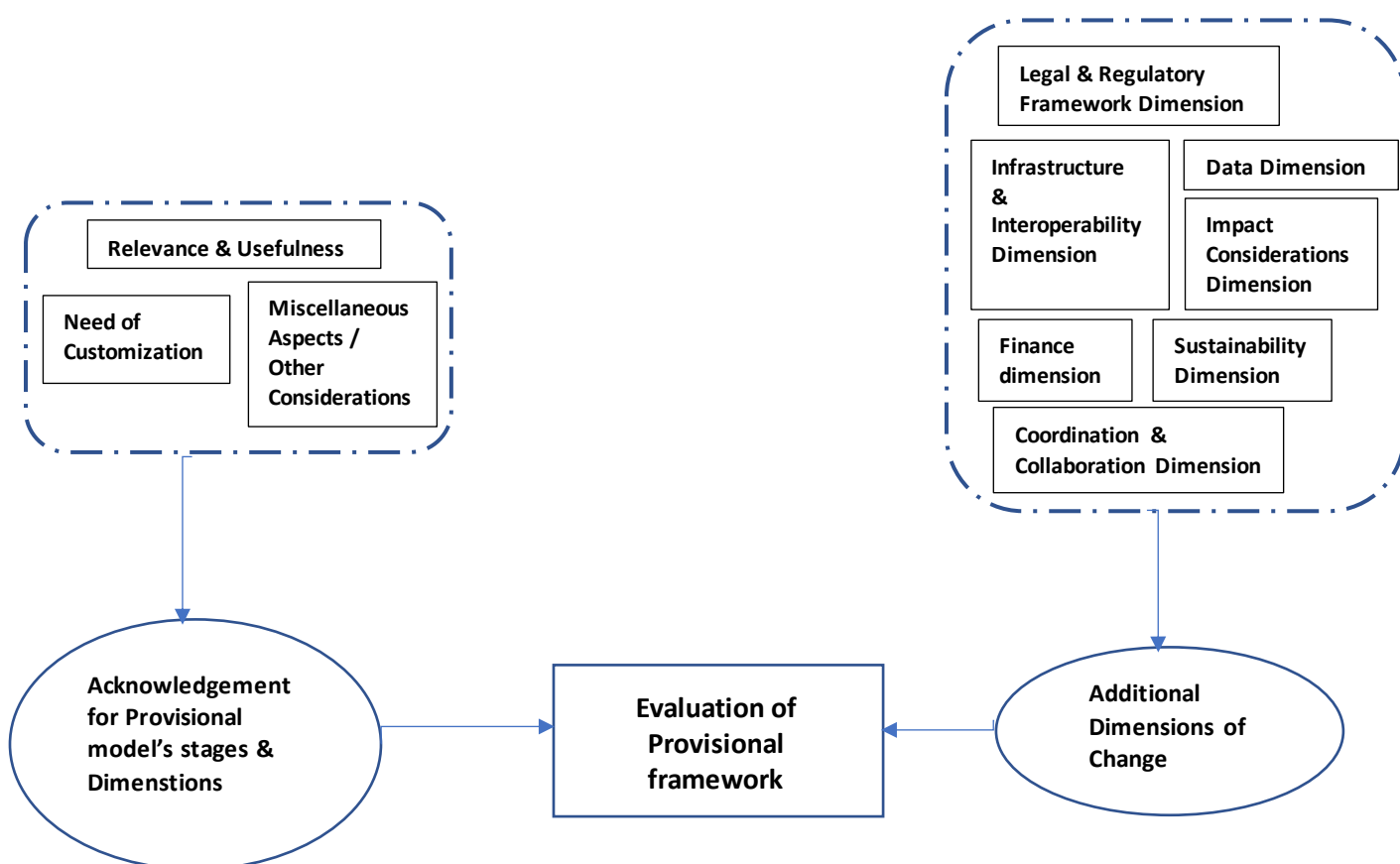


Figure 0.13: Evaluation of Provisional framework



The organizing theme **Acknowledgement for Provisional model's stages & Dimensions** has been discussed by all interviewees. These interviewees have acknowledgement that the suggested conceptual framework's stages and dimensions are important, appropriate, relevant and useful for evaluating the implementation and impact of AI/Blockchain technologies. They are of the view that, each stage of change of this model, represents a specific level of maturity for the implementation process and each dimension of change represents a critical component of implementation. Overall, five stages and four dimensions of change, provide a reliable and holistic framework and a very good starting point for evaluation. According to Interviewee,

"The five stages of change (Initial, Repeatable, Defined, Managed, Optimized) and dimensions of change (Strategy, Technology, People, and Processes) presented in provisional model provide a comprehensive framework for evaluating the implementation and impact of AI and Blockchain technologies in the UAE public sector."

The Interviewee's have also discussed that apart from the stages and dimensions of change, there are also some other aspects such as continuous monitoring, assessment, need of prioritizing certain stages over the other, level of adaption, specific circumstance and nature of organization, that should be considered for evaluating the implementation and impact of these technologies. As the deployment of these technologies is iterative in its nature and impact of these technologies also depends on different factors such level of adoption, quality & availability of data, effectiveness of regulatory frameworks, so the framework should be customized / tailored according to context & use case of implementation. According to Interviewee,

"Overall, while these stages and dimensions can provide a useful framework, the specific stages and descriptions may need to be customized and adapted to the unique context and challenges faced by the UAE Public Sector in deploying AI and Blockchain technologies."



Figure 05.14: Code cloud of Evaluation of Provisional framework

The organizing theme **"Additional Dimensions of change"** has been discussed by all interviewees, in which the participant has discussed that depending upon the specific objective, context of implementation and use -cases, there are some other important dimensions that should also be considered. According to Interviewee,

"It is essential to identify the appropriate dimensions of change relevant to the specific implementation and its impact. Therefore, it is advisable to consult with experts in the field or conduct research to identify any additional dimensions of change that may be relevant to specific use cases."



They have discussed that, although the dimensions of change given in provisional model are suitable for evaluation but other dimensions such as infrastructure & interoperability, ethical or social implications dimensions, governance and regulation dimensions can make the network more comprehensive and adaptable for wider implementations. As the finance and sustainability play a vital role for the successful adaption and implementation of these technologies, and without sufficient resources, it is impossible to fully adopt and implement these technologies, so, finance & sustainability is another important dimension that should be considered. As the implementation and deployment of these technologies, raise many legal and ethical concerns particularly around data protection, information dissemination, and availability of high-quality data, and public sector of UAE has complex and strict laws and regulations, so for evaluation the impact and implementation of these technologies, legal & regulatory framework dimension and Data dimensions should be considered to avoid any regulatory breaches. According to Interviewee,

“The regulatory and policy environment can significantly impact the implementation and adoption of AI/Blockchain technologies in the public sector. Therefore, it is important to evaluate how these technologies align with existing regulations and policies and whether any modifications are necessary.”

They have also discussed that to consider ethical, environmental, societal aspects and cultural factors of implementation, impacts considerations dimensions can play vital role. While the implementation of AI and blockchain technologies require latest technological infrastructure in terms of hardware, software, data storage & connectivity, and the successful implementations should also enable interoperability between different systems, departments and agencies, to work together, so Infrastructure & interoperability dimension should also be contemplated. To meet different objectives of implementation, the successful implementation of AI & blockchain technologies also relies on coordination and collaboration between different departments, organizations and entities such as stakeholders, academia, technology vendors, government officials & regulatory authorities, so, coordination/collaboration dimensions should also be considered. According to Interviewee,

“The successful implementation of AI/Blockchain technologies in the public sector requires the involvement and cooperation of multiple stakeholders. Therefore, it is important to evaluate the level of stakeholder engagement and collaboration in the implementation process.”

5.6.1.4 Network of Ways & Means to improve the Adoption/implementation & deployment of AI+BCT

In Network for Ways & means to improve the adoption, implementation & deployment of AI & Blockchain technologies and their associated solutions, as the name describes, the participants based on their experiences, have provided their suggestions to improve the adoption, implementation & deployment of these technologies. This network, represented in figure 5.15, is composed of 6 organizing themes, which are further composed of 25 basic themes.

In **Setting up the ground** organizing theme, 5/5 focus groups participants, and 6/7 interviewee's have discussed that, for the successful adoption and implementation of these technologies, it is very essential to set up the ground/environment to accommodate these technologies. As the adoption of these technologies raise many legal and ethical concerns, so it is very crucial to establish regulatory frameworks which also comply with existing regulations of UAE public sector. Without breaching any rules & regulations of UAE public sector, these frameworks should ensure the responsible deployment of these technologies. The regulatory frameworks developed should also protect citizen's rights and information and address the biases and privacy concerns. While data is crucial component of the implementation and & deployment of these technologies, so data governance frameworks can play vital role in driving the success for adoption of these technologies and their associated solution. Data governance frameworks should ensure the quality, availability, accessibility, integrity, security and privacy of data. According to participant,

“Developing a comprehensive governance framework can help ensure that AI and Blockchain solutions are deployed in a responsible, ethical, and transparent manner. This can involve establishing clear guidelines and standards for data privacy, security, and ethical use, as well as developing mechanisms for oversight, accountability and risk management.”



To successfully implement and deploy AI & blockchain solutions, it is essential to clearly define the objectives of implementations, resources required, priorities & timelines of project and also the expected outcomes of implementation. Defining all these, would help to customize the implementation and deployment of solutions according to the needs and demands of project & its objectives. By doing so, the results/outcomes of implementation and deployment can be monitored and evaluated effectively. While the implementation of these technologies also requires specialized infrastructure, so modernizing the IT infrastructure including development of data centres and cloud-based platforms for AI & blockchain applications, is salient to ensure the seamless integration of these technologies. Besides, establishment of platforms, forums & communities of practice is also vital, so that AI & blockchain experts and organizations which have deployed these technologies, can share their knowledge, experiences, success stories & lessons learned with others to encourage and help the adoption of these technologies at wider scale. According to participant,

“Establishing platforms or forums for sharing best practices, success stories, and lessons learned can accelerate the adoption and implementation of AI and blockchain solutions.”

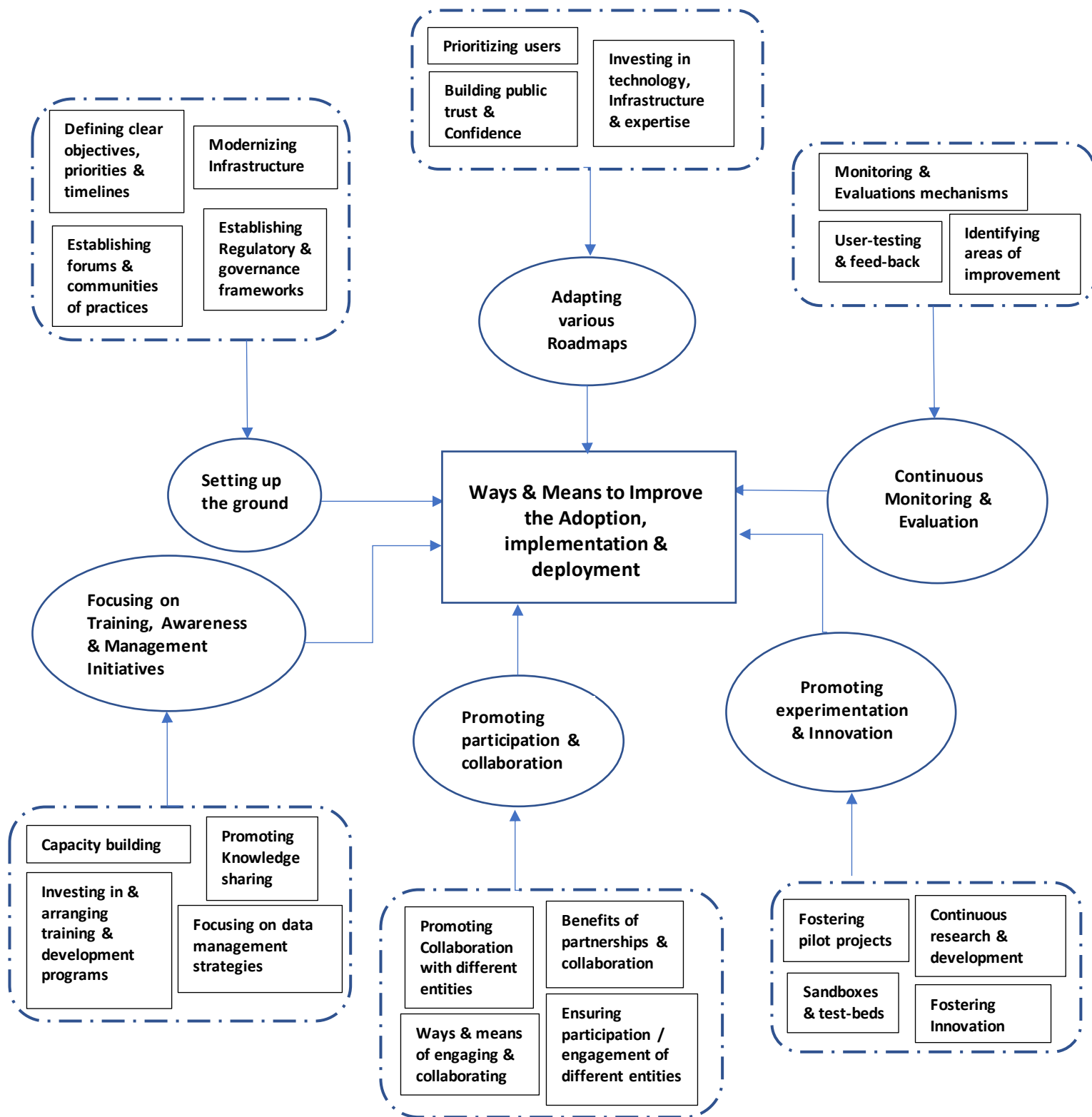


Figure 5.15: Ways & Means to Improve the Adoption, implementation & deployment

The **code cloud** representing the codes of this network, is give in figure 5.16, where the intensity & font of the code corresponds to its frequency of occurrence in whole dataset.



Figure 0.16: Code cloud of Ways & Means to Improve the Adoption, implementation & deployment

The organizing theme, **adapting various roadmaps**, has been discussed by 5/5 focus groups and 5/7 interview's participants. This theme discusses the various roadmaps and strategies such as addressing various concerns, prioritizing users, interoperability & standardization, and making substantial investments, that can improve the adoption, implementation and deployment of these technologies. Participants have discussed that to meet the demand of specialized and updated infrastructure & specialized expertise, making significant investments in technological infrastructure of UAE's public sector and expertise development programs can accelerate the adoption of these technologies and their associated solutions. They have also discussed that, the implementation of these technologies and solutions should place the users at the centre of implementation, by prioritizing users, their needs & interests and adopting user-centric design approach which also involves the stakeholders and end-users in the design & development phases of these solutions. Adopting user-centric approach can help in providing solutions which satisfy the needs and expectations of end users. According to an Interviewee,

"AI and blockchain solutions should be designed with the user in mind, and should prioritize user experience, accessibility, and usability. This can help ensure that these technologies are user-friendly and meet the needs of citizens, government employees and other stakeholders."

They have discussed that when users and stakeholders have trust and confidence in these technologies, they are eager to adopt and invest in these technologies. It is recommended to address citizen's various concerns such as about their participation, legal concerns, data privacy & security issues, to build their interest and confidence in these technologies. Addressing citizen's ethical concerns such as concerns around biases; fairness & transparency of these solutions is mandatory for improving the adoption. According to participant,

"Building trust and addressing concerns related to data privacy, security, and ethical implications can foster public support and acceptance of these technologies."

Continuous Monitoring & Evaluation, theme has been discussed by 5/7 interviewee's and 3/5 focus group participants. In this theme, participants have discussed that, continuous monitoring and evaluation of AI & blockchain solutions is vital to improve the implementation & deployment of these technologies and to ensure that these technologies are aligned with evolving needs & priorities of UAE public sector. According to interviewee,



“Continuous evaluation and improvement of AI and blockchain solutions are essential to ensure that these technologies continue to deliver value and meet the evolving needs of public sector entities.”

These solutions can be monitored and evaluated using different mechanisms such as feedback loops, regularly monitoring the evolving regulations and updating regulatory frameworks accordingly, iterative developments, usability testing, analysing performance indicators etc. To take the user’s feedback on these solutions, users can be involved in the design and development phases, or the solutions can be provided to end users for users-testing and gaining their feedback. By regularly monitoring and evaluating the impacts of these solutions, it becomes easy to identify areas of improvements, and areas of success of these solutions, which can enable AI & Blockchain experts to concentrate and put more efforts to convert areas of improvements into areas of success.

According to participant,

“Define clear metrics and key performance indicator to assess the impact and return on investment of AI & blockchain implementations. Regularly monitor and evaluate the results to identify areas for improvement and optimization.”

Promoting experimentation & innovation, theme has been discussed by 4/5 focus groups and 5/7 interview participants. In this theme participants have discussed that the implementation and deployment of these technologies can be widely improved, if a culture of innovation and experimentation is fostered in public sector of UAE. AI and blockchain solutions should be experimented and tested at smaller scale and in a controlled environment via sandboxes & test-beds, to save time and resources allocated for implementation of these technologies. This would also provide opportunity to resolve issues at smaller scale rather than resolving bigger & complex problem after full deployment. To do the experimentation at smaller scale, pilot projects can be conducted, which can test the feasibility and effectiveness of AI & blockchain solutions. These tests also help in identifying areas of improvement, potential challenges, technical, operational or ethical issues, preparing strategies to resolve potential issues, driving valuable insights and informed decision making. According to participant,

“Conducting pilot projects and proof of concepts can provide valuable insights and practical experience before scaling up. Public sector entities can identify specific use cases within their operations and test AI or blockchain solutions in controlled environments.”

To drive the innovative AI & BC solutions which are aligned with technological advancements of era, AI experts & Blockchain developers should be encouraged to have a mindset of continuous learning, openness to new ideas, and eagerness to accept changes. They should also be encouraged to take risks and continuously research and develop new solutions. According to interviewee,

“Building a culture of innovation and experimentation within public sector organizations can help drive the adoption and deployment of new technologies.”

Promoting participation & collaboration, theme has been discussed by 5/5 focus groups and 7/7 interviewees. These participants have discussed that fostering partnership, collaboration and participation of different entities is vital for successful implementation & deployment of these technologies. The various entities might include technology vendors, external consultants, research institutions, academia, stake-holders, private sector, regulatory authorities, international standards bodies. These various entities can collaborate via conferences, communities of practice, forums, public consultations and awareness campaigns. They have also discussed that collaboration and partnership can yield numerous benefits such as sharing resources, knowledge and expertise. Collaboration with academia can help in upskilling employees and growing certified professionals of AI & blockchain technologies. This can also resolve major challenge “lack of experts”, of implementing these solutions. Similarly, collaboration with regulatory authorities can assist in understand legal requirements, complying the implementation with regulations, and developing new frameworks required for implementation of these solutions. According to participant,



“Collaborating with private sector, start-ups, and research institutions can bring in expertise, innovation, and resources to accelerate the implementation of AI & blockchain technologies. Public-private partnerships can foster knowledge exchange, co-creation of solution, and sharing of investment costs.”

Focusing on Training, awareness & management initiatives, theme has been discussed by 5/5 focus groups and 7/7 interviewees. In this theme, participants have discussed that, as there is lack of expertise, and lack of knowledge about AI & blockchain technologies and their associated solutions among the public and key stakeholders, so capacity building, is a key to successful implementation & deployment of these technologies. Due to lack of knowledge in these technologies, people lack confidence, as a result of which, stakeholders are reluctant to invest in these systems while employees are reluctant to adopt these technologies and work on their solutions. So, it has been discussed that, to build capacity in public to accept and trust these technologies, it is essential to educate employees, stakeholders, and end-users about AI & blockchain technologies, their benefits, challenges, impacts and applications. There is a need to upskill/reskill Employees or existing staff of organizations according to their job roles & responsibilities, so that they can confidentially and successfully implement and deploy these technologies and solutions in their organizations. To achieve training & awareness initiatives, organizations should invest in these initiatives and arrange training & awareness programs, workshops or seminars catered to the needs of employees & stakeholders. The training & awareness programs should target technical & non-technical, operational and ethical aspects of these technologies. According to interviewee,

“Building the necessary skills and expertise within public sector entities is essential for successful implementation of AI & blockchain solutions. Investing in training programs, workshops, and other capacity-building initiatives can help to develop a skilled workforce that can effectively use and manage these technologies.”

They have also discussed that, these initiatives can be achieved successfully, if a culture of knowledge sharing is promoted. The employees & stakeholders should be encouraged to share their knowledge, experience and expertise with each other, so that knowledge is not limited to specific audience, and it also encourages others to invest their time & resources in these technologies. It has also been discussed that, these technologies can be successfully implemented, if all resources including finance, infrastructure, hardware, software, data & information and human resources associated with these technologies are managed properly.

5.6.1.5 Network of AI & Blockchain Training & Awareness Initiatives at different stages

This network discusses training & awareness initiatives according to five **stages of change (initial, Developed, defined, managed, optimized)** of **suggested conceptual framework** given above. Each stage of change is illustrated using the organizing theme, which further represents basic themes related to training & awareness at that stage of change. This network discusses how training & awareness initiatives at different stages would advance in regards of their aims, coverage domain, & modes. The network is illustrated in figure 5.17.

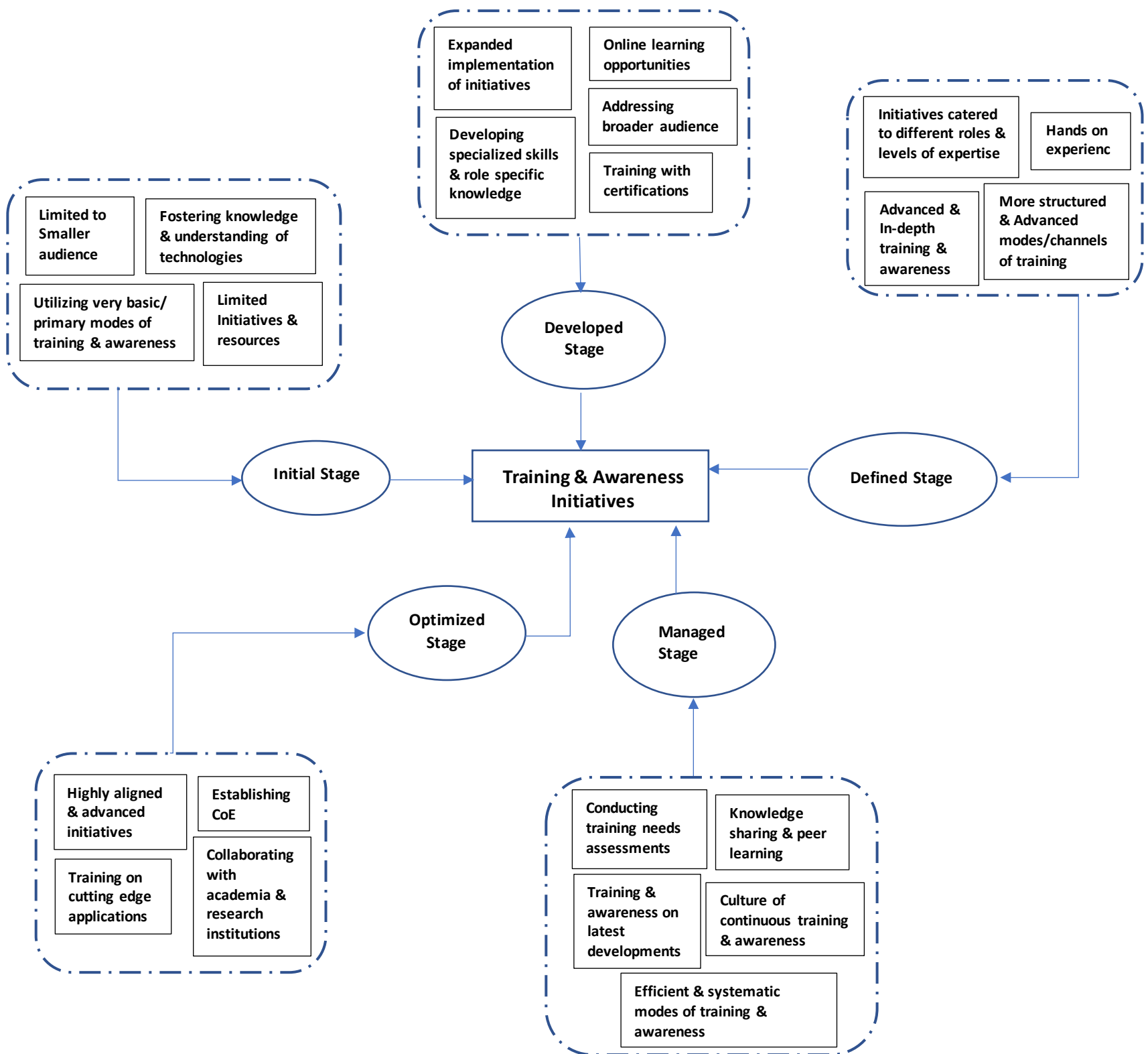


Figure 0.17: Network of Training & Awareness Initiatives

At the **initial stage**, training & awareness efforts are made to familiarize the target audience about AI & Blockchain technologies, their use-cases, benefits and ways to utilize these technologies effectively. The training & awareness initiatives are very finite at this stage, which aim to provide limited training on programming languages, data analytics, algorithms & blockchain protocols, with a greater focus on building basic knowledge & understanding about these technologies among audience. According to participant,

“At the initial stage, the focus of AI and blockchain training and awareness initiatives would be on building foundational knowledge and creating awareness among key stakeholders.”



In this phase, only basic/primary modes of training & awareness are utilized which include awareness campaigns, workshops, seminars and training sessions, to train and educate people. There are also limited resources such as time & money available for spreading awareness and training workforce, so, these efforts are limited to smaller audience which might include only key stakeholder's, decision makers or technical teams working on AI & BC projects. According to participant,

"AI and blockchain training & awareness would be limited to a small group of individuals, likely those directly involved in the implementation process."

In the **developed stage**, as the implementation of these technologies' forwards, training & awareness initiatives are also enhanced, expanded and formalized. Organizations begin to invest in training to upskill their employees, so that they can utilize best practices to implement & manage these technologies. Awareness sessions include discussions on case studies, demonstrations showing real world applications of these technologies, and also success stories of AI & blockchain projects, to encourage employees to advance in this field. Training & awareness is not limited to only specific/limited audience, but it expands to address broader audience including wide range of employees, all teams and departments involved in implementation process. At this stage, to develop specialized skills & role specific knowledge in employees, these initiatives aim to educate & train the employees and stakeholders on practical applications of these technologies within organization, upskilling employees in AI & blockchain technologies, and in specific tools & methodologies required to utilize these technologies. According to participant,

"At the developed stage, the training and awareness initiatives would expand to cater to a broader audience and address specific roles and functions."

Organizations or public sector of UAE may also establish collaboration with academic institutions, so that academia can produce a skilled workforce, provide specialized courses or degree programs related to these technologies, and certifications to individuals in recognition of skills they acquire. Efforts are also made to not only provide the learning opportunities by physically being present in particular institutions, but also to provide online learning opportunities, so that employees can gain knowledge & skills at any time of a day and at any place. This would also eliminate restriction of physical presence which can hinder their learning progress.

There is advanced, targeted & comprehensive training & awareness efforts at **defined stage**. At this stage, training and awareness initiatives are ingrained into organization's culture and these programs are designed to meet training & awareness needs of different roles and expertise level within organization. For example, there might be some initial training programs for employees with no knowledge or experience of AI & blockchain technologies, and advance training programs for skilled employees/professional who have been working on AI & blockchain projects. At this stage, training programs provide in-depth knowledge and training on these technologies which include hands on experience on using different tools & techniques, AI algorithms, or blockchain governance model development, machine learning techniques and smart contract development. According to participant,

"Training covers technical aspects of AI and blockchain, as well as their implications on business, processes and decision-making."

This stage utilizes more structured & advanced modes/channels of training & awareness, such as newsletters, internal knowledge sharing platforms, seminars, conferences or knowledge repositories.

At **managed stage**, training & awareness efforts focus on providing training & awareness on industry-based domain specific knowledge and awareness on latest developments in AI & blockchain technologies, rules & regulations. In this phase culture of continuous training & awareness is fostered, to keep employees up to date on emerging tools & techniques related to AI & BC. Besides, the employees & stakeholders are updated regularly on new policies or regulatory frameworks, so that the implementation of these technologies is also aligned with legal & regulatory requirements. According to participant,



“In the managed stage, organizations focus on ongoing training and awareness to ensure continuous learning and proficiency in AI and blockchain technologies. This stage involves providing regular training updates and refresher sessions to keep employees up to date with the latest advancements and industry trends.”

To better understand the needs of employees & identify the skills gap, training needs assessments are conducted regularly, in which employees are asked to provide their feedback on these programs, what are their learning barriers and which AI & blockchain related skills they want to develop. To keep pace with evolving technologies and demands, these training needs assessments are then used to tailor the training programs according to specific requirements. This stage utilizes very efficient and systematic modes/channels of training & awareness with a greater focus on knowledge sharing & peer learning. For this purpose, knowledge sharing platforms/forums, communities of practice, discussion portals & collaborative forums are established to ease knowledge sharing & peer learning among employees and various stakeholders involved in these projects.

At the **optimized stage**, training & awareness initiatives are highly aligned with specific needs of public sector of UAE and aim to foster innovation in AI & blockchain. Dedicated training departments or Centre's of Excellence (CoE) are established at this stage to provide development and mentorship opportunities which would encourage continuous learning and professional development in employees. CoE also promotes knowledge sharing, research and experimentation on AI & blockchain technologies. Collaboration with academia, research institutions and industry networks is established to further research on AI & blockchain technologies and to drive innovation.

“Additionally, the organization may have established partnerships with universities or other educational institutions to ensure a steady pipeline of skilled employees in these areas.”

At this stage, as the employees are already well-versed in these technologies, so training is provided on emerging technologies, cutting edge applications, and domain or industry specific applications.

5.6.1.6 Network of Employee's Digital skills at different stages

The network of “Employee's digital skills”, given in figure 5.18, illustrates employee's digital skills at various stages and also shows that how their skills would evolve through five stages of change.

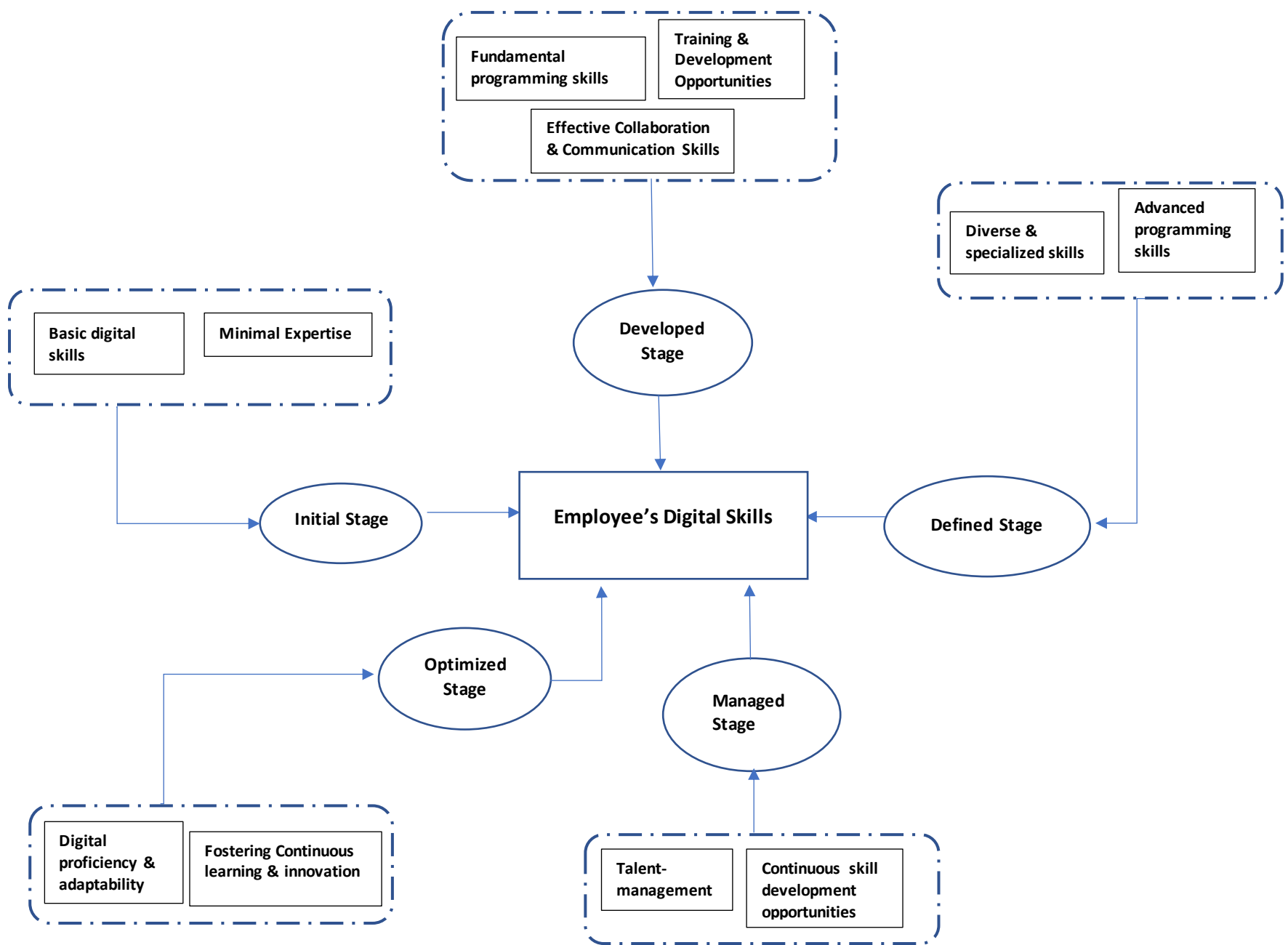


Figure 0.18: Network of Employee's Digital Skills

At **initial stage**, employees have very limited or basic digital skills related to AI & blockchain technologies. They are expected to have fundamental digital skills such as proficiency in using computers, navigating through networks, understanding of fundamental programming concepts and ability to leverage AI & Blockchain tools and platforms. They might have understanding & knowledge of AI & blockchain concepts, potential advantages and implementation use-cases but lack technical skills required to implement & manage these technologies such as data management & analysis and AI & blockchain related programming skills. According to participant,

"At the initial stage, employee digital skills in the UAE private sector may be relatively basic. Employees might have general understanding of digital technologies but may lack specific skills related to AI and blockchain."

As employee's digital literacy related to AI & blockchain is confined to basic skills, so they require proper training and skill development to enhance their digital competency related to AI & blockchain technologies.



At **developed** stage, employees have increased technical competencies related to AI & blockchain technologies. They have fundamental programming skills required for AI & blockchain technologies such as machine learning, data analysis and cryptography. They also have effective collaboration & communication skills to work in teams or multidisciplinary environments. Although employee's digital skills have progressed, but they would still require further training & development opportunities which would provide them supportive learning resources and hands on experience to acquire more specialized technical skills, so organizations might arrange training & development programs to upskill their employee's digital competency. According to participant,

"As AI and blockchain implementation progress, employees start acquiring more specialized digital skills. Organizations may invest in training programs to upskill employees in areas such as data analysis, machine learning, or blockchain development."

At **defined stage**, employees would possess diverse and specialized skills related to AI & blockchain technologies. Their digital skills would be well-aligned with specific job requirements for various jobs related to AI & blockchain. Employees have comprehensive knowledge and understanding of legal & ethical implications of these technologies and their skills would comply with legal & ethical regulations. According to participant,

"Employees would be trained to understand the ethical and legal implications of AI and blockchain technologies. They would develop knowledge of privacy, security, data protection and compliance regulations to ensure responsible use of these technologies."

At this stage, the specific unit/department responsible for implementing & managing AI & blockchain initiatives would have teams of AI & Blockchain professionals equipped with advanced technical & programming skills such as AI model development, data engineering, blockchain architecture and smart contract programming.

At **managed stage**, organizations employee's digital skills are continuously managed and optimized to develop highly advanced skills for effectively implementing and managing AI & blockchain technologies. Organizations implementing AI & blockchain in their operations and processes have comprehensive talent management strategies for hiring & retaining skilled professionals and upskilling existing staff. They would conduct skill assessments and performance evaluations to identify any skill gaps in employees and refine their training & development initiatives accordingly. According to participant,

"Performance evaluation mechanisms would be in place to assess and provide feedback on employee digital skills. This would help identify areas for improvement and support individual development plans to bridge any skill gaps."

The organizations also provide continuous skill development opportunities to its employees, to yield effective implementation and continuous improvement. Such initiatives might include online courses, seminars, and workshops to upskill employees according to latest technological advancements. Employees might also acquire advanced training in deep learning, natural language processing and smart contract development.

At **optimized stage**, employees are empowered with highly advanced digital skills which facilitate enhanced productivity and decision making. They possess highly proficient skills and ability to effectively lead and manage AI & Blockchain projects, teams, and organizational strategies. There is culture of digital proficiency & adaptability in organizations, as these organizations have employees who possess highly specialized AI & blockchain related digital skills and capability to experiment with emerging tools and technologies and explore new applications of these technologies. Organizations foster a culture of continuous learning and encourage their employees to explore and research innovative ideas relevant to AI & blockchain. This would facilitate creativity and innovation in these technologies. According to participant,

"In optimized stage, employee digital skills reach a high level of proficiency and agility. This stage involves fostering a culture of continuous learning and innovation. Employees may have advanced skills in AI and blockchain technologies and be capable of exploring new applications, experimenting with emerging tools and driving innovation within organization."



5.6.1.7 Network of Organization Structure & Communication at different stages

The “Network of Organization structure & communication”, describes how the structure of organization would evolve from flat & centralized structure to well defined & comprehensive structure through change in stages. This network also discusses evolution of communication channels & objectives with different stages of change. This network is illustrated in figure 5.19.

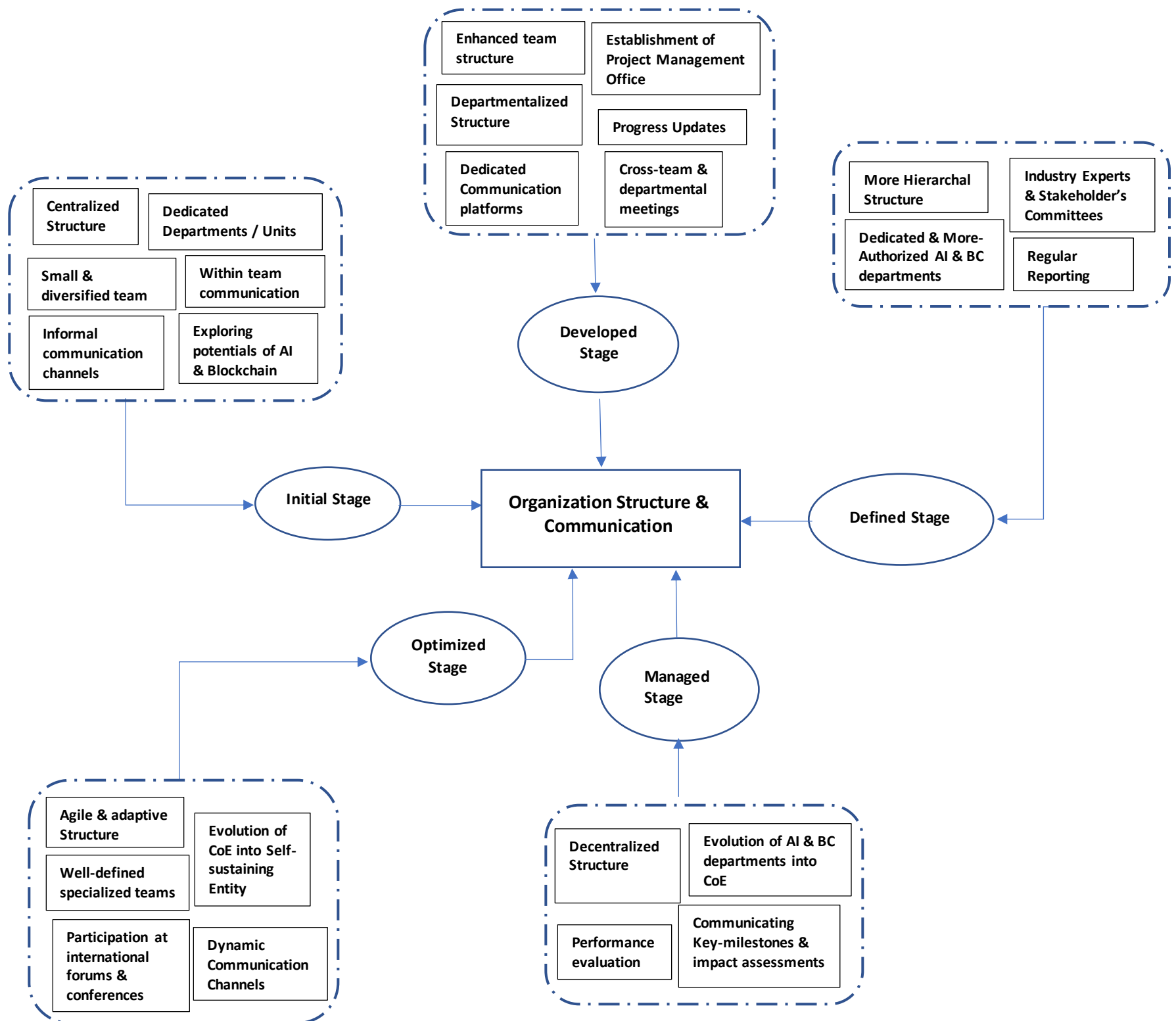


Figure 0.19: Network of Organization Structure & Communication

At **initial stage**, the organization structure is very flat & informal. The organizations have centralized structure in which each team reports to a designated project sponsor and work under a central innovation unit. At this stage, only a particular or dedicated department or unit of organization is responsible to explore these technologies and work on AI & BC related projects. AI & BC project



teams consists of members with diverse backgrounds which might include, project managers, domain experts, policy advisors, various government department representatives or technology experts. At this stage, communication only take place within team and the aim of this communication is also to explore the potentials of these technologies and to build awareness and understanding of these technologies. Gathering insights, collecting information, information dissemination, exploring the potentials & use -cases of these technologies, exploring the external collaboration and partnership opportunities are the objectives of communication at this stage. This stage utilizes very basic and informal modes/channels of communication which include, emails, presentations, workshops, regular meetings and internal knowledge sharing platforms. According to participant,

“Communication at this stage would focus on information gathering, research, and awareness building. The team members would collaborate closely to conduct feasibility studies, identify potential use cases, and explore partnerships with technology providers.”

At **developed stage**, the organization structure is enhanced and expanded which consists of cross-functional teams having members from different departments & business units. These team members have enhanced expertise such as specializations in AI & blockchain, data science, machine learning, and many other related fields. At this stage, the Project management office (PMO) might also be established to administer AI & BC initiatives. The structure of organization is departmentalized in this phase where teams are organized into various workstreams to work on various AI & BC related projects. Specialized roles & responsibilities are assigned to each team member and these teams are also encouraged to work on pilot projects to experiment the solutions offered by these technologies and scale up the implementation of AI & Blockchain technologies across different departments and agencies. According to participant,

“At the developed stage, the organization structure could be more departmentalized, with distinct teams or divisions responsible for different aspects of AI and blockchain implementation. For example, there might be teams focusing on AI model development, blockchain infrastructure management, data governance & policy formulation.”

At developed stage, more structured and formalized communication channels are utilized to exchange information and share progress updates on projects associated with these technologies. The progress updates might include project status reports & dashboards. In this phase regular meetings and various reporting mechanisms such as reporting lines are established. To ensure coordination and collaboration among different departments and agencies implementing AI & BC, cross-team & departmental meetings, conferences, or industry events are held so that knowledge, experiences and best-practices can be shared with each other. This stage also utilizes dedicated communication platforms such digital platforms, project management tools, and collaboration platforms.

At **defined stage**, the structure of organization becomes more standardized and hierarchal with specialized roles defined, and establishing units within departments, to effectively implement and manage these technologies. These specialized roles and divisions of units focus on different aspects implementation such as data management & governance, policy formulation, and technology integration, to successfully deploy these technologies across department or organization. According to participant,

“At defined stage, organization structure might be more hierarchical, with clearly defined roles, responsibilities, and reporting structures. There could be specialized divisions or units within AI and blockchain department, focussing on areas such as res earch and development, operations and maintenance, training & capacity building.”

The structure of organization has dedicated departments or centres of excellence to support the strategy development, implementation and governance of AI & BC in organization. These departments are more authorized at this stage and have decision making authority and they report to only senior management or advisory boards committees supervising AI & BC initiatives.

The communication is also streamlined at this stage. At this stage, committee’s including industry experts and various internal / external stakeholders and technology vendors, might be held to share best practices regarding implementation of these



technologies. Communication mediums of this stage include whitepapers, conferences, executive briefings, strategic planning sessions and industry publications. Regular reporting and feedback mechanisms are established in this phase, so that any adoption / implementation challenges being faced, could get resolved for seamless integration of these technologies. According to participant,

“Communication may become more formalized, with regular reporting & feedback mechanisms established. The focus may be on establishing policies and procedures for implementing these technologies in a secure, ethical, and transparent manner.”

At **managed stage**, AI and BC would have been fully integrated and structure of organizations would be decentralized in which each division or unit of organization is responsible to implement specific function of these technologies, and there would be specialized teams for managing the implementation of AI & BC initiatives. At this stage, senior level executives are appointed to monitor the various operations of these departments. According to participant,

“At managed stage, organization structure would be mature and well-integrated with overall government structure. The AI and blockchain department would have well-defined divisions and units responsible for specific functions.”

In this phase, AI & BC departments are evolved into Centre of Excellence, which have expanded capabilities and dedicated resources to monitor the deployment of these technologies across various government departments, and to foster innovation via collaborating with private organizations, universities and research institutions. At this stage, focus is kept on proper governance of AI & BC and its associated resources and optimizing the performance of these technologies. For this purpose, the performance of these technologies is evaluated regularly using real time feedback mechanisms and adopting clear governance structures & policies to ensure ethical and responsible deployment of these technologies.

To optimize the communication standards, collaboration platforms and tools are utilized for communication at managed stage. The results of performance evaluation, impact assessments of these technologies in organizations, and key-milestones of AI & BC related projects are communicated with senior leaders, regulatory bodies and government officials via using formalized communication channels which might include, executive briefings, formal presentations and strategic planning sessions or conferences.

At **optimized stage**, the organizations have agile and adaptive structure, which can swiftly adopt the emerging technologies and keep pace with technological advancements of era. At this stage, AI & BC would have integrated throughout the organization and to stay aligned with advancing technologies, focus is kept on continuous learning & fostering innovation. According to participant,

“The organizational structure may become more flexible and adaptable, with an emphasize on agility and responsiveness to changing market conditions.”

At this stage, the CoE becomes a self-sustaining entity which thrives to drive continuous improvements and foster innovation within organization. CoE, at this stage consists of specialized teams working on AI & BC projects. CoE becomes capable of setting up the industry standards and performs a role of consultative body for all public or private organizations who are seeking help to integrate these technologies in their business units. It can also provide insights and proposals for future policy formulation and strategic decision making.

At this stage, data-driven communication, and analytics & predictive models-based decision making is carried out. This stage develops external and strategic communication plans for real time dissemination of information, knowledge and exchange of ideas. For this purpose, dynamic communication channels are utilized which might include online collaboration platforms, innovation hubs and high-level presentations. These organizations actively participate at international forums, conferences and in thought leadership roles to optimize the performance of these technologies, foster innovation, gathering latest updates on technological & industrial advancements and to publish their research papers.



5.6.1.8 Network of Vision, Mission, Objectives at different stages

The network of vision, mission, & objectives, given in figure 5.20, illustrates that how the vision, mission and objectives of organization might evolve through, different stages of change, of conceptual framework. Although, each organization would have its specific Vision, mission, and objectives for implementing AI & Blockchain in its operations, so the network discusses the organization's generic vision, mission, and objectives for adopting these technologies. As vision, mission and objectives are components of organization's strategic management and they have been discussed collectively in this network, so basic themes comprising each of these components are highlighted in different colours as shown in figure.

At **initial stage**, the vision would be to enhance the efficiency & transparency of organization's operations and processes by leveraging AI and blockchain technologies. The vision at this stage would also be to utilize these technologies to improve government services of public sector of UAE, and providing customers, the citizen-centric services and most joyful and reliable experience. The organizations would have mission to identify use-cases of these technologies and conducting experiments such as pilot-projects or proof-of-concepts to assess the viability of these technologies. According to participant,

"The mission could be to conduct pilot projects and proof-of-concepts to evaluate the feasibility and benefits of AI and blockchain in specific areas of public sector."

The objectives would include establishing roadmaps for conducting experiments or future implementation of these technologies and identifying areas/processes in organization where these technologies can add value. Besides, organizations would also establish collaboration & partnership with key stakeholders, academia, technology vendors, legal authorities for successfully leveraging these technologies. Building awareness and knowledge in public and key officials, about these technologies, their use-cases, potential benefits and challenges, would be key objective to build public trust and interest in these technologies.

At **developed stage**, the vision would be to enhance and expand the implementation of these technologies. The organizations might foresight to become a regional leader for successful adoption of these technologies and for setting up new standards for enhancing the efficiency and providing citizen-centric services, by leveraging these technologies. According to participant,

"The vision at the developed stage could be to have implemented AI and blockchain solutions across multiple government departments, enabling improved service delivery, data sharing, and decision-making processes."

The mission at this stage, would be to scale up the implementation of these technologies across multiple departments, various business functions & processes of organization. It might also include establishing standardized AI & blockchain systems in organization and setting up SOPs for deploying these technologies. The objective at this stage would be to establish a secure and scalable blockchain infrastructure which can support the expanded implementation of these technologies. To enhance the implementation and effectiveness of these technologies, the objectives would include establishing governance mechanisms for governing the implementation and making necessary changes. The interoperability between different systems would be promoted to facilitate seamless collaboration and exchange of information.

At **defined stage**, the vision of organizations would be to maximize the benefits of these technologies, while minimizing the various risks associated with these technologies. As these technologies would have been adopted by majority or public sector of UAE, the vision would be to ensure that these technologies are being implemented lawfully and ethically. The mission would be to create intelligent and self-governing systems, which provide maximized benefits such as enhanced efficiency, productivity, privacy & security and intelligent decision-making. To ensure ethical implementation, the mission would be to establish various regulatory frameworks, such as policies for data privacy & security, governance frameworks, and regulations for ethical data collection, storage and usage. According to participant,



“The mission could be to develop a comprehensive framework for managing these technologies, including policies for data privacy and security, governance and accountability and stakeholder engagement.”

The objectives of this stage would be to establish regulatory compliance frameworks for ensuring that, the implementation/deployment of these technologies is in accordance with the established regulatory frameworks or regulations of public sector of UAE, and various risks associated with these technologies such as concerns regarding data privacy & security are reduced. The objectives would also include upgrading AI and blockchain solutions by leveraging advanced AI models & algorithms, and decentralized blockchain networks to address complex business challenges.

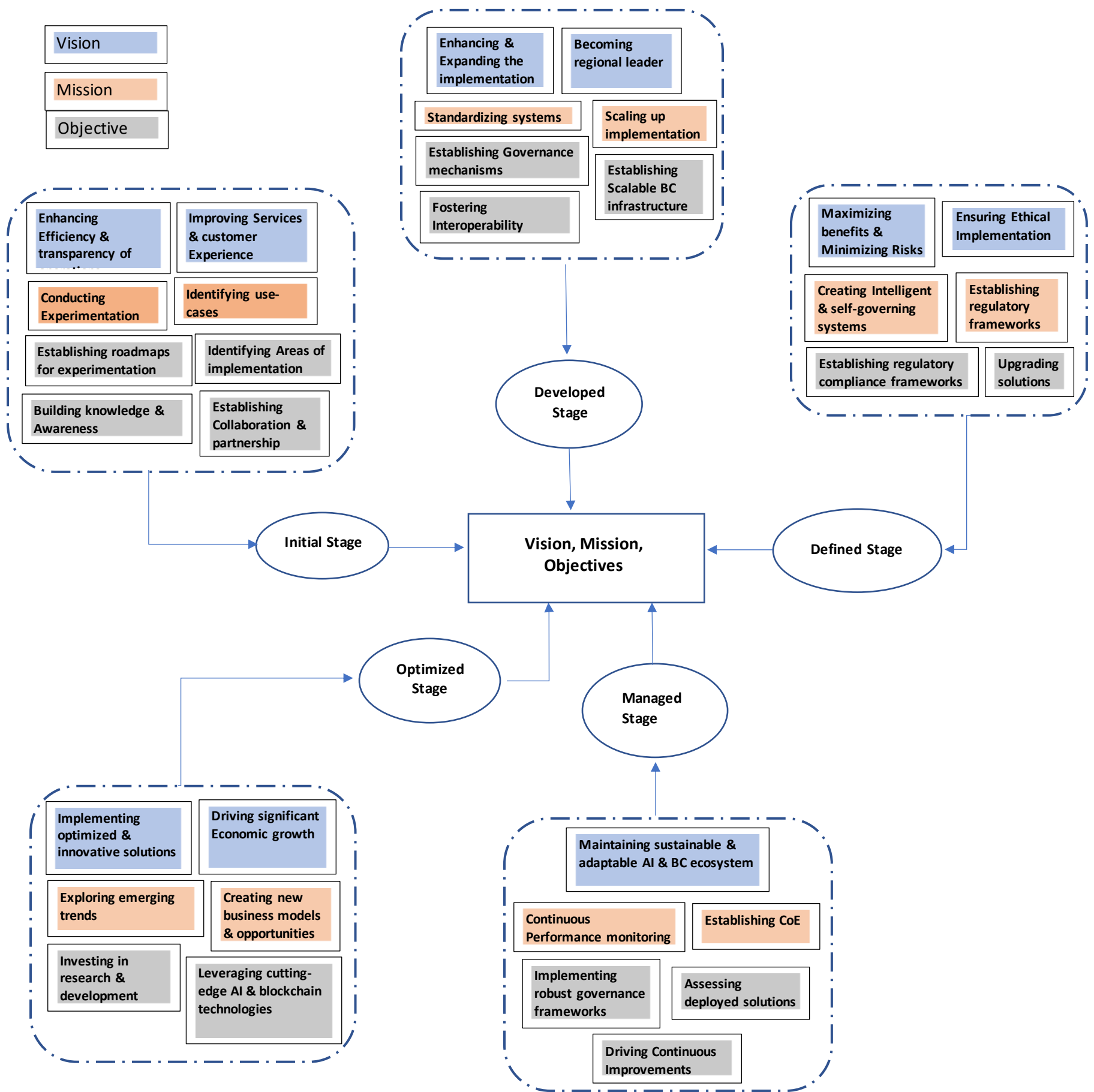


Figure 0.20: Network of Vision, Mission & Objectives

At **managed stage**, the vision would be to maintain a sustainable and adaptable AI & Blockchain ecosystem, which can be tailored to evolving market conditions or specific needs of public sector of UAE. The mission would be to continuously monitor the



deployment of these technologies and their performance to ensure that these technologies are achieving the targeted objectives and producing the desired outcomes/results. It might also include establishing dedicated Centre of Excellence (CoE), responsible for effectively monitoring & managing these technologies. According to participant,

“The mission would be to continuously monitor and manage AI and blockchain deployments, ensuring their alignment with organizational goals, ethical standards, and regulatory requirements.”

The objectives would include implementing robust governance frameworks for continuous monitoring of these solutions and assessing the impacts & implications of these technologies by leveraging various key performance indicators (KPIs). The purpose of continuous monitoring would be to utilize the results of monitoring or analysis to drive continuous improvements in these solutions accordingly to yield the optimized results.

At **optimized stage**, the vision would be to leverage and implement optimized and innovative AI & blockchain solutions and yielding a significant economic growth in public sector of UAE. The mission would be to explore the emerging technological advancements and industrial trends and researching in depth on those trends to create & implement innovative solutions, for yielding optimal performance. It would also include exploring and creating new business models and opportunities to deliver highly optimized and personalized services and driving economic growth. According to participant,

“The mission could be to explore emerging AI and blockchain trends and apply them strategically to disrupt markets, deliver exceptional customer experiences, and generate sustainable growth.”

The objectives at this stage would be to leverage and implement cutting-edge AI and blockchain technologies in business operations to achieve the optimal efficiency, effectiveness and productivity. The objectives would also include investing in research and development initiatives to foster a culture of research and innovation within organization. It would encourage employees to explore new AI & Blockchain opportunities and investing their efforts to create innovative solutions, for staying abreast of technological advancements.

5.6.1.9 Network of Rules & Regulations at different stages

The network of “Rules & Regulations” given in figure 5.21, provides an overview of how regulatory frameworks or rules & regulations regarding the adoption, implementation and deployment of AI & BC technologies would evolve at each stage of change. Each stage of change represents the rules & regulations that would be adopted and developed in that phase.

At **initial stage**, there are very limited or general rules & regulations which are followed for adoption, implementation and deployment of AI & BC technologies. As this stage, as there is a lack of confidence in these technologies and how to utilize them effectively, the primary focus is kept on exploring the potentials and use-cases of these technologies. As there is also a lack of knowledge around the legal & regulatory requirements and restrictions that should be considered. So, to avoid breaching any rules and regulations of UAE public sector, considerate efforts are made in analysing & identifying legal concerns and requirements. To understand and identify legal requirements, the officials responsible for adoption & implementation of these technologies might deeply analyse the use-cases of these technologies and they can also collaborate with regulatory authorities and legal experts to understand legal requirements. According to participant,

“Risk assessments and impact analyses may be conducted to identify potential legal, ethical, and security concerns.”

At this stage’s regulatory frameworks are established which basically intends to ensure the ethical and responsible use of these technologies while ensuring the compliance with existing regulations such as General Data Protection regulations of UAE public sector. It is the responsibility of organizations adopting these technologies that any personal data or information of end-users is collected, processed and stored securely, and AI algorithms and blockchain transactions are transparent and impartial. According to participant,



“Guidelines and principles around ethical AI usage and responsible data handling may be established to address potential biases, fairness, and transparency in AI and blockchain technologies.”

At **developed stage**, as the focus is on expanding the implementation of these technologies, so more comprehensive and formalized rules & regulations which provide essential guidelines and policies for AI & BC deployment, are established and followed at this stage. These regulations also intend to overcome industry-specific challenges and requirements of deploying these technologies in various sectors/industries such as healthcare or finance. As the implementation is scaled up across different departments or units of organizations, coordination with regulatory bodies becomes crucial, to establish new regulations. It also becomes important to follow the existing regulations of UAE public sector and ensure the ethical & lawful deployment of these technologies. In this stage, regulations are also developed to ensure the compatibility and interoperability of AI & Blockchain technologies and their associated solutions, with other systems. The regulations provide guidelines on how data can be exchanged between different government entities or organizations for seamless integration of AI & blockchain technologies across different departments or units. This stage also introduces regulations for proper protection and management of citizen's data. For this purpose, regulations such as data governance, data sharing, data privacy & security regulations are established, which ensures that citizen's sensitive information is used lawfully to provide efficient services.

“Regulatory frameworks may be established to address data privacy, security, intellectual property, and accountability.”

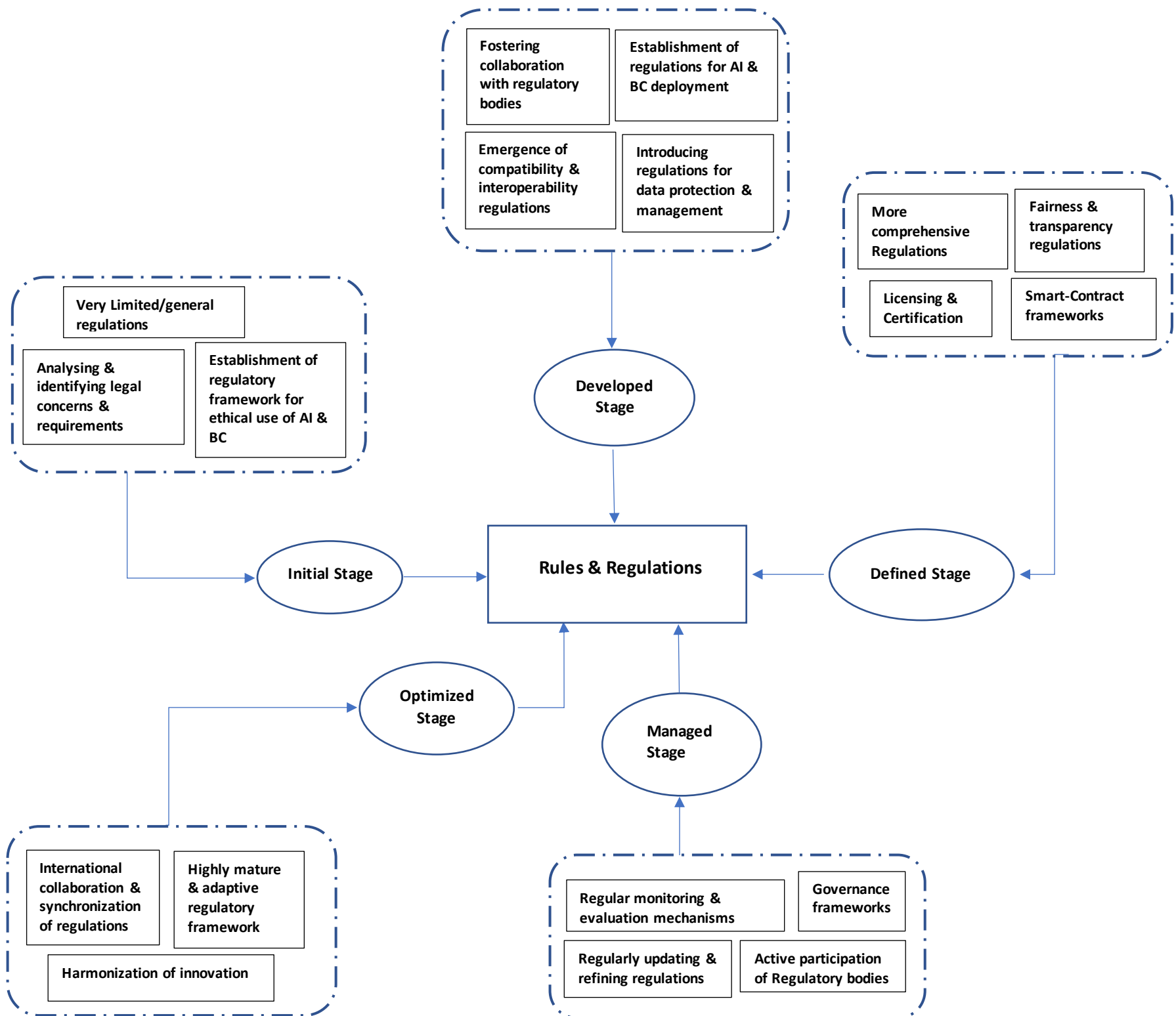


Figure 0.21: Network of Rules & Regulations

In the **defined stage**, more comprehensive and refined rules & regulations are established for responsible adoption and implementation of these technologies, which might include regulations towards ethical considerations, fairness & transparency, interoperability, regulatory sand-boxes and compliance regulations. In this stage, regulations are established to ensure fairness in blockchain transactions and bias-free utilization of citizen's sensitive information. Regulations are also developed to ensure transparency of AI algorithms used for providing AI-based solutions to organizations. According to participant,



“Specific regulations may be put in place to address AI algorithm transparency, explain ability, and bias mitigation.”

In this stage, smart-contract frameworks are also established and implemented to ensure the legal enforceability. These frameworks are programs/scripts stored on blockchain networks, that are executed automatically when specified terms & conditions are met. As the implementation of these technologies progress, AI & blockchain systems and technology infrastructure also develops and enhances to provide well-defined solutions. The advancements of these solutions might also use sensitive information of end-users or critical hardware/software components at this stage. Thus, there is a great need of License's or Certificate's to authorize the legitimate and legalized use of these technologies and to accommodate this challenge, this stage also establishes licensing and certifications mechanisms. Such mechanisms, regularly assess and analyse use of these technologies in organizations and provide certificates/license to authorized entities.

In **managed stage**, rules & regulations become more advanced and well-established in organizations. This stage primarily focusses on regular monitoring and evaluation of regulations in organizations to ensure effective administration of these regulation within government entities and to compete with evolving requirements and challenges. According to participant,

“The focus would be on continuous monitoring, evaluation, and adaptation of regulations to keep pace with the evolving technology landscape.”

These regulations are regularly monitored & evaluated to update them according to new challenges and technological advancements. These regulations are regularly updated and refined based on experience and lessons learned from adoption, implementation and deployment of these technologies and their associated solutions. To govern the deployment of AI and blockchain technologies, governance frameworks are also established in this stage. These frameworks define roles and responsibilities, methodologies and processes for managing and governing the use of these technologies. These frameworks also provide guidelines to ensure compliance, risk management and accountability of these technologies. In this stage, regulatory bodies play an active role in inspecting, auditing and assessing the implementation of these regulation to ensure adherence of these regulations. The legal enforceability at this stage aids in maintaining transparency and public trust in deployment of these solutions. The regulatory bodies provide guidance on legalized deployment of these technologies and also help in resolving disputes among key stakeholder and entities.

At **optimized stage**, there are highly mature and adaptive regulatory frameworks which include more advanced and strict regulations around advanced aspects of implementation such as algorithmic bias, data ownership, autonomous systems and AI-driven decision making. This stage introduces adaptive and agile regulatory frameworks which are developed using advanced analytics and machine learning algorithms and can address dynamic challenges, requirements and risks associated with advanced AI & blockchain solutions. This stage focuses on fostering regulatory innovation and to harmonizing it with social and ethical considerations of implementing these technologies. These frameworks should provide regulations & policies to experiment and adopt innovative ideas regarding the implementation of these technologies. As at this stage, the public sector of UAE would have fully adopted and implemented these technologies, the focus would be on deploying these technologies across private sector entities of UAE, working in other countries. So, international collaboration and synchronization of regulations would be promoted to assist the world-wide implementation of these technologies and ease the interoperability between different systems across the globe. The government might also coordinate with international organizations and regulatory bodies to synchronize existing regulations with international benchmarks and standards. According to participant,

“The UAE public sector may actively engage in international collaborations and partnerships to align regulatory approaches and standards with global best practices. This promotes interoperability, knowledge sharing, and harmonization of regulations across borders.”



5.6.1.10 Network of Database Integration at different stages

Network for Database integration, given in figure 5.22, provides an overview of how the database integration would progress through five main stages of change.

At **initial stage**, there are multiple isolated or detached databases and data sources available, which are placed at different locations such as in different departments or in different agencies. Each department has their own data source managed differently from other organizations. All these databases are managed independently, which give rise to data integrity challenges such as data silos or inconsistent data formats. It is very essential to solve data discrepancies and prepare it for integration. Besides data integrity challenges, there is also very limited interoperability between these data sources, and it is very difficult for organizations to exchange data/information effectively. This stage focusses on identifying data sources / databases that contains information which can be required to use in AI & BC applications, and then connecting multiple data sources such as several independent database, spreadsheets, or data repositories into centralized system to ensure connectivity between these resources. At this stage, there is only very basic/limited integration of database with AI & BC systems or applications which might include integrating only primary data sources, integrating existing databases or only structured databases. According to participant,

“At initial stage, database integration for AI & blockchain implementation in UAE private sector may be relatively basic. Organizations might rely on existing databases and data storage systems to support initial experiments and proof of concepts projects. The focus may be integrating limited and structured data sources into AI & blockchain solutions.”



Figure 0.22: Network of Database Integration



At **developed stage**, as the implementation of AI & Blockchain progresses in organization, there is a need to integrate expanded data sources such as structured or unstructured databases, data warehouse or external data feeds. For this reason, it is intended to integrate heterogeneous data sources, systems and applications into a unified data infrastructure. This Unified data infrastructure would aid in providing systematic and unified view of data. At this stage, to integrate data into a unified data infrastructure, it is essential to standardize data and prepare it for integration. To achieve this, data needs to be prepared and transformed into a standardize format and prepare it for integration by performing data transformation steps, cleansing steps or adopting data standardization protocols or regulatory frameworks.

In this phase, substantial investments would be made in integration applications as this stage utilizes enhanced integration platforms, custom-built connectors, or middleware applications to enable connectivity between various databases, systems or departments. These middleware applications act as bridge between various data sources and facilitate data exchange or synchronization between different systems. According to participant,

“To facilitate data integration and interoperability, middleware solutions might be employed. These could act as a layer between different databases and application, enabling efficient data exchange, transformation, and synchronization.”

At **Defined stage**, there is more standardized and streamlined integration of database, which is achieved by leveraging standardized data models and enhanced data management tools. This stage utilizes enhanced data management tools such as master data management, advanced data management platforms or data lakes for streamlined and effective data processing and storage. According to participant,

“This stage involves implementing robust data management systems to support AI and blockchain applications. Organizations may adopt data lakes, data warehouses, or data pipelines to hand the diverse data types, such as structured, unstructured, and semi-structured data, required for AI and blockchain solutions.”

To ensure data integrity and reliability, effective data governance frameworks are employed, which can provide a set of standard rules or guidelines that should be followed when integrating databases with AI & Blockchain applications. In collaboration with legal & regulatory bodies of government, organizations might also establish regulatory frameworks for ethical and responsible integration of databases with AI & blockchain systems. Besides, standardized data models, APIs or efficient data exchange formats might also be leveraged for compatible and seamless integration of databases. ETL is abbreviation of extraction, transformation, and loading of data, which means a process of extracting / getting data from various data sources, transforming it into a required format or standard and loading it into desired database/repository. This stage utilizes refined ETL processes which can provide advanced expertise such as data mapping, data lineage or data synchronization.

At **managed stage**, organizations explore and implement real-time or near real time data integration techniques to optimize their database integration. The real time data integration could be achieved by utilizing advanced technologies like change data capture (CDC) or event-driven architectures, and it ensures that AI & blockchain systems or application have access to latest or up-to-minute data or information to yield real time data analytics and perform data-driven decision making. At this stage, organizations highly focus on managing the integration efficiently and effectively so that these databases can be used to drive insights. Then these insights can be leveraged to take insights/data-based decision which can yield significant benefits for organization. According to participant,

“There may be an increased focus on data analytics and using data to inform decision-making, with more advanced analytics tools and techniques being deployed to extract insights from data.”

In this phase, organizations also strive to preserve or retain data integrity and quality achieved in previous stages, and it is achieved by leveraging data quality monitoring mechanism or data access controls. Data quality monitoring mechanisms such as data quality



checks, validation processes and error handling mechanisms can ensure that data is accepted only in specified standard or format and Data access controls, would ensure that only authorized people can modify data and the information is protected from any breaches or cyber threats.

At **optimized stage**, efforts are made to perform highly scalable database integration by leveraging integrated data architecture and advanced data analytics tools & techniques such as machine learning or artificial intelligence . This stage can also handle and manage to integrate very large volumes and varieties of data and can perform strategic decision making. To achieve big data integration, high performance data ingestion technologies such as Apache Spark, Hadoop, Apache Kafka might be utilized. The organizations also utilize data visualization or data fabric technologies to provide unified view of various databases and to facilitate seamless access and analysis of data for AI and blockchain applications. According to participant,

“The integration might leverage data virtualization techniques and data federation approaches to provide a unified view of data from disparate sources. This would enable efficient data access and analysis without physically moving or duplicating data.”

This stage also aims to continuously monitor, maintain and optimize the database integration to stay align with evolving demands of AI & BC solutions. The emerging database technologies and integration methodologies should be perpetually explored to keep on optimizing the database integration.

5.6.1.11 Network of Technology Infrastructure at different stages

The “Technology infrastructure network”, given in figure 5.23, represents the underlying technological structure of organizations that can support successful implementation and deployment of AI & blockchain technologies. This network illustrates that how the infrastructure, its capabilities, and its components would evolve through five main stages of change.

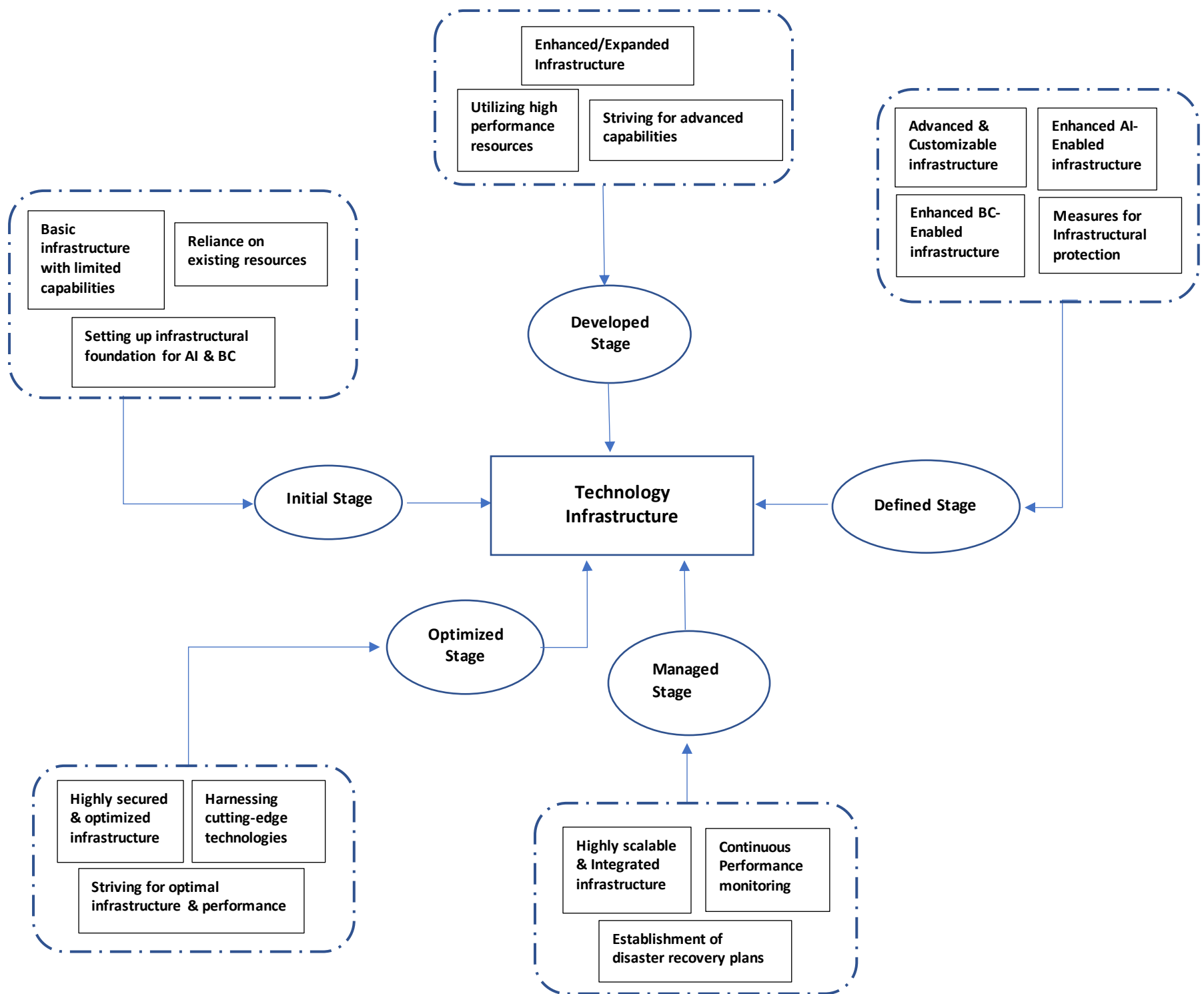


Figure 05.23: Network of Technology Infrastructure

At **initial stage**, organizations would have very basic technology infrastructure which might consists of only basic hardware and software components. This infrastructure would have limited capabilities such as limited integration of AI & BC solutions in its processes and limited interoperability between different systems. The infrastructure would also lack standardization and compatibility with other systems. At this stage, organizations mainly rely on existing resources such as basic hardware and software components and traditional storage systems which could only support small scale projects and storage needs. Organizations, utilize this existing infrastructure to test the feasibility of AI & BC solutions and to decide whether organizations should invest their resources for full integration and deployment of these technologies in their businesses. According to participant,



“At initial stage, the technology infrastructure for AI and blockchain implementation in UAE public sector may be relatively basic. Organizations might rely on existing infrastructure and cloud computing platforms to conduct initial experiment and proof-of-concept projects.”

At this stage, the focus is on setting up infrastructural foundation for AI & BC based solutions. It might involve setting up servers, development tools, computing resources and storage platforms such as cloud-based infrastructure for extensive data storage and real-time processing. For AI solutions, it might involve setting up dedicated hardware and deploying AI algorithms and models on servers. For blockchain, it might involve setting up network infrastructure consisting of nodes and validators.

At **developed stage**, there would be expanded and enhanced technology infrastructure for AI & blockchain programs. The infrastructure would incorporate advanced hardware and software components and would also have advanced capabilities such as cloud-based solutions, data analysis, enhanced data connectivity and cybersecurity measures for enhanced technology protection. This infrastructure would be deployed across different departments or units to foster widespread adoption of these technologies. This stage utilizes high performance computing resources to satisfy the increasing computational power and storage needs of larger and complex AI & BC systems. It might include using GPUs or TPUs to handle complex AI algorithms, establishing robust cloud infrastructure & data-centres, advanced networking tools such as high-speed switches, routers, and load balancers. The BC infrastructure would be amplified to accommodate more nodes for secure data validation and consensus protocols. According to participant,

“This stage involves deployment of dedicated hardware resources to support AI workloads. High-performance computing systems and graphics processing units (GPUs) might be utilized to accelerate AI training and inference tasks. For blockchain, organizations may set up private or consortium networks with dedicated nodes and servers to support decentralized data storage and transaction processing.”

Although, at this stage, infrastructure would have advanced but still organizations strive to integrate advanced capabilities in infrastructure. At this stage, significant efforts are made to standardize the infrastructure and enable the interoperability between different systems. Organizations also begin to invest in infrastructure to establish more mature, robust and specialized technology infrastructure.

At **defined stage**, technology infrastructure for AI & BC solutions would be highly advanced which might comprise of latest hardware and software components. The infrastructure would have capability to be optimized and customized according to AI & BC use-cases within particular businesses and functions. The infrastructure would leverage standardized software frameworks and tools, application-specific integrated circuits (ASICs), field-programmable gate arrays (FPGAs), for accelerated and effective deployment of AI & blockchain solutions. The infrastructure would be highly scalable and distributed to empower AI systems. AI enabled infrastructure would be enabled to handle larger data volumes and yield real-time data analytics, by leveraging advanced data managements systems and automated data pipelines. BC infrastructure would be highly advanced and supportive to facilitate scalability and interoperability between different systems and public sector organizations. This infrastructure would be distributed and decentralized which might leverage permissioned or hybrid blockchain networks, Application Programming Interfaces (APIs), and data integration platforms. This stage focuses on setting up measures or mechanisms to protect infrastructure from breaches and cybersecurity threats. Organizations may establish security and privacy protocols to protect sensitive information of users. According to participant,

“The infrastructure would prioritize security measures, including encryption protocols, firewalls, intrusion detection systems and access controls. This would protect sensitive data and ensure secure communications between different components of system.”

At **managed stage**, technology infrastructure would be highly scalable and integrated with advanced networking capabilities, storage systems and deployment frameworks. To upgrade scalability and flexibility of infrastructure, the infrastructure would be



incorporate advanced cloud-based solutions and AI & Blockchain would be integrated with latest technologies like IoT and Big data. This infrastructure would be scalable enough to facilitate fluctuating workloads. The infrastructure might leverage containerization technologies and orchestration platforms to scale up or down its resources according to varying demands of AI & BC solutions. At this stage, the technology infrastructure is continuously monitored to keep infrastructure secure and yield optimal performance. In regards of AI infrastructure, organizations would ensure fair utilization of various resources, and monitor data quality and performance metrics. For blockchain infrastructure, network health and security vulnerabilities would be monitored. These infrastructures are also continuously monitored to ensure their compliance with established standards and regulatory frameworks. According to participant,

“The infrastructure would include automated deployment frameworks and monitoring tools to streamline deployment and management of AI & blockchain applications. This would ensure efficient resource allocation, performance monitoring and issue detection.”

Disaster recovery plans are established at this stage, which would outline guidelines and policies to continue the processes and business functions in case of any technological disaster. Technological disaster cases might include any hardware or software failures, cyber-attacks and data breaches. Disaster recovery plans would outline strategies that organizations can adopt to cope up with such situations. These disaster recovery plans or mechanisms might include backup systems and data redundancy measures. At **optimized stage**, technology infrastructure would be highly secured and optimized to accommodate seamless data exchange and analysis across the organization and enhance operational efficiencies and business outcomes. By leveraging sharding, sidechains or advanced interoperability protocols, infrastructure become capable of accommodating large scale deployments. The infrastructure becomes highly secure at this stage, as it has robust disaster recovery plans, continuous performance monitoring mechanisms and infrastructural protection measures. According to participant,

“The infrastructure would be designed for high performance, scalability, and reliability to support real-time processing, advanced analytics, and secure blockchain transactions.”

Optimized stage infrastructure utilizes cutting-edge technologies like quantum computing, edge federated learning, edge computing or distributed AI systems to optimize the efficiency and performance of infrastructure and to support advanced AI and blockchain capabilities. Although, the infrastructure is highly optimized at this stage, but organizations might continue to strive for optimal infrastructure performance. They might continue to research and explore new technologies to stay abreast with technological advancements.

5.6.1.12 Network of Technology Usability & Accessibility at different stages

The network of technology usability & accessibility, given in figure 5.24, depicts that how with advancement in stages of conceptual framework, the AI and blockchain technology usability & accessibility of technology would enhance.

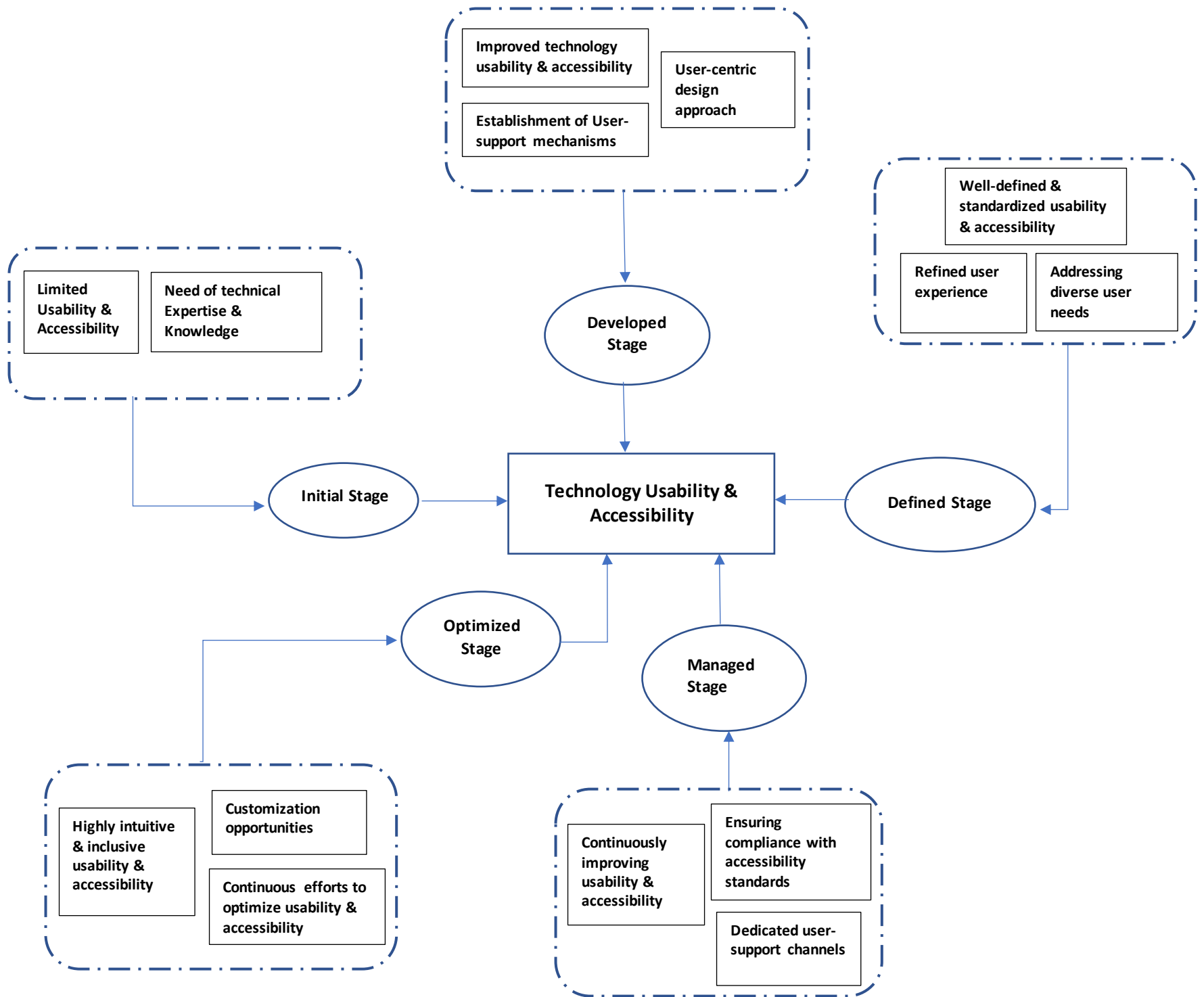


Figure 0.24: Network of technology usability & accessibility

At **initial stage**, the usability & accessibility of AI & blockchain technology is limited, as the organizations mainly focus on conducting experimentation to understand the potentials of these technologies. This technology is used & accessed by only small group of people such as experts, researchers or employees, who are involved in AI & blockchain related projects. There is high learning curve for technology usability & accessibility, due to complexity of various aspects of technology such as complex interfaces and incompatibility with other devices and requires specialized technical skills and knowledge to operate it. However, there are minimal training or technology usability support available, as technology usability & accessibility is not primarily focused on at this stage. According to participant,



“Usability would be limited, and the applications may require technical expertise to operate. Accessibility could be limited to a smaller group of users within the organization, and the technology might be accessible only through specific devices or interfaces.”

At **developed stage**, the technology usability & accessibility is improved as the accessibility of technology is provided to wider range of users, with the interfaces being user friendly and availability of interactive dashboards, which leads to easier adoption and usage of these technologies. Organizations begin to make significant efforts to improve the interaction and utilization of AI and blockchain technologies and substantial investments are made to create intuitive dashboards, visualization tools and mobile applications for these technologies. According to participant,

“As the implementation progresses, technology usability and accessibility would improve. User interfaces and workflows would be designed with user experience (UX) principles in mind, making the applications more intuitive and user-friendly.”

To enhance the technology usability and accessibility, user-centric design approach is mainly focused. This approach greatly emphasizes on user experience and the creation of interactive applications, tools and interfaces which are easy to learn & use. Besides, user-support mechanisms are established to provide technology usability & accessibility support to wide range of users. This might include, tutorials, training programs, documentations, and self-help guides to enable the users to make most out of these technologies.

At **defined stage**, as AI and blockchain technologies become more integrated into various processes and business functions, the technology usability & accessibility also becomes well-defined and standardized. Technology usability & accessibility standards, guides, workflows and best-practices are established to guide users to efficiently use the technology and eliminate their confusion regarding its various aspects. At this stage, the technology usability & accessibility standards meet divers needs of users by providing them appropriate support, such as providing different languages options, ensuring compatibility of technology with different devices and screen-sizes. The accessibility standards also ensure that, the technology is accessible to all users including users with various disabilities. To provide a refined user-experience, user-feedback is collected and analysed to make the required changes in technology to provide user with more seamless experience. Besides, organizations might also conduct usability testing, to detect any flaws or user’s difficulties in technology usability & accessibility. According to participant,

“User feedback and usability testing may be conducted to identify and address any pain point or barriers to adoption. Organizations may also prioritize accessibility considerations, ensuring that AI and blockchain solutions can be accessed and used by individuals with diverse abilities and needs”.

At **managed stage**, the technology usability & accessibility is proactively monitored and managed to continuously improve it. At this stage, the user interfaces and workflows are refined to ensure smooth operations and attain maximum user-satisfaction. Based on analysis of user’s feedback, emerging trends, and evolving demands, regular updates are also implemented to enhance technology usability & accessibility. According to participant,

“In managed stage, organizations focus on ongoing management and optimization of technology usability and accessibility. This stage involves monitoring user experiences and continuously improving interfaces and tools based on user feedback and changing requirements.”

This stage greatly focuses on ensuring compliance with accessibility standards by strictly following accessibility regulations and guidelines. These regulations ensure that the technology is accessible to broader audience and satisfies wide range of user’s needs and preferences. There are also dedicated user support channels available to promptly answer user’s queries and for troubleshooting and resolving any potential issues. These support channels might include, online forums, help desks, chatbots and comprehensive user documentation and training programs.



At **optimized stage**, technology usability & accessibility is highly intuitive and inclusive. The learning curve to use the technology become low by requiring minimum training or technical expertise to operate the technology. The technology also provides a valuable user experience across all AI and blockchain systems. The accessibility standards also ensure that technology is accessible to all users with diverse needs. Besides, customization opportunities are also provided to users, to enable them to customize their applications and interfaces according to their needs and preferences such as selection of language, colours, interface size and many other features. According to participant,

“The technology would provide options for personalization and customization to cater to different user preferences and requirements. Users could tailor their interfaces, settings, and workflows to suit their specific needs.”

To continuously enhance & optimize technology usability & accessibility, for yielding maximum user-satisfaction and productivity, significant efforts are made, which might include implementing user-feedback, sentiment analysis, and automation & intelligent assistants to streamline tasks and providing proactive suggestions and assistance, to help users achieve their goals more efficiently and effectively.

5.6.1.13 Network of Level of implemented/Adopted AI & BC at different stages

The network of “Level of Implemented AI & Blockchain” represented in figure 5.25 depicts how, the level of implementation/adoption of AI & blockchain technologies, would advance through five stages of changes of maturity model.

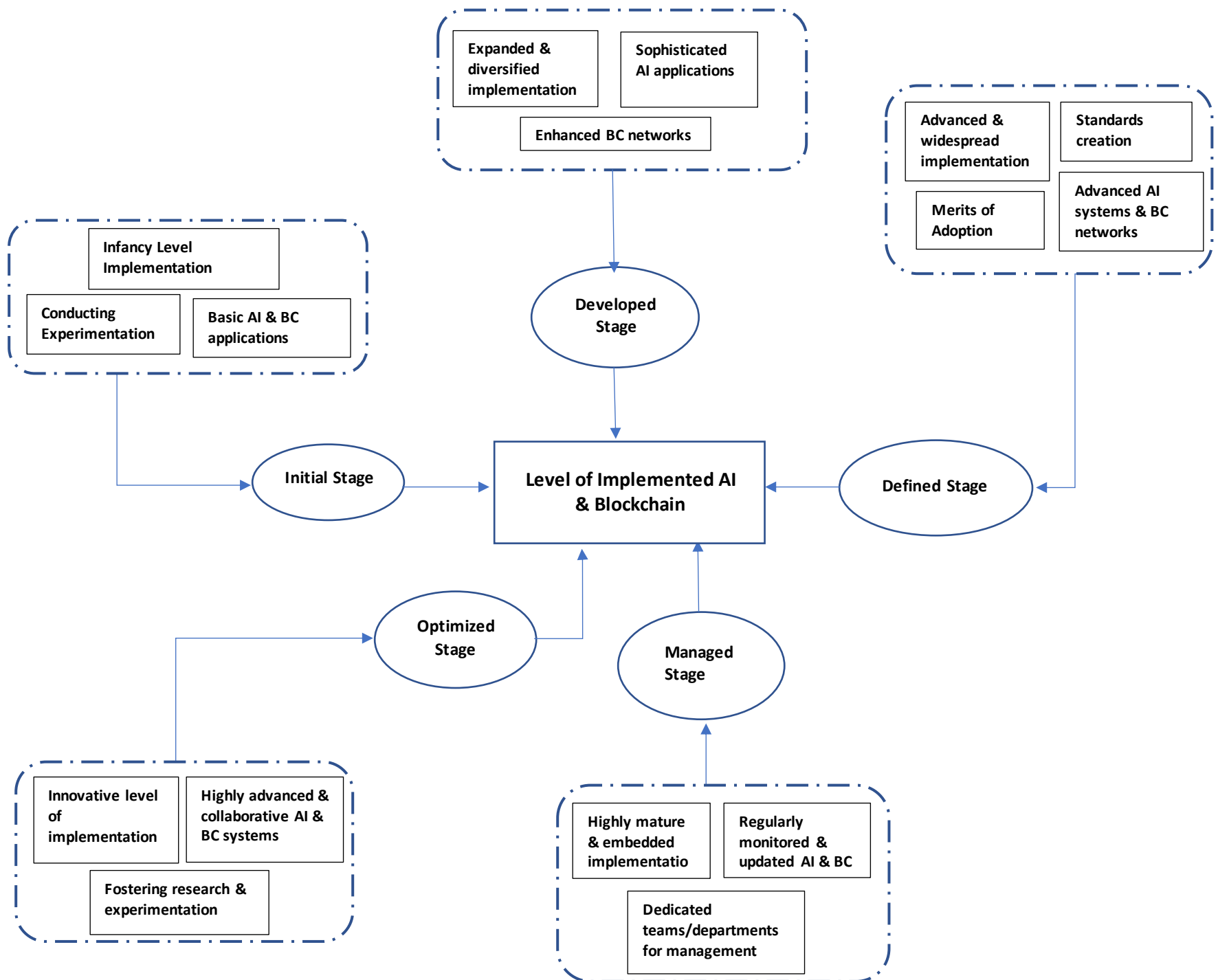


Figure 0.25: Level of Implemented AI & Blockchain

At **Initial Stage**, there is infancy level implementation of AI & Blockchain technologies in public sector of UAE. Organizations usually intend to understand & explore these technologies. To identify potential use-cases of these technologies, organizations conduct experimentation such as pilot-projects or proof-of-concepts. The level of implementation/adoption of these technologies is confined to only specific departments or domains of UAE's public sector, in which only basic AI & Blockchain applications are deployed. The primary AI applications might include chatbots or data analytics for enhancing operational efficiency, and in regards of blockchain networks, digital ledgers might be created for various processes like record keeping or identity management. However, the implementational scale of these applications is narrow and limited to only specific use-cases. According to participant,



“At initial stage, the level of implemented AI and blockchain technologies might be limited to experimental initiatives. These implementations could be focused on specific use cases within a few government departments or agencies.”

At **developed stage**, the implementation of AI & blockchain expands across different departments or agencies. The organizations transcend experimental initiatives and implement these technologies in their working environment for various purpose such as automating routine tasks, enhancing data analytics capabilities, predictive analytics, resource allocation, and enhancing data integrity. According to participant,

“In the developed stage, organizations have moved beyond experimentation and have started integrating AI and blockchain into their operations. This stage involves the deployment of more mature and scalable AI and blockchain solutions.”

As the implementation of these technologies expands to achieve variety of objective, AI & blockchain solutions are also be enhanced. There are more sophisticated AI-powered applications which utilize advanced techniques such as machine learning or natural language processing to facilitate sentiment analysis, predictive analysis, or resource allocation. Whereas advanced blockchain networks leveraging distributed ledger technology & complex decentralized applications (DApps) are developed to facilitate secure data management & transactions, identity verification and supply chain management.

At **defined stage**, the advanced & widespread implementation of these technologies encompasses different business functions, processes and systems within numerous organizations of public sector of UAE. Advanced AI systems are implemented into various business processes and decision-making workflows which leverage advanced analytics, and natural language processing (NLP) to facilitate complex human based interactions and for providing personalized services. The advanced blockchain implementations enable transparent and auditable transactions within public sector. Organizations might also establish consortia or industry collaborations for establishing shared blockchain infrastructure or protocols. To ensure responsible, consistent, and lawful implementation of these technologies, the government establishes legal frameworks, policies, and guidelines to be followed. The implementation of these technologies optimizes business processes, enhance decision-making capabilities, improve customer experience, and enhance the transparency and efficiency of public sector transactions. According to participant,

“AI-driven systems are widely deployed for data analytics, predictive modelling, and citizen services. Blockchain implementation span multiple domains, including healthcare, finance, procurement, and smart-cities. AI and blockchain solutions contribute to increased transparency, improved governance, and optimized service delivery.”

At **managed stage**, the level of implementation becomes highly mature and embedded within organization’s overall strategy, operations & core business processes. At this stage, the implementation covers significant portion of public sector of UAE and facilitates interoperability and seamless data sharing between different departments and agencies of public sector of UAE. To analyse the impact of these technologies on business operations or organizations, these technologies and their associated solutions are regularly monitored. To ensure the security and scalability of blockchain networks, these networks are regularly audited and updated to meet the evolving market conditions. Besides, these technologies are regularly updated to yield continuous improvement, implement security updates, and for ensuring regulatory compliance. According to participant,

“In the managed stage, AI and blockchain solutions would be actively monitored and optimized. AI systems would be continuously trained and updated to improve performance and accuracy. This stage would involve a strong governance framework to ensure ethical and responsible use of these technologies.”

The organizations might also establish dedicated teams or departments for proactively managing and maintaining AI & blockchain related initiatives. These teams/departments would be responsible for continuous monitoring, optimization and governance for these technologies.



At **optimized stage**, there is innovative level of implementation, with these technologies being implemented throughout public sector of UAE. At this stage, the implementation of these technologies intends to drive new business models and developing new sources of revenue generation by leveraging highly advanced and collaborative AI & Blockchain systems. According to participant, *“At the optimized stage, the level of implemented AI and blockchain technologies would be at its peak. AI and blockchain systems would be fully integrated and optimized across all relevant government services and processes.”*

AI systems/applications leverage advanced techniques such as deep learning or reinforcement learning to attain high level of automation, accuracy, efficiency, and transparency. The cutting-edge blockchain networks are widely adopted, enabling interoperability across multiple sectors and jurisdictions. The organization also encourage research and experimentation to stay abreast of technological advancements. This would also foster continuous innovation and adaptation to emerging technologies and challenges.

5.6.1.14 Network of Process Documentation at different stages

The “Network of process documentation”, given in figure 5.26, represent the extent to which processes are documented at each stage. The themes of this network also elucidate what does the process documentation covers at each stage. This network is composed of 18 themes which have appeared in various stages of change.

At **Initial stage**, there would be only limited and informal documentation of processes. As discussed earlier, the initial stage focuses on exploring the potentials and implementation cases of AI & blockchain technologies, and processes itself might be ambiguous, so there are not many details and procedures available to be documented, so documentation is very minimal at this stage. As this stage, explore the use-cases of these technologies, so high level overviews of process are documented at this stage. These high-level overviews might include process-diagrams or flowcharts to illustrate the workflow of AI & Blockchain application processes.

“Documentation may include high-level process diagrams or flowcharts to outline the intended workflow and identify key stakeholders. The documentation may also capture basic guidelines and protocols related to data handling, security, and privacy.”

At this stage, feasibility assessments or pilot-projects are conducted to identify applications and use-cases of these technologies, thus, initial stage documentation includes feasibility frameworks and areas where these technologies can be implemented. This documentation also includes initial concepts explanations, exploratory reports of these technologies, data sources and project requirements including list of all required resources.

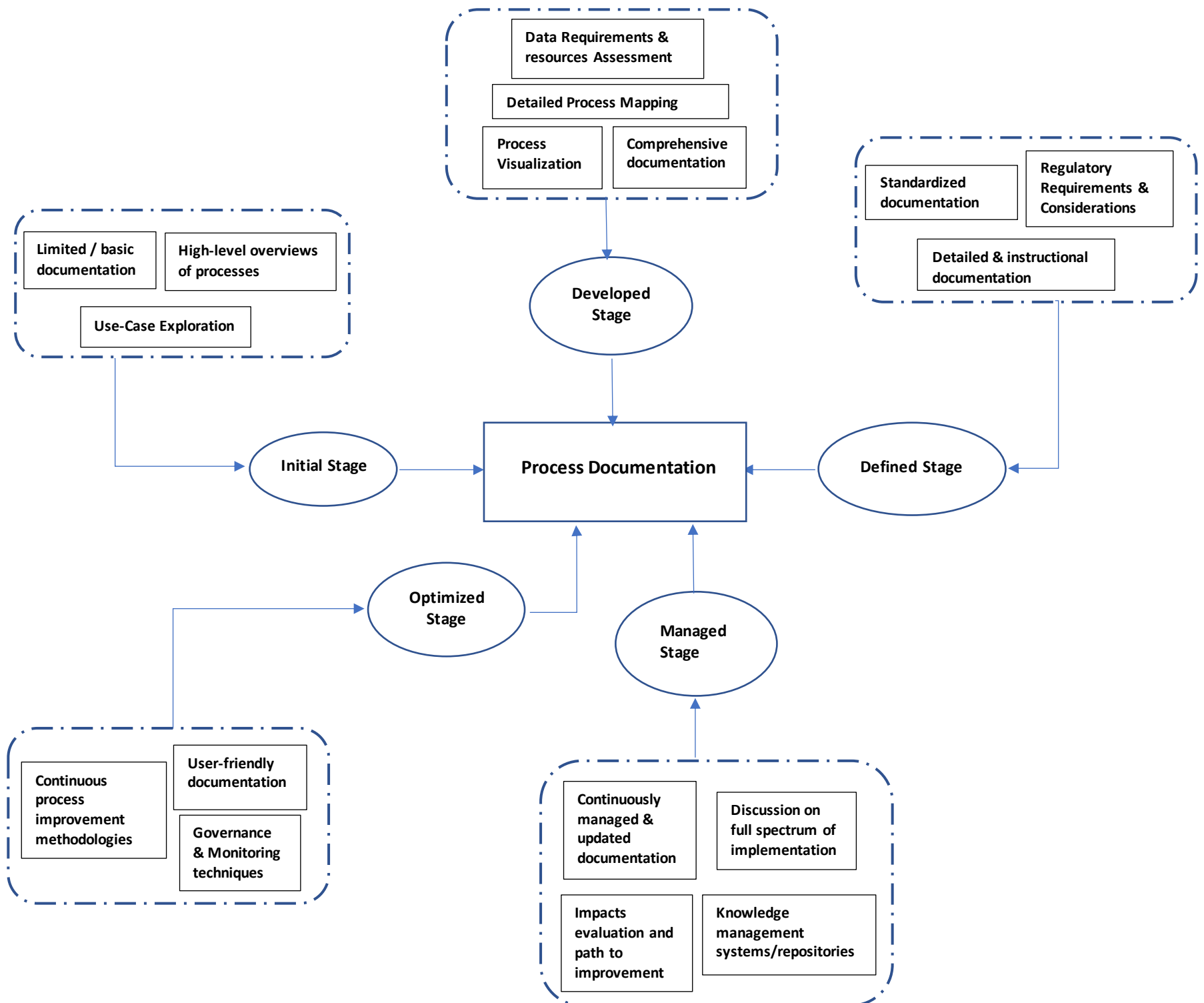


Figure 05.26: Network of Process Documentation

At **developed stage**, there would be comprehensive documentation of processes which would explain standard operating procedures (SOPs), process model, and maps used for implementing these technologies in specific business or organization. Developed stage documentation can serve as a guide for future reference and provide enough information and assistance to employees or stakeholders involved implementation of these technologies. According to participant,

“As the implementation progresses, processes documentation would become more comprehensive and detailed. Processes would be documented in greater depth, including specific tasks, responsibilities and decision point within the AI & blockchain workflows.”



At this stage, all data requirements of AI and BC solutions would be documented, which include details of data sources (from which sources/entities data would be required and collected), the particular data formats and considerations regarding the quality and security of data. This stage documentation would also include assessment of resources required for effective implementation of these technologies, which would comprise of details about all the skills, technologies, and infrastructural requirements of these technologies. The developed stage documentation also includes process visualization diagrams/illustrations, which include workflow diagrams, data flow diagrams, system architecture diagrams, process maps and business process models. This stage documentation also provides detailed process mapping, which explains step by step guides and best procedures for implementing these technologies and their associated solutions. According to participant,

“The documentation includes detailed process mapping for the identified AI and blockchain use cases. It outlines the current process, inputs, outputs, and potential integration points for AI & blockchain technologies.”

At **defined stage**, there is well-structured and standardized documentation of processes. This stage provides thorough documentation of processes which include procedural descriptions, guidelines and effective methodologies. This stage documentation may provide standard templates and checklists regarding AI & BC initiatives, suggestions to optimize processes, smart contract deployment frameworks, and data privacy & security protocols. At this stage, documentation is very detailed and instructional, which provides comprehensive guidelines regarding different implementational aspects of AI & blockchain technologies, namely, business and process model development, AI & blockchain integration points, data pre-processing, legal, ethical and compliance considerations. Defined stage documentation also provides details on regulatory requirements of UAE public sector to implement these technologies. The documentation also addresses other societal & ethical aspects and quality assurance processes & methodologies that needs to be considered. According to participant,

“The processes documentation addresses compliance requirements and governance frameworks related to AI and blockchain, such as data privacy, security, and regulatory considerations.”

At **managed stage**, as AI & BC applications or systems are continuously managed and optimized to yield optimal efficiency, so the process documentation is also managed & updated according to evolving organizational needs, process changes and industry standards. The managed stage documentation may consist of various documentation versions according to changes recorded in each iteration of process optimization. Each version of documentation would provide details of problem statement, changes made to processes, debugging purpose, and frequently asked questions. Managed stage documentation shed lights on full spectrums of implementation, which means that it discusses all aspects of implementation including technical and non-technical and all possible factors involved in implementation process which might range from basic process guidelines and project requirements to detailed procedural guidelines, details of changes required, changes made and performance metrics. The documentation would also consist of process plans, decision points, change management strategies to address organizational & cultural changes and key performance indicators to evaluate the impact and effectiveness of these technologies. According to participant,

“The documentation reflects the integration of AI and blockchain technologies into existing processes, with clear workflows, decision points, and dependencies.”

Based on results of performance metrics such as key performance indicators (KPIs), experiences and lessons-learned, documentation would also provide path to improvement by making future recommendations and providing data-based insights to yield optimal performance and efficiency of processes. This documentation would be stored and processed in knowledge management systems or repositories so that it can be easily available and accessible to all the employees and stakeholders involved in AI & BC projects.

At **optimized stage**, there are fully automated processes and considerable attention, or focus is paid on maintaining the efficiency and effectiveness of AI & BC initiatives by continuously monitoring and managing these initiatives and programs. The documentation



also consists of process governance and monitoring mechanisms & guides, enforced regulatory frameworks, data privacy & security, and infrastructural security considerations. Personnels appointed for governing and monitoring these initiatives are also documented with clear roles & responsibilities defined. According to participant,

“Processes documentation may include comprehensive documentation on data governance, model monitoring, performance evaluation, regulatory compliance and change management.”

As this stage focuses on continuous optimization of process, documentation also consists of continuous process improvement methodologies which should eradicate redundancies and drawbacks of AI & Blockchain solutions. For streamlined and seamless implementation & optimization of AI & BC process, documentation also sheds light on automation opportunities for automating complex processes. Other continuous process improvement methodologies might also include feedback mechanisms, iterative enhancements and utilizations of experiences and best practices. According to participant,

“The processes documentation incorporates mechanisms for continuous improvement, such as feedback loops, iterative enhancements, and lessons learned from previous deployments.”

Optimized stage documentation is user-friendly and easily accessible to all stakeholders involved in AI & BC projects and it aids in knowledge sharing & collaboration between all employees and stakeholders. This documentation is shared and exchanged via knowledge sharing platforms, communities of practices and knowledge management systems or repositories.

5.6.1.15 Network of Process Automation at different stages

The network of process Automation, given in figure 5.27, depicts how the automation initiatives during each stage, change, and what sort of tools and methodologies are used at each stage to automate the process.

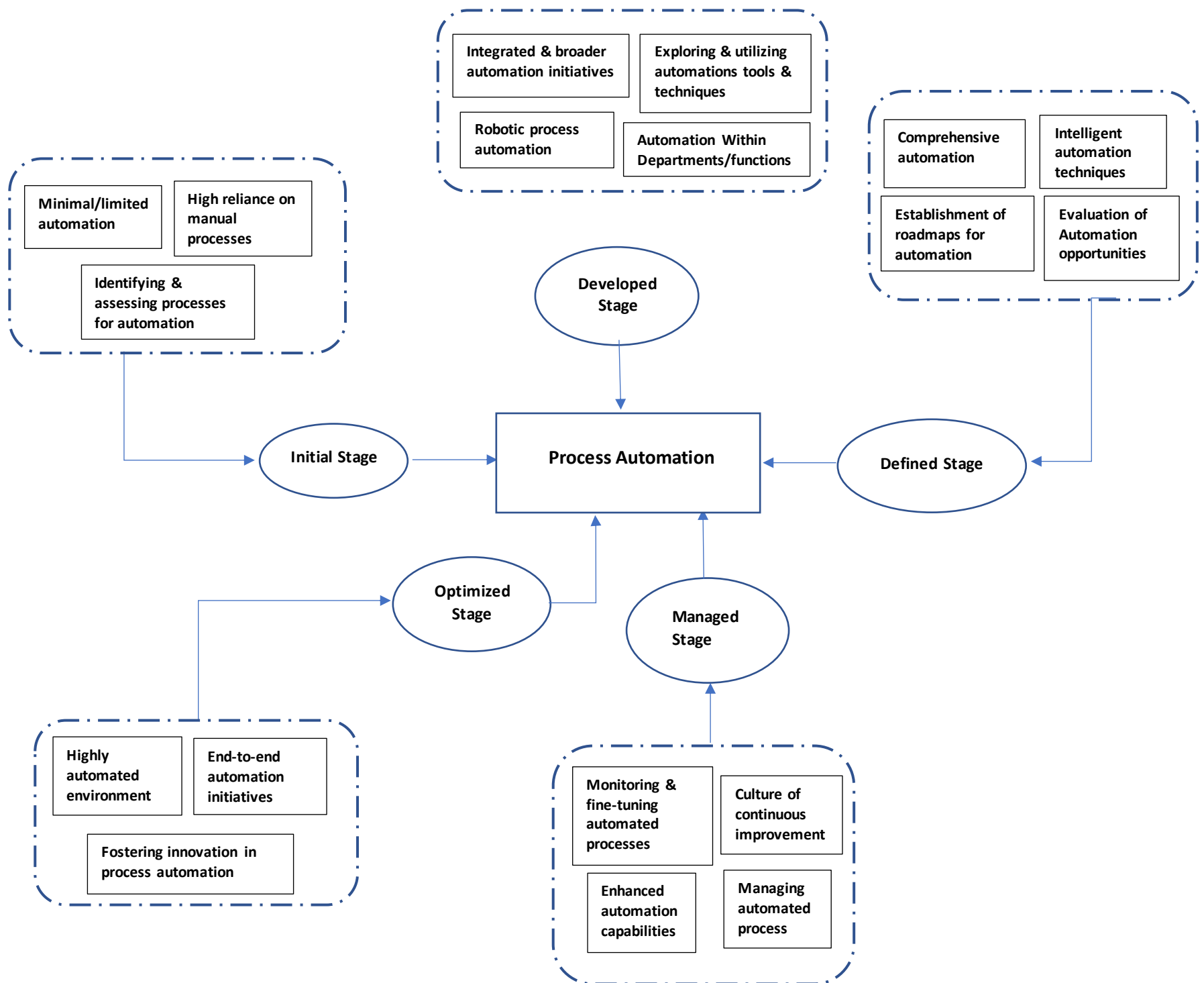


Figure 0.27: Network of Process Automation

At **initial stage**, there is very little process automation which utilizes only basic automation tools. At this stage, organizations aim to understand AI & BC initiatives, their use-cases within business, and focus on understanding automation initiatives and objectives. Organizations also intend to analyse and identify those processes within organization which can be automated using AI & block chain technologies. To identify such process, process assessments and feasibility studies are performed by conducting pilot projects or proof of concepts. Then, this analysis might serve as foundation for setting up process automation initiatives. According to participant,



“At the initial stage, processes automation within the UAE Public sector would typically be limited. The focus would be on identifying opportunities for automation and exploring the potential benefits. Basic processes, such as data entry, data pre-processing, or basic calculations may be automated using simple tools or scripts.”

At this stage, organizations heavily rely on manual processes and traditional paperwork. The organizations continue to work on projects by utilizing existing process methodologies that have significant manual handling and is based on human decision-making instead of data-driven decision-making.

At **developed stage**, there are broader process automation initiatives are integrated into organizations culture. This stage aims to automate most frequent or routine processes. To build confidence and trust in automated processes, this stage widely targets to automate processes within different departments, organizations and functions. To implement process-automation initiatives broadly, this stage also explores and utilizes several automation tools & techniques such as custom development, smart contracts, AI & blockchain based commercial automation tools and Robotic Process Automation (RPA). RPA is basically used to automate recurring and rule-based tasks such as data extraction from documents, report generating and for data transfers between systems. According to participant,

“Automation initiatives may include using AI algorithms to automate data analysis tasks, deploying smart contracts for automating contract execution and enforcement, or utilizing blockchain for automating supply chain processes and verifying transactions.”

At **defined stage**, comprehensive processes are automated with an automation initiative widespread across various existing systems, processes, applications and departments in businesses. Defined stage automation initiatives are well-aligned with AI & blockchain project requirements and specific needs of UAE public sector. Organizations also establish proper roadmaps, guidelines, workflows and procedures to automate processes. Automation procedures of this stage also include automation preparation steps such as streamlining and optimization of processes for automation. To enhance efficiency and effectiveness of AI & blockchain processes, this stage focuses on elimination of manual intervention and on automating complex processes. Various systems and applications are also integrated at this stage to enhance and meet automation objectives. According to participant,

“Automation solutions are integrated with existing systems and processes to ensure smooth data flow and interoperability. The organization begins to scale up automation efforts across multiple departments or functions.”

Process automation at this stage becomes more systematic by evaluating several process automation opportunities or initiatives. This stage utilizes evaluation frameworks and assessments to evaluate various automation opportunities. The results of this analysis are used to select standardized automation solutions and prioritizing different automation initiatives based on their business impact. As there are well-defined and integrated automation initiatives so this stage utilizes intelligent automation tools and techniques to automate complicated processes such as anomaly detection, data analysis and decision making. To yield optimal performance, Intelligent automation techniques are used which might include integration of automation platforms in key processes and using AI-driven process automation (AIDPA), machine learning algorithms and robotic process automation.

At **managed stage**, culture of continuous improvement and process optimization is fostered to enhance overall process efficiency and decision making. Organizations intend to optimize processes by leveraging advanced automation tools and technologies and by adopting change management strategies which manage the manual to automation transitional change of processes. Organizations also intend to educate & train employees to implement and manage automated processes.

“The focus would be on continuous improvement and leveraging emerging technologies and tools for automation, such as natural language processing (NLP), computer vision, or blockchain-based smart contracts.”



At this stage, process automation is continuously managed to retain the efficiency and effectiveness of these initiatives. Process automation is also regularly monitored by leveraging several process monitoring tools such as exception handling and performance metrics to assess the performance of these automated processes and ensuring that expected outcome is received. To yield optimal efficiency, process-automation initiatives are updated or fine-tuned based on performance metrics and evolving technological and organizational demands. According to participant,

“The automation solutions would be regularly evaluated and optimized based on performance metrics and feedback.”

At **optimized stage**, process automation would have been fully integrated into businesses functions or processes. Organizations would have fully automated environment in which all processes would have been automated. Intelligent automation techniques or solutions, such as blockchain based decentralized autonomous organizations (DAOs) or cognitive automation would be implemented to drive continuous improvement and innovation in processes. According to participant,

“At optimized stage, processes automation would be highly advanced and optimized for maximum efficiency and value generation. Automation would be embedded throughout the organization, supporting a digital workforce and enhancing operational agility.”

This stage focusses on driving innovation in process automation methodologies, so that processes can be fully optimized according to evolving demands. To drive continuous innovation in processes, organization would continuously explore latest technologies and advancements in AI & Blockchain applications and initiatives to experiment with innovative process automation techniques. To enable secure and transparent process execution, this stage intends to foster end-to-end process automation ranging from simple routine processes to complex processes such as predictive analytics or cognitive tasks. These end-to-end automation initiatives would also greatly enhance decision-making capabilities and facilitate self-executing and self-regulating processes.

5.6.1.16 Network of Process's Efficiency & Effectiveness at different stages

The network of process's efficiency & effectiveness, given in figure 5.28, illustrates that with advancement of stages of conceptual framework, the processes would become more efficient and effective. It shows how the processes would benefit from using both basic and advanced AI and Blockchain techniques to achieve maximum efficiency and effectiveness.

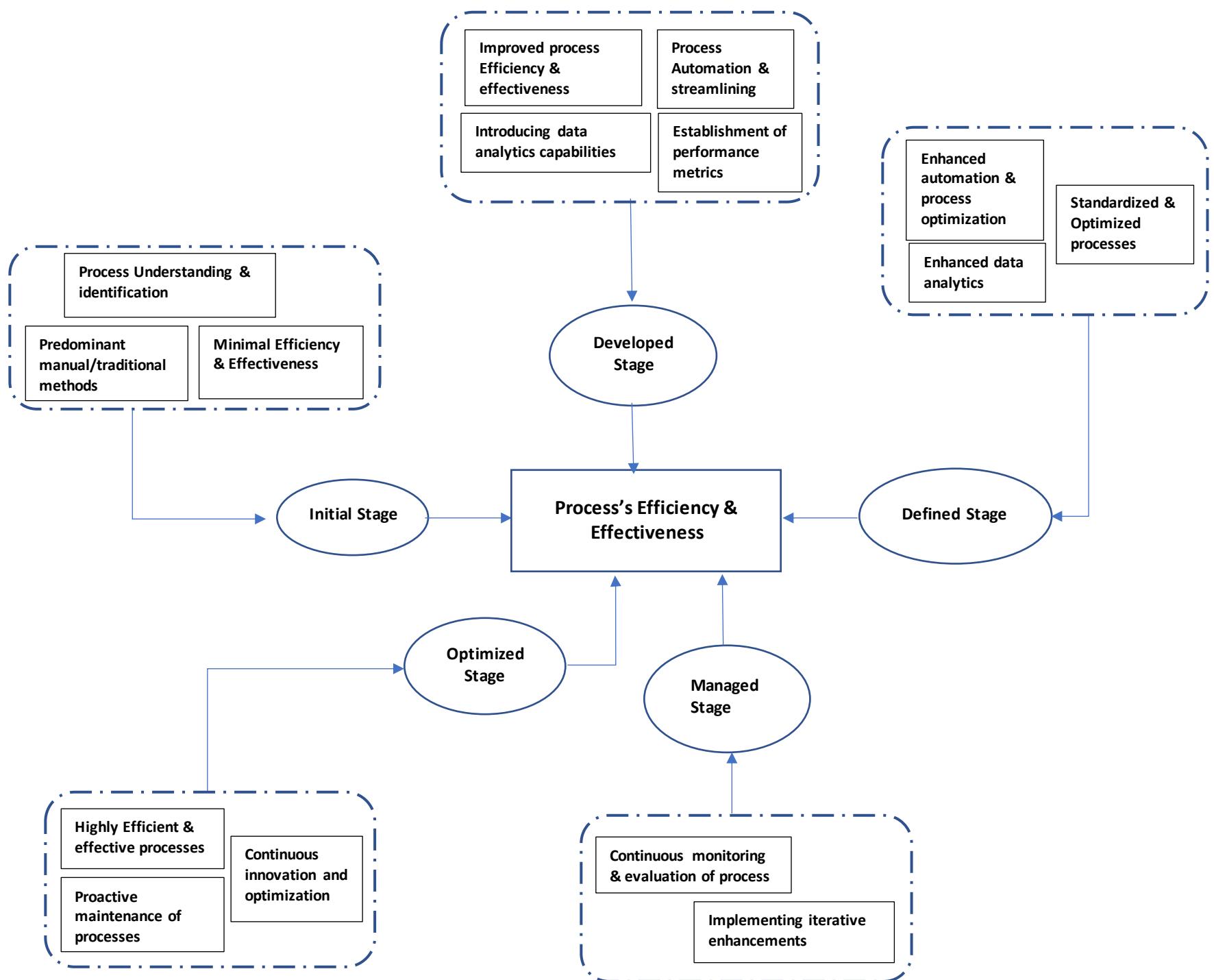


Figure 0.28: Network of Process's Efficiency & Effectiveness

At **initial stage**, organizations mainly focus on understanding current process and workflows to identify which areas of process can benefit from AI & blockchain technologies and documenting those process before implementing any optimization technique. The organizations/agencies identify inefficiencies or bottlenecks in its processes and plan for future improvements by leveraging AI & blockchain technologies. According to participant,

"At initial stage, the organization identifies processes that have potential for improvement through AI and blockchain technologies. These processes may have existing inefficiencies or challenges that can be addressed through automation or enhanced data management."



The manual/traditional methods are predominant in various business functions, such as manual data management and analysis. The utilization of such traditional methods leads to inefficiencies such as higher error-rate and delays in processing. There is limited automation and lack of data analysis opportunities. The lack of decision-making support also makes the decision-making process very slow. Thus, the process efficiency & effectiveness is very minimal at this stage.

At **developed stage**, the organization's make targeted improvements in its processes by leveraging AI & blockchain and make the processes more accurate, reliable and time-efficient. Process efficiency and effectiveness is improved by implementing process optimization techniques such as Lean six sigma or reengineering, and automation. The organization start to use basic automation tools & techniques for automating repetitive or rule-based tasks, to remove manual errors and decrease the overall processing time. According to participant,

"The organization begins implementing AI and blockchain technologies to automate selected processes. This can include streamlining workflows, automating repetitive tasks, and enhancing data management and analysis."

At this stage, the data analytics capabilities are implemented to enhance data management, analysis and for informed decision making. To examine the efficiency and effectiveness of process, the process performance metrics such as key performance indicators (KPIs) are established for identifying areas of improvement. These performance metrics facilitate better monitoring and evaluation of processes.

At **defined stage**, enhanced automation and process optimization techniques are implemented. The processes are optimized to reduce variations, operational cost and time by implementing continuous process improvement methodologies such Kaizen or agile. More advanced AI and blockchain technologies are utilized to streamline workflows and enhance the automation process to increase process accuracy and reduce processing time. There are enhanced data analytics capabilities which uses advanced AI techniques such as machine learning to facilitate real-time data analysis and decision-making. According to participant,

"The organization leverages AI and blockchain to gather and analyse data from multiple sources, enabling better decision-making and process optimization based on data-driven insights."

As, at this stage, the significant improvements are made, and enhanced capabilities are implemented, so there are more standardized and optimized processes at this stage as compared to previous stages. These processes are well-aligned with specific needs of public sector of UAE and provide improved business outcomes. The process at this stage is streamlined and optimized to allow faster cycle times, reduced cost and improved productivity.

At **managed stage**, processes are continuously monitored and evaluated to achieve high level of process efficiency & effectiveness. To monitor the process performance in real-time, robust monitoring system are used for proactively identifying issues and deviations from the required standards. According to participant,

"In the managed stage, organizations focus on continuous monitoring and management of processes to ensure ongoing efficiency and effectiveness. This stage involves implementing performance metrics, process monitoring tools, and quality control mechanisms."

To evaluate the processes, performance reviews are conducted, and the process performance is measured against established KPIs. The performance metrics help in actively identifying and resolving process inefficiencies. To conduct performance reviews, feedback mechanisms are established to collect feedback of end-users and key stakeholders, which is then analysed to identify any pain point, anomalies or areas of optimization. The advanced AI algorithms, data analytics, and data-driven insights are used to implement iterative enhancement into automated processes. Besides to iteratively enhance the processes, continuous process



improvement methodologies such as lean six sigma are also applied. These methodologies help in reducing variability, eliminating waste and enhancing the overall efficiency and effectiveness of processes.

At **optimized stage**, advanced AI techniques such as machine learning, natural language processing and predictive analytics are used for proactive decision making and providing personalized user experience. The full integration of AI and blockchain based solutions also facilitate advanced analytics, predictive capabilities, autonomous decision-making, and end-to-end automation which makes the processes highly efficient and effective. According to participant,

“At this stage, processes may be highly efficient and effective, with the use of advanced AI and blockchain technologies, such as machine learning and smart contracts. There may be a high level of automation and integration between different systems and processes, with a focus on real-time data analysis and decision-making support.”

At this stage, the processes are proactively managed and maintained for achieving optimal performance. To proactively maintain the processes, advanced technologies such as machine learning and predictive analytics are used to instantly identify bottlenecks, anticipating issues and proactively resolving them. The organizations also foster a culture of continuous innovation and process optimization to encourage workforce to propose and implement innovative AI and blockchain related enhancements. This would make the processes agile, scalable and adaptable to handle evolving market requirements and changing circumstances.

5.6.2 Survey Analysis

For the undertaken research study, survey was conducted using online platform “Google forms”. To examine the population opinion/views on some general aspects related to the project, the questionnaire was analysed using google forms. From summary analysis of questionnaire, which consisted of bar charts or pie plots corresponding to every question, **the results were organized into different groups** that provide information on related factors. The detailed analysis for each group is given in following sections.

5.7.2.1 AI & Blockchain Implementation Requirements

In order to seek participant’s views on requirements for implementing AI & Blockchain in an organization, questions related to various requirements and importance of some elements such as need of clear vision, mission, training, awareness, etc, were asked and analysed. From the analysis, the percentage of population with favourable opinion on those questions was calculated, which has been presented in table 5.1. The analysis showed that 62.6% population agrees that there is a need of comprehensive awareness of AI & Blockchain technologies among people for implementing AI & Blockchain. 70.4% agreed that the implementation of these technologies require AI & Blockchain related skills and competencies in staff/teams responsible for implementing these technologies. In order to have a skilled workforce for implementing & managing these technologies, 76.1% population accepted that there is a need of training programs for educating & upskilling employees in AI & blockchain related fields. For successfully implementing AI & blockchain in organization, 72.1% population agreed that organization should have, clear vision, and mission of implementing these technologies and 71.5% population agreed that the structure or organization should support the implementation. 68.7% population agreed that there should be proper regulatory frameworks to lawfully implement these technologies.



Table 0.1: AI & Blockchain Implementation Requirements

Implementation Requirements	Percentage of Population with Favourable responses
Needs Comprehensive Awareness	62.6%
AI & Blockchain related Competencies & skills	70.4%
Needs Training programs	76.1%
Needs Clearly Documented Processes & procedures	65.4%
Needs clear vision & Mission	72.1%
Needs proper regulatory frameworks	68.7%
Organization structure supporting Implementation	71.5%

5.6.2.2 Implementational Benefits

In order to justify that the implementation of AI & blockchain technologies in public sector of UAE would yield numerous benefits, participant's opinion on various benefits of these technologies was recorded via this survey. The analysis summarized in table 5.2, shows that the majority of population agrees to benefits mentioned in questionnaire. 70.8% participants provided their favourable opinion that the implementation of these technologies would increase the efficiency of organization's transactions and services and 73.4% population agreed that the effectiveness of services would also be enhanced. 60.5% population also agreed that the number of transactions would also be increased. 72.7% population provided favourable opinion that the implementation of these technologies would enhance the accuracy and transparency of transactions and services and it would also resolve overlaps & duplications of transactions between federal government, local government and private sector. According to 67.1% population, the operational cost of public services and transactions would be reduced, and 62.7% agreed that implementation would also reduce customers efforts. 69.8% population also agreed that the transaction time would be decreased. 59.7% population was of the view that by implementing these technologies digital bugs and various fraud cases would be resolved and 61.1% population agreed that the implementation of these technologies can provide users the choice of making their data public or private. According to 62.3% population, the integration of these technologies ensures that data is collected and stored with high integrity & resiliency and this data becomes tamper-proof. 61.7% population agreed that the implementation of AI & Blockchain in public sector of UAE would increase the overall satisfaction & happiness level of public sector customers.

Table 0.2: AI & Blockchain Implementation Benefits

Advancements/Enhancements	Percentage of Population with Favourable responses
increased Efficiency of Organizations Transactions & Services	70.8%
increased Effectiveness of Organizations Transactions & Services	73.4%
Increased Number of Transactions	60.5%
increased accuracy, transparency and resolve overlaps & duplications between Federal, Local Government and Private Sector.	72.7%
Reduced Public Transactions/Services Operational Costs	67.1%
Reduced Customers Efforts	62.7%
Reduced Transactions Time	69.8%



resolved Digital bugs/ errors and fraud cases.	59.7%
The Integration gives users choice to make data public or private.	61.1%
The Integration ensure collecting and storing data with high integrity and resiliency and cannot be tampered with.	62.3%
Increased Satisfactions & Happiness of Public Sector Customers.	61.7%

5.6.2.3 Implications of AI & Blockchain

To identify the implications of AI & Blockchain in public sector of UAE, survey participant's opinions on various implications that their organizations might have faced, were asked. The results of analysis given in table 5.3, depicted that the implementation of these technologies has various implications that organizations experience. 20.7% population noticed changes in patterns of consumptions of various resources such as time, money and technological infrastructure. According to 56.7% population there are changes in nature of work and 49.4% was of the view that the implementation of these technologies leads to creation of new opportunities for entrepreneurs. 53% population agreed that the implementation creates new products & services for customers. 38.4% population noticed changes in organizational structures and business models. Only 15.9% population agrees that there are shifts surplus between producers or industries and only 9.1% population agreed that are shifts surplus from producers to consumers.⁴

Table 0.3: Implications of AI & Blockchain

<i>Various Implications</i>	<i>Percentage of Population with Favourable responses</i>
Changes in patterns of consumption	20.7%
Changes in nature of work	56.7%
Creation of new opportunities for entrepreneurs	49.4%
Creation of new products & services	53%
Changes in organizational structures and business models	38.4%
Shifts surplus between producers or industries	15.9%
Shifts surplus from producers to consumers	9.1%

5.6.2.4 Key Barriers/Obstacles of Implementing AI & Blockchain

To spot the key barriers/obstacles of implementing AI & Blockchain, participants' opinions on various obstacles that their organizations might have faced, were recorded. From the analysis summarized in table 5.4, it is evident that the implementation of AI & blockchain might not be a very smooth process for organizations as they might face various internal/external barriers when implementing these technologies. According to 32.7% population, their organization's legal framework was barrier and 36.4% population agreed that national legal framework was barrier towards implementing these technologies. 35.2% population agreed that limited access to funding and increasing number of investments were challenges faced by their organization. According to 54.5% population, availability of insufficient human resources such as limited skills and confined learning opportunities were the barriers. According to 35.8% population, public attitudes towards acceptance of these technologies in organization has been challenging.



Above all, 64.3% population agreed that they have faced various technical issues in terms of developing appropriate infrastructure, conducting experimentation and during deployment of these technologies.

Table 0.4: Key Barriers/Obstacles of Implementing AI & Blockchain

Key Obstacles	Percentage of Population with Favourable responses
organizational legal framework	32.7%
National Legal framework	36.4%
Access to funding and investments	35.2%
Human resources, i.e. employee skills or training	54.5%
Public attitudes/acceptance	35.8%
Various Technical issues	64.3%

5.6.2.5 Actions for encouraging Innovation & Global competitiveness

To collect the participant's opinion for encouraging innovation & global competitiveness (in regards of AI & Blockchain), in public sector of UAE, various actionable suggestions were provided in questionnaire. 22.8% population was of the view that, there should be better regulatory frameworks. According to 18% population, there should be better financial environment to support new investments. 22.2% population was of the view that, the availability of better technical standards can encourage innovation & global competitiveness in context of AI & blockchain technologies. 11.4% population provided favourable opinion that there should be better ethical standards to promote innovation and global competitiveness in public sector of UAE. According to 12% population there should be better market incentives and measures to facilitate public acceptance of these technologies, which would in turn promote innovation and global competitiveness in public sector of UAE.

Table 0.5: Actions for encouraging Innovation & Global Competitiveness

Various Actions	Percentage of Population with Favourable responses
Better Regulatory framework	22.8%
Better Financial Environment for new investments	18%
Better technical standards	22.2%
Better ethical standards	11.4%
Better market incentives	12%
Measures to facilitate public acceptance	12%

5.6.2.6 Net impact of Increased Digitalization & Automation

In order to realize the net impact of increased digitalization & automation on organizations, the feedback obtained from survey was analysed. According to 30.4% population, increased digitalization & automation results in employment gained. 51.8% population agreed that it results in, shifts in value chain and employee's profiles. Only 6% population had an opinion that increased digitalization & automation in industry results in job/employment lost. 11.4% population considers that, there is not impact of increased digitalization & automation on organization, which can be an outlier in some organizations.



Table 0.6: Net Impact of Increased Digitalization & Automation

Impacts	Percentage of Population with Favourable responses
Employment gained	30.4%
Shifts in value chain and profile of employees	51.8%
Employment lost	6%
No impact	11.4%

Table 5.6

5.6.3 Final Conclusions

The data analysis conducted and discussed in this chapter has successfully achieved various objectives of this research study. The first objective of this analysis was to identify and analyse the main drivers behind AI and blockchain deployment in UAE public sector. From the analysis, it can be concluded that there are numerous drivers that influence the deployment of AI & blockchain in public sector of UAE. Majority of interview and focus group participants have discussed that optimized operations & resource allocation, effective decision making, transparent & citizen-centric services, effective data management & utilization, economization and derivation of innovation are the key drivers of AI & blockchain implementation and deployment in UAE public sector. The survey participants have also discussed that deployment of these technologies can also provide significant industrial benefits to businesses/organizations, which might include reduced customer efforts, reduced transactions time, increased efficiency of organization's transactions and services and many more. Another objective of study was to determine the challenges that businesses or industry sectors might face when integrating, implementing or deploying these technologies in their organizations and operations. Participants have discussed some general challenges alongside internal barriers and external barriers of adopting these technologies. Main challenges discussed include Legal & regulatory challenges, availability of limited resources and high demand of investments, integration and compatibility issues, various technical issues, lack of knowledge, awareness & expertise, and various data related issues such as fragmented data sources, poor data quality, high reliance on data accessibility and data privacy and security concerns. Internal barriers that organizations might face include attracting new talent, upskilling & educating current staff, existence of legacy systems and De-acceptance of changes and new technologies by employees. External barriers faced by organizations might include security, privacy & ethical concerns, cultural barriers, lack of standardization, and interoperability challenges. Another objective of this analysis was to evaluate the proposed conceptual framework/provisional model, that is proposed facilitate and evaluate the deployment, implementation and adoption of these technologies. This conceptual framework consists of 5 stages of change called Initial, repeatable/developed, defined, managed & optimized and four dimensions of change known as strategy, technology, people and process. All participants of interviews and focus groups have acknowledged that the suggested stages and dimensions are relevant and useful and these should be customized according to implementational context of these technologies. These participants have also suggested some additional dimensions to consider, which include legal & regulatory framework dimension, Finance dimension, infrastructure & interoperability dimension, data dimension, sustainability dimension, coordination & collaboration dimension and various impacts consideration dimension.

The other objective of this study was to analyse and evaluate how AI and blockchain technologies and their associated solutions can be effectively deployed or implemented effectively. Participants of this research study have discussed various ways & means to elevate the adoption of these technologies. They have discussed that these technologies can be effectively deployed by defining clear objectives, priorities, timelines, establishing regulatory and governance frameworks and focusing on training & awareness initiatives. The other strategies that can enhance the implementation and adoption of these technologies include, building public trust & confidence, prioritizing users, investing time & resources in technology, infrastructure & expertise, and fostering a culture of experimentation and innovation in organization. Participants have also discussed that these technologies can be effectively



deployed if participation and collaboration with other organizations, key-stakeholders and officials is promoted. They have also discussed that continuous monitoring and evaluation of AI & blockchain deployment initiatives would also lead to a successful deployment of these technologies. The analysis also discusses that how different factors of conceptual framework, such as organization structure, Database integration, rules & regulations, process documentation, process automation and technology infrastructure etc, should evolve within five main stages of change of conceptual framework, to effectively implement & deploy these technologies in public sector of UAE to provide its citizens optimized services and great experience.

5.7 Chapter Summary

Initially, chapter 5 has introduced United Arab Emirates and elaborated its government structure as four case studies of the research have been selected from two main categories of U.A.E. i.e. U.A.E Federal government, U.A.E Local government. Then Entities/organizations of each of these case-studies are addressed highlighting their AI & Blockchain associated initiatives and their domains of services in these fields. To seek participants views on AI & blockchain implementation challenges, barriers and impacts of technological advancements of these technologies in their organizations, survey, interviews and focus groups sessions were held. The survey was conducted online via google forms whereas interviews and focus groups sessions were conducted face to face. The qualitative data analysis approach “thematic analysis followed by a thematic network” was deployed for conducting data analysis to gain insights on participants views and experiences of implementing & using AI & blockchain from an interview and focus-groups dataset. The results of qualitative analysis have been presented in “summaries of thematic networks”. The survey analysis has been presented in following section, whilst concluding the results of data analysis in Final conclusion sections.



Chapter Six: Model Revision and Model Application

6.1 Introduction

The initial conceptual framework was suggested based on in-depth study of subject domain and literature review regarding adoption of these technologies in various sectors. To accomplish the aim of developing a maturity model, tech professionals' feedback was collected on initial framework. The collected data/feedback has been analysed & based on research findings, this chapter presents new maturity model along with newly identified dimensions and factors, which had not been discussed either in literature or initial framework. From data analysis, researcher was also able to derive stage level definition for each dimension of new maturity model.

The structure of this chapter is as stated: **Section 6.2** provides Introduction & explanation to Newly Identified Dimensions & Factors. **Section 6.3** presents New Maturity Model. In **Section 6.4** Capability level definition of each dimension and factor of new maturity model is given. **Section 6.5** provides discussion on how to use/apply maturity model for evaluating the implementation of AI & Blockchain. **Section 6.6** concludes chapter with overview & summary of new maturity model.

6.2 Analysis of Newly Identified Dimensions & Factors

As shown in figure 6.1 below, the initial conceptual framework proposed, suggested five main stages of change called as Initial, Developed, Defined, Managed, & Optimized. This framework suggested 4 dimensions of change namely, "Strategy & Governance, Technology, People and Process". Participants of research study have agreed that these stages and dimensions are highly pertinent and useful to evaluate the adoption, implementation of these technologies.

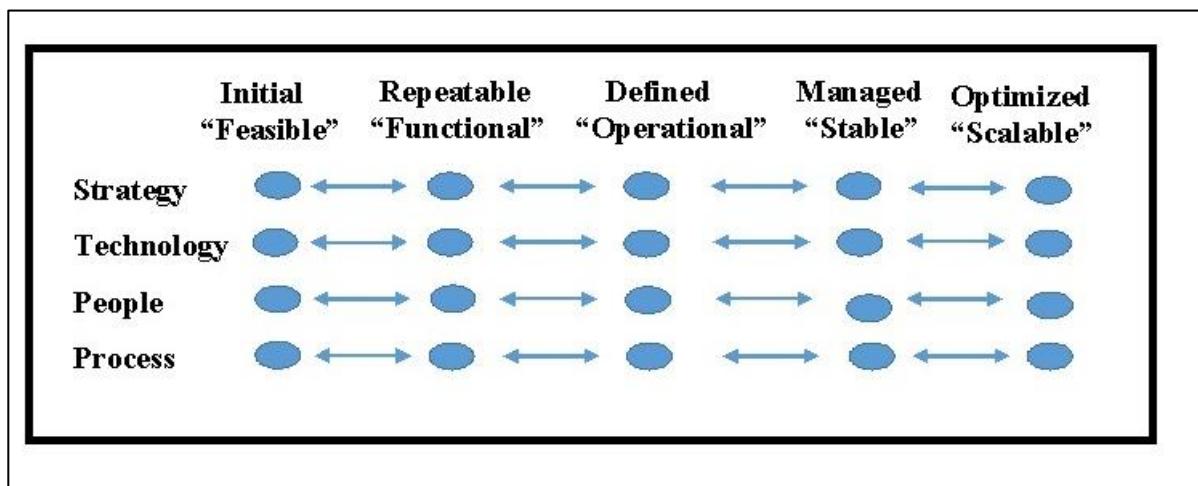


Figure 0.1: Conceptual Framework

Participants also argued that although the dimensions suggested in conceptual framework are relevant & appropriate but only these four dimensions are not ample for a thorough evaluation of organizational capacity to successfully adopt, implement and deploy AI & Blockchain in all sectors and entities of UAE public sector. They discussed that, based on context of implementation, specific industry and its requirements, there are several other dimensions that should also be considered. Once the whole data set of study was fully analysed, the researcher identified new dimensions and factors for the maturity model. From qualitative analysis of study, the themes which appeared most / highly discussed in thematic networks were selected. As the conceptual framework dimensions and factors had already been considered highly effective and important by majority of participants, so in order to avoid duplicate identification of dimensions and factors, only those themes were selected which were already not a part of conceptual framework. These themes were again organized into basic, organizing and global themes. From this organization, the global themes were regarded as dimensions whereas basic and organizing themes were considered as factors of these dimensions. The "Legal & Regulatory framework" was added as a dimension in maturity model as its dimension and factors were highly focused by research



participants. All interviewee's and focus group sessions discussed the importance of legal & regulatory frameworks. According to participants, the implementation of AI & Blockchain in UAE public sector is contingent to legal & regulatory frameworks which depends on the applications of these technologies and the sector in which they are being implemented. They were also of view that as there are complex regulatory & legal frameworks in UAE so AI & blockchain solutions should obey the existing local laws & regulations and specially should comply with data protection frameworks, intellectual property rights, & cybersecurity standards, liability, interoperability, and ethical considerations standards. Data dimension was selected as a part of maturity model as participants of study discussed various aspects related to data, it's availability, quality, management, governance & privacy. The participant's expressed their opinion that as the implementation & deployment of AI & Blockchain technologies raise many legal and ethical concerns around data protection, information dissemination, and availability of high quality data to deliver AI & Blockchain based optimized solutions, so data itself should be regarded as a whole dimension.

Finance was also regarded as dimension of new maturity model as research participant's highlighted the importance and need of availability of significant funds, for successful deployment of AI & Blockchain solutions along with issues/challenges faced due to unavailability of sufficient funds. The participant's also discussed that as the deployment of these technologies is expensive in terms of technological infrastructure, investment for talent acquisition, and budget for ongoing maintenance, so a thoughtful consideration should be given to financial requirements at various stages of implementation process.

As the customization would enable organizations to adapt the framework according to their requirements such as by prioritizing certain stages over the other or emphasizing certain dimensions over the other, and considering participant's valuable feedback the customization was selected as dimension for maturity model to showcase its dynamic nature. As each organization is different and has its own circumstances, priorities and requirements, the participants greatly focused on customizing the framework according to specific context of organization and use case of implementation. They were of the view that as the deployment of AI & Blockchain technologies is iterative process and impacts of these technologies depends on different factors such quality and availability of data, level of adaption, specific circumstances and nature of organization and organizational regulatory frameworks so customization should always be considered to meets the organizational demands and specific use-case of implementing AI & blockchain technologies.

Since the impact of implementing AI & Blockchain technologies in an organization is also dependent of factors such the extent /level to which these technologies are being implemented, the quality and availability of data in organization and effectiveness of organization's governance and regulatory framework so impacts evaluation was considered as a significant evaluation dimension of maturity model. The research participants believed that the organizations should determine / decide the level of implementation of these technologies, assess the quality of data they have, determine the accessibility level of their data resources and effectiveness of their governance and regulatory frameworks, for successful deployment of these technologies. While the successful implementation of AI & blockchain technologies also greatly relies on coordination and collaboration between different departments, organizations, and different entities such as stakeholders, academia, government official and regulators and this aspect was also highlighted in all focus group sessions and by two interviewee's as well so coordination and collaboration was also regarded as dimension of maturity model. The participants also addressed that the successful implementation of these technologies greatly require a strong coordination & collaboration between various stakeholders such as technology providers, regulators, and academia, to acquire knowledge, talent and for sharing their resources such as technology, infrastructure and finances with each other. This will safeguard the individual organizations from the challenges/difficulties of managing all resources on its own.

Furthermore, participants of study also suggested to add "infrastructure & interoperability" & "sustainability", as a dimensions of maturity model. These participants highlighted that the technological infrastructure and it's interoperability should be assessed as these are vital elements for successful implementation of AI & Blockchain. They addressed that if organizations have legacy systems or their infrastructure lacks interoperability, the success rate of AI & blockchain implementation in those organizations would be minimal. As, technology was already a dimension of conceptual framework which already focus on various aspects of technology such as infrastructure, database integration, usability & accessibility, so "infrastructure & interoperability" was not added as another



dimension of maturity model as it would have caused redundancy in maturity model dimensions. The participant of a study introduced “sustainability” as a dimension, highlighting on its importance that it would enable to assess overall sustainability level of organizational in terms of its processes, outcomes, technology, employee’s expertise and finance. It was not regarded as a dimension of maturity model because the suggested sustainability assessment terms were already a part of maturity models as an independent dimension or their factors. Additionally, the concept of assessing the overall sustainability level also appeared only once and it might also require a weighting measure to determine the overall sustainability, so it was not added as a dimension of a maturity model. However, this dimension can be investigated further in future studies.

All newly introduced dimensions along its factors are as follows.

6.2.1 Legal & Regulatory Framework Dimension

The implementation of AI & Blockchain based solutions is a very thoughtful process as it can raise various legal, social and ethical concerns. These technologies use complex algorithms and citizen’s sensitive information to solve real-life problems. The aim of legal & regulatory framework dimension is to ensure that implementation is not breaching any regulatory requirements of UAE public sector and AI & blockchain are being adopted lawfully. Two main aspects or factors of this dimension that can ensure lawful implementation of these technologies, include 1) compliance with existing Regulatory frameworks and 2) Establishment of new rules & regulations.

Compliance with Existing Regulatory frameworks

As these technologies can be scaled up to larger scale, and if the implementation of these technologies follows existing regulatory frameworks or requirements of UAE public sector, it would gain more public trust & confidence. Compliance with existing regulations ensures that these technologies are being adopted & implemented in a secure and ethical manner. Participants discussed that the implementation of these technologies should follow existing regulations related to general data protection & management regulations, intellectual property, cybersecurity and algorithmic transparency & fairness algorithms. According to interviewee, *“UAE has complex regulatory and legal framework that can make it challenging to implement and deploy AI and Blockchain solutions. It is important to ensure that these solutions comply with relevant laws and regulations, particularly in areas such as data privacy and security.”*

Research participants also suggested to organizations, to collaborate with regulatory bodies/agencies for better understanding of regulatory requirements and complying the implementation with regulatory frameworks. So, ensuring compliance of AI & Blockchain initiatives with existing regulatory frameworks is mandatory and it is important factor to be considered.

Establishment of New Rules & Regulations

The regulatory environment can greatly impact the implementation of these technologies in the organization, as the implementation of these technologies may require changes in existing laws & regulations or even establishment of new regulations for legal & ethical adoption of these technologies. For successful deployment and implementation of these technologies, it is crucial to establish guidelines for proper handling of citizens data, data governance & usage and for data ownership. Depending on context and area of implementation, industry/sector specific regulations should be established. For a controlled and governed implementation of these technologies, it is also very essential to establish auditing, licensing and certification frameworks. Participants have also discussed that as the implementation of these technologies evolve to advanced level through five stages of change, the establishment of new regulations should also mature to address biasness, transparency, interoperability, data privacy & security issues.



6.2.2 Data Dimension

As the implementation & deployment of these technologies heavily rely on data, so it is very essential to consider data dimension. In AI, data is required for training machine learning models, anomaly detection, derivation of autonomous systems and yielding data-driven insights. In Blockchain, data can be used in identity verification, Decentralized Applications (DApps), and immutable record keeping. While these technologies leverage citizens data or personal information so there must be proper data handling & management mechanisms. Considering the importance and usage of data in AI & Blockchain, participants have discussed that organizations implementing these technologies should consider two main factors related to data which are as follows.

Data Quality & Availability

In AI & blockchain, data quality & availability play essential in generating desired and correct solutions or information. The availability of relevant data is crucial to train AI models and to build blockchain networks. Sometimes, it might become difficult for organizations to gather sufficient relevant data which might cause hinderance to adopt these technologies and their associated solutions. In AI, data quality can greatly impact model's accuracy, generalization and prediction capabilities. Similarly, high quality data can reduce biasness and increase robustness of AI systems. The availability of high-quality data can also support transfer learning in AI models. Whereas in blockchain, high quality data is essential to have a reliable blockchain network. Data quality & availability is also important for gaining supply chain transparency and for correct functioning of smart contracts. Thus, ensuring the availability of high-quality data is important factor to be considered for successful implementation or deployment of these technologies.

Data Governance & privacy

For ethical and secure use of data in AI and Blockchain, ensuring data governance and privacy is of utmost importance, which can be achieved by adopting appropriate data governance frameworks & privacy regulations. Data governance frameworks can ensure fair use of data by addressing data biases and preventing discriminations in AI algorithms which would enhance transparency in AI systems. In blockchain, data governance can be used for granting user control over his data and taking his permission to use it for specific purpose. These data governance frameworks can outline data ownership and data retention & erasure policies. Likewise, data privacy policies would ensure that citizen's data is protected from any breaches, unauthorized access or cyber-security threats & vulnerabilities. It would assure that AI & blockchain technologies are not compromising with security and privacy of individuals. Thus, data governance & privacy is another important factor to be considered.

6.2.3 Finance Dimension

AI & blockchain require significant financial resources for successful deployment of these technologies, such as deployment of AI models demands powerful computing resources, which can be costly depending on their specifications. For deploying blockchain technology, Blockchain network setup, development of smart-contracts, and assuring network security also requires substantial financial resources, so finance is another important dimension to be considered. There are two main financial factors that every organization should consider to efficiently manage and utilize their resources.

Budget & Investments

The organizations implementing AI & Blockchain should consider this important financial factor. These organizations should analyze their funding resources and should allocate sufficient budget for successful deployment of these technologies. The implementation of these technologies requires significant investments related to various aspects of these technologies such technological infrastructure, storage and network resources. For implementing and managing these technologies, there is also a great need of skilled professional such as data scientists, AI researchers, blockchain developers, auditors and machine learning engineers and attracting & retaining professionals with desired skills is also very costly. Besides, organizations would also need budget for risk



management, ensuring compliance, satisfying regulatory requirements and for maintenance & scalability of these technologies. So, organizations should carefully plan on their budget and investments for successful implementation and maintenance of these technologies.

Return on Investments (ROI)

Return on Investments is a metric that can be used to measure the profitability relative to investment. To simplify, it can show if the investor is gaining profit or making loss in respect of investment made for particular business activity. ROI can be simply calculated by

$$\text{ROI} = (\text{Net Profit} / \text{Investment Cost}) * 100$$

Where net profit is the total income which has been generated from investment, and investment cost is the total cost of investment.

Research participants have emphasised that organizations should perform cost benefit analysis or ROI, as it can benefit organizations in many ways. For example, ROI can help business in assessing the performance of different investments or initiatives. They can find, which investments are making more profit. Similarly, from ROI, they can make informed decisions about resources allocation or prioritizing a particular project over other as they can depict highest profit-making investments. From ROI, organizations can also determine if their goals & objective are accomplished in regard to investments made. Similarly, for AI & blockchain initiatives, organizations can evaluate the performance of these initiatives and make informed decisions based on it. Thus, ROI is another important financial factor to be considered.

6.2.4 Customization Dimension

Public sector organizations of UAE may leverage AI & Blockchain technologies for different purposes. For successful adoption of these technologies, it is essential to tailor implementation & deployment of these technologies according to specific industry and particular context & use-cases. By Customizing AI & blockchain, business can derive various benefits such as enhanced efficiency, scalability, performance, and competitive advantage by providing unique services, features or insights which are not readily available. According to interviewee,

“Overall, while these stages and dimensions can provide useful framework, the specific stages and descriptions may need to be customized and adapted to unique context and challenges faced by UAE public sector in deploying AI and Blockchain technologies.”

The customization of these technologies can depend on the following factors:

Industry/Type organization

Every industry or specific organization might deal with different aspects of life such as healthcare, finance, education, and logistics. The workflow or process mechanism can vary from organization to organization and these organizations can have different compliance & regulatory requirements. So, it is essential to customize the deployment of these technologies according to specific requirements of each industry/organization. By doing so, AI models can have improved accuracy, if they are trained on domain specific data. Besides, these can also be designed to be scalable as and when needs of organization grow and change. Similarly, blockchain networks can be configured to meet industry-specific regulations or legal requirements, making them more appropriate & useful for particular industry. Thus, it is vital to customize AI & Blockchain by keeping this factor in mind.

Specific-context & Use-cases

Each organization/industry might have specific goals and objectives to meet and use cases of these technologies can vary depending on organization or industry. For example, in healthcare AI can be used for medical diagnosis or predictive analytics whereas in retail



it can be used for personalized marketing. So, implementation and deployment of these technologies should be customized according to specific context, circumstances of organization and its stakeholders. In some cases, it might be essential to prioritize some dimensions or stages of change over the other, or there might be need of adopting the deployment process in a completely different way. Thus, it is important to evaluate the context of implementation and consider the most relevant dimensions accordingly. According to interviewee,

“While the provisional model can provide useful starting point, it may need to be adapted and customized to specific context and use case of each AI/Blockchain implementation. For example, the dimensions of change and stages of change may differ depending on sector, application, and stakeholders involved.”

6.2.5 Impacts Evaluation

The implementation and deployment of AI & Blockchain technologies can have serious impacts on the organization and society as a whole. Depending on various factors, these technologies might have legal, ethical, societal & cultural impacts, which can be either positive or negative. For instance, if these technologies are not deployed following general data protection regulations of UAE, it would raise serious legal and ethical concerns. Similarly, the successful adoption of these technologies would have positive societal & cultural impacts which might include healthcare advancements, effective business models and efficient & digitalized society. Thus, for successful adoption of these technologies, it is vital to monitor and assess the impacts of these technologies. According to interviewee,

“AI/Blockchain technologies are constantly evolving, and their impact can change over time. Therefore, it is important to continuously monitor, assess and adapt the implementation to ensure that it is achieving the intended outcomes and is aligned with changing needs and priorities of stakeholders.”

These impacts can be evaluated by leveraging different tools and techniques such as, continuously monitoring the implementation, taking user feedback, stakeholder engagement and utilizing performance metrics. These impacts can vary depending on different factors such as the level of adoption, availability and quality of data, and effectiveness of governance & regulatory frameworks.

Level of Adoption

Different businesses/organizations can adopt AI & blockchain at a varying scale. Some organizations might adopt lower scale, and other organizations might adopt these technologies on a moderate or high scale where each level of adoption would have different organizational or societal impacts. For example, the lower scale adoption of these technologies might cause organizations to gain lower productivity, limited data security and potential to vulnerability and cyber threats. Whereas higher scale adoption can, enhance efficiency and productivity of processes, support data sovereignty and global connectivity. Besides it might also cause job displacement in some areas whereas job creation for higher-skilled roles related to AI & Blockchain technologies. Thus, each level of adoption might have positive or negative impacts, so it is an important factor to be considered for evaluating the impacts of these technologies.

Effectiveness of Governance & regulatory framework

Governance & regulatory frameworks are essential for successful adoption, implementation and deployment of these technologies. The existence of effective and well-defined governance & regulatory frameworks can lead to increased data privacy & security. Governance regulations can be used to ensure that applications/solutions of AI & blockchain meet safety & quality standards. These frameworks can also address various issues such as biasness, transparency, accountability, fairness, fraud detection & prevention and consumer protection. These frameworks might also clarify on legal status of smart contracts, intellectual property rights,



certification and licensing. As effectiveness of governance and regulatory frameworks can have huge impacts thus this factor is also vital to be considered.

Data Quality & Availability

Same has been discussed in Data Dimension.

6.2.6 Coordination & Collaboration

Being a critical aspect of any team, organization or project, coordination & collaboration among various entities such as technology vendors, lawful authority, government officials, stakeholders and employees, is also crucial for successful implementation & deployment of AI & Blockchain initiatives. As the implementation of these technologies require vast resources such as proper infrastructure, hardware, software, knowledge & expertise, legal consultations and support, so it might become very difficult for single entity/organization to gather & manage all these resources independently. Coordination & collaboration among various entities and organizations can provide significant benefits which might include sharing of resources, information, knowledge and expertise, and by fostering teamwork and collaboration, organizations can achieve their implementational & deployment objectives more efficiently. According to interviewee,

“Collaboration with other government entities, private sector organizations, and civil society can be critical to the success of AI and Blockchain initiatives. This includes partnerships for data sharing, joint development of solutions, and alignment with industry standards and best practices.”

Trust & communication, Availability of technology & resources and organizational culture are key factors that affect Coordination & collaboration between different entities. Each of this factor is explained as follows.

Trust & Communication

Trust & communication are core of coordination & collaboration. For effective coordination, various entities should have trust on each other to share their information & resources. If there is a lack of trust between stakeholders they would be reluctant to establish healthy business relations and would prefer lone working which might impose barriers towards successful implementation or deployment of these technologies. Effective communication and enhanced communication channels are essential for coordination & collaboration. Various participating entities should clearly communicate and decide on roles & responsibilities, and they should also have clear communication on goals & objectives of implementation. Effective communication strategies should also focus on conflict resolution mechanisms to resolve any disputes among participants. Besides, they should utilize effective communication channels i.e. email, presentations, collaboration forums, instant messaging platforms, to timely update each other. This would avoid any misalignment of objectives and misinterpretation of messages. Thus, trust & communication is important factor to be considered for coordination & collaboration.

Availability of Resources & Technology

Coordination & collaboration requires proper resources in terms of time, money, technology and equipment. For communication the availability of proficient collaboration tools, platforms and software is mandatory. The availability of limited resources & technology can pose a barrier in effective coordination. For instance, availability of enough time and strong network can support fast and efficient collaboration between entities while weak network can make the communication process very slow. Besides, entities might only share major updates or brief information with other due to shortage of time, as they might focus on working on projects rather than on information dissemination. Thus, availability of sufficient resources and technology is crucial factor to be considered.



Organizational Culture & Willingness

Organization culture & willingness is another important factor to be considered for effective coordination & collaboration. As strong and effective leaders can properly guide their employees, efficiently manage their resources and effectively resolve conflicts, the organizations having effective leadership and fostering a culture of teamwork and open communication can greatly support collaboration with other entities. But, if the organization's culture is influenced by hierarchical power dynamics having rigid hierarchies, subordinate employees might feel reluctant to share their ideas or concerns. Besides willingness of employees to collaborate can play vital role in collaboration as if the employees are not willing to collaborate with each other or work in team, there would not be intra-agency collaboration, which would also affect interagency collaboration at a broader scale. However, collaboration can be encouraged in employees by utilizing metrics that promote teamwork, such as rewarding employees for doing a teamwork on particular project etc. Thus, organizations should consider their culture and willingness level of employees to successfully implement and deploy AI & blockchain technologies.

6.3 New Maturity Model

The conceptual model proposed in chapter 3 has been updated based on qualitative data analysis conducted on data collected from Interviews and focus group sessions. Participants agreed that conceptual frameworks dimensions are the most appropriate & highly recommended dimensions. But they also suggested that there are some other dimensions that should also be considered and prioritized based on Goals & objectives of implementation of these technologies in organization. Figure 6.2 represents the new maturity model that has been developed based on conceptual framework and results of qualitative data analysis conducted in chapter 5. The **new maturity model consists of ten dimensions and five stages of change/maturity**. In this model, six new dimensions have been introduced which include "legal & Regulatory framework, Data, Finance, Customization, Impacts Evaluation, Coordination & collaboration" dimensions. This maturity model is an assessment tool which can be used to evaluate the organizational current status of digital transformation agenda in terms of dimensions and stages of this model. Five stages of change/maturity represent how these dimensions along with its various factors, should evolve and develop through these maturity stages. Corresponding to each dimension, there are various factors, which play a vital role in assessing organization capacity to successfully adopt, implement and deploy these technologies in its operations.

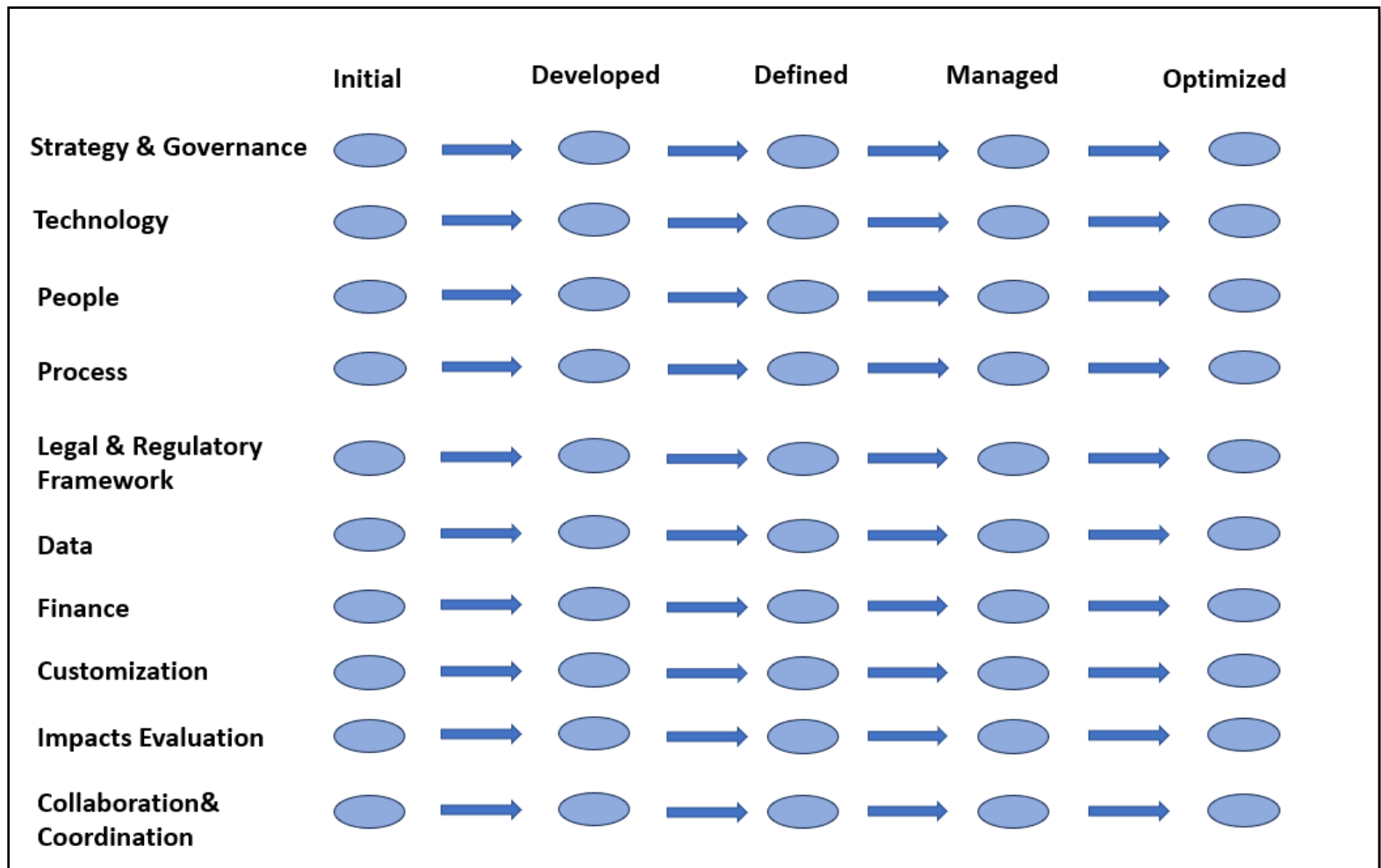


Figure 0.2: New Maturity Model

Figure 6.3 represents all dimensions of new maturity model, along with various factors for each dimension that should be considered. These factors greatly impact the adoption, implementation, and deployment of AI & Blockchain technologies in public sector of UAE.

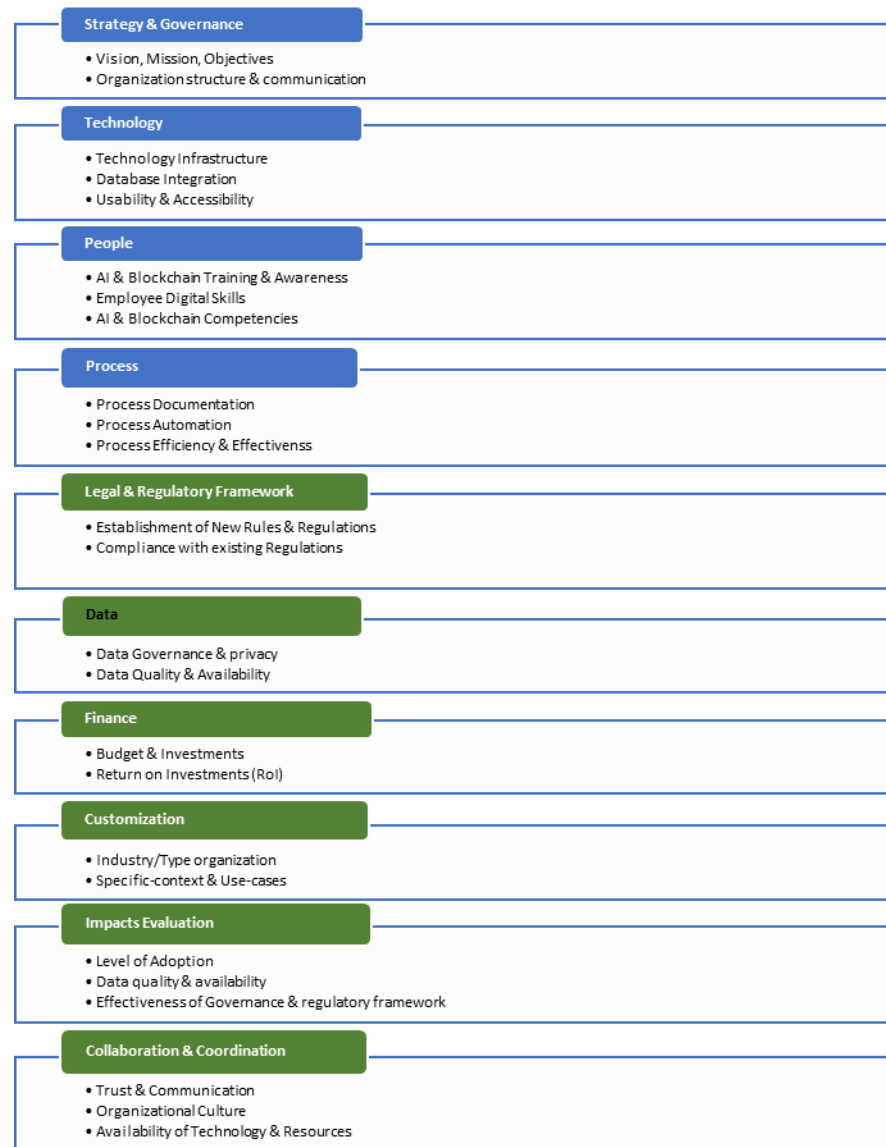


Figure 0.3: Dimensions & Factors of New Maturity Model

■ Newly Identified Dimension & Factors
 ■ Conceptual Framework Dimension & Factors

6.4 Capability Level Definition

After evolving the conceptual framework into maturity model, the researcher attempted to extract capability level definition for each dimension. This definition would interpret the level of maturity that organization can achieve at each stage of change of maturity model. Each stage of change or level depicts a higher degree of maturity and capability. From maturity level, organizations can analyse/assess their current capacity to adopt & implement AI & Blockchain technologies and thereby improve their capabilities in regards of dimensions and factors given in maturity model. Each dimension has a maturity level scale range (Initial, Developed, Defined, Manage, Optimized) which corresponds to each stage of change of maturity model. Each dimension would mature further in practice, which can be evaluated by assessing its capabilities via its factors, at a maturity level's scale range. The maturity levels are not recommended to be used as threshold levels, where one cannot move to next maturity level without fulfilling all conditions of lower/previous level. Similarly, different dimensions can have different level of maturity, where organizations can customize or target different maturity level for each dimension according to specific context and use -case of AI & Blockchain. The capability level definition for each dimension is given as follows:

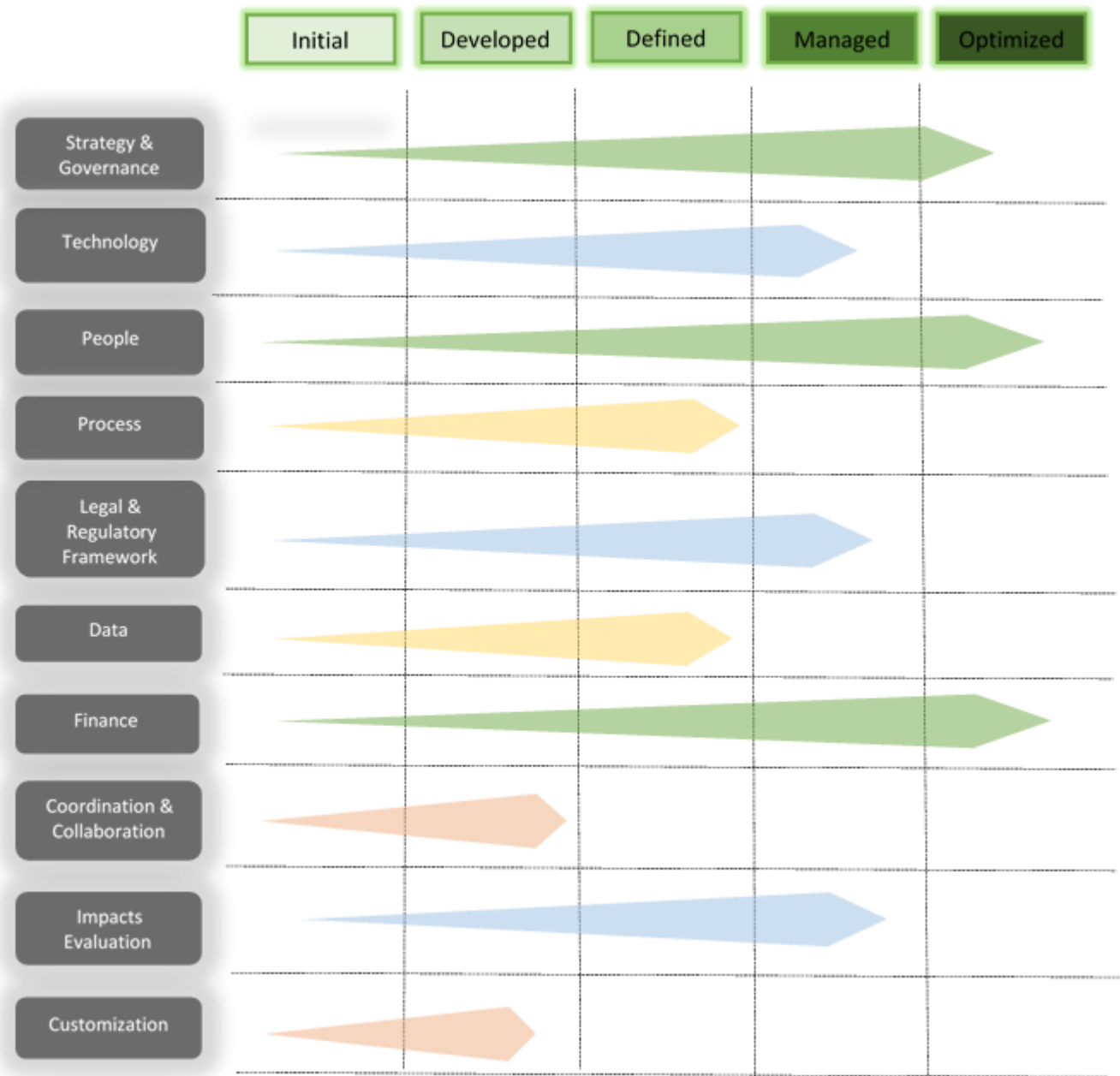


Figure 0.4: Capability Level Definition of New Maturity Model

6.4.1 Strategy & Governance Capability Definition

Capability	Definition
Initial	The vision is to explore the potential of AI & Blockchain technologies and leverage these technologies to enhance operational efficiency & transparency, reduce service cost and provide citizen-centric services in public sector of UAE. The mission is to explore and identify potential use-cases of AI & Blockchain in organization's processes, system and services by conducting pilot project or proof-of-concepts . The objectives include; developing a roadmap for pilot projects, allocating resources for implementation of pilot projects and assessing existing processes and identifying areas which can benefit from AI & Blockchain . There is only small team or department responsible for implementing AI & Blockchain technologies. The team consists of individuals with diverse backgrounds which includes project managers, technical staff, policy advisors, domain experts and professionals for various other departments of organization. The team reports to designated department of organization or work under a central digital transformation unit.



Developed	The vision is to establish AI & Blockchain as core component of UAE public sector infrastructure and scale up the implementation of these technologies. Mission is to deploy AI & blockchain technologies across various government departments by scaling up successful pilot projects, and ensuring interoperability, data sharing and securing blockchain transactions. The objectives include; enhancing data security & privacy by utilizing blockchain's decentralized & immutable nature, implementing and deploying AI & Blockchain in core operational areas (supply chain management, financial transactions, customer-relationship management, data analytics) and aligning AI & blockchain initiatives and strategies with national priorities and regulatory frameworks. There is project management office (PMO) established which is responsible to govern AI & blockchain initiatives. The team responsible for AI & Blockchain implementation expands and includes additional specialists in AI & blockchain such as Data scientists, cybersecurity professional and dedicated project managers. The organization structure is more departmentalized and has a distinct team responsible for different aspects of implementation.
Defined	Vision is to become a global leader in adoption of AI & blockchain, create ecosystem of AI & Blockchain solutions which well aligned with UAE governments strategic objectives and enables seamless collaboration, data sharing, delivery of efficient & citizen-centric services and promotes innovation. Mission is to expand the reach and impact of AI & Blockchain across the organization & industry, enable intelligent decision-making and decentralized governance by establishing standardized frameworks, governance structures, regulations and policies. The objectives include; integrating advanced AI algorithms and decentralized networks to address complex business challenges, enabling predictive analytics, creating self-governing systems and auditing, tracking, and monitoring government transactions by leveraging blockchain. There is dedicated AI & Blockchain department having decision-making authority and consists of specialized divisions or units for research & development, training & capacity building, ensuring compliance with regulatory frameworks, and managing the overall implementation process. This department is governed by advisory boards or committees comprising of industry experts and stakeholders.
Managed	The vision is to maintain a sustainable & adaptable AI and Blockchain ecosystem by continuously monitoring, managing and optimizing AI & blockchain solutions and to ensuring that these solutions adapt to evolving technological advancements & dynamic needs of organizations. Mission is to establish a dedicated Centre of Excellence (CoE) for managing & monitoring the performance, security, and risks associated with these technologies and for providing research, development and training support. The objectives include monitoring and assessing the social, ethical and legal implications of these technologies, implementing measures to address emerging risks, and collaborating with regulatory authorities to stay updated on legal & compliance requirements. Dedicated AI & blockchain department evolves into CoE, with expanded capabilities & resources and the organization structure is decentralized where AI & blockchain expertise have been embedded within



	departments and business units. The CoE reports to high-level executives or board responsible for technology-driven transformation initiatives.
Optimized	The vision is to fully integrate AI & Blockchain ecosystem across various government departments that supports derivation of innovation, creation of new business models, seamless data sharing, streamlined processes , and enhanced citizen-centric services. Mission is to explore and leverage emerging technologies to deliver personalized, seamless and citizen centric-services which generate sustainable economic growth and establish UAE as global centre of excellence. The objectives include; developing robust AI models and algorithms and customizing them according to specific government functions, establishing decentralized blockchain networks , exploring & leveraging emerging technologies like machine learning, natural language processing, Internet of Things (IoT) and fostering a culture of collaboration, innovation and experimentation. The organization structure is agile & adaptive where CoE evolves into mature & self-sustaining entity comprising professionals with expertise in AI & blockchain, project management, and policy development and it might also provide consultative services to other government entities aiming to integrate AI & Blockchain. This department is led by directors or senior officials and reports to highest levels of government .

6.4.2 Technology Capability Definition

Capability	Definitions
Initial	There is basic technology infrastructure with limited computing resources (hardware, software), finite storage capacity (traditional databases / cloud-based) and limited capabilities in terms of integration & interoperability. Initial AI algorithms & models are deployed on servers and blockchain network is setup with nodes & validators. Database integration is also limited, and focus is kept on consolidating various data sources (spreadsheets, databases, data repositories) into centralized system and utilizing simple data pipelines/scripts to extract data from data sources and preparing it for AI & blockchain. AI & Blockchain technology is accessible to only small group of individuals (technical experts/researchers) and technology usability is very limited as it's interfaces or overall usage would require technical expertise or specialized knowledge.
Developed	Technology infrastructure comprises of high-performance computing resources (GPUs, TPUs), storage capacity (robust cloud infrastructure) and advanced network capabilities (high-speed network switches, routers, load-balancers). AI frameworks/tools are integrated and there are private or consortium blockchain networks with dedicated/larger number of nodes. AI system and blockchain networks are integrated with databases and expanded database integration is achieved through middleware, data integration platforms or custom-built connectors. There are enhanced ETL, data cleansing, transformation and standardization processes . Technology is accessible to wide range of users and easy to use as it would provide Graphical user interfaces/ interactive dashboards which are designed based on user experience (UX) principles .



Defined	There is advanced technology infrastructure which consists of advanced data management systems, automated data pipelines, robust security measures, standardized software frameworks & tools, specialized hardware such as ASICs or FPGAs. The infrastructure utilizes standardized data formats, APIs and data integration platforms and facilitates seamless data sharing & interoperability between AI & blockchain systems. Database integration can handle and integrate various data types (structured, unstructured, semi-structured) and leverages dedicated data integration platforms which facilitate data mapping, lineage and synchronization. AI systems integrated with databases can facilitate advanced analytics, predictive modelling and real-time decision making whereas Blockchain networks integrated with databases can provide secure and immutable data storage and transaction verification. Technology usability & accessibility is enhanced by adhering accessibility standards, conducting usability testing, incorporating user-feedback, and multiple languages to facilitate diverse user needs.
Managed	Technology infrastructure is designed to accommodate scalability & elasticity by leveraging containerization technologies (Docker), orchestration platforms (Kubernetes) and actively monitored & managed by implementing advanced monitoring & management tools, automated deployment pipelines or frameworks, robust data management systems (data lakes, data warehouses), and robust disaster recovery plans to ensure continuity of business in case of any tragedy. AI & Blockchain technologies are integrated with IoT and big data. There is almost real-time database integration is achieved by using advanced technologies like change data capture (CDC) or event-driven architecture. Advanced data governance practices, data quality monitoring checks, validation processes, error handling mechanisms and data access controls are also implemented. AI systems are integrated with databases via APIs or direct database access and blockchain networks are deeply integrated with databases for efficient data storage & retrieval. User-Interfaces/dashboards are highly intuitive & customizable and regular updates & enhancements are implemented to continuously improve technology usability & accessibility. User support systems (help-desks, chatbots, manuals) are established to provide ease and assistance for technology usability.
Optimized	There is highly scalable, fault-tolerant technology infrastructure which is customized to satisfy specific requirements of AI & blockchain and leverages cutting-edge technologies (edge computing, quantum computing, federated learning, distributed AI systems, sharding, sidechains, interoperability protocols) to facilitate large-scale deployments and to enhance efficiency & privacy. Database integration is highly mature and optimized for performance and agility and encompasses big data technologies & frameworks to handle massive volume, varieties, and velocities of data. Data virtualization techniques and data federation approaches are adopted to provide unified view of data from disparate sources. For high throughput data ingestion distributed file systems (Apache Hadoop, Apache Spark, Apache Kafka) are used. Technology usability and accessibility is highly refined and optimized and provides personalization and customization options to achieve maximum user



satisfaction and productivity. There are robust accessibility features and extensive user training & support resources available to effectively reduce learning curve.

6.4.3 People Capability Definition

Capability	Definition
Initial	Employees have basic knowledge and understanding of AI & Blockchain technologies and they require training & awareness to understand the potentials of these technologies including their use-cases, pros and cons. Although employees don't have solid digital skills related to these technologies, but they are expected to have basic digital literacy skills such as proficiency in using computers, internet and common software applications. Training & Awareness initiatives are limited to small audience (decision-makers, government officials, employees involved in AI & BC projects), and these initiatives intend to provide basic knowledge, understanding and experience of utilizing these technologies by conducting workshops, training sessions or seminars . Employees are trained on data analysis, data management, programming skills in training & awareness sessions.
Developed	Employees have enhanced competencies and they are capable of using basic AI & Blockchain tools, platforms & applications and they also understand how these technologies can be integrated into existing systems & processes. Training & awareness initiatives enhance and expands to provide role-specific training (for roles such as data scientists, AI & Blockchain developers, legal experts, project managers) to wide range of employees by conducting specialized training sessions, certifications, online courses, degree programs and providing self-learning resources such as online tutorials or documentation. Employees digital competencies are limited to specific use-cases or applications of these technologies and they'll acquire specialized technical skills such as machine learning, cryptography, smart contract development and blockchain protocols.
Defined	Employees have well-defined competencies in AI & Blockchain concepts, algorithms, frameworks and in implementation of complex AI & blockchain applications. Besides they also understand legal & ethical implications of these technologies and they have sound knowledge of privacy, security, data protection and compliance regulations . Training is provided to employees to acquire advanced skills in AI model development, data governance, blockchain implementation, data engineering, cybersecurity, blockchain architecture, smart-contract programming and AI & Blockchain project management. Besides, there are level-catered training program which provide basic training & awareness to general staff and advanced technical training to AI & Blockchain professionals. There are continuous & dedicated training and awareness resources such as online learning platforms, knowledge repositories, online courses and webinars, which cover both technical and non-technical aspects related to these technologies.



Managed	Employees have highly advanced competencies and are capable of providing training to other employees or new-starters. They also completely understand risks associated with these technologies and know how to mitigate such risks (data privacy, security, biasness). Training & Awareness initiatives are continuously managed by conducting competency assessments & evaluations of training programs and employees to identify and bridge any skills gap and updating employee's competencies according to evolving demands and emerging technologies. Advanced training is provided to employees in specialized fields like natural language processing (NLP), deep learning (DL), or smart-contract development. Awareness initiatives also provide updates on emerging industrial trends, regulations, and ethical considerations via internal or external knowledge sharing platforms , portals, discussion forums communities of practices, internal newsletters, or industry events.
Optimized	Employees are experts in AI & Blockchain technologies and have advanced level skills in AI algorithm design, deep learning, blockchain architecture, AI & Blockchain integration and decision making. Their digital skills also touch higher level of proficiency and agility. There are dedicated training departments or centre of excellence (CoE) in organizations, which provides training on emerging technologies, industry-specific applications, and also supports cutting-edge research & experimentation in these technologies. There are also certification programs to recognize & validate employees' expertise in AI & Blockchain and providing them certificates accordingly.

6.4.4 Process Capability Definition

Capability	Definition
Initial	Manual processes are prevalent with only few iterative and basic processes (data entry, data pre-processing, basic calculations) automated by using simple automation tools or scripts. Efforts are made to identify processes for automation by conducting process assessments, feasibility studies and proof of concepts . There is limited documentation of processes which includes basic project requirements, objectives, high-level process diagrams, flowcharts, data sources and feasibility assessment frameworks . It may also include basic guidelines and protocols for data-handling, security and privacy. Process efficiency & effectiveness is very limited and significant efforts are made on process assessments and improvements by defining & leveraging baseline metrics or key-performance indicators (KPIs) to measure process cycle times, resource utilization, or error rates.
Developed	There is widespread and integrated process automation which automates rule-based tasks (data extraction, reports generation, automated data transfer) across different departments. Automation is performed by leveraging commercial or custom-built automation tools & techniques such as Robotic process automation (RPA) for rule-based tasks, AI algorithms for automating data analysis and blockchain for



	automating supply chain processes and transaction verification. Processes are defined and documented with more clarity and detail which include specific tasks, responsibilities, decision points in AI & Blockchain workflows, SOPs, process maps, business process models, system architecture diagrams and step-by-step guides for implementing AI & Blockchain technologies. Processes are more accurate, reliable, time-efficient which enhance process overall efficiency & effectiveness. Process is optimized for streamlining workflows, reducing waste and improving productivity by leveraging optimization techniques (Lean Six Sigma, process reengineering) and establishing more robust metrics and KPIs.
Defined	Processes are end-to-end automated and automation is performed by leveraging intelligent automation techniques like AI-driven process automation (AIDPA) or machine learning algorithms for handling complex tasks such as data analysis, decision-making, or anomaly detection. There are different roadmaps or frameworks for evaluating & selecting automation solutions. Processes are documented in structured and comprehensive manner and process documentation covers all aspects of AI & blockchain implementation such as industry standards & regulatory requirements of UAE public sector, data acquisition, pre-processing, model development, blockchain integration and compliance considerations. It also includes process documentation templates, guidelines, and checklists for AI model development, data preparation, blockchain network setup and smart contract deployment protocols. Process efficiency & effectiveness is well defined with specific requirements of UAE public sector's AI & Blockchain initiatives, where process excellence (reduced cost, improved productivity, faster cycle times) is achieved by conducting comprehensive process assessments, adopting reengineering workflows, identifying and eliminating bottlenecks and un-necessary steps.
Managed	Automated processes are monitored, managed and fine-tuned by leveraging process monitoring tools, performance metrics, exception handling, performance metrics and feedback. Emerging technologies and tools such as natural language processing (NLP), computer vision (CV), or blockchain based smart-contracts are used for continuously optimizing automation opportunities. Documentation is regularly reviewed and updated by implementing version control mechanisms for tracking changes and updating accordingly. Documentation covers both technical and non-technical aspects of AI & blockchain projects and also includes troubleshooting guidelines, FAQs for efficient problem solving, post-implementation analysis, impact assessments & lessons-learned. There are also knowledge management systems or repositories for storing and sharing documentation. Process efficiency & effectiveness is optimized by utilizing data-driven analytics and AI algorithms for patterns identification and anomaly detection. Process's performance is monitored in real time by leveraging agile methodologies and robust monitoring systems.
Optimized	All routine and complex processes such as complex decision-making processes, predictive analytics, or cognitive tasks are automated. Automation initiatives include achieving end-to-end automation, enabling self-executing and self-regulating processes by implementing advanced techniques such as cognitive



automation, ML-based process optimization, and decentralized autonomous organizations (DAOs) powered by blockchain. Documentation is comprehensive, user-friendly, easily accessible & researchable and it comprises process documentation frameworks, continuous process improvement methodologies (feedback loops, iterative enhancements), scalability & sustainability considerations, best-practices, benchmarks and industry standards. Processes are highly efficient & effective, agile, adaptable, capable of handling evolving requirements and are continuously optimized to achieve optimal performance.

6.4.5 Legal & Regulatory Framework Capability Definition

Capability	Definition
Initial	To recognize the potential legal implications of AI & Blockchain, risk-assessments are conducted. As these technologies heavily rely on data, so guidelines and rules are established for responsible data handling . Some principles regarding ethical AI usage are also developed to address any biasness, fairness and transparency concerns regarding these algorithms. Various general regulations such as data protection, privacy & security regulations, informal guidelines & best practices for ethical use of these technologies, are followed. Compliance with existing regulations such as UAE Data Protection law, international standards and regulations related to data protection, cybersecurity, and intellectual property is also ensured.
Developed	As the deployment & implementation expands gradually, interoperability standards are established to ensure compatibility and seamless integration of these technologies across various platforms. In regards of AI, regulatory frameworks are established to ensure non-discrimination, fairness and un-biasness . Besides regulatory frameworks for data governance, data sharing, and consent management are also established. There might be industry-specific regulations in the industry where these technologies are being deployed, so compliance with industry specific regulation is mandatory. Organizations also collaborate with regulatory bodies & legal experts to understand regulatory requirements and for ensuring compliance with existing relevant laws & regulations.
Defined	Regulatory frameworks for governing data collection, usage, data sharing, and standards for data management are established. For ensuring legal enforceability and consumer protection for Blockchain-based transactions, smart-contract frameworks are established. Besides, regulatory framework for auditing & certification of AI & Blockchain systems are also developed. Compliance with various data privacy & security requirements is also assured for ethical use of data. AI & Blockchain projects are regularly audited & assessed to ensure compliance with regulatory requirements. Efforts are made to collaborate with international organizations , regulatory bodies or industry associations to align regulations and implementation of these technologies with global best practices.



Managed	Proper Guidelines & policies for AI & Blockchain systems accountability , including transparency and fairness are established. For defining roles & responsibilities and processes for governing the use of AI & Blockchain technologies, internal or external governance frameworks are established. Based on experiences, technological advancements, and evolving needs, the regulatory frameworks are refined & updated . There are real-time monitoring and evaluation mechanisms to ensure legal & regulatory compliance. There are also regulatory authorities governing compliance and ensuring legal enforceability. To ensure compliance with regulatory requirements, government might also establish regulatory sandboxes or innovation zones for experimenting with AI & Blockchain technologies & identifying any regulatory breaches.
Optimized	Regulatory bodies or agencies focusing on overseeing the implementation of AI & Blockchain technologies are established. Various applications of AI & Blockchain might be critical, so auditing, licensing, or certifications frameworks for AI & Blockchain systems & professionals are established. As there are advanced regulations in place related to various aspects of these technologies (data management & ownership, accountability, interoperability), so compliance with all such regulations is ensured. To accommodate cross-border implementation of these technologies, international collaboration & harmonization of regulations is also ensured.

6.4.6 Data Capability Definition

Capability	Definition
Initial	There are only limited data sources available from where data is collected. As there is limited collaboration & partnership between various stakeholders & entities so organizations might have limited data access and limited data sharing capabilities. The quality of available data is poor & unreliable. There are various inconsistencies in data such as data silos, inaccurate or missing data, inconsistent formats , and data anomalies . Data is leveraged without considering/following any strict data privacy measures or policies and there are ad-hoc or non-existent data governance practices as data is leveraged only for conducting pilot projects or proof of concepts.
Developed	As the implementations of these technologies expands and organizations have enhanced data infrastructure , so data can be accessed & collected from multiple sources. Data quality is improved by performing data cleansing, transformation or validation operations on data. Various primary data governance policies / procedures such as data classification (sensitive, confidential, public), data access, data authorization, and data ownership, are defined. To protect sensitive information and ensuring data privacy, encryption measures, data encryptions or authentication policies are implemented.
Defined	There are expanded data sources such as data lakes, data warehouses and well-defined collaboration & partnership with other organizations for data sharing & data



	integration, so data is readily available & accessible . There are well-defined data quality standards & procedures for ensuring data accuracy, consistency & completeness. There are well-established data governance frameworks which clearly define roles & responsibilities for governing data and enforce data quality standards. Data privacy & security is enhanced by adopting various policies or procedures (consent management, access controls, data retention or disposal policies, documenting data processing activities) and ensuring compliance with existing regulations for data privacy such general data protection regulations or UAE's data protection law.
Managed	Data from multiple sources is available in real-time or near real-time. Efforts are made to retain data quality by leveraging data quality metrics or continuously monitoring data quality by using automated tools and processes . There are data governance policies for secure data sharing between different systems and applications. Advanced encryption techniques, tokenization or differential privacy policies are used for ensuring data privacy & security. To enforce data governance policies, and managing & maintaining data access and lineage, automated data governance tools and platforms (i.e., Alation, Collibra, Datum) are leveraged.
Optimized	There is high quality, highly optimized and tamper-resistant data available. For highly refining data to optimize data quality, advanced techniques such as machine learning or natural language processing are used. There is mature and optimized data governance ecosystem which treats data as a strategic asset. Data privacy is achieved by adopting privacy by design principles or privacy preserving techniques such as federated learning or homomorphic machine learning .

6.4.7 Finance Capability Definition

Capability	Definition
Initial	The implementation of AI & Blockchain technologies and their associated solutions is expensive and requires significant financial investments. There is very limited budget allocated for AI & Blockchain initiatives, which is invested in conducting pilot projects or proof-of-concepts for testing the feasibility of these technologies. Measuring return on investment (ROI), is difficult, as investments have been made in feasibility tests for experimental or learning purposes. However, if it is calculated, ROI might be minimal or even negative .
Developed	From feasibility testing, informed decisions are made on a level to which these initiatives should be scaled up. As the implementation is scaled up from pilot projects to implementing these technologies in a particular business function or process, more budget is allocated to facilitate expanded implementation. As there is a lack of technical knowledge or AI & Blockchain related expertise, so significant investments are made in arranging training programs/workshops, to train the workforce to confidently adopt and implement these technologies. There are limited sources (infrastructure, hardware, software, networking tools) available for implementing



	these technologies so investments are made in acquiring the desired infrastructure. As investments go beyond feasibility tests, so measuring ROI becomes easier. The successful implementation results in cost-saving, improved operational efficiency and enhanced customer experience, so ROI would be positive, moderate & encouraging to continue the efforts to achieve optimal efficiency.
Defined	As, there are clear strategic plans for integrating these technologies across various departments of organizations, so substantial budget is allocated for supporting AI & Blockchain initiatives. As the implementation expands across multiple departments or business areas, the need of various investments also increases. As implementation of these technologies require AI & Blockchain related specialized personnel's, legal experts, project managers, robust systems, infrastructural upgrades and extensive storage requirements, so investments are made accordingly to ensure the successful & ethical implementation of these technologies. While AI & Blockchain initiatives, focusing on expanding the implementation, become integral part of business strategy, ROI becomes more significant & predictable. As the expanded implementation results in increased benefits, so ROI is led by reduced operational cost and increased revenue.
Managed	Budget allocation and investments intend to scale up the implementation initiatives across the whole business functions or throughout the organization, so substantial budget is allocated accordingly. Investments are made to expand the infrastructure, enhancing security measures, and developing & implementing advanced AI models, and scaling up blockchain networks. Besides investments are made for ongoing maintenance of these technologies, efficient data management, and continuous monitoring of these systems. The expanded implementation results in effective decision making, efficient service delivery, automation of process, and fraud & error control, thus ROI is seen to be positive and led by operational excellence, reduced manual labour, cost saving in time, labour, infrastructure, innovation & competitive advantage.
Optimized	As AI & Blockchain technologies have been fully integrated into organization, budget allocation and investments intend to optimize operational efficiency and costs while maintaining high-quality solutions. Investments are also made to explore cutting-edge technologies, research and for derivation of innovation. AI & blockchain initiatives deliver maximum value and ROI is on its peak, which is led by sustained excellence, national/global leadership and innovation.



6.4.8 Collaboration & Coordination Capability Definition

Capability	Definition
Initial	There are experimental initiatives for implementing AI & Blockchain technologies, which involves only small team, so collaboration & coordination is generally informal & limited which take place only between individuals of team or within department. These individuals / teams collaborate to brainstorm implementation ideas, conducting feasibility tests, identifying potential use-cases and for awareness building . They collaborate via utilizing informal, primary and internal communication channels such as emails, face-to-face discussions, internal communication tools, workshops or knowledge-sharing sessions .
Developed	As these technologies are implemented in different business functions/processes, so coordination & collaboration also begins to increase & formalized . Cross-functional teams working on AI & Blockchain projects coordinate for knowledge-sharing, discussing progress updates & project-status reports , and for decision making . Departmental meetings, cross-team coordination sessions, digital platforms , include the regular communication channels leveraged for coordinating & collaborating with other teams, key officials & stakeholders.
Defined	The coordination & collaboration is enhanced as the implementation is expanded across multiple departments or organizations of UAE's public sector. There are dedicated teams working on AI & Blockchain projects and Centres of excellence responsible for managing these projects which coordinate & collaborate for sharing resources, expertise, regular reporting, and strategic planning and for discussing case studies, whitepapers and industry publications . Coordination & collaboration among key stakeholders, various organizations, technology vendors, key officials, and academia take place via inter-departmental meetings, executive briefings, formal presentations, official reports and policy documents .
Managed	Coordination & collaboration is pervasive across multiple organizations working multiple on AI & Blockchain projects. Senior executives, boards of officials, senior management, regulatory bodies, government entities, and industry associations coordinate & collaborate with each other for sharing progress updates, best-practices, key-milestones and impact assessments . These entities leverage formalized reporting mechanisms, strategic meetings, stakeholder engagement events, and knowledge sharing platforms to coordinate & collaborate with each other.
Optimized	As AI & Blockchain technologies become fully integrated, coordination & collaboration also becomes fully embedded into organizational culture. There is inter-organization and intra-organization coordination & collaboration which facilitate further research & innovation in implementing these technologies. Coordination & collaboration take place to share success stories and for promoting research & innovation across public sector of UAE. Dynamic communication channels such as online collaboration platforms, innovation hubs are used for collaborating with each other to facilitate continuous knowledge exchange & ideation .



6.4.9 Impacts Evaluation Capability Definition

Capability	Definition
Initial	As AI & blockchain technologies are being explored and tested to assess their feasibility, and these technologies are not yet practically integrated into any business process area, so the impact of these technologies is limited & not widely understood . As, data is required only for conducting feasibility test or pilot projects so ensuring data quality & availability is not a main focus, so data also does not have some serious impacts. The governance & regulatory frameworks provide guidelines for conducting feasibility tests, and these frameworks are underdeveloped for wider adoption. Due to lack of knowledge & understanding of regulatory requirements, compliance with existing regulations is also limited. Thus, lack of regulatory requirements and compliance might cause regulatory uncertainties among key stakeholders and officials. Lack of knowledge and lack of expertise related to AI & Blockchain technologies in employee would cause job displacement concerns among them and would be reluctant to adopt these technologies .
Developed	The implementation of these technologies become widespread across different departments of organization and these technologies are implemented for different purposes. For instance, AI-powered systems might be used for sentiment analysis or predictive analysis and Blockchain might be used for developing decentralized applications which can result in enhanced supply chain transparency or streamline transactions. Thus, based on applications of these technologies, the impacts of these technologies can vary from enhancing data integrity, identity verification, supply chain management to streamlined workflows and improved overall efficiency . As more data is required and utilized for providing AI & Blockchain based solutions, so the way data is managed and secured, has significant impacts on society. For instance, if data of citizens is not secured properly, organizations would lose public trust and confidence in these technologies. The governance & regulatory frameworks cover various aspects of implementation such as interoperability, data sharing & communication, fairness & un-biasness in algorithms and data privacy & security. The strength and coverage of regulatory frameworks for implementing these technologies, would also have different legal & ethical impacts accordingly. Besides, the impact of these technologies can be evaluated by analysing the level to which industries are adopting these technologies, examining the outcomes of their use-cases to know if real-world problems are being solved, and measuring return on investments.
Defined	AI & Blockchain technologies are implemented into core government functions, processes, or systems, and cover significant portion of public sector of UAE. As the implementation expands, regulatory & governance frameworks also enhance and become well-aligned with UAE public sector's AI & Blockchain initiatives which clearly define roles & responsibilities, with clear guidelines, standards and well-defined data privacy & security policies. The expanded implementation and enhanced regulatory frameworks lead to increased transparency & accountability in government



	operations, and citizen-centric service delivery which significantly increase public trust in these technologies. As these technologies become well-integrated into systems, their impacts can be evaluated in terms of cost reductions, customer satisfaction, efficiency gains and revenue generation . The impacts can also be evaluated by analysing how well these technologies have achieved goals & objectives of implementation and for identifying success level in particular industry, industry specific evaluation metrics can also be leveraged.
Managed	As these technologies become well-integrated throughout organization/industry, the focus is kept on continuously governing & managing the solutions to improve their performance and reliability. There is strong enforceability of legal & regulatory frameworks to ensure ethical & responsible use of these technologies. The security & scalability of blockchain networks is also upgraded by continuously auditing these networks. Thus, the successful implementation and continuous monitoring of solutions has substantial impacts such as continuous improvements, security updates, regulatory compliance and productivity improvements . Other impacts of these technologies can be evaluating by analysing scalability of these solutions, examining the growth of ecosystem in terms of partnerships, service providers and market/industry maturity to provide AI & blockchain services & products.
Optimized	The implementation reaches the highest level of maturity and has substantial impacts such as high level of automation, secure, immutable, & interoperable data sharing , and seamless collaboration across multiple government entities. The inclusive impact of these technologies would be transformative and pervasive , leading to restructured/new business models and government operations. However, the overall impacts can also be evaluated by analysing societal impacts of these technologies in terms of employment rate, level of disruptions occurring in work environment, level of sustainability and customization. In all capability levels, the impacts can be evaluated using different qualitative & quantitative evaluation metrics such as surveys, case studies, feedback loops, performance metrics, societal assessments and return on investments (ROI).

6.5 Application of Maturity Model

The new maturity model can be used by any organization intending to implement AI & Blockchain technologies & their associated solutions in current systems, business functions or process areas. Such organization can use this maturity model as an assessment tool to evaluate its current status/capacity to implement & deploy these technologies, against the defined dimension of the maturity model. This model assesses & determines the maturity level of organization in correspondence to dimensions & factors of maturity model. The maturity model can be effectively deployed by adhering to the recommended implementation guidelines.

6.5.1 Implementation Guidelines

The implementation guidelines aim to provide a roadmap for organizations to assess their current maturity level, identify areas for improvement, and establish strategies for enhancing the implementation of AI and Blockchain technologies. The key aspects of the implementation guidelines include preparing for the assessment, conducting the assessment, setting improvement goals, and tracking progress.



6.5.1.1 Preparing for Assessment

Before initiating the assessment process, it is crucial to adequately prepare for the evaluation of AI and Blockchain implementation within the UAE public sector. This involves several key steps, including:

Defining the Scope: Clearly outlining the scope and boundaries of the assessment is essential to ensure a focused and meaningful evaluation. This includes identifying the specific AI and Blockchain initiatives, departments, or functions that will be assessed.

Identifying Assessment Criteria: Establishing the assessment criteria is necessary to evaluate the maturity level of AI and Blockchain implementation. These criteria should align with the objectives of the maturity model and consider relevant factors such as technology adoption, regulatory frameworks, and stakeholder engagement etc.

Selecting Assessment Team: Assembling a competent assessment team with expertise in AI, Blockchain, and assessment methodologies is crucial. This team will be responsible for carrying out the assessment, analysing data, and providing recommendations. It is essential to ensure that the team members have the necessary knowledge, skills, and impartiality to conduct a thorough evaluation.

Collecting Necessary Resources: Gathering the required resources, such as analysis tools/software, data collection instruments, is necessary to facilitate the smooth execution of the assessment process. These resources should be aligned with the chosen assessment approach and adequately support the data collection and analysis activities.

6.5.1.2 Conducting the Assessment

Once the preparation phase is complete, the assessment can be conducted. This stage involves systematically evaluating the AI and Blockchain initiatives within the UAE public sector against the established assessment criteria. The maturity model can be practically applied to conduct the assessment by following three main activities of assessment process.

1. **Data Collection:** Discuss current status of organizations in terms of 10 main dimensions of maturity model, with most senior and experienced employees / officials. Also discuss organization status for each dimension & factor in detail, and this information/data can be collected by employing the data collection techniques discussed earlier, such as surveys/questionnaires, focus group sessions, and leadership interviews. This process should be conducted in a structured and consistent manner to ensure the reliability and validity of the collected data.
2. **Data Analysis:** Applying appropriate data analysis techniques, including qualitative and quantitative analysis, to interpret the collected data. This analysis should uncover insights, identify strengths and weaknesses, and assess the current maturity level of AI and Blockchain implementation within the public sector.
3. **Evaluation and Tagging of Information:** Compare the information gathered in step 2 with capability model definition of maturity model and tag this information with capability level to which it belongs to. Figure 4 can also be used to mark this information according to capability level determined in this step.

6.5.1.3 Setting Improvement Goals

Following the assessment, it is crucial to set improvement goals that align with the identified gaps and areas for improvement. The following steps can guide the goal-setting process:

Prioritizing Areas for Improvement: Based on the assessment results, identify the key gaps and areas that require attention and improvement. This involves analysing the assessment findings and considering their impact on the overall maturity of AI and Blockchain implementation.

Defining Realistic and Measurable Goals: Setting specific, achievable, and measurable improvement goals is essential to provide a clear direction for enhancement efforts. These goals should be aligned with the organization's vision, objectives, and available resources.

Establishing Timeframes: Determining realistic timelines for achieving the improvement goals is necessary to create a sense of urgency and facilitate effective planning and implementation. The timeframes should consider the complexity of the improvement initiatives and the organization's capacity to implement changes.



6.5.1.4 Tracking Progress

To ensure the effectiveness of improvement efforts, ongoing monitoring and tracking of progress is essential. The following activities should be undertaken:

Establishing Key Performance Indicators (KPIs): Defining relevant KPIs to measure progress toward the improvement goals. These indicators should be measurable, aligned with the assessment criteria, and reflect the desired outcomes of the AI and Blockchain implementation.

Implementing Monitoring Mechanisms: Developing systems and processes to collect and analyse data on an ongoing basis. This includes regular data collection, analysis, and reporting to track progress, identify any deviations or challenges, and make informed decisions based on the findings.

Periodic Reassessment: Conduct periodic reassessments to evaluate the impact of improvement efforts and determine the overall maturity level of AI and Blockchain implementation over time. This allows for adjustments and refinements to the improvement strategies and ensures a continuous cycle of enhancement.

6.6 Chapter Summary

This chapter intended to design and purpose new maturity model for evaluating the organization's capacity to adopt, implement, and deploy AI & Blockchain in its systems or processes. The same has been achieved by analysing the newly identified dimensions, which have been identified in qualitative analysis conducted in chapter 5. This chapter presents six newly identified dimensions known as "Legal & Regulatory framework dimension, data dimension, finance dimension, customization dimension, impacts evaluation dimension, and Coordination & collaboration dimension". A new maturity model comprising of 10 dimensions and 25 factors of these dimensions, has been designed, based on 4 dimensions of conceptual framework proposed in chapter 3, and 6 newly identified dimensions discussed earlier. Then a capability level definition of this maturity model is given in which each dimension and is defined according to 5 main capability levels/ 5 main stages of change, known as Initial, developed, defined, managed & optimized. Then, the last section provides the implementation guidelines to effectively deploy the maturity model.



Chapter Seven: Maturity Model Validation

7.1 Introduction

The validation is a systematic and well-organized set of procedures, which are carried out to evaluate and confirm the effectiveness and accuracy of proposed framework, model, product or a system. This chapter validates the reliability, credibility and usefulness of Maturity model, in public sector of UAE. Section 7.2 discusses details of the validation process adopted for this purpose. Section 7.3 provides the holistic validation of the maturity model, whereas, in section 7.4, all new dimensions along with its factors are validated and their results are provided. Ultimately, the validation results are concluded and summarized in section 7.5.

7.2 Validation Process

The specific validation process/technique is required to verify the reliability and credibility of particular product, system, or model. There are various validation techniques such as pilot testing, content validity, cross validation, literature review, expert review, peer review, user feedback & surveys, and content validity. Depending upon the nature of research, research objective, and type of framework, particular validation technique can be adopted. To gain more comprehensive assessment of systems or frameworks validity, several validation techniques can be combined and applied together. To validate the maturity model, proposed in chapter 6, “Expert reviewing combined with User Feedback & Surveys” techniques were applied, to get the maturity model validated by all case studies of research (UAE Federal Government, Abu Dhabi Local Government, Dubai Local Government, and Ajman Local Government). In “Expert reviewing”, feedback from domain experts or professionals having sound knowledge of subject area, is collected, to validate the appropriateness and completeness of the model. In “User-feedback & surveys”, feedback from potential users of model or stakeholders is collected to analyse their perspectives regarding the usability and effectiveness of model. In both techniques, feedback can be collected via surveys, interviews or focus-groups. **To validate the maturity model, expert reviews and user’s feedback was collected through mixed-mode survey which consisted of both closed-ended questions (Likert-scale) for all new dimensions of maturity model, and open-ended questions related to effectiveness of overall maturity model.** The participants of the survey included AI & Blockchain specialists, digital transformation experts, strategy specialists, and employees from four case studies of the research. The survey was conducted using online survey platform “Google Forms” and it was shared with 200 participants out of which it received 44 responses for closed-ended questions. From summary analysis of closed-ended questions of questionnaire, which consisted of bar-charts corresponding to every question, the results were organized into tables for each newly identified dimension along with its factors. **For open-ended questions, 32 responses were recorded.** The feedback/responses on open-ended questions underwent analysis using the same qualitative methodology (thematic analysis followed by thematic network approach) as employed in chapter 5. Then the results of analysis were synthesized to draw final conclusions regarding the validation of maturity model, which have been discussed in section 7.5. The validation process has been illustrated in figure 7.1.

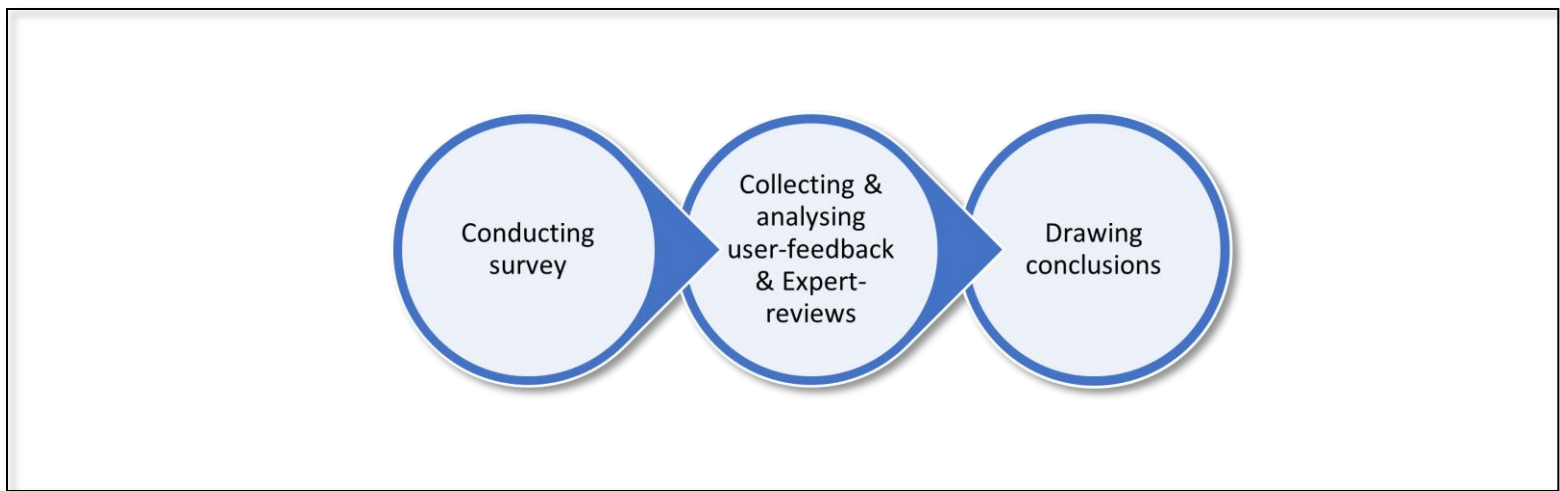


Figure 0.1: Validation Process

7.3 Holistic Validation of the Maturity Model

To thoroughly authenticate the maturity model, participants input was recorded via open-ended questions of the questionnaire. This feedback was analysed using thematic analysis followed by a thematic network approach, and outcomes have been presented in holistic validation network, given in figure 7.1. The results of analysis have been categorized into two primary categories of challenges and strengths which have been presented as organizing themes of the network, with each organizing theme further comprising of 5 and 3 basic themes respectively.

Strengths

The results of analysis showed that, the proposed maturity model has great strengths. According to participants, the maturity model would aid in seamless adoption of AI & blockchain technologies in the organization. The maturity model would also help in transforming the organization's processes, and implementation methodologies which would result in enhanced operational efficiency, customer experiences, efficient transactions and services. The maturity model would yield trust and agility in the organization by allowing phased and secure implementation of AI and blockchain technologies. Participants have discussed that the maturity model provides a fully-fledged strategic roadmap for comprehensive implementation of AI & BC technologies in the organization and this roadmap can provide clear direction towards goals. They are also of view that maturity model serves as a comparison tool, which can structurally assess the compliance of organization for digital transformation agenda and with many other digital transformation initiatives of UAE's government. The maturity model also has the power to bring all stakeholders involved in project, on a common platform, to discuss maturity assessment results of organization, and pave the path for future progression. According to participant,

"It gives each government/public entity with a full roadmap in how to implement and adopt such a new technology and also give them a clear procedure for what they should to do in their Technology infrastructure, employees, rules and regulation, strategy, budget and financing, process automation and optimization."

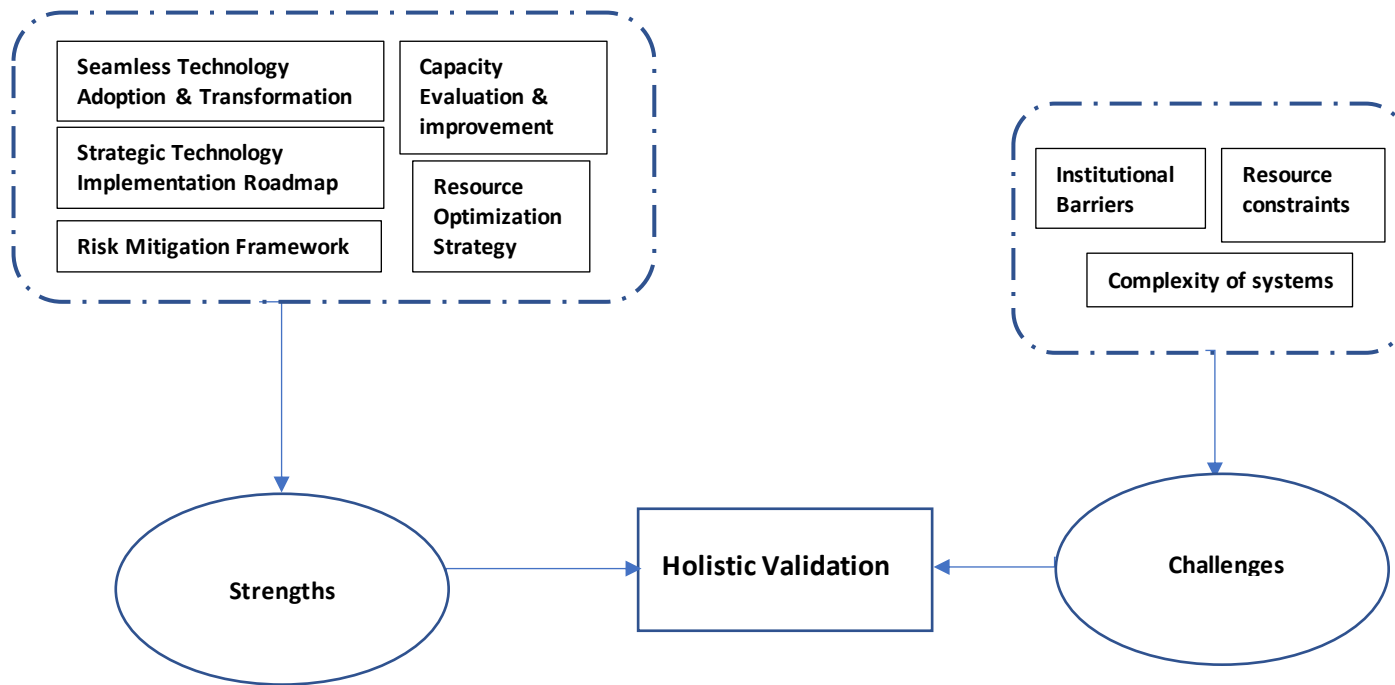


Figure 7.2: Holistic Validation

They have also discussed that, maturity model can serve as a benchmark for measuring performance of organization, in its detailed process of AI & BC implementation. It can continuously monitor the progress of implementation through its stages of development (initial, developed, defined, managed, optimized) and mark its advancement. The maturity model can also identify organization weakness and strengths for AI & BC implementation, which includes, employee's capabilities, availability of finance, quality of data, strategy & governance, the level of process's automation and optimization.

Thus, based on the evaluation finding, the organization can enact necessary alterations in specific area of implementation, and stakeholders can also make well-informed decisions regarding different aspects of deployment. This would facilitate flawless adoption & implementation of these technologies. According to participant,

"The assessment tool provides decision-makers with a clear understanding of the organization's current state in terms of AI and blockchain maturity. This enables informed decision-making regarding resource allocation, project prioritization, and overall technology strategy."

Further, they have discussed that, the maturity model would also serve as a risk mitigation framework, as it allows systematic identification of risks, that organization might face at a particular stage of deployment of these technologies. This model is also able to proactively identify any resource or capacity gaps within the organization, based on which key decision makers can establish risk management and resource optimization strategies. They can also conduct cost benefit analysis and optimize resource allocation according to specific requirements of process in terms of time, money, efforts, technology, data, and human power etc. According to participant,

"By assessing the maturity level of existing processes and technologies, the Maturity Model helps optimize resource allocation. Public sector entities can prioritize investments based on identified needs, ensuring that resources are directed toward areas with the highest impact and potential for improvement."

Challenges



Participants have discussed that the maturity model might face various institutional barriers such as bureaucratic hurdles, lack of knowledge and awareness about the assessment tool and change resistant. Adopting the maturity model as an assessment tool for implementation of AI & BC technologies, requires a strong enforcement by government, steering committee in the organization, strong leadership support and full engagement & collaboration between different entities of the organization. According to participant,

"No obstacles but require government enforcement, knowledge sharing and understanding and steering committee."

The maturity model would also require data sharing & communication between various departments of the organization for a thorough assessment of the organization for implementing these technologies. As the maturity model would also bring changes in traditional mode of carrying out the implementation process, it might face change resistance, and reluctance for a new culture of digital technology by people. According to participant,

"Implementing a maturity model often involves significant organizational changes. Overcoming resistance and fostering a culture that embraces innovation is crucial for success."

They have also discussed that, adoption of maturity model requires significant resources in terms of finance, time and capabilities. The organizations implementing AI & Blockchain might already face resource constraints, and for such organization allocation of resources for maturity model would be difficult, thus maturity model itself would have lack of resources. As the maturity model provides a comprehensive assessment tool, and thorough assessment of organization would require sufficient time, so the maturity model's adoption would increase the implementation time of AI & Blockchain technologies. Besides, it also requires a strong commitment and leadership capabilities to fully conduct the assessment process. According to participant,

"Public sector organizations may face budgetary constraints and resource limitations, making it difficult to allocate the necessary resources for a comprehensive assessment. This includes financial resources for technology implementation, as well as human resources for training and capacity-building."

Further, they have discussed that, the assessment of public sector organization might be a difficult process, due to the complexity of public sector's process, systems or technology. The public sector organizations have siloed information with their processes and data being spread across different departments/entities and collecting all the required data and information would be a complex process. They have also discussed that, the assessment tool relies on data quality & availability, which can also raise various data security and privacy concerns. According to participant,

"Navigating through intricate existing systems and ensuring compatibility with AI and blockchain solutions may pose difficulties in accurately assessing the organization's maturity level."

7.4 Validation of the Maturity Model – New Dimensions

To validate each new dimension in maturity model, Likert-scale questions were asked to understand participant's perspectives on these dimensions and its factors. Each Likert-scale question provided five choices to users, which were 1: Strongly disagree, 2: Disagree, 3: Neutral, 4: Agree, and 5: Strongly Agree. The summary analysis of participant's responses consisted of bar-charts corresponding to five choices of Likert-scale. The analysis results were organized into tables for each dimension, with each table mirroring the participant's viewpoint in relation to the factors within that particular dimension. To comprehensively present the findings, each table is given below:

Legal & Regulatory Framework Dimension

According to results of analysis, 58.35% participants agree that Legal & Regulatory framework dimension should be a part of new maturity model. As shown in table 7.1, 33.3% participants strongly agree, and 52.4% participants agree that "Establishment



of New Rules & Regulations” is important factor of this dimension. Approximately 64.3% participants express agreement regarding the inclusion of “compliance with existing regulations” factor.

Table 0.1: Legal & Regulatory Framework Dimension's validation

	Strongly Agree	Agree
Establishment of New Rules & Regulations	33.3%	52.4%
Compliance with Existing Regulations	33.3%	64.3%

Data Dimension

The results of analysis have shown that 46.4% participants concur on the inclusion of data dimension in a maturity model. 47.6% participants agree that “Data Governance & Privacy” and 45.2% agree that “Data Quality & Availability” factors should be part of data dimension.

Table 0.2: Data Dimension's Validation

	Strongly Agree	Agree
Data Governance & Privacy	47.6%	47.6%
Data Quality & Availability	50%	45.2%

Finance

The analysis results indicate that 54.75% participants agree with incorporating finance dimension into the maturity model. 50% participants have agreed that “Budget & Investments” factor is important factor of finance dimension. 59.5% participants have agreed that “Return on Investment” factor holds significance within finance dimension.

Table 0.3: Finance Dimension's Validation

	Strongly Agree	Agree
Budget & Investments	35.7%	50%
Return on Investments (RoI)	31%	59.5%

Customization

For the customization dimension, the results showed that 59.55% participants agree that customization dimension is appropriate dimension for the proposed maturity model. 64.3% participants agree that customization dimension should consider “Type of organization/industry” an important factor to take into account. 54.8% participants are in consensus to acknowledge “Type of customers in terms of specific context & customer use-cases” as an essential factor of customization dimension.



Table 0.4: Customization Dimension's Validation

	Strongly Agree	Agree
Type of organization/Industry	33.3%	64.3%
Type of customers in terms of specific context & customer use-cases	33.3%	54.8%

Impacts Evaluation

53.7% participants agree that Impact evaluation dimension ought to be included in maturity model. The have also agreed that “Level of Adoption of AI & Blockchain projects” is crucial factor in evaluating the overall impacts of adopting these technologies within the organization.

Table 0.5: Impacts Evaluation Dimension's validation

	Strongly Agree	Agree
Level of Adoption of AI & Blockchain projects	34.1%	53.7%

Collaboration & Coordination

According to results of analysis, 47.65% participants agree that integrating “Collaboration & coordination” dimension into maturity model is crucial. Additionally, 42.9% participants concur that “Trust & Communications between Digital Transformation Entities & other government entities” and 52.4% agree that “Organization Culture” are significant components of this dimension.

Table 0.6: Collaboration & Coordination dimension's validation

	Strongly Agree	Agree
Trust & Communications between Digital Transformation Entities & Other Government Entities	42.9%	42.9%
Organization Culture	33.3%	52.4%

7.5 Final Conclusions

From holistic validation of the maturity model and validation of each new dimension of maturity model, it is evident that the maturity model has yielded significant positive feedback, elucidating on its great strengths and participants strong agreement for the inclusion of each new dimension in maturity model. Participants have noted that the model provides a strategic roadmap for comprehensive implementation of AI & blockchain technologies, facilitates stakeholders’ alignment and serve as a benchmark for performance measurements. The maturity model can also mitigate risks, optimize resource allocation, and support informed decision making by



proactively identifying any resource or capacity gaps within organization. In evaluating the new dimensions of the maturity model, including legal and regulatory frameworks, data governance, finance, customization, impacts evaluation, and collaboration dimension, participants have concurred on their relevance and importance in the proposed maturity model.

Participants have highlighted that, in spite of advantages of maturity model, the model poses some challenges related to institutional barriers, change resistance, resource allocation, and data complexity. There is also a need of strong enforcement, leadership support, and collaboration for successful adoption of maturity model. Moreover, for public sector organizations with complex systems, the process might be time-consuming and resource intensive. Despite of facing these challenges, the maturity model demonstrates significant validity in facilitating the adoption and implementation of AI and blockchain technologies, as the model offers valuable insights for organizations seeking to navigate the complexities of digital transformation. The agreement of participants for inclusion of new dimensions, further enhances the model's applicability and relevance, addressing key factors affecting the implementation of these technologies. By incorporating these dimensions, the model provides a holistic framework for assessing and advancing the organization's maturity for adoption of AI & blockchain technologies. Overall, while there are challenges to overcome, the maturity model offers a valuable tool for organizations to navigate the complexities of digital transformation and realize the benefits of AI and blockchain technologies.

Case Study: Applying the Maturity Model in a UAE Government Entity – DDA

In this case study, we will explore the application of the new maturity model for AI and blockchain implementation within a UAE government entity. The purpose of this case study is to demonstrate how the maturity model can be used to assess the current state, identify areas for improvement, and guide the entity towards optimized deployment of AI and blockchain technologies.

The government entity in focus is the **Dubai Digital Authority (DDA)** responsible for driving digital transformation and innovation across various sectors. Recognizing the potential of Artificial Intelligence (AI) and Blockchain technologies, the DDA has embarked on a journey to implement these technologies within its operations. To ensure a structured and effective approach, the DDA decided to apply the Maturity Model for AI & Blockchain Implementation within the UAE Public Sector.

This case study highlights the implementation process and the progress made by the DDA in advancing its maturity level across the key dimensions:

Strategy & Governance:

The DDA initiated the implementation process by focusing on the Strategy & Governance dimension. At the initial stage, the entity conducted a comprehensive assessment of its current strategy and governance framework related to AI and Blockchain. This involved evaluating existing policies, regulations, and frameworks to identify any gaps or areas for improvement. Based on the assessment results, the DDA developed a roadmap to align its strategy and governance with the goals of AI and Blockchain implementation. This included establishing clear objectives, defining roles and responsibilities, and ensuring compliance with relevant standards and guidelines.

Technology:

In the Technology dimension, the DDA assessed its existing technological infrastructure and capabilities related to AI and Blockchain. The assessment involved evaluating the availability of necessary hardware, software, and technical expertise within the organization. By identifying the gaps and areas for improvement, the DDA developed plans to upgrade its technological infrastructure, acquire the required resources, and enhance its technical capabilities. This included investing in advanced AI and Blockchain solutions, establishing data management systems, and implementing robust cybersecurity measures to protect sensitive information.

People:

Recognizing the importance of skilled personnel in driving AI and Blockchain initiatives, the DDA focused on the People/Public Sector Employees dimension. The entity conducted a comprehensive assessment of its workforce's knowledge and skills related to AI and Blockchain technologies. This involved conducting training needs assessments, identifying skill gaps, and designing training programs



to enhance the competency of employees. The DDA also emphasized the importance of fostering a culture of innovation and collaboration, encouraging employees to embrace technological advancements, and promoting continuous learning and development.

Process:

In the Process dimension, the DDA assessed its existing processes and workflows to identify areas where AI and Blockchain technologies could be integrated to streamline operations and enhance efficiency. The entity analyzed various processes across different departments and identified opportunities for automation, data-driven decision-making, and improved transparency. Based on the assessment, the DDA developed plans to redesign processes, implement AI and Blockchain solutions, and establish mechanisms for continuous process improvement and optimization.

Legal & Regulatory Framework

Understanding the importance of legal and regulatory requirements of AI & blockchain technologies, DDA collaborated with regulatory bodies and legal experts to ensure the compliance of implementation process with existing regulations of UAE and for establishing new regulations to ensure lawful implementation of AI & blockchain technologies. The entity established regulatory frameworks for data governance, data sharing and consent management. It also established smart-contract frameworks for ensuring legal enforceability and consumer protection for blockchain-based transactions. The entity also set proper guidelines and policies for AI & blockchain systems accountability, emphasizing transparency and fairness of these systems. The regulatory committee was also established for ongoing monitoring and evaluation of regulatory frameworks according to evolving demands/levels of implementation.

Data

In data dimension, DDA assessed its existing data requirements (which processes require which data), sources and quality of data. The entity employed data cleansing, transformation and validation techniques to uplift the quality of data to satisfy implementation requirements of AI & Blockchain technologies. To ensure data privacy and security, the entity implemented various policies such as consent management, access controls, data retention or disposal policies. It also implemented advanced encryption techniques, tokenization or differential privacy policies to ensure compliance with data privacy and security regulations such as UAE's general data protection regulations. The entity also strived for enabling real-time availability of data from different sources and continuously monitoring and retaining the quality of data by deploying data quality metrics and automated data governance tools & processes.

Finance

In finance dimension, DDA strived to maximize its Return on Investments (ROI) by leading reduced operational cost and increased revenue, stemming from the adoption/implementation of AI & blockchain technologies. The entity assessed its current budget, financial resources, investments plans and specific processes or areas AI & blockchain implementation requiring significant financial resources. It allocated substantial budget for capacity development by training programs/workshops, infrastructural upgrades in terms of hardware, software, storage and networking tools. The entity also allocated budget for AI & blockchain experts, legal experts, project managers and for scaling up blockchain networks.

Coordination & Collaboration

Recognizing the importance of coordination & collaboration for successful implementation of AI & blockchain technologies, DDA analyzed the key stakeholders, departments, AI & blockchain experts, technology vendors and teams involved in the implementation process. The entity decided to conduct inter-departmental meeting, executive briefings and formal presentations to coordinate & collaborate for sharing progress updates, projects-status reports, strategic planning and decision-making. The entity also utilized both formal and informal communication channels for collaboration, such as emails, face-to-face discussions, departmental meetings, and digital platform.



Progress and Achievements

Through the implementation of the maturity model, the DDA has made significant progress in advancing its maturity level across the key dimensions. The entity has successfully aligned its strategy and governance framework to support AI and Blockchain implementation, ensuring a clear direction and effective management of initiatives. In terms of technology, the DDA has upgraded its infrastructure, implemented advanced solutions, and strengthened its cybersecurity measures, enabling secure and efficient utilization of AI and Blockchain technologies.

The DDA has also focused on building the capabilities of its workforce, offering training programs, and creating a culture that encourages innovation and collaboration. This has empowered employees to embrace AI and Blockchain technologies and utilize them effectively in their respective roles. Additionally, the DDA has streamlined its processes, leveraging AI and Blockchain to automate tasks, improve data-driven decision-making, and enhance transparency in its operations. DDA also aligned the implementation with internal & external regulatory requirements by establishing necessary regulatory policies and frameworks, which ensured the lawful implementation of these technologies. In terms of data dimension, the entity acquired high quality, real-time data and protected this by implementing data privacy and security policies. Moreover, DDA also enhanced its Return on investments (ROI), by diligently assessing its financial requirements and allocating necessary financial resources for capacity building, infrastructural upgrades, and scaling up blockchain networks.

Benefits and Potential Impact

Implementing a new maturity model for AI and Blockchain in the UAE public sector yields significant benefits in terms of enhanced service delivery, increased transparency and accountability, improved decision-making and policy development, as well as the empowerment of citizens and stakeholders. By embracing advanced technologies and optimizing processes, government entities can achieve greater operational efficiency and provide faster, more efficient, and citizen-centric services.

Enhanced Service Delivery and Efficiency: Through the adoption of AI and Blockchain technologies, government entities can automate routine tasks, streamline workflows, and provide faster and more efficient services to citizens. For instance, AI-powered chatbots can offer instant responses to citizen inquiries, reducing response times and improving customer satisfaction. Blockchain technology can facilitate secure and transparent transactions, eliminating intermediaries and reducing processing times. By optimizing processes and leveraging these technologies, the UAE public sector can deliver citizen-centric services in a more efficient and timely manner.

Increased Transparency and Accountability: Blockchain technology enables transactions and data to be recorded in an immutable and transparent manner, ensuring the integrity and traceability of information. This level of transparency fosters trust between the government and citizens, as it allows for public scrutiny and verification of actions. Moreover, AI-based analytics can identify patterns of corruption or inefficiencies, enabling authorities to take proactive measures to address them. The increased transparency and accountability resulting from the maturity model implementation contribute to a more trustworthy and effective public sector.

Improved Decision-Making and Policy Development: AI technologies provide data-driven insights and predictive analytics, empowering decision-makers with accurate and timely information. Advanced algorithms can analyze vast amounts of data, identify trends, and provide recommendations for policy formulation and strategic planning. This data-driven approach enables government entities to make more effective decisions based on evidence and insights, leading to better outcomes and optimized resource allocation. By leveraging the maturity model, the UAE public sector ensures that decisions and policies are grounded in objective analysis and aligned with the country's vision and goals.

Empowered Citizens and Stakeholders: AI and Blockchain technologies enable increased citizen participation through platforms that facilitate feedback, collaboration, and co-creation of public services. Citizens can engage in online consultations, express their preferences, and contribute to policy discussions, ensuring that government decisions are inclusive and representative of diverse perspectives. Blockchain technology ensures the security and privacy of citizen data, enabling individuals to have greater control over their personal information and selectively share it with trusted entities. Through the maturity model, the UAE public sector



creates an environment of citizen empowerment and engagement, fostering a sense of ownership and co-responsibility in shaping public services.

Conclusion: Putting it All Together

The case study of the Dubai Digital Authority (DDA) demonstrates the successful application of the Maturity Model for AI & Blockchain Implementation within the UAE Public Sector. Through a systematic approach and focus on key dimensions, the DDA has made significant progress in advancing its maturity level in AI and Blockchain implementation. By aligning its strategy, enhancing technological capabilities, investing in its workforce, and optimizing processes, the DDA has positioned itself as a leading government entity driving digital transformation and innovation in the UAE. The experience of the DDA serves as an inspiring example for other government entities seeking to implement AI and Blockchain technologies effectively and realize the immense benefits they offer in public sector. The implementation of AI and blockchain technologies within the UAE public sector presents complex challenges that require careful consideration of strategy & governance, technology, people, process, data, finance, legal & regulatory framework and coordination & collaboration dimensions. Failing to anticipate or overemphasize a single dimension can impede progress and hinder competitiveness in the long run.

However, organizations that persevere and approach the implementation systematically can achieve transformative impact, evidenced by the case study. By leveraging this framework, organizations can overcome specific challenges and propel their projects forward by leveraging their strengths in different dimensions. The new Maturity Model is applicable to organizations across UAE public sector, providing actionable insights to address barriers and drive progress. Continuously referencing and updating the framework will ensure the creation of a dynamic roadmap that enables organizations to adopt AI & blockchain and realize remarkable benefits.

7.6 Chapter summary

This chapter intended to validate the new maturity model, proposed in chapter 6. For this purpose, “expert reviewing” combined with “User Feedback & Surveys”, technique was employed to collect expert’s and user’s opinion on the maturity model. The feedback was analysed by conducting both qualitative and quantitative analysis on survey. The results of analysis expressed that, the proposed maturity model has both, benefits and challenges, associated with it. The maturity model has great strengths in terms of seamless adoption & transformation of technology, capacity evaluation & improvement, risk mitigation, resource optimization and providing a roadmap for strategic implementation of AI & blockchain technologies. Participants have also discussed that, the adoption of maturity model can be challenging due to institutional barriers, resource constraints and complexity of public sector’s processes and systems.



Chapter Eight: Discussion & Conclusion

8.1 Research Overview

Chapter one introduces the research problem, which focuses on the gap in existing literature regarding the real impacts of AI & BC technologies on the public sector of the UAE, as well as the necessity for a business model to effectively implement these technologies for efficient service transactions in the UAE. The motivations for conducting the research are outlined, along with the key objectives and a literature review.

Chapter two provides a detailed exploration of Artificial Intelligence (AI) and Blockchain (BC) technologies individually. It delves into the conceptual and architectural structure of blockchain, highlighting its benefits, applications, and challenges. Similarly, it discusses the origins of Artificial Intelligence and its functions within government. Subsequently, it explores the joint approach of AI and blockchain, along with associated applications and challenges.

In chapter 3, provisional conceptual framework is proposed which depicts the potential factors that could influence the acceptance and implementation of AI and BC in government services. The conceptual model provides the primary frame of reference and direction to empirical research for in depth investigation of such factors. This conceptual framework/model comprises of four dimensions and five stages of change, including initial, development, defined, managed and optimized stages.

Chapter four addresses research paradigms, selecting pragmatism as the guiding paradigm. In this chapter various research approaches are discussed and qualitative research approach is selected and justified, with a detailed research design provided, including the rationale for selecting the case study method. Additionally, data collection techniques such as surveys, focus groups, and leadership interviews are also explored.

Chapter five introduces selected case studies and their entities, followed by justification for the chosen qualitative data analysis approach, i.e. "Thematic analysis followed by thematic network approach." To investigate participant's views on proposed conceptual framework and on other research questions, data collected through various earlier discussed techniques is analysed both qualitatively and quantitatively, with results illustrated and conclusions drawn at the end of chapter.

In Chapter 6, the analysis results of conceptual framework along with newly identified dimensions and factors affecting the implementation of AI & BC technologies, are addressed. The results of analysis lead to development of New Maturity model, which comprises of both the old & newly identified dimensions and factors influencing the implementation of AI & BC technologies. This model comprises of ten dimensions and five stages of development, from initial to optimized, with capability level definitions provided for each dimension. Ultimately, the implementation of this maturity model is presented.

Chapter seven focuses on validating the new maturity model, discussing the participants, data collection techniques, and validation process i.e. Expert reviewing combined with User Feedback & Surveys. Then the holistic validation of the maturity model is provided which is accomplished through qualitative data analysis of the dataset. The outcomes highlighted both the strengths and challenges associated with this model. Additionally, each dimension of the maturity model is validated using quantitative analysis, with their outcomes deliberated in conjunction.

Finally, in chapter eight, the researchers provide overview of the research and address how objectives of research are met. It also discusses limitations of the study and provides suggestion for future work. It also provides recommendations for implementation of maturity model.



8.2 Main Achievements

Research Objective 1: To critically identify and analyse the main drivers behind effective AI+BC deployment of public service transactions, and determine the associated challenges involved within such deployment.

To accomplish RO1, along with literature review in chapter 1 & 2, surveys, interviews and focus group sessions were conducted to collect participants experienced-based feedback regarding main-drivers for effective AI + BCT deployment in public service transactions and for challenges associated with such deployment. In chapter 5, the participants feedback was analysed, which highlighted main-drivers and challenges of AI+BC deployment individually. Majority of interview and focus group participants discussed that optimized operations & resource allocation, effective decision making, transparent & citizen-centric services, effective data management & utilization, economization and derivation of innovation are the key drivers of AI & blockchain implementation and deployment in UAE public sector. The survey participants discussed that deployment of these technologies can also provide significant industrial benefits to businesses/organizations, which might include reduced customer efforts, reduced transactions time, increased efficiency of organization's transactions and services and many more. The outcome of analysis conducted in chapter five showed that the adoption of these technologies faces some general challenges along with internal and external barriers of deployment. Main challenges include Legal & regulatory challenges, availability of limited resources and high demand of investments, integration and compatibility issues, various technical issues, lack of knowledge, awareness & expertise, and various data related issues such as fragmented data sources, poor data quality, high reliance on data accessibility and data privacy and security concerns. Internal barriers that organizations might face include attracting new talent, upskilling & educating current staff, existence of legacy systems and De-acceptance of changes and new technologies by employees. External barriers might include security, privacy & ethical concerns, cultural barriers, lack of standardization, and interoperability challenges.

Research Objective(RO) 2: To critically conduct a systematic literature review to determine the current literature related to adopting, implementing & deployment of AI & Blockchain solutions/technologies, within public sector, and critically reviewing research studies which provide guidelines to make adoption/implementation journey of these technologies successful.

To meet this objective a systematic literature review was conducted which had been given in chapter 2 of this study. The methodology involved a Systematic Literature Review that involves the literature between the following years – 2014 to 2024— hence offering a well-structured framework and case study assessment of the frameworks. This review provides an overview of new specific maturity model conceived for measuring and guiding the implementation of these technologies, which takes into account the features of public administration. Overall, this work greatly contributes the growing literature on digital transformation in governance by proposing a research agenda that considers both technological and strategic horizon as well as human factors

Research Objective 3: To identify the main pillars that should be considered from public sector organizations/entities, through their journey of adopting, implementing and deployment AI & Blockchain solutions/technologies

To meet this objective a literature review was conducted and based on findings of literature review the conceptual framework/model was proposed in chapter 3. This framework was discussed with participants of survey's, interviews and focus-groups to gather their views regarding the efficiency of the model for deploying/implementing AI & BC technologies in public service transactions. Their feedback was critically analysed and evaluated in chapter 5, and based on results of analysis, the main pillars and factors were yielded which are vital to be considered for successful journey of adopting, implementing, and deployment of AI & Blockchain solutions/technologies.

Research Objective 4: To design an applicable New Maturity Model / framework assessment tools, including the main critical pillars/sub pillars, and defining the level of maturity, to assess and evaluate the public sector organizations/entities maturity



according to their journey of adopting, implementing and deployment AI & Blockchain solutions/technologies, and then validating new maturity model

To accomplish RO4, conceptual framework proposed in chapter 3, based on results of data analysis was evolved into the maturity model proposed which was proposed in chapter 6. This maturity model was validated, in chapter 7, and the outcomes of validation of maturity model showed that the model proposed has great strengths in terms of seamless technology adoption & transformation, strategic technology implementation roadmap, risk mitigation framework, capacity evaluation & improvement and resource optimization strategy. This model can be used to assess the maturity level of organization for adoption/implementation of AI & BC technologies. The validation outcomes also outlined challenges associated with maturity model which include institutional barriers, resource constraints and complexity of systems.

8.3 Contributions to the New knowledge Generation

The undertaken research study significantly contributes to both the existing body of knowledge and in generation of new knowledge by:

- The study offers comprehensive insights into the primary challenges and opportunities surrounding the implementation of AI and blockchain technology in UAE's public sector, along with internal and external barriers that public sector's organizations face while deploying these technologies.
- The research has identified and elucidated the key drivers that facilitate the successful integration of AI and blockchain technologies in UAE's public sector.
- The research has introduced a pioneering maturity model tailored specifically to assist organizations in assessing their readiness and capacity to embrace and implement AI and Blockchain technologies in context of United Arab Emirates.
- The newly developed maturity model provides a standardized assessment mechanism, offering a roadmap for both government and private entities in the UAE to confidentially navigate the complexities of AI and blockchain deployment.
- By providing comprehensive assessment tool in form of maturity model and guidelines, the study empowers organizations in UAE to effectively embrace and implement these technologies in their operations.
- To harness the full benefits of maturity model, the study also provides comprehensive guidelines covering four key aspects including preparation for assessment, conducting assessment, setting improvement goals, and progress tracking.
- Facilitating seamless technology adoption & transformation, strategic technology implementation roadmap, risk mitigation framework, capacity evaluation & improvement and resource optimization strategies are substantial strengths of the maturity model.
- The adoption of this model would enhance service delivery & efficiency of transactions, increased transparency and accountability of organization's operations, and improved decision making and policy development within organization.
- The study fulfils a significant gap in academic literature related to specific challenges, applications, drivers & potential benefits of integrating AI & Blockchain technologies and lack of guidance or tool for successful deployment of these technologies.
- By proposing a maturity model and discussing the implementation guidelines of the model, the study significantly bridges a gap in academic literature suggesting / providing maturity models for assessment of integrated implementation of AI & Blockchain technology
- The study also provides a roadmap and motivation for future researcher's to propose maturity models for deployment assessment of emerging technologies
- The maturity model was presented at International conference in Singapore and it received a very positive feedback which suggested the potential applicability of this model in Singapore, as there is a lack of such comparable assessment tool for deployment of AI & Blockchain technologies.



Overall, these contributions deepen scholarly understanding and drive tangible progress and innovation in the implementation of AI and blockchain technologies within UAE's public sector.

8.4 Recommendations for Maturity Model implementation

The successful implementation/adoption of maturity model requires a strong leadership support, significant time and commitment to fully deploy this model to evaluate organization's capacity to implement AI & Blockchain technologies in its operations. Traditionally public / large organizations might have complex processes, so conducting a full assessment might be time-consuming and employees might feel a sense of being trapped during the process. Thus, it would greatly require leadership support to continue with the assessment process. Moreover, the maturity model being a comprehensive assessment tool, can be employed not only prior to the implementation of AI & BC technologies but also repeatedly throughout the deployment process to monitor the progress. Additionally, implementing a Maturity Model for AI and blockchain within the UAE public sector requires careful planning and consideration of various factors unique to the region. Here are some recommendations:

1. **Assessment of Current State:** Begin by assessing the current state of AI and blockchain adoption within the UAE public sector. Identify existing initiatives, projects, and their levels of maturity.
2. **Stakeholder Engagement:** Engage with key stakeholders including government agencies, policymakers, industry experts, and technology providers to gather insights and perspectives on AI and blockchain maturity.
3. **Education and Training:** Provide comprehensive training programs to familiarize government officials with AI and blockchain maturity model. This includes understanding its potential applications, benefits, and how to effectively implement them within the public sector.
4. **Collaboration with Industry Experts:** Partner with industry experts and organizations experienced in AI and blockchain to develop tailored solutions and provide guidance throughout the implementation process.
5. **Infrastructure Development:** Invest in the necessary infrastructure, including hardware, software, and networking capabilities, to support AI and blockchain initiatives within the public sector. This may involve upgrading existing systems or building new ones to accommodate the requirements of these technologies.
6. **Data Governance:** Develop robust data governance policies and protocols to ensure the integrity, security, and privacy of data used in AI and blockchain maturity model. This includes defining data ownership, access controls, and mechanisms for data sharing and collaboration.
7. **Customization of Maturity Model:** Tailor existing maturity models for AI and blockchain to fit the specific needs, goals, and challenges of the UAE public sector. Consider factors such as regulatory environment, cultural aspects, and technological infrastructure.
8. **Set Clear Objectives:** Define clear objectives and goals for AI and blockchain maturity within the public sector. These objectives should align with broader government strategies such as digital transformation, innovation, and efficiency improvement.
9. **Roadmap Development:** Develop a comprehensive roadmap outlining the steps and milestones for implementing the maturity model. Include timelines, resource requirements, and dependencies for each stage of maturity.
10. **Selecting Assessment Team:** Assembling a competent assessment team with expertise in AI, Blockchain, and assessment methodologies is crucial. This team will be responsible for carrying out the assessment, analyzing data, and providing recommendations. It is essential to ensure that the team members have the necessary knowledge, skills, and impartiality to conduct a thorough evaluation.
11. **Collecting Necessary Resources:** Gathering the required resources, such as assessment tools, templates, data collection instruments, and analysis software, is necessary to facilitate the smooth execution of the assessment process. These resources should be aligned with the chosen assessment approach and adequately support the data collection and analysis activities.
12. **Pilot Projects:** Start with pilot projects to demonstrate the value and feasibility of AI and blockchain applications within the



public sector. These projects can help build confidence, generate insights, and identify best practices.

13. Collaboration and Partnerships: Foster collaboration and partnerships with academia, industry players, and international organizations to leverage expertise, resources, and best practices in AI and blockchain implementation.

14. Monitoring and Evaluation: Establish mechanisms for monitoring and evaluating the progress and impact of AI and blockchain maturity within the public sector. Continuously assess performance against predefined metrics and adjust strategies accordingly.

15. Public Awareness and Communication: Educate the general public about the benefits of AI and blockchain technologies, AI and Blockchain maturity model and how they are being used to improve public services and governance. Transparent communication is key to building trust and fostering acceptance of these technologies within the community.

8.5 Generalization / Globalization of Maturity Model

The integration of artificial intelligence with blockchain opens a completely new horizon of opportunities in the public sector; however, effective implementation demands an overall and broad-ranging maturity model regarding governance, strategy, regulation, data management, budgeting, human resources, processes, IT infrastructure, integration capability, organizational adaptability, and customization. The section summarizes recent scholarly research on the critical assessment pillars which have already been proposed maturity model providing an evidence that the proposed model can be generalized.

Governance and Strategy

Governance is also central in developing maturity in the adoption of both AI and blockchain. De Almeida, dos Santos and Farias 2021 identified a conceptual framework for regulating AI, and it emphasized a lot on the point of governance through all stages of public policymaking. Their so-called "AI Regulation Framework" embeds societal values like fairness and sustainability. Therefore, through a governance lens, the technological advance has had an ethical balance by extending ethical oversight. On the other hand, AI and blockchain can play an essential role in enhancing the transparency of governance according to AlShamsi et al., 2020. These technologies reduce information asymmetry and enhance decision-making processes through conceptual modeling and analytics-based approaches. The other key foundation involves strategic alignment. Suarez and Caetano (2021) present a discussion on strategic maturity, linking this to AI and blockchain in view of sustainability management. Their maturity model shows the way an organization moves from compliance-driven approaches through to value creation by innovation. This strategic focus underpins the necessary alignment in the adoption of technologies to achieve long-term organizational goals and societal impact.

Regulation and Compliance

The foundation of mitigating risks with AI and blockchain technologies is effective regulation. In this respect, De Almeida et al. (2021) stress that the adaptive regulatory framework has become highly relevant for the policy decisions on using and governing AI. Proposed AIR embeds agile methodologies with ethical consideration and hence can be considered a flexible, stakeholder-aware approach to country-specific landscapes of regulation. Singh et al. (2020) go a step further and discuss security challenges in smart city ecosystems where AI and blockchain converge to an environment that needs very strict regulatory measures with regard to data integrity and privacy.

Data and IT Infrastructure

Data management and IT infrastructure form the backbone for both AI and blockchain systems. In the review, Colomo-Palacios, Sánchez-Gordón, and Arias-Aranda (2020) identified blockchain's technological development from pure cryptocurrency platforms to general usage which would call for robust assessment frameworks. In fact, this review pinpointed such factors like a research approach, adoption processes, and technology waves influential for blockchain maturity. Their effective implementation does indeed call for mechanisms of data security and infrastructural resilience.

Budget and Resource Allocation

Budget considerations and resource allocation are considered one of the major determinants in the maturity of technology adoption. Suarez & Suarez, 2021, present the economic implications of sustainability-driven innovation, arguing that investments in AI and blockchain technologies should be made strategically aligned with long-term value creation. Similarly, AlShamsi et al. (2020)



investigate how AI and blockchain optimize resources, indicating that budget planning should be estimated to take into consideration not just immediate implementation costs but ongoing maintenance as well.

People, Processes, and Organizational Adaptability

Naturally enough, the human dimension embraces everything related to important components of people, processes, and organizational culture-Whately's AI and Blockchain cannot bypass en route to maturity. Singh et al. (2020) had highlighted the critically enabling role of highly skilled human resources needed while deploying intelligent systems towards sustainable Smart cities. Further, according to AlShamsi et al. (2020), process complexity demands a maturity model that shall measure up to the assessment of process efficiency, ecological completeness, and technical performance. This itself requires integrating technology in ways to be adapted and customized to suit the peculiar needs of the public sector organizations if benefits are to be maximally derived.

Current Proposed AI and BC Maturity Assessment Mode

This model, which is proposed in the current study, is globally applicable and beyond the context of the United Arab Emirates. It can be used in all public sectors globally. While the model integrates insights from various countries such as the UAE, the core principles on which it was developed have universal applicability. According to AlShamsi et al. (2020), the governance and strategy pillar mainly involves transparency and better decision-making processes, quite crucial in the public sector of any country with which the AI and blockchain technologies must integrate. On the other hand, De Almeida et al. (2021) present the regulatory and compliance framework as one that calls for adaptive and stakeholder-aware regulations that could be more sensitive to specific legal and ethical standards of various countries. Besides, some of the core technological components related to the model-robust IT infrastructure and data management, as pointed out by Colomo-Palacios et al. (2020)-are key towards scalable and secure AI and blockchain implementations in any public sector anywhere in the globe. This maturity model consequently provides a holistic and flexible approach toward innovativeness, transparency, and efficient delivery of public services in various governments around the world. Therefore, a broad-based AI and blockchain maturity model in the public sector should focus on integrating aspects of governance, strategy, regulatory frameworks, data security, IT infrastructure, budget management, human capital, processes, and organizational adaptability. These pillars reinforce an integrated approach toward sustainable innovation that enhances transparency in support of effective public service delivery.

8.6 Limitations of the Study

Better to present the limitations in bullet points. You can list three to 4 limitations.

- The undertaken research study has highlighted the main drivers of AI & blockchain technologies, their associated challenges, potential benefits and internal & external barriers, based on dataset collected only from United Arab Emirates, so these finding could not be considered universal, as each country is unique in terms of its initiatives, technological power, human capacity and many other factors, affecting the implementation of these technologies.
- Implementing the proposed maturity model in practice requires significant resources in terms of time, finance and capabilities, which may pose challenges for organizations already lacking such resources while adopting these technologies.
- The assessment process leveraging the maturity model is time consuming, which necessitates the strong commitment and leadership capabilities to fully conduct the assessment.
- Proposed maturity model relies on high quality of data and its availability & accessibility whereas large organizations of public sector of U.A.E have siloed information systems, with their data & processes being spread across different departments or organizations and instantly collecting the required information from such organizations is a complex process.

8.7 Suggestions for Future research

Better to present the suggestions in bullet points as well, corresponding to the limitations.



- The proposed maturity model has only undergone validation in four main case studies in UAE. To enhance its credibility at broader national scale, future research could focus on validating this model across a large number of organizations within UAE.
- As the proposed maturity model is developed based on analysis of dataset collected from only U.A.E, but efforts can be directed to make this model universally applicable by collected dataset from various countries around the globe and also getting this model validated internationally.
- The future research can also investigate data collection & management mechanisms which ensure instant availability & accessibility of high-quality data, for both maturity model and AI & Blockchain technologies.
- As sustainability dimension was not added in maturity model due to it's sparse occurrence in data analysis, this dimension can be explored in more detail and best weighting measure can be determined to evaluate the overall sustainability level of organizations.
- If needed, further efforts can be made to make the maturity model more concise & compact to require fewer resources such as time, money, human power or capabilities.
- Additionally, since the model was presented at international conference in Singapore, and received feedback suggesting its potential applicability in Singapore due to the absence of a such comparable assessment tool, so future research could aim to establish this model as internationally recognized benchmark for organizational capacity assessment.



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1) Appendices

Appendix A: Conceptual Framework Questionnaire

A PHD Questionnaire to Study: A new Maturity Model for Artificial Intelligence and Blockchain Technology

Integration in the Public Services Sector in the UAE

**In UAE Public Sector – UAE Federal Government, Abu Dhabi Local Government, Dubai Local Government, And Ajman
Local Government**

Introduction

Dear Respondent,

We put in your generous hands this questionnaire prepared for a study: **A new Maturity Model for Artificial Intelligence and Blockchain Technology Integration in the Public Services Sector in the UAE.**

Your cooperation with us in answering all questions accurately, honestly and objectively will have a great impact on enriching the research and achieving the desired goals.

Therefore, we ask you to answer the questions of this questionnaire, by placing a mark (v) on the scale in front of the phrase that matches your opinion, noting that the data is confidential and the data will be used for scientific research only.

Thank you for your cooperation.



Demographic Data

A. Gender						
☐ Male			☐ Female			
B. Age						
☐ <20	☐ 21–30	☐ 31–40	☐ 41–50	☐ 51–60	☐ 61–70	☐ >70
C. Education						
☐ Under Senior	☐ Vocational	☐ Bachelor	☐ Master	☐ Doctorate		
D. UAE Public & Private Sector						
☐ UAE Federal Government Employee	☐ Abu Dhabi Local Government Employee	☐ Dubai Local Government Employee	☐ Ajman Local Government Employee	☐ Private Sector Expert working with UAE Public Sector	☐ Other Organizations/Entities /Freelancer	
E. Occupation						
☐ AI Specialist/Expert	☐ Blockchain Specialist/Expert	☐ Digital Transformation Specialist/Expert	☐ IT Technical Engineer	☐ Strategy, Excellence, Productivity, Efficiency & Effectiveness Specialist/Expert	☐ Other Occupation	
F. Level of understanding of the study research subject						
☐ None or Poor	☐ Little	☐ Fair	☐ Good	☐ Specialized		

The name of your organization/company/public authority/international organization:

Your full name (first name, last name):

Email address:

Research Objective Questions

In this section, we seek your views on the challenges, key issues and impact that your organization/industry faces as a result of technological developments in the area of Blockchain and AI. Please justify your choice(s). Where possible, please provide references to any evidence, data, reports or studies.

1. What implications has the implementation of Blockchain and AI in your field/industry/organization? (More than one answer possible)

- ☐ changes patterns of consumption
- ☐ changes nature of work
- ☐ creates new opportunities for entrepreneurs
- ☐ creates new products and services
- ☐ changes organizational structures and business models
- ☐ shifts surplus between producers or industries
- ☐ shifts surplus from producers to consumers



o other*

If other, please specify

2. In your field, what are the key obstacles/barriers in Blockchain and AI implementation? (More than one answer possible)

- o organizational legal framework
- o National legal framework
- o access to funding and investment
- o human resources, i.e. employee skills or training
- o public attitudes/acceptance
- o technical issues related to the development of the technology
- o technical issues related to testing and application of technology
- o technical issues related to physical infrastructure
- o other

3. What action, in the context of technological developments in Blockchain and AI in your field, should the organization take to encourage innovation and global competitiveness?

- o Better regulatory framework
- o Better financial environment for new investments
- o Better technical standards
- o Better ethical standards
- o Better market incentives
- o Measure to facilitate public acceptance
- o other

4. What is the net impact of increased digitalization and automation in your industry/organization on employment?

- o employment lost
- o employment gained
- o there are shifts in the value chain and profile of employees needed
- o no impact
- o other

The Project Related Questions

The questionnaire was built in the light of two main factors effect on our integrated framework implementation, the first (Strategic Factor) associated with the independent variable and the second (Performance - Executive) associated with the dependent variable. Each factor branched into a set of main dimensions (themes), through which the questionnaire questions were formulated. Please indicate your answer according to the following scale

Scale	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
	لا أوافق بشدة	لا أوافق	محايد	موافق	موافق بشدة



Qes. No.	Questions / Choices of Answers				
Part 1	Conceptual Framework – Strategy & Governance Factors				
	The successful Implementation of AI & Blockchain within UAE Public Sector should be mentioned earlier from top Leadership within the Organization Vision, Mission & Values?				
	Strongly Disagree لا أوافق بشدة	Disagree لا أوافق	Neutral محايد	Agree موافق	Strongly Agree موافق بشدة
	The successful Implementation of AI & Blockchain within UAE Public Sector should be mentioned clearly within the Organization Strategic Plans Objectives, Initiatives & Projects?				
	Strongly Disagree لا أوافق بشدة	Disagree لا أوافق	Neutral محايد	Agree موافق	Strongly Agree موافق بشدة
	The successful Implementation of AI & Blockchain within UAE Public Sector should be mentioned earlier within Government Rules, Regulations and Policies from Authorized Government Entity in UAE Federal & Local Governments?				
	Strongly Disagree لا أوافق بشدة	Disagree لا أوافق	Neutral محايد	Agree موافق	Strongly Agree موافق بشدة
	The successful Implementation of AI & Blockchain within UAE Public Sector should be mentioned clearly within Organization Structure with a Certain unit or Team who responsible to lead such Transformational Projects?				
	Strongly Disagree لا أوافق بشدة	Disagree لا أوافق	Neutral محايد	Agree موافق	Strongly Agree موافق بشدة
	The successful Implementation of AI & Blockchain within UAE Public Sector should be controlled & monitored through documented and implemented Governance Framework to manage the use case of AI & Blockchain within UAE Public Sector?				
	Strongly Disagree لا أوافق بشدة	Disagree لا أوافق	Neutral محايد	Agree موافق	Strongly Agree موافق بشدة
	The implementation of Blockchain and AI in your field/industry/organization, that lead to Achieve for your Organization / your clients, Objectives, Targets & Strategic Goals.				
	Strongly Disagree لا أوافق بشدة	Disagree لا أوافق	Neutral محايد	Agree موافق	Strongly Agree موافق بشدة
	The long run implementation of Blockchain and AI in your field/industry/organization, that lead to Reducing Public Transactions/Services Operational Costs to your Organization / your clients.				
	Strongly Disagree لا أوافق بشدة	Disagree لا أوافق	Neutral محايد	Agree موافق	Strongly Agree موافق بشدة
	The long run implementation of Blockchain and AI in your field/industry/organization, that lead to Increase level of Utilization of available resources (Human, Technology -Systems, Infrastructure, and Financial) for your Organization / your clients.				
	Strongly Disagree لا أوافق بشدة	Disagree لا أوافق	Neutral محايد	Agree موافق	Strongly Agree موافق بشدة
	The implementation of Blockchain and AI in your field/industry/organization, that lead to increase level of Satisfactions & Happiness of Public Sector Customers.				
	Strongly Disagree لا أوافق بشدة	Disagree لا أوافق	Neutral محايد	Agree موافق	Strongly Agree موافق بشدة
Part 2	Conceptual Framework – Technology Factors				
	The Integrating between artificial intelligence and blockchain gives users significant flexibility to choose what data they want to make public and transparent and what data they want to keep private.				
	Strongly Disagree لا أوافق بشدة	Disagree لا أوافق	Neutral محايد	Agree موافق	Strongly Agree موافق بشدة
	Theirs a Levels of implemented artificial intelligence and blockchain technologies within UAE Public Sector and it's depend on available technology & type of Government organization.				



	Strongly Disagree لا أوافق بشدة	Disagree لا أوافق	Neutral محايد	Agree موافق	Strongly Agree موافق بشدة
	Do you think the ideal technology partner for federal government is not necessarily the best match for another local government within UAE?				
	Strongly Disagree لا أوافق بشدة	Disagree لا أوافق	Neutral محايد	Agree موافق	Strongly Agree موافق بشدة
	The dynamic between AI & Blockchain technology providers and Public Sector, It's vitally important that all parties be fully aware of the arrangements around who owns the data, both now and in the future.?				
	Strongly Disagree لا أوافق بشدة	Disagree لا أوافق	Neutral محايد	Agree موافق	Strongly Agree موافق بشدة
	The Integrating artificial intelligence and blockchain within UAE public sector, use the decentralized flexibility which will be managed by collecting flexibility requests and offers and matching them together.				
	Strongly Disagree لا أوافق بشدة	Disagree لا أوافق	Neutral محايد	Agree موافق	Strongly Agree موافق بشدة
	The Integrating artificial intelligence and blockchain within UAE Public sector ensure collecting and storing data with high integrity and resiliency, and cannot be tampered with.				
	Strongly Disagree لا أوافق بشدة	Disagree لا أوافق	Neutral محايد	Agree موافق	Strongly Agree موافق بشدة
	The implementation of Blockchain and AI in your field/industry/organization, that lead to Increasing Number of Digital Payments & payment accuracy in your Organization / your clients.				
	Strongly Disagree لا أوافق بشدة	Disagree لا أوافق	Neutral محايد	Agree موافق	Strongly Agree موافق بشدة
	The implementation of Blockchain and AI in your field/industry/organization, that lead to Increasing Number of Government Digital Documents & Digital Attributes Used to enhance Customer Experience and minimize the efforts and time to Provide Government services to the customers, for your Organization / your clients.				
	Strongly Disagree لا أوافق بشدة	Disagree لا أوافق	Neutral محايد	Agree موافق	Strongly Agree موافق بشدة
	The implementation of Blockchain and AI in your field/industry/organization, that lead to Increasing Number of Integrations API's & Databases between UAE Federal Government, Local Government & Private Sector, that lead to enhance Customer Experience.				
	Strongly Disagree لا أوافق بشدة	Disagree لا أوافق	Neutral محايد	Agree موافق	Strongly Agree موافق بشدة
	The implementation of Blockchain and AI in your field/industry/organization, that lead to resolve Digital bugs/ errors and fraud cases that facing the public sector transactions/services.				
	Strongly Disagree لا أوافق بشدة	Disagree لا أوافق	Neutral محايد	Agree موافق	Strongly Agree موافق بشدة
	The implementation of Blockchain and AI in your field/industry/organization, that lead to increase level of accuracy, transparency and resolve overlaps & duplications between Federal, Local Government and Private Sector.				
	Strongly Disagree لا أوافق بشدة	Disagree لا أوافق	Neutral محايد	Agree موافق	Strongly Agree موافق بشدة
Part 3	Conceptual Framework - <u>People Factor</u>				
	The successful Implementation of Artificial Intelligence and Blockchain within the UAE public Sector needs a comprehensive awareness?				
	Strongly Disagree لا أوافق بشدة	Disagree لا أوافق	Neutral محايد	Agree موافق	Strongly Agree موافق بشدة



	The successful Implementation of Artificial Intelligence and Blockchain within the UAE public Sector needs a specific competencies & skills for the employees who works on such transformational Projects?				
	Strongly Disagree لا أوافق بشدة	Disagree لا أوافق	Neutral محايد	Agree موافق	Strongly Agree موافق بشدة
	The successful Implementation of Artificial Intelligence and Blockchain within the UAE public Sector needs a certain level of training program for all stakeholders and employees who works on such transformational Projects?				
	Strongly Disagree لا أوافق بشدة	Disagree لا أوافق	Neutral محايد	Agree موافق	Strongly Agree موافق بشدة
	The implementation of Blockchain and AI in your field/industry/organization, that lead to Reducing Customers Efforts, for your Organization / your clients.				
	Strongly Disagree لا أوافق بشدة	Disagree لا أوافق	Neutral محايد	Agree موافق	Strongly Agree موافق بشدة
Part 4	Conceptual Framework – Process Factors				
	The successful Implementation of AI & Blockchain within UAE Public Sector needs a Clear, Documented Processes & procedures for all Public Sector Transactions?				
	Strongly Disagree لا أوافق بشدة	Disagree لا أوافق	Neutral محايد	Agree موافق	Strongly Agree موافق بشدة
	The successful Implementation of AI & Blockchain within UAE Public Sector needs a Fully Automated Processes & procedures for all Public Sector Transactions?				
	Strongly Disagree لا أوافق بشدة	Disagree لا أوافق	Neutral محايد	Agree موافق	Strongly Agree موافق بشدة
	The Implementation of AI & Blockchain within UAE Public Sector will increase the level of Productivity of Organizations Transactions & Services?				
	Strongly Disagree لا أوافق بشدة	Disagree لا أوافق	Neutral محايد	Agree موافق	Strongly Agree موافق بشدة
	The Implementation of AI & Blockchain within UAE Public Sector will increase the level of Efficiency of Organizations Transactions & Services?				
	Strongly Disagree لا أوافق بشدة	Disagree لا أوافق	Neutral محايد	Agree موافق	Strongly Agree موافق بشدة
	The Implementation of AI & Blockchain within UAE Public Sector will increase the level of Effectiveness of Organizations Transactions & Services?				
	Strongly Disagree لا أوافق بشدة	Disagree لا أوافق	Neutral محايد	Agree موافق	Strongly Agree موافق بشدة
	The implementation of Blockchain and AI in your field/industry/organization, that lead to Increasing Number of Transactions for your Organization / your clients?				
	Strongly Disagree لا أوافق بشدة	Disagree لا أوافق	Neutral محايد	Agree موافق	Strongly Agree موافق بشدة
	The implementation of Blockchain and AI in your field/industry/organization, that lead to Reducing Transactions Time for your Organization / your clients.				
	Strongly Disagree لا أوافق بشدة	Disagree لا أوافق	Neutral محايد	Agree موافق	Strongly Agree موافق بشدة

Appendix B: Interview Questionnaire

Appendix Leadership Interview – Discussions Pillars

Name of participant	
Date of interview	
Organization	
Emirate/Federal	
Position title	



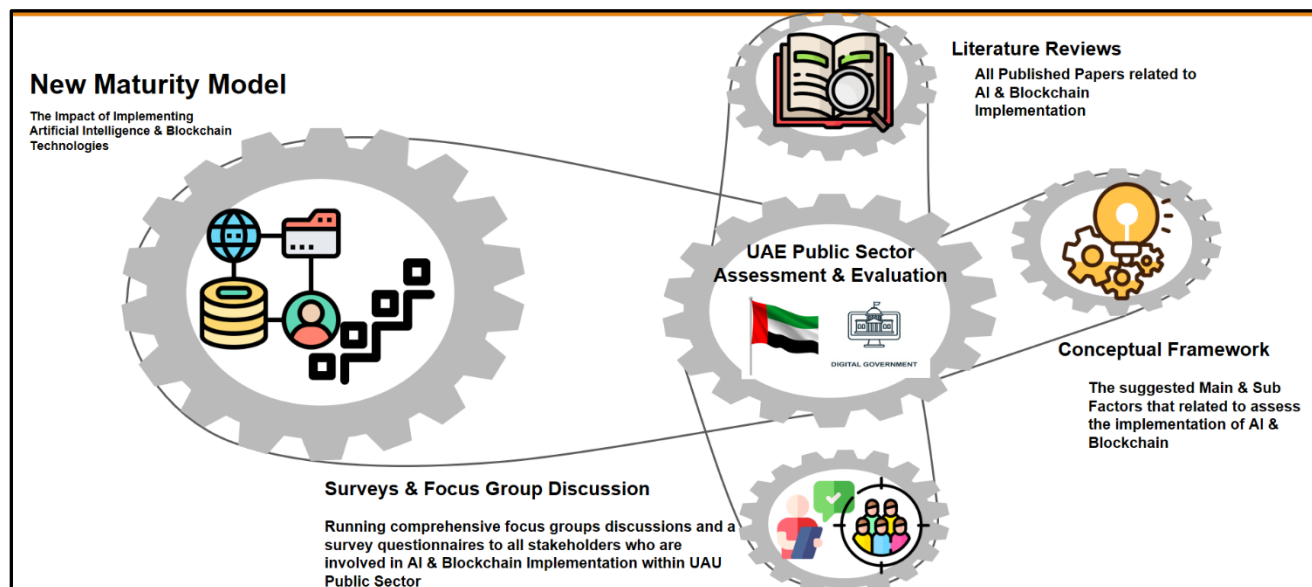
Number of years' experience	
Number of years' experience in Leading AI / Blockchain Technologies within UAE Public Sector	
Level of education	

1. Introduction:

This project mainly aims to define a New Maturity Model for assessing the Implementation of Artificial Intelligence & Blockchain technologies, within UAE Public Sector (UAE Federal Government, Abu Dhabi Local Government, Dubai Local Government, and Ajman Local Government), And Evaluate the Impact of two technologies to the public sector transactions productivity, efficiency of processes and systems & the effectiveness of achieving public sector targets.

2. Research Approach:

Through the published literature reviews and based on what researcher suggest the main factors that consist of conceptual framework, we will discuss with each subject matter expert within the fields to define the main and sub factors that formulate the conceptual framework and lead us to design the New Maturity Model that will be used by UAE public sector to evaluate the Implementation Impact of Artificial Intelligence & Blockchain Technologies.



3. Literature Reviews – Artificial Intelligence & Blockchain Maturity Models & Framework

Blockchain Maturity Model



Table 1 Taxonomy of the maturity assessment

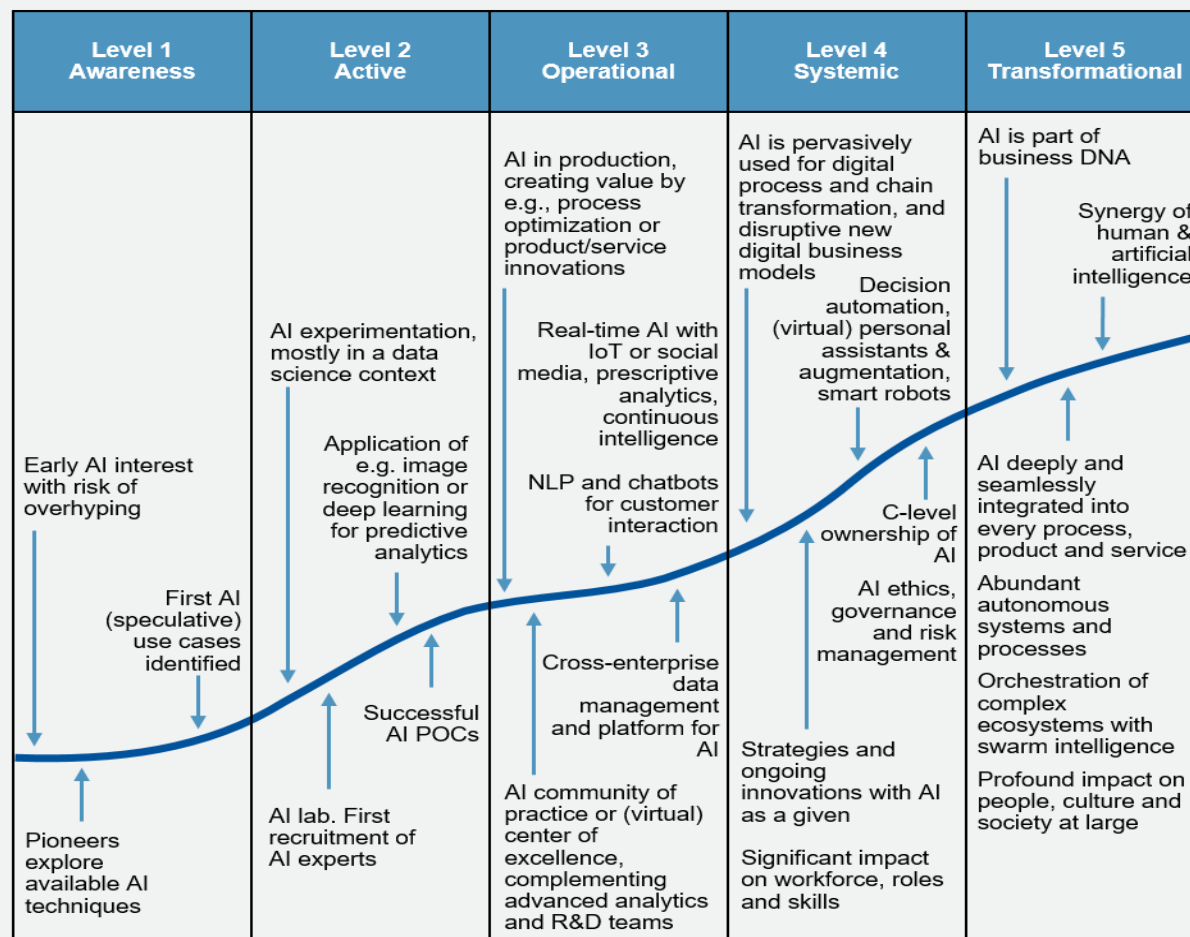
	1. Initial	2. Repeatable	3. Defined	4. Managed	5. Optimized
Technology	- Ad hoc, chaotic - Emerging - Lack of understanding	- Methodology establishment - Controlled and coordinated - Reactive	- Standardized and documented - Proactive	- Quality metrics establishment - Consolidated and reliable	- Continuous improvement - Share of knowledge and information
Market	- Focus on function - High cost	- Focus on reliability - Transactional customers - Broad no-target promotion	- Focus on assured delivery of services - Prices settle down - Requirements are measured	- Standard services - Price with incentives and outcome metrics - Customers are grouped with profiles - Promotion is targeted	- Empathy in dealing with emerging business needs - Create the product special influents in industry.
Regulation	- Less supervision - Competition is forbidden	Rules have been borrowed from related domains	Regulation rules and laws are defined	- Measurements on regulation is set up - Competition is encouraged under supervision	- Free competition - Market based on well-established legal system

Table 2 Blockchain maturity model

	Initial (stage 1)	Repeatable (stage 2)	Defined (stage 3)	Managed (stage 4)	Optimizing (stage 5)
Networks		Network load	Reliability		
Information Systems	Architecture Upgrading Integration	Maintenance Storage Scalability		Business efficiency	
Computing Methodologies	Standardization	Computational complexity			
Security and Privacy			Privacy	Data security Transaction security	

Artificial Intelligence

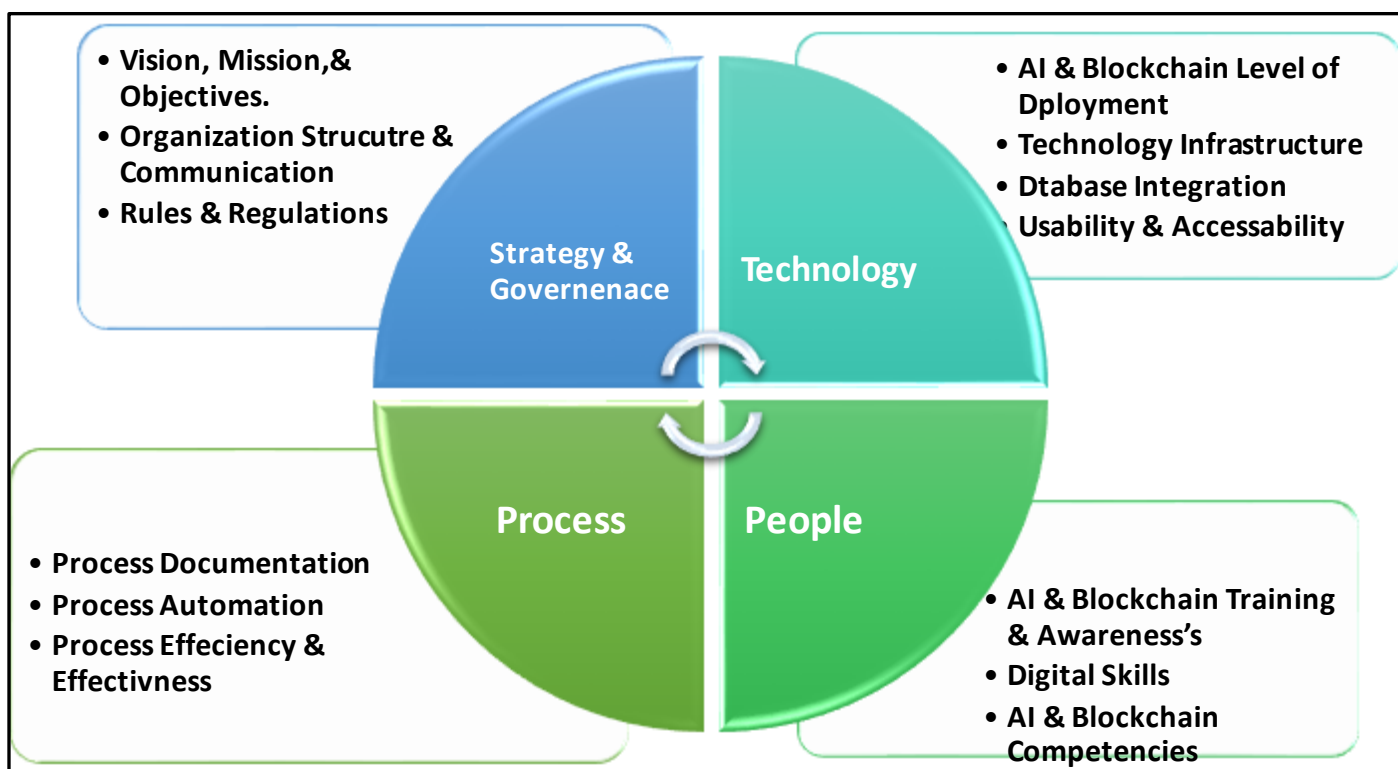
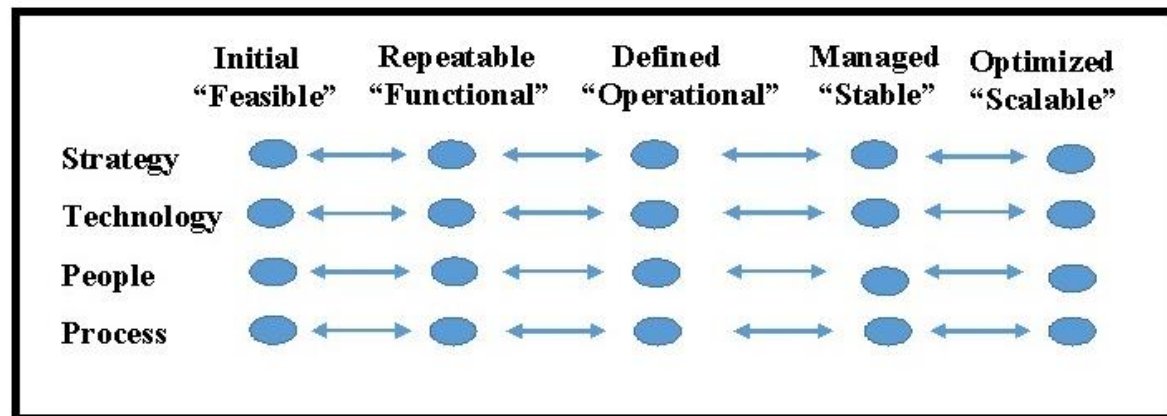
AI Maturity Model



ID: 358062

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4. Suggested Conceptual Framework



1. Please consider the provisional model shown above – with 5 stages of change (initial to optimized) and four dimensions of change (Strategy, Technology, People and Processes). Do you think these are the most appropriate dimensions for evaluating the implementation and impact of AI/Blockchain Technologies in UAE Public Sector from your experience? Would you suggest other dimensions of change?
2. Do you think each stage above represent the overall stages and right description for levels of deployed AI & Blockchain within UAE Public Sector?

5. Main Challenges, Drivers, barriers/obstacles behind implementing technologies

1. From Your Experience, what are the Main Challenges behind Implementing AI & Blockchain Solutions within UAE Public Sector?



2. From Your Experience, what are the Main Drivers to enhance Implementing AI & Blockchain Solutions within UAE Public Sector?

3. What are the main Internal & External, barriers/obstacles of adopting/ implementing and deploying AI or Blockchain technologies and their related solutions to enhance efficiency and effectiveness of UAE Public Sector Transactions?

4. What other comments do you have about improving the adopting/ implementing and deploying AI or Blockchain technologies and their related solutions within UAE Public Sector Entities?

Appendix C: Focus Group Questionnaire

Appendix A-Focus Group Sessions – Discussions Pillars

Name of participant	
Date of the sessions	
Private or Local Organization	
Emirate/Federal	
Position title	
Number of years' experience	
Level of education	
Role in implementing the AI / Blockchain Technologies	

6. Introduction:

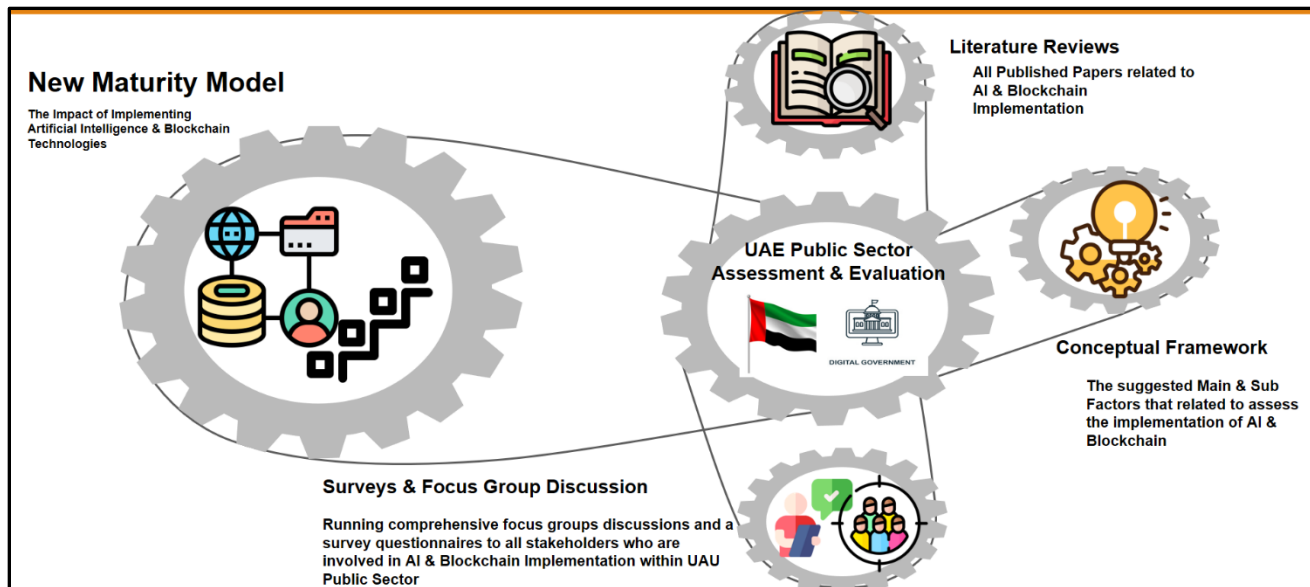
This project mainly aims to define a New Maturity Model for assessing the Implementation of Artificial Intelligence & Blockchain technologies, within UAE Public Sector (UAE Federal Government, Abu Dhabi Local Government, Dubai Local



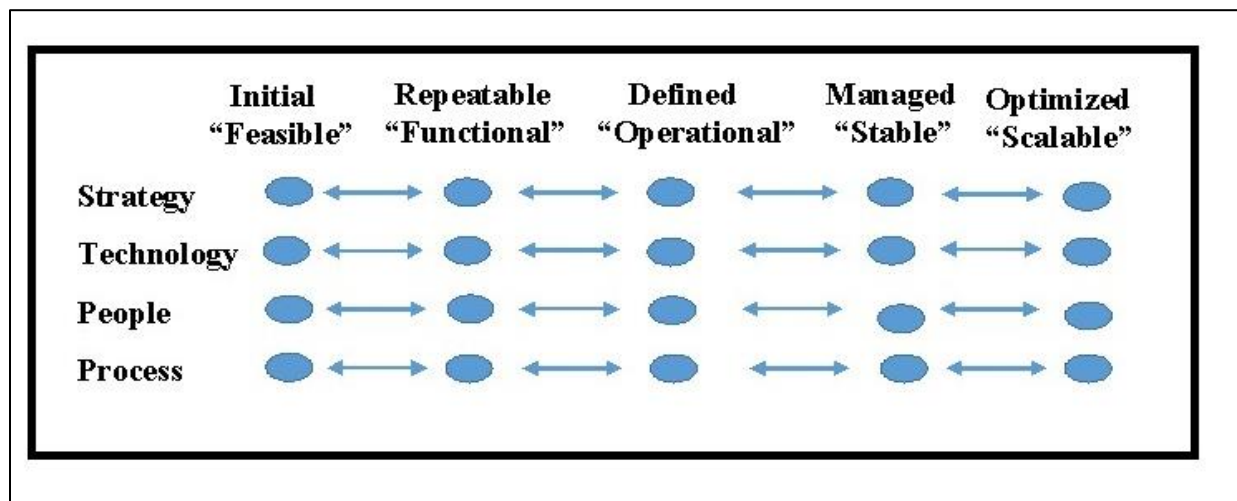
Government, and Ajman Local Government), And Evaluate the Impact of two technologies to the public sector transactions productivity, efficiency of processes and systems & the effectiveness of achieving public sector targets.

7. Research Approach:

Through the published literature reviews and based on what researcher suggest the main factors that consist of conceptual framework, we will discuss with each subject matter expert within the fields to define the main and sub factors that formulate the conceptual framework and lead us to design the New Maturity Model that will be used by UAE public sector to evaluate the Implementation Impact of Artificial Intelligence & Blockchain Technologies.



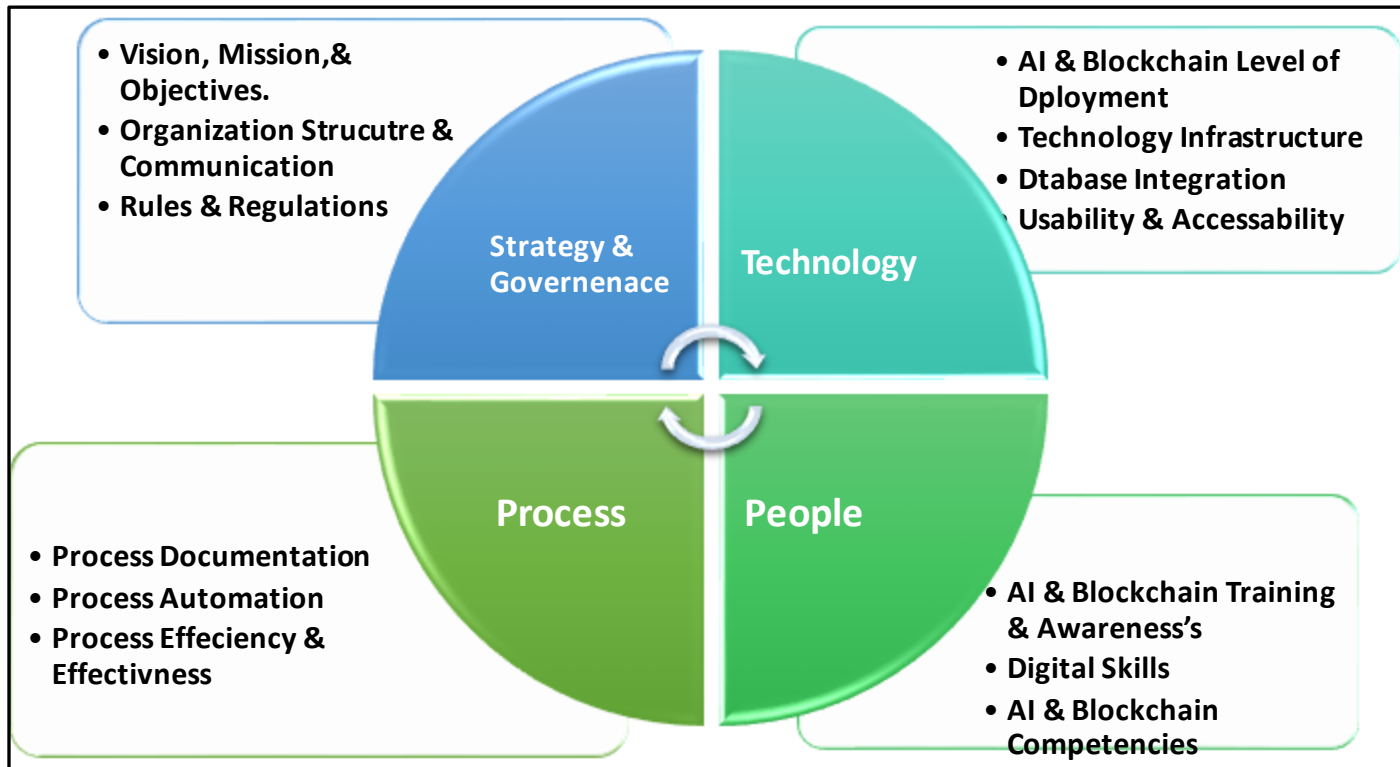
8. Suggested Conceptual Framework



- Please consider the provisional model shown above – with 5 stages of change (initial to optimized) and four dimensions of change (Strategy, Technology, People and Processes). Do you think these are the most appropriate dimensions for evaluating the implementation and impact of AI/Blockchain Technologies in UAE Public Sector from your experience? Would you suggest other dimensions of change?



4. Do you think each stage above represent the overall stages and right description for levels of deployed AI & Blockchain within UAE Public Sector?



Quest.	From your Experience in Deploying AI & Blockchain within UAE Public Sector, what would the “Vision, Mission, and Objectives” at the Initial Stage look like? What would they be like at the Optimized stage? And at the other stages?				
	Initial	Developed	Defined	Managed	Optimized
Quest.	From your Experience in Deploying AI & Blockchain within UAE Public Sector, what would the “Organization Structure & Communication” at the Initial Stage look like? What would they be like at the Optimized stage? And at the other stages?				
	Initial	Developed	Defined	Managed	Optimized
Quest.	From your Experience in Deploying AI & Blockchain within UAE Public Sector, what would the “Rules & Regulations” at the Initial Stage look like? What would they be like at the Optimized stage? And at the other stages?				
	Initial	Developed	Defined	Managed	Optimized
Quest.	From your Experience in Deploying AI & Blockchain within UAE Public Sector, what would the “Level of Implemented AI & Blockchain” at the Initial Stage look like? What would they be like at the Optimized stage? And at the other stages?				
	Initial	Developed	Defined	Managed	Optimized
Quest.	From your Experience in Deploying AI & Blockchain within UAE Public Sector, what would the “Technology Infrastructure” at the Initial Stage look like? What would they be like at the Optimized stage? And at the other stages?				
	Initial	Developed	Defined	Managed	Optimized
Quest.	From your Experience in Deploying AI & Blockchain within UAE Public Sector, what would the “Database Integration” at the Initial Stage look like? What would they be like at the Optimized stage? And at the other stages?				
	Initial	Developed	Defined	Managed	Optimized



Quest.	From your Experience in Deploying AI & Blockchain within UAE Public Sector, what would the “Technology Usability & Accessibility” at the Initial Stage look like? What would they be like at the Optimized stage? And at the other stages?				
	Initial	Developed	Defined	Managed	Optimized
Quest.	From your Experience in Deploying AI & Blockchain within UAE Public Sector, what would the “AI & Blockchain Training & Awareness’s” at the Initial Stage look like? What would they be like at the Optimized stage? And at the other stages?				
	Initial	Developed	Defined	Managed	Optimized
Quest.	From your Experience in Deploying AI & Blockchain within UAE Public Sector, what would the “Employee Digital Skills” at the Initial Stage look like? What would they be like at the Optimized stage? And at the other stages?				
	Initial	Developed	Defined	Managed	Optimized
Quest.	From your Experience in Deploying AI & Blockchain within UAE Public Sector, what would the “Employee AI & Blockchain Competencies” at the Initial Stage look like? What would they be like at the Optimized stage? And at the other stages?				
	Initial	Developed	Defined	Managed	Optimized
Quest.	From your Experience in Deploying AI & Blockchain within UAE Public Sector, what would the “Processes Documentation” at the Initial Stage look like? What would they be like at the Optimized stage? And at the other stages?				
	Initial	Developed	Defined	Managed	Optimized
Quest.	From your Experience in Deploying AI & Blockchain within UAE Public Sector, what would the “Processes Automation” at the Initial Stage look like? What would they be like at the Optimized stage? And at the other stages?				
	Initial	Developed	Defined	Managed	Optimized
Quest.	From your Experience in Deploying AI & Blockchain within UAE Public Sector, what would the “Processes Efficiency & Effectiveness” at the Initial Stage look like? What would they be like at the Optimized stage? And at the other stages?				
	Initial	Developed	Defined	Managed	Optimized



9. Main Challenges, Drivers, barriers/obstacles behind implementing technologies

5. From Your Experience, what are the Main Challenges behind Implementing AI & Blockchain Solutions within UAE Public Sector?

6. From Your Experience, what are the Main Drivers to enhance Implementing AI & Blockchain Solutions within UAE Public Sector?

7. What are the main Internal & External, barriers/obstacles of adopting/ implementing and deploying AI or Blockchain technologies and their related solutions to enhance efficiency and effectiveness of UAE Public Sector Transactions?

8. What other comments do you have about improving the adopting/ implementing and deploying AI or Blockchain technologies and their related solutions within UAE Public Sector Entities?

Thank you so much for your time and consideration in this research.

Appendix D: Focus Groups Setting Guide

Introduction:

The below highlights points are our guidelines & methodology to run the focus groups and interview questions to the public sector in UAE and private sector as well, in order to discuss all factors, challenges, impact and benefits from implementing the advance technology to public sector transaction by using Artificial Intelligence & Blockchain Technologies.

1. Selection Team to Join Focus Groups.

- They are focused on our topic – The Implementation use cases of Artificial Intelligence & Blockchain Technologies within UAE Public Sector.
- The Groups Team Members will be from Technical & Leadership backgrounds who worked and managed projects successfully with UAE public sector in implementation of Artificial Intelligence & Blockchain Technologies.
- Members of the group are encouraged to talk openly about their opinions and respond to other members (The Moderator, sometime will be the researcher, and also I have 4 to 5 Subject matter experts how also are interested to run the focus groups session on behalf of me, because it will be running in Different locations, Such as: Dubai, Abu Dhabi, Ajman, Jordan-Amman, Egypt Cairo, And Online Sessions through Global Platforms)

2. Before Running any Focus Groups.



- Recheck our goals – our research main aims and goals.
- Consider other methods to discuss our topic.
- Find a good leader within the group.
- Find a recorder too document all sessions.
- Prepare our Introduction and our specific topic questions.
- Review the arrangements.

3. Starting & Running of each Focus Groups Session.

- We will Thank people/the group for coming.
- We will Review the group's purpose and goals.
- We will Explain how the meeting will proceed and how members can contribute.
- We will Ask further questions in the same general manner in order to expand our Knowledge of AI & Blockchain.
- When all our questions have been asked, we will ask if anyone has any other comments to make.
- We will Tell the group about any next steps in our project that will occur and what they can expect to happen now.

4. Closing/ Finishing each Focus Groups.

- We will ensure to Document & Make a transcript or written summary of the meeting.
- We will sure, Examine the data for patterns, themes, new questions, and conclusions.
- We will Share the results with the group.
- We will, Use the results to enhance our research journey.

Appendix E: Interview Responses

Appendix E.1: Response 1

5. Please consider the provisional model shown above – with 5 stages of change (initial to optimized) and four dimensions of change (Strategy, Technology, People and Processes). Do you think these are the most appropriate dimensions for evaluating the implementation and impact of AI/Blockchain Technologies in UAE Public Sector from your experience? Would you suggest other dimensions of change?

based on my training data and knowledge, I believe the four dimensions of change - Strategy, Technology, People, and Processes - are relevant and appropriate for evaluating the implementation and impact of AI/Blockchain technologies in the UAE Public Sector.

However, there may be other dimensions of change that could also be considered, depending on the specific context of the implementation. For example, regulatory and legal frameworks, ethical considerations, and environmental impacts could be additional dimensions to consider. It is essential to identify the appropriate dimensions of change relevant to the specific implementation and its impact. Therefore, it is advisable to consult with experts in the field or conduct research to identify any additional dimensions of change that may be relevant to the specific case.



6. Do you think each stage above "Strategy governance, Technology, People and Processes" represent the overall stages and right description for levels of deployed AI & Blockchain within UAE Public Sector?

The five stages of change presented in the provisional model - Initial, Awareness, Preparation, Implementation, and Optimized - can provide a useful framework for evaluating the deployment of AI and Blockchain technologies within the UAE Public Sector.

The four dimensions of change - Strategy, Technology, People, and Processes - can be considered as key areas of focus for each stage of change. For instance, in the Initial stage, the focus may be on defining the strategy and governance structure for AI and Blockchain technologies within the UAE Public Sector, as well as identifying potential use cases and stakeholders.

In the Awareness stage, the focus may shift to building awareness and understanding among stakeholders about the potential benefits and risks of using AI and Blockchain technologies in the UAE Public Sector, as well as identifying potential barriers to adoption.

In the Preparation stage, the focus may be on developing the necessary infrastructure and capabilities for deploying AI and Blockchain technologies, such as building the required technical expertise and ensuring data quality and security.

In the Implementation stage, the focus may be on deploying AI and Blockchain technologies in a phased and controlled manner, monitoring their performance and impact, and addressing any issues that arise.

Finally, in the Optimized stage, the focus may be on continually refining and improving the use of AI and Blockchain technologies, as well as leveraging them to drive innovation and improve public services.

Overall, while these stages and dimensions can provide a useful framework, the specific stages and descriptions may need to be customized and adapted to the unique context and challenges faced by the UAE Public Sector in deploying AI and Blockchain technologies.

7. From Your Experience, what are the Main Challenges behind Implementing AI & Blockchain Solutions within UAE Public Sector?

based on my training data and knowledge, some potential challenges behind implementing AI and Blockchain solutions within the UAE Public Sector could include:

Data quality and availability: The successful implementation of AI and Blockchain solutions in the public sector requires access to high-quality and reliable data. However, data quality and availability may be a challenge in the UAE Public Sector, particularly if data is scattered across various departments and systems.

Regulatory and legal frameworks: AI and Blockchain technologies raise complex legal and regulatory issues that need to be addressed. Ensuring compliance with existing regulations and developing new regulations that adequately address the unique challenges of AI and Blockchain deployment can be a significant challenge for the UAE Public Sector.

Lack of technical expertise: AI and Blockchain technologies require specialized technical expertise, which may be in short supply within the UAE Public Sector. The public sector may need to invest in training and development programs to ensure that staff have the necessary skills to deploy and manage these technologies effectively.

Cost and resource constraints: Implementing AI and Blockchain solutions can be expensive, and the UAE Public Sector may face resource constraints that limit its ability to invest in these technologies.



Ethical and privacy concerns: AI and Blockchain technologies raise ethical and privacy concerns that need to be carefully considered and addressed. Ensuring that

these technologies are deployed in a way that respects the privacy and human rights of citizens can be a significant challenge for the UAE Public Sector.

Overall, addressing these challenges will require a concerted effort from the UAE Public Sector, including investment in infrastructure and technical expertise, development of appropriate regulations and governance frameworks, and careful consideration of ethical and privacy concerns.

8. From Your Experience, what are the Main Drivers to enhance Implementing AI & Blockchain Solutions within UAE Public Sector?

based on my training data and knowledge, some potential drivers to enhance implementing AI and Blockchain solutions within the UAE Public Sector could include:

Improving efficiency and reducing costs: AI and Blockchain technologies have the potential to streamline processes and reduce costs within the public sector. By automating routine tasks and reducing the need for manual data entry, these technologies can free up staff time and resources.

Enhancing transparency and accountability: Blockchain technology can enable greater transparency and accountability in government operations, allowing citizens to track the flow of information and funds across the government's systems.

Improving citizen engagement and satisfaction: AI and Blockchain technologies can help improve citizen engagement and satisfaction by providing more personalized and responsive services. Chatbots and virtual assistants, for example, can help citizens access information and services more easily and quickly.

Driving innovation and economic growth: AI and Blockchain technologies have the potential to drive innovation and economic growth within the UAE, particularly in the areas of healthcare, education, and transportation. By investing in these technologies, the UAE Public Sector can position itself as a leader in the development and deployment of cutting-edge solutions.

Addressing complex challenges: AI and Blockchain technologies can help address complex challenges facing the UAE Public Sector, such as cybersecurity, fraud, and corruption. By leveraging the unique capabilities of these technologies, the public sector can better protect itself and its citizens from these threats.

Overall, enhancing the implementation of AI and Blockchain solutions within the UAE Public Sector will require a strategic and concerted effort, focused on leveraging the potential benefits of these technologies to improve government operations and better serve citizens.

9. What are the main Internal & External, barriers/obstacles of adopting/ implementing and deploying AI or Blockchain technologies and their related solutions to enhance efficiency and effectiveness of UAE Public Sector Transactions?

The main internal and external barriers/obstacles of adopting/implementing and deploying AI or Blockchain technologies and their related solutions to enhance the efficiency and effectiveness of UAE Public Sector transactions may include:

Internal barriers/obstacles:



Lack of awareness and understanding: Some stakeholders within the UAE Public Sector may not fully understand the potential benefits of AI and Blockchain technologies or how to effectively deploy them in their operations.

Resistance to change: Implementing AI and Blockchain solutions may require significant changes to existing processes and workflows, which may be met with resistance from staff members who are used to working in a particular way.

Lack of technical expertise: As mentioned earlier, implementing AI and Blockchain solutions requires specialized technical expertise, which may be in short supply within the UAE Public Sector.

Data quality and availability: As also mentioned earlier, ensuring the quality and availability of data is crucial to the success of AI and Blockchain implementations.

Integration with existing systems: Integrating new AI and Blockchain solutions with existing systems and workflows can be a complex and challenging task, requiring significant technical expertise.

External barriers/obstacles:

Regulatory and legal frameworks: As mentioned earlier, AI and Blockchain technologies raise complex legal and regulatory issues that need to be addressed.

Cybersecurity and privacy concerns: As with any technology that involves the handling of sensitive information, AI and Blockchain solutions must be designed with cybersecurity and privacy concerns in mind.

Cost and resource constraints: As mentioned earlier, implementing AI and Blockchain solutions can be expensive, and the UAE Public Sector may face resource constraints that limit its ability to invest in these technologies.

Interoperability with other systems: Ensuring that new AI and Blockchain solutions are compatible with existing systems and can integrate with other systems across the public and private sectors can be a significant challenge.

Cultural barriers: The successful implementation of AI and Blockchain solutions within the UAE Public Sector may require a shift in organizational culture, with a greater focus on collaboration, innovation, and openness to new ideas.

Overall, addressing these barriers/obstacles will require a concerted effort from the UAE Public Sector, including investment in infrastructure and technical expertise, development of appropriate regulations and governance frameworks, and careful consideration of ethical and privacy concerns.

10. What other comments do you have about improving the adopting/ implementing and deploying AI or Blockchain technologies and their related solutions within UAE Public Sector Entities?

To improve the adopting/ implementing and deploying AI or Blockchain technologies and their related solutions within UAE Public Sector Entities, the following suggestions may be considered:

Develop a clear and comprehensive strategy: A clear and comprehensive strategy should be developed that outlines the goals and objectives of AI and Blockchain implementation, the resources required, the roles and responsibilities of stakeholders, and the expected outcomes.

Increase awareness and understanding: There should be a concerted effort to increase awareness and understanding of AI and Blockchain technologies among stakeholders within the UAE Public Sector. This can be achieved through training programs, workshops, and other educational initiatives.

Foster collaboration and partnerships: Collaboration and partnerships with other public and private sector entities can help to leverage expertise and resources, as well as facilitate the development of interoperable systems.



Invest in technical expertise and infrastructure: As mentioned earlier, implementing AI and Blockchain solutions requires specialized technical expertise and infrastructure. Therefore, the UAE Public Sector should invest in building technical capacity and infrastructure, including cloud-based platforms and data centers.

Develop appropriate regulations and governance frameworks: As also mentioned earlier, AI and Blockchain technologies raise complex legal and regulatory issues. Therefore, appropriate regulations and governance frameworks should be developed to address these issues and ensure the ethical and responsible use of these technologies.

Address cultural barriers: Cultural barriers within the UAE Public Sector may need to be addressed to ensure the successful implementation of AI and Blockchain solutions. This may involve fostering a culture of innovation, openness to new ideas, and a willingness to embrace change.

Overall, improving the adopting/ implementing and deploying AI or Blockchain technologies and their related solutions within UAE Public Sector Entities will require a strategic and concerted effort, focused on addressing the barriers and obstacles identified earlier, leveraging opportunities for collaboration and partnership, and fostering a culture of innovation and openness to new ideas.

Appendix E.2: Response 2

- 11. Please consider the provisional model shown above – with 5 stages of change (initial to optimized) and four dimensions of change (Strategy, Technology, People and Processes). Do you think these are the most appropriate dimensions for evaluating the implementation and impact of AI/Blockchain Technologies in UAE Public Sector from your experience? Would you suggest other dimensions of change?**

based on my personal experience and knowledge and understanding of AI/Blockchain technologies and their implementation, the proposed dimensions of change (Strategy, Technology, People, and Processes) are relevant and important for evaluating the implementation and impact of AI/Blockchain Technologies in the public sector.

Strategy refers to the overall plan and approach for implementing AI/Blockchain technologies in the public sector, including the goals and objectives, resource allocation, and risk management strategies.

Technology refers to the technical infrastructure and tools needed to support the implementation of AI/Blockchain technologies, including hardware, software, and data management systems.

People refer to the human resources involved in the implementation and management of AI/Blockchain technologies, including their skills, knowledge, and attitudes towards the technology.

Processes refer to the workflows, procedures, and protocols involved in the implementation of AI/Blockchain technologies, including data governance, security, and privacy policies.

These dimensions provide a holistic framework for evaluating the implementation and impact of AI/Blockchain Technologies in the UAE Public Sector. However, depending on the specific context and goals of the implementation, other dimensions such as ethical, legal, and social implications of AI/Blockchain technologies may also be relevant.



12. Do you think each stage above” Strategy governance , Technology, People and Processes” represent the overall stages and right description for levels of deployed AI & Blockchain within UAE Public Sector?

The stages of change (Initial, Experimental, Defined, Managed, Optimized) and dimensions of change (Strategy, Technology, People, and Processes) presented in the provisional model provide a comprehensive framework for evaluating the implementation and impact of AI/Blockchain Technologies in the UAE Public Sector.

Each stage of change represents a different level of maturity in the implementation of AI/Blockchain technologies. The Initial stage represents the starting point, where the implementation of AI/Blockchain technologies is in its early stages, with limited understanding and adoption. The Experimental stage represents a stage where organizations are beginning to experiment with AI/Blockchain technologies, but they are not yet fully integrated into the organization's operations. The Defined stage represents a stage where the organization has established a clear vision and strategy for the implementation of AI/Blockchain technologies, with defined processes and guidelines for implementation. The Managed stage represents a stage where the implementation of AI/Blockchain technologies is well-managed, with metrics and monitoring in place to ensure the technology is delivering expected benefits. Finally, the Optimized stage represents a stage where the implementation of AI/Blockchain technologies is fully integrated into the organization's operations, with continuous improvement and optimization.

Similarly, each dimension of change (Strategy, Technology, People, and Processes) represents a critical component of the implementation of AI/Blockchain technologies. Strategy refers to the overall plan and approach for implementing AI/Blockchain technologies. Technology refers to the technical infrastructure and tools needed to support the implementation. People refer to the human resources involved in the implementation and management of AI/Blockchain technologies. Processes refer to the workflows, procedures, and protocols involved in the implementation of AI/Blockchain technologies.

Therefore, I believe that the stages and dimensions presented in the provisional model are appropriate for evaluating the deployment of AI/Blockchain within the UAE Public Sector. However, it is important to note that the specific stages and dimensions may vary depending on the context and goals of the implementation.

13. From Your Experience, what are the Main Challenges behind Implementing AI & Blockchain Solutions within UAE Public Sector?

some of the main challenges behind implementing AI & Blockchain solutions in the UAE Public Sector may include:

1. **Lack of awareness and understanding:** There may be a lack of awareness and understanding of AI & Blockchain technologies among public sector officials and decision-makers, which may hinder the adoption and implementation of these technologies.
2. **Data quality and availability:** AI & Blockchain technologies rely heavily on data, and the quality and availability of data in the public sector may be a challenge. Ensuring data quality and availability is critical for the successful implementation of AI & Blockchain solutions.
3. **Integration with existing systems:** Integrating new AI & Blockchain solutions with existing systems and processes can be a challenge, especially if the existing systems are outdated or not compatible with new technologies.
4. **Regulatory and legal challenges:** The implementation of AI & Blockchain technologies in the public sector may be subject to regulatory and legal challenges, such as data protection and privacy regulations.
5. **Cost and resource constraints:** The implementation of AI & Blockchain solutions may require significant financial and human resources, and these resources may be limited in the public sector.
6. **Skills and expertise gaps:** The implementation of AI & Blockchain technologies requires specialized skills and expertise, which may not be readily available in the public sector.
7. **Cultural resistance and change management:** The introduction of new technologies may face resistance from employees and stakeholders who are not familiar with or resistant to change. Effective change management and communication strategies are critical for successful implementation.



These challenges may vary depending on the specific context and goals of the implementation, and addressing them may require a multidisciplinary approach and collaboration among different stakeholders.

14. From Your Experience, what are the Main Drivers to enhance Implementing AI & Blockchain Solutions within UAE Public Sector?

some of the main drivers to enhance implementing AI & Blockchain solutions within UAE Public Sector may include:

1. **Improved efficiency and effectiveness:** AI & Blockchain technologies have the potential to automate and streamline many processes within the public sector, resulting in improved efficiency and effectiveness in service delivery.
2. **Cost savings:** Implementing AI & Blockchain solutions can result in cost savings by reducing manual labor and errors, optimizing resource utilization, and improving decision-making.
3. **Enhanced transparency and accountability:** AI & Blockchain technologies can improve transparency and accountability within the public sector by enabling secure, tamper-proof record-keeping and audit trails.
4. **Better decision-making:** AI & Blockchain technologies can provide real-time, data-driven insights that can inform better decision-making within the public sector.
5. **Improved citizen experience:** AI & Blockchain solutions can enhance the citizen experience by providing faster, more personalized, and more efficient services.
6. **Innovation and competitiveness:** The implementation of AI & Blockchain solutions can position the UAE Public Sector as an innovative and competitive player in the global digital economy.
7. **Addressing societal challenges:** AI & Blockchain solutions can help address societal challenges, such as improving public health outcomes, enhancing environmental sustainability, and reducing inequality.

These drivers may vary depending on the specific context and goals of the implementation, but they can provide strong motivation for the UAE Public Sector to invest in and enhance the implementation of AI & Blockchain solutions.

15. What are the main Internal & External, barriers/obstacles of adopting/ implementing and deploying AI or Blockchain technologies and their related solutions to enhance efficiency and effectiveness of UAE Public Sector Transactions?
Some of the main internal and external barriers/obstacles of adopting/implementing and deploying AI or Blockchain technologies and their related solutions to enhance efficiency and effectiveness of UAE Public Sector transactions may include:

Internal barriers:

1. **Resistance to change:** Employees may be resistant to change and reluctant to adopt new technologies, which can hinder the successful implementation of AI and Blockchain solutions.
2. **Lack of expertise:** The public sector may lack the technical expertise and skills required to implement and deploy AI and Blockchain technologies effectively.



3. Inadequate funding: The cost of implementing and deploying AI and Blockchain solutions can be significant, and the public sector may not have adequate funding to support these initiatives.

4. Legacy systems: The public sector may have legacy systems that are not compatible with new technologies, making it difficult to integrate AI and Blockchain solutions with existing systems.

5. Data privacy and security concerns: There may be concerns around the privacy and security of sensitive data, particularly in the public sector, where data protection regulations are strict.

External barriers:

1. Regulatory and legal challenges: Implementing AI and Blockchain solutions in the public sector may be subject to regulatory and legal challenges, such as data protection and privacy regulations.

2. Lack of industry standards: There may be a lack of industry standards for AI and Blockchain technologies, which can make it difficult to assess and compare different solutions.

3. Limited adoption and integration: The limited adoption and integration of AI and Blockchain solutions in other sectors can make it difficult for the public sector to integrate these technologies into their operations.

4. Trust issues: There may be trust issues among citizens and stakeholders regarding the use of AI and Blockchain technologies in the public sector, particularly around issues of data privacy and security.

5. Infrastructure challenges: The public sector may face infrastructure challenges, such as limited broadband connectivity or inadequate technology infrastructure, which can hinder the adoption and deployment of AI and Blockchain technologies.

Addressing these internal and external barriers and obstacles may require a multi-faceted approach that involves collaboration among different stakeholders, including government entities, private sector organizations, and the wider community.

16. What other comments do you have about improving the adopting/ implementing and deploying AI or Blockchain technologies and their related solutions within UAE Public Sector Entities?

Here are some additional comments on improving the adoption, implementation, and deployment of AI or Blockchain technologies and their related solutions within UAE Public Sector Entities:

1. Prioritize human-centered design: The successful implementation of AI and Blockchain solutions in the public sector requires a human-centered approach that places citizens and employees at the center of the design process. It is essential to involve all stakeholders, including end-users, in the development and deployment of these solutions.

2. Foster a culture of innovation: A culture of innovation is critical to the successful adoption and deployment of AI and Blockchain solutions in the public sector. The UAE Public Sector Entities can foster a culture of innovation by creating an environment that encourages experimentation, risk-taking, and learning from failures.

3. Build capacity and skills: The public sector may need to build capacity and skills in AI and Blockchain technologies to ensure the successful adoption and deployment of these solutions. This can be done through training programs, partnerships with educational institutions, and collaboration with private sector organizations.

4. Ensure data privacy and security: The UAE Public Sector Entities should prioritize data privacy and security when adopting and deploying AI and Blockchain solutions. This includes implementing robust data protection measures, ensuring compliance with relevant regulations, and involving citizens in decisions around data collection and use.

5. Collaborate with the private sector: The private sector can provide valuable expertise and resources to support the adoption and deployment of AI and Blockchain solutions in the public sector. Collaborating with the private sector can help to address capacity and funding challenges and ensure that solutions are fit-for-purpose and aligned with industry standards.

6. Measure and evaluate impact: It is essential to measure and evaluate the impact of AI and Blockchain solutions in the public sector continually. This can help to identify areas of success, areas for improvement, and ensure that these solutions are meeting the needs of citizens and employees.



In conclusion, the successful adoption and deployment of AI and Blockchain solutions in the public sector require a multi-faceted approach that prioritizes human-centered design, fosters a culture of innovation, builds capacity and skills, ensures data privacy and security, collaborates with the private sector, and measures and evaluates impact continuously.

Appendix E.3: Response 3

- 17. Please consider the provisional model shown above – with 5 stages of change (initial to optimized) and four dimensions of change (Strategy, Technology, People and Processes). Do you think these are the most appropriate dimensions for evaluating the implementation and impact of AI/Blockchain Technologies in UAE Public Sector from your experience? Would you suggest other dimensions of change?**

based on my knowledge of best practices in technology adoption, I can suggest some additional dimensions of change that could be relevant in evaluating the implementation and impact of these technologies:

1. Governance and regulation: Governance and regulation play a crucial role in the adoption and deployment of AI and Blockchain technologies in the public sector. This includes policies, guidelines, and standards for ethical and responsible AI and Blockchain use, as well as mechanisms for ensuring compliance and accountability.
2. Infrastructure and interoperability: The success of AI and Blockchain solutions depends on the underlying infrastructure and the ability of different systems to work together. This includes considerations such as data storage, connectivity, and APIs.
3. Partnerships and collaboration: Collaboration with other government entities, private sector organizations, and civil society can be critical to the success of AI and Blockchain initiatives. This includes partnerships for data sharing, joint development of solutions, and alignment with industry standards and best practices.
4. Financial resources and sustainability: The adoption and deployment of AI and Blockchain solutions require financial resources and a sustainable business model. This includes considerations such as funding mechanisms, cost-benefit analysis, and long-term sustainability planning.

In summary, while the original dimensions of change in the provisional model (Strategy, Technology, People, and Processes) are relevant, additional dimensions such as governance and regulation, infrastructure and interoperability, partnerships and collaboration, and financial resources and sustainability can provide a more comprehensive framework for evaluating the implementation and impact of AI and Blockchain technologies in the UAE public sector.

- 18. Do you think each stage above” Strategy governance , Technology, People and Processes” represent the overall stages and right description for levels of deployed AI & Blockchain within UAE Public Sector?**

I can suggest that the stages of Strategy governance, Technology, People, and Processes can be relevant and useful for evaluating the deployment of AI and Blockchain technologies in the UAE public sector.

These stages are aligned with the key areas that organizations typically need to address when deploying new technologies, and they can help to ensure that the deployment process is well-planned, well-executed, and well-aligned with organizational goals and objectives. For example, a sound strategy that is aligned with organizational objectives and takes into account the regulatory landscape and the potential impact of AI and Blockchain technologies is crucial for success. Likewise, technology choices need to



be appropriate and fit for purpose, while the people involved in deploying and using the technologies need to be properly trained and supported.

However, it's worth noting that the specifics of each stage may vary depending on the organization and the particular technologies being deployed. In some cases, it may be necessary to emphasize certain stages over others, or to approach the deployment process in a different way. Therefore, it's important to tailor the deployment process to the specific needs and circumstances of the organization and its stakeholders, while still taking into account best practices and lessons learned from other deployments.

19. From Your Experience, what are the Main Challenges behind Implementing AI & Blockchain Solutions within UAE Public Sector?

based on my knowledge of best practices and research in technology adoption, some of the main challenges that may be faced when implementing AI and Blockchain solutions within the UAE public sector could include:

1. **Regulatory and legal barriers:** The deployment of AI and Blockchain solutions in the UAE public sector may be subject to strict regulatory requirements, particularly in areas such as data protection, privacy, and cybersecurity. Ensuring compliance with these requirements can be a significant challenge.
2. **Limited technical expertise:** There may be a shortage of skilled professionals with the technical expertise required to design, develop, and deploy AI and Blockchain solutions in the UAE public sector. This can limit the ability of organizations to implement these technologies effectively.
3. **Data quality and accessibility:** The success of AI and Blockchain solutions often depends on the quality and accessibility of data. In the UAE public sector, there may be challenges around the availability and quality of data, particularly in areas such as healthcare, education, and social services.
4. **Interoperability and integration:** Integrating AI and Blockchain solutions with existing systems and processes can be challenging, particularly if these systems are complex and fragmented. Achieving interoperability between different systems and technologies can also be difficult.
5. **Cost and resource constraints:** Implementing AI and Blockchain solutions can require significant financial and human resources. This can be a challenge in the UAE public sector, particularly for smaller organizations or those with limited budgets.
6. **Acceptance and trust:** AI and Blockchain technologies are often seen as complex and opaque, which can lead to concerns around trust and acceptance. Ensuring that stakeholders understand the benefits and risks of these technologies, and are willing to use them, can be a significant challenge.

Overall, addressing these challenges will require careful planning, collaboration, and investment in both technology and human resources. It will also be important to engage with stakeholders and build trust through transparency and open communication.

20. From Your Experience, what are the Main Drivers to enhance Implementing AI & Blockchain Solutions within UAE Public Sector?

some of the main drivers that could enhance the implementation of AI and Blockchain solutions within the UAE public sector include:

1. **Improved efficiency and effectiveness:** AI and Blockchain solutions have the potential to significantly improve the efficiency and effectiveness of public sector operations, reducing costs and improving service delivery.
2. **Increased accuracy and reliability:** AI and Blockchain technologies can improve the accuracy and reliability of public sector processes, reducing errors and improving outcomes.



3. Enhanced transparency and accountability: Blockchain technologies can provide a tamper-proof record of transactions and activities, improving transparency and accountability in the public sector.

4. Better decision-making: AI technologies can help to analyze large amounts of data and generate insights that can inform better decision-making in the public sector.

5. Improved citizen engagement: AI and Blockchain solutions can help to engage citizens more effectively and provide them with more personalized services and experiences.

6. Competitive advantage: By adopting AI and Blockchain technologies, the UAE public sector can gain a competitive advantage over other organizations that have not yet embraced these technologies.

7. National strategic vision: The UAE government has expressed a strong commitment to driving innovation and digital transformation, including the deployment of AI and Blockchain solutions. This vision can provide a strong impetus for public sector organizations to adopt these technologies.

Overall, these drivers can help to create a compelling business case for the implementation of AI and Blockchain solutions within the UAE public sector, and can help to overcome some of the challenges associated with deployment.

21. What are the main Internal & External, barriers/obstacles of adopting/ implementing and deploying AI or Blockchain technologies and their related solutions to enhance efficiency and effectiveness of UAE Public Sector Transactions?

There are several internal and external barriers or obstacles to adopting, implementing, and deploying AI or Blockchain technologies and their related solutions to enhance the efficiency and effectiveness of UAE public sector transactions. Some of these barriers include:

1. Limited funding: Implementing AI and Blockchain solutions can be expensive, and public sector organizations may have limited budgets to invest in these technologies.

2. Lack of expertise: Developing and implementing AI and Blockchain solutions requires specialized knowledge and expertise, which may not be readily available within the public sector.

3. Resistance to change: Public sector organizations may be resistant to change, especially if the change involves the adoption of new and unfamiliar technologies.

4. Regulatory and legal frameworks: There may be regulatory or legal barriers to the deployment of AI and Blockchain solutions in the public sector, such as data privacy and security concerns.

5. Interoperability: There may be challenges in integrating AI and Blockchain solutions with existing systems and processes, leading to interoperability issues.

6. Data quality and availability: AI and Blockchain solutions rely on high-quality data to function effectively, and the availability and quality of data may be a barrier to their deployment.

7. Ethical considerations: There may be ethical considerations related to the deployment of AI and Blockchain solutions, such as bias in AI algorithms or the potential misuse of Blockchain data.



8. Lack of standards: There may be a lack of standards and guidelines for the deployment of AI and Blockchain solutions in the public sector, leading to uncertainty and confusion.

9. Security concerns: AI and Blockchain solutions may introduce new security risks and vulnerabilities, which may need to be addressed before deployment.

Overall, addressing these barriers will require a collaborative effort between public sector organizations, technology providers, and other stakeholders. It may involve investing in training and education programs to build expertise, developing new regulatory frameworks and standards, and addressing concerns related to data quality, security, and ethics.

22. What other comments do you have about improving the adopting/ implementing and deploying AI or Blockchain technologies and their related solutions within UAE Public Sector Entities?

To improve the adoption, implementation, and deployment of AI or Blockchain technologies and their related solutions within UAE public sector entities, the following steps could be taken:

1. Build awareness and education: Raising awareness about the benefits and potential applications of AI and Blockchain technologies can help build support for their adoption. Training and education programs can also help build expertise and capacity within public sector organizations.
2. Foster collaboration and partnerships: Collaboration between public sector organizations, technology providers, and other stakeholders can help overcome barriers to deployment and promote knowledge sharing.
3. Develop a clear strategy and roadmap: Developing a clear strategy and roadmap for the adoption of AI and Blockchain technologies can help ensure that resources are allocated effectively and that stakeholders are aligned around common goals.
4. Address regulatory and legal concerns: Addressing regulatory and legal concerns related to the deployment of AI and Blockchain technologies can help build trust and confidence in these solutions.
5. Address data quality and availability issues: Ensuring that high-quality data is available for use in AI and Blockchain solutions can help ensure their effectiveness and success.
6. Build a culture of innovation and experimentation: Building a culture of innovation and experimentation within public sector organizations can help drive the adoption and deployment of new technologies.
7. Monitor and evaluate outcomes: Monitoring and evaluating the outcomes of AI and Blockchain deployments can help identify areas for improvement and ensure that the benefits of these technologies are being realized.

Overall, the successful adoption, implementation, and deployment of AI and Blockchain technologies within the UAE public sector will require a comprehensive and collaborative approach that addresses the technical, regulatory, and cultural challenges associated with these solutions.

Appendix E.4: Response 4

- 23. Please consider the provisional model shown above – with 5 stages of change (initial to optimized) and four dimensions of change (Strategy, Technology, People and Processes). Do you think these are the most appropriate dimensions for evaluating the implementation and impact of AI/Blockchain Technologies in UAE Public Sector from your experience? Would you suggest other dimensions of change?**

based on my knowledge.



The provisional model you mentioned with 5 stages of change (initial to optimized) and four dimensions of change (Strategy, Technology, People, and Processes) can be a good starting point to evaluate the implementation and impact of AI/Blockchain technologies in the UAE Public Sector.

However, there may be other dimensions of change that could also be important to consider. For example, regulatory and legal frameworks may be important dimensions to consider as the implementation of AI/Blockchain technologies in the public sector may require changes in laws and regulations to ensure ethical and legal use of these technologies.

Furthermore, ethical and societal implications may also be important dimensions to consider as the implementation of AI/Blockchain technologies may have implications for privacy, security, and social equity.

Therefore, it is essential to consider a wide range of dimensions to evaluate the implementation and impact of AI/Blockchain technologies in the UAE Public Sector comprehensively.

24. Do you think each stage above” Strategy governance , Technology, People and Processes” represent the overall stages and right description for levels of deployed AI & Blockchain within UAE Public Sector?

The stages of Strategy, Technology, People, and Processes mentioned in the provisional model can be relevant and appropriate for evaluating the levels of deployed AI and Blockchain within the UAE Public Sector.

The Strategy stage represents the development of a clear and comprehensive strategy for the implementation of AI/Blockchain technologies, which includes identifying the goals and objectives, assessing the potential benefits and risks, and defining the scope and timeline of the project.

The Technology stage involves the selection, deployment, and integration of AI/Blockchain technologies into the existing infrastructure of the public sector organization. This stage includes the development and testing of prototypes, choosing the right hardware and software, and ensuring compatibility and interoperability with other systems.

The People stage focuses on the development of a skilled and knowledgeable workforce that can effectively use and maintain the AI/Blockchain technologies. This stage includes training and capacity-building activities, recruitment of qualified personnel, and ensuring that the organizational culture supports innovation and collaboration.

The Processes stage involves the redesign and optimization of business processes to leverage the benefits of AI/Blockchain technologies fully. This stage includes identifying the processes that can be automated, developing new workflows and procedures, and ensuring that the processes are aligned with the overall strategy of the organization.

Overall, these stages can provide a comprehensive framework for evaluating the levels of deployed AI and Blockchain within the UAE Public Sector. However, it is important to note that the specific stages and their descriptions may vary depending on the context and objectives of the organization.

25. From Your Experience, what are the Main Challenges behind Implementing AI & Blockchain Solutions within UAE Public Sector?

based on my knowledge.

Implementing AI and Blockchain solutions in the UAE Public Sector can face several challenges. Some of the main challenges are:

Regulatory and Legal Framework: Developing and implementing AI/Blockchain solutions require compliance with legal and regulatory frameworks. Ensuring that the solutions are in line with local laws and regulations can be a challenge for public sector organizations.



Data Privacy and Security: AI and Blockchain solutions involve handling sensitive and confidential data. Ensuring data privacy and security can be challenging, and breaches can lead to significant consequences, including legal and reputational damage.

Technical Expertise: Developing and implementing AI and Blockchain solutions require specialized technical expertise. The public sector organizations may face challenges in recruiting and retaining skilled personnel with the necessary expertise.

Interoperability: Public sector organizations typically have several legacy systems and databases that need to integrate with new AI/Blockchain solutions. Ensuring interoperability can be challenging and may require significant investments in infrastructure.

Cost: Developing and implementing AI/Blockchain solutions can be expensive, and public sector organizations may face budget constraints that limit their ability to invest in these technologies.

Change Management: The adoption of new technologies can require significant changes in the way public sector organizations operate. Ensuring that employees are trained and prepared for these changes can be a challenge.

Overall, addressing these challenges requires a holistic approach that involves collaboration between various stakeholders, including policymakers, regulators, industry experts, and the public sector organizations themselves.

26. From Your Experience, what are the Main Drivers to enhance Implementing AI & Blockchain Solutions within UAE Public Sector?

based on my knowledge.

There are several drivers that can enhance the implementation of AI and Blockchain solutions in the UAE Public Sector. Some of the main drivers are:

Digital Transformation: The UAE government has been actively promoting digital transformation, and AI and Blockchain solutions can play a significant role in this transformation. The government's vision for a digitally transformed society provides a strong motivation to implement these technologies.

Efficiency and Cost Savings: AI and Blockchain solutions can streamline processes, reduce redundancies, and improve efficiencies, leading to cost savings for the public sector organizations.

Improved Services: AI and Blockchain solutions can improve the quality of services offered by public sector organizations, leading to higher levels of citizen satisfaction and trust.

Data Management: AI and Blockchain solutions can help public sector organizations manage and analyze large volumes of data, leading to better decision-making and policy formulation.

Innovation and Competitiveness: Implementing AI and Blockchain solutions can position public sector organizations as innovators and leaders in the adoption of emerging technologies, enhancing their competitiveness and reputation.

Sustainability: AI and Blockchain solutions can help public sector organizations achieve sustainability goals by reducing energy consumption, emissions, and waste.

Overall, these drivers provide strong motivations for public sector organizations in the UAE to implement AI and Blockchain solutions, and can help them to reap the benefits of these technologies in a wide range of areas.

27. What are the main Internal & External, barriers/obstacles of adopting/ implementing and deploying AI or Blockchain technologies and their related solutions to enhance efficiency and effectiveness of UAE Public Sector Transactions?

The main internal and external barriers/obstacles to adopting, implementing, and deploying AI or Blockchain technologies and their related solutions to enhance the efficiency and effectiveness of UAE Public Sector transactions are:



Internal Barriers:

Resistance to Change: Implementing new technologies requires significant changes to organizational processes and workflows, and this can face resistance from employees who are used to existing systems and practices.

Lack of Skills and Expertise: Developing and implementing AI and Blockchain solutions requires specialized technical expertise, and public sector organizations may not have the necessary resources or expertise in-house.

Legacy Systems: Public sector organizations may have legacy systems that are not compatible with AI or Blockchain technologies, and upgrading these systems can be time-consuming and costly.

Budget Constraints: Implementing AI and Blockchain solutions can be expensive, and public sector organizations may face budget constraints that limit their ability to invest in these technologies.

External Barriers:

Regulatory and Legal Framework: The development and implementation of AI and Blockchain solutions require compliance with legal and regulatory frameworks, and navigating these frameworks can be challenging.

Data Privacy and Security: AI and Blockchain solutions involve handling sensitive and confidential data, and ensuring data privacy and security can be challenging.

Interoperability: Public sector organizations typically have several legacy systems and databases that need to integrate with new AI/Blockchain solutions. Ensuring interoperability can be challenging and may require significant investments in infrastructure.

Standards and Protocols: The lack of standardization in AI and Blockchain technologies can be a barrier to adoption, as organizations may face challenges in integrating solutions from different vendors.

Overall, addressing these internal and external barriers requires a coordinated effort from various stakeholders, including policymakers, regulators, industry experts, and public sector organizations themselves. Developing a clear strategy, building the necessary skills and expertise, and investing in the right infrastructure can help to overcome these barriers and enable the successful implementation of AI and Blockchain solutions in the UAE Public Sector.

28. What other comments do you have about improving the adopting/ implementing and deploying AI or Blockchain technologies and their related solutions within UAE Public Sector Entities?

Here are some additional comments on improving the adoption, implementation, and deployment of AI or Blockchain technologies and their related solutions within UAE Public Sector Entities:

Collaboration and Partnership: Collaboration and partnership between public sector entities, private sector companies, and academia can facilitate the development and implementation of AI and Blockchain solutions. The UAE government has already established initiatives such as the Dubai Future Accelerators and the Abu Dhabi Global Market Sandbox, which bring together public and private sector stakeholders to collaborate and innovate.

Capacity Building and Training: Building the necessary skills and expertise within public sector entities is essential for the successful implementation of AI and Blockchain solutions. Investing in training programs, workshops, and other capacity-building initiatives can help to develop a skilled workforce that can effectively use and manage these technologies.

User-Centric Approach: A user-centric approach that takes into account the needs and preferences of citizens and stakeholders can help to ensure that AI and Blockchain solutions are designed and implemented to meet their needs. User testing and feedback can provide valuable insights into how these solutions can be optimized for maximum impact.

Standards and Interoperability: Standards and interoperability are crucial for the successful integration of AI and Blockchain solutions within the UAE Public Sector. Establishing standards and protocols for data exchange, cybersecurity, and other critical areas can help to ensure that these solutions are interoperable and can integrate with legacy systems.



Continuous Evaluation and Improvement: Continuous evaluation and improvement of AI and Blockchain solutions are essential to ensure that these technologies continue to deliver value and meet the evolving needs of public sector entities. Regular monitoring, data analysis, and feedback can help to identify areas for improvement and guide future investments in these technologies.

Overall, by adopting a strategic and collaborative approach that focuses on capacity building, user-centric design, standards and interoperability, and continuous evaluation and improvement, UAE Public Sector Entities can successfully adopt and implement AI and Blockchain technologies and realize their full potential in enhancing efficiency and effectiveness in their transactions.

Appendix E.5: Response 5

29. **Please consider the provisional model shown above – with 5 stages of change (initial to optimized) and four dimensions of change (Strategy, Technology, People and Processes). Do you think these are the most appropriate dimensions for evaluating the implementation and impact of AI/Blockchain Technologies in UAE Public Sector from your experience? Would you suggest other dimensions of change?**

The provisional model with five stages of change and four dimensions of change seems to be a good starting point for evaluating the implementation and impact of AI/Blockchain technologies in UAE public sector organizations. However, it may be useful to consider additional dimensions such as data and infrastructure.

Data is a critical dimension that affects the success of AI/Blockchain solutions. It is important to ensure that high-quality data is available and accessible to these technologies, and that appropriate data governance policies are in place. Infrastructure is another critical dimension that can impact the success of these solutions, particularly in terms of computing power and network infrastructure.

In summary, while the provisional model provides a good starting point for evaluating the implementation and impact of AI/Blockchain technologies in UAE public sector organizations, it may be useful to consider additional dimensions such as data and infrastructure to provide a more comprehensive evaluation framework.

30. **Do you think each stage above” Strategy governance , Technology, People and Processes” represent the overall stages and right description for levels of deployed AI & Blockchain within UAE Public Sector?**

The stages of the provisional model - Strategy governance, Technology, People, and Processes - are commonly recognized as important areas to consider for successful implementation and deployment of AI and Blockchain technologies in any organization, including those within the UAE public sector.

The Strategy governance stage involves developing a clear vision and roadmap for the implementation of AI and Blockchain technologies, including defining the organization's goals and objectives and identifying potential benefits and risks. The Technology stage includes selecting and implementing the appropriate technologies, such as AI and Blockchain solutions, and ensuring that they are integrated with existing systems and infrastructure. The People stage involves developing the necessary skills and capabilities among employees and stakeholders to work effectively with these new technologies. The Processes stage involves adapting or redesigning existing processes to leverage the new capabilities of AI and Blockchain technologies.

Therefore, I would say that the stages of the provisional model provide a good framework for evaluating the deployment of AI and Blockchain technologies within UAE public sector organizations. However, it is important to note that the specific implementation details may vary based on the nature of the organization and the specific use case for these technologies.

31. **From Your Experience, what are the Main Challenges behind Implementing AI & Blockchain Solutions within UAE Public Sector?**

Implementing AI and Blockchain solutions within the UAE public sector can present a number of challenges. Some of the main challenges include:



1. Data quality and availability: AI and Blockchain technologies require high-quality data to function effectively. Ensuring that relevant and reliable data is available and accessible can be a challenge, particularly if the data is dispersed across different departments or agencies.

2. Regulatory and legal framework: The UAE has a complex regulatory and legal framework that can make it challenging to implement and deploy AI and Blockchain solutions. It is important to ensure that these solutions comply with relevant laws and regulations, particularly in areas such as data privacy and security.

3. Talent shortage: There may be a shortage of skilled talent with experience in AI and Blockchain technologies in the UAE. This can make it difficult to find and retain the necessary expertise to implement and maintain these solutions.

4. Integration with legacy systems: The UAE public sector has a large number of legacy systems that may not be compatible with new AI and Blockchain solutions. Ensuring that these systems can be integrated with new technologies can be a challenge.

5. Cost: Implementing and deploying AI and Blockchain solutions can require significant investment in terms of technology, infrastructure, and talent. Budget constraints may limit the ability of public sector organizations to invest in these technologies.

Overall, these challenges can be addressed through careful planning and execution, including identifying specific use cases for AI and Blockchain technologies, developing a clear roadmap for implementation, and building partnerships with industry experts and stakeholders.

32. From Your Experience, what are the Main Drivers to enhance Implementing AI & Blockchain Solutions within UAE Public Sector?

There are several drivers that are fueling the adoption of AI and Blockchain solutions within the UAE public sector:

1. Improving efficiency and effectiveness: AI and Blockchain technologies have the potential to improve the efficiency and effectiveness of public sector operations by automating routine tasks, enhancing decision-making processes, and improving the accuracy and speed of transactions.

2. Enhancing transparency and accountability: Blockchain technology can provide an immutable record of transactions, which can enhance transparency and accountability within the public sector.

3. Delivering better services to citizens: AI and Blockchain technologies can enable public sector organizations to deliver more personalized and responsive services to citizens, enhancing their overall experience and satisfaction.

4. Supporting innovation and economic growth: The UAE has set an ambitious goal of becoming a world leader in AI and Blockchain technologies. By investing in these areas, the public sector can support innovation and drive economic growth.

5. Addressing societal challenges: AI and Blockchain technologies have the potential to address some of the biggest societal challenges facing the UAE, such as improving healthcare outcomes, reducing energy consumption, and enhancing public safety.

Overall, these drivers are leading the UAE public sector to invest in and adopt AI and Blockchain solutions, with the aim of creating a more efficient, transparent, and citizen-centric government.

33. What are the main Internal & External, barriers/obstacles of adopting/ implementing and deploying AI or Blockchain technologies and their related solutions to enhance efficiency and effectiveness of UAE Public Sector Transactions?

There are several internal and external barriers/obstacles to adopting, implementing, and deploying AI or Blockchain technologies in the UAE public sector:

1. Regulatory and legal barriers: The regulatory environment and legal framework surrounding the use of AI and Blockchain technologies are still developing, which can create uncertainty and hinder adoption.

2. Lack of skills and expertise: There may be a shortage of skilled professionals with the necessary expertise to implement and manage AI and Blockchain technologies.



3. Resistance to change: Resistance to change within public sector organizations can also be a significant barrier to adoption, as some employees may be hesitant to adopt new technologies and processes.

4. Cost: Implementing and deploying AI and Blockchain technologies can be expensive, which may be a barrier for public sector organizations with limited budgets.

5. Data privacy and security concerns: The use of AI and Blockchain technologies can raise concerns about data privacy and security, which may make some public sector organizations hesitant to adopt these technologies.

6. Interoperability: Ensuring that different systems and technologies can work together seamlessly can be a challenge, especially in large and complex organizations.

7. Limited scalability: Some AI and Blockchain technologies may not be scalable to meet the needs of large-scale public sector operations.

Overall, addressing these internal and external barriers is critical to successfully adopting and implementing AI and Blockchain technologies in the UAE public sector. Public sector organizations should develop a clear strategy for overcoming these challenges, which may involve investing in training and development programs, partnering with external organizations, and developing policies and procedures to ensure compliance with regulations and standards.

34. What other comments do you have about improving the adopting/ implementing and deploying AI or Blockchain technologies and their related solutions within UAE Public Sector Entities?

Some additional comments on improving the adoption, implementation, and deployment of AI and blockchain technologies in the UAE public sector could include:

1. Collaboration: Collaboration among government entities, private sector organizations, and academic institutions can help in the development and implementation of AI and blockchain solutions. This collaboration can facilitate knowledge sharing, skill development, and co-creation of solutions that meet the needs of the UAE public sector.

2. Training and Education: Training and education programs can help in building the skills and capabilities required for implementing and managing AI and blockchain solutions. These programs can be designed for different levels of personnel, from executives to operational staff, and can cover technical, operational, and ethical aspects of the technology.

3. Regulatory Framework: Establishing a regulatory framework that enables the adoption of AI and blockchain technologies while ensuring data privacy, security, and ethical use is crucial. The framework should balance the need for innovation with the need to protect the interests of individuals and society.

4. Pilot Projects: Pilot projects can help in testing and validating the effectiveness of AI and blockchain solutions before full-scale implementation. Pilot projects can be used to identify and address any technical, operational, or ethical issues before the solutions are scaled up.

5. Awareness and Communication: Awareness and communication campaigns can help in building trust and confidence in AI and blockchain technologies among the general public and stakeholders. These campaigns can also help in highlighting the benefits and potential risks of the technologies, and in promoting a culture of responsible use of the technologies.

6. Continuous Improvement: Continuous improvement of AI and blockchain solutions is necessary to ensure their effectiveness, relevance, and alignment with changing needs and priorities. This can be achieved through feedback mechanisms, monitoring and evaluation, and ongoing research and development.

Appendix E.6: Response 6

35. Please consider the provisional model shown above – with 5 stages of change (initial to optimized) and four dimensions of change (Strategy, Technology, People and Processes). Do you think these are the most appropriate dimensions for



The 5 stages of change (initial, awareness, adoption, adaptation, and optimization) are widely recognized in the field of organizational change management and can be applied to any type of change, including the implementation of AI/Blockchain Technologies in the public sector. Similarly, the four dimensions of change (strategy, technology, people, and processes) are relevant for evaluating the impact of any technology implementation, including AI/Blockchain Technologies.

However, in addition to these dimensions, there may be other dimensions that are relevant for evaluating the implementation and impact of AI/Blockchain Technologies in the UAE Public Sector. For example, regulatory and legal frameworks, stakeholder engagement, ethical considerations, and cultural factors may also be important dimensions to consider.

Moreover, as the implementation of AI/Blockchain Technologies in the public sector often involves collaboration between different government agencies, inter-agency coordination and communication may also be an important dimension to consider.

Therefore, it is essential to carefully evaluate the context of the implementation of AI/Blockchain Technologies in the UAE Public Sector and identify the relevant dimensions of change that need to be considered for a comprehensive assessment of the impact of these technologies.

36. Do you think each stage above” Strategy governance , Technology, People and Processes” represent the overall stages and right description for levels of deployed AI & Blockchain within UAE Public Sector?

The stages of Strategy, Technology, People, and Processes are commonly used to describe the various aspects of organizational change management, and they can be relevant for evaluating the implementation of AI and blockchain technologies in the UAE Public Sector. However, it's important to note that the specific stages and descriptions may vary depending on the context of the implementation and the specific goals and objectives of the organization.

For instance, in the context of AI and blockchain implementation in the UAE Public Sector, the strategy stage may involve defining the overall goals and objectives for the technology implementation, determining the appropriate governance and regulatory frameworks, and identifying the key stakeholders and partners. The technology stage may involve selecting and deploying the appropriate AI and blockchain solutions, ensuring interoperability with existing systems, and addressing any technical challenges that arise. The people stage may involve training and upskilling employees, ensuring adequate staffing levels, and managing the cultural and organizational changes associated with the technology implementation. The process stage may involve redesigning business processes to leverage the benefits of AI and blockchain technologies, ensuring compliance with relevant regulations and standards, and monitoring and evaluating the impact of the technology implementation.

Overall, while the stages of Strategy, Technology, People, and Processes can be relevant for evaluating the implementation of AI and blockchain technologies in the UAE Public Sector, it's important to adapt the stages and descriptions to the specific context and goals of the organization.

37. From Your Experience, what are the Main Challenges behind Implementing AI & Blockchain Solutions within UAE Public Sector?

based on my knowledge of the challenges commonly faced during the implementation of emerging technologies in public sector organizations, here are some potential challenges that could be faced:

Regulatory and legal challenges: The implementation of AI and blockchain technologies in the UAE Public Sector may be subject to regulatory and legal challenges, including data privacy, security, and intellectual property concerns.

Technical challenges: The implementation of AI and blockchain technologies may require significant technical expertise, resources, and infrastructure. Issues such as data quality, interoperability, and system integration may also arise.



Organizational culture and change management: The adoption of AI and blockchain technologies may require significant organizational change, including changes to business processes, job roles, and workforce capabilities. It may also require changes in the organizational culture and mindset towards the use of new technologies.

Talent and skills gap: Implementing AI and blockchain technologies may require specific skills and expertise, such as data analytics, machine learning, and blockchain development. The UAE Public Sector may face challenges in attracting and retaining talent with the necessary skills.

Cost and funding: Implementing AI and blockchain technologies may require significant investments in infrastructure, hardware, software, and talent. Securing funding for these initiatives can be a challenge for public sector organizations.

Stakeholder engagement and communication: Implementing AI and blockchain technologies may require stakeholder engagement and communication to ensure buy-in and support from various stakeholders, including employees, partners, and citizens.

Overall, the successful implementation of AI and blockchain technologies in the UAE Public Sector will require addressing the challenges and adopting a comprehensive approach that addresses technical, organizational, and cultural aspects of the implementation.

38. From Your Experience, what are the Main Drivers to enhance Implementing AI & Blockchain Solutions within UAE Public Sector?

based on my knowledge of the potential benefits of these technologies, here are some potential drivers that could enhance the implementation of AI and blockchain solutions in the UAE Public Sector:

Increased efficiency: AI and blockchain technologies can automate processes, streamline workflows, and reduce manual labor, leading to increased efficiency in the delivery of public services.

Improved data management: AI and blockchain technologies can provide better data management capabilities, ensuring the accuracy, reliability, and security of data used in public sector services.

Enhanced transparency and accountability: Blockchain technology can enable transparent and tamper-proof records, providing greater accountability and trust in public sector services.

Better decision-making: AI and blockchain technologies can provide better insights and analytics, enabling more informed and data-driven decision-making in the public sector.

Cost savings: The implementation of AI and blockchain technologies can lead to cost savings in areas such as labor, infrastructure, and maintenance.

Improved citizen experience: The use of AI and blockchain technologies can provide citizens with more efficient, effective, and personalized services, enhancing the overall citizen experience.

Innovation and competitiveness: The adoption of AI and blockchain technologies can position the UAE Public Sector as a leader in innovation, driving competitiveness and economic growth.

Overall, these drivers highlight the potential benefits of implementing AI and blockchain solutions in the UAE Public Sector, and they can be used to build a strong business case for the adoption of these technologies.

39. What are the main Internal & External, barriers/obstacles of adopting/ implementing and deploying AI or Blockchain technologies and their related solutions to enhance efficiency and effectiveness of UAE Public Sector Transactions?

Internal and external barriers/obstacles to adopting/implementing and deploying AI or Blockchain technologies in the UAE Public Sector can include:



Internal barriers:

Resistance to change: Employees and stakeholders may resist changes to their work processes or the adoption of new technologies.

Lack of expertise: Organizations may lack the necessary expertise to effectively implement and manage new technologies such as AI and blockchain.

Data quality and management issues: The accuracy, completeness, and consistency of data can be a challenge for public sector organizations, impacting the reliability and effectiveness of AI and blockchain solutions.

Siloed systems and data: Public sector organizations may have siloed systems and data that are not easily integrated, impacting the interoperability and efficiency of AI and blockchain solutions.

Funding and resource constraints: Implementation and deployment of AI and blockchain technologies can require significant financial resources and talent, which may not always be readily available within public sector organizations.

External barriers:

Regulatory and legal challenges: Regulatory and legal frameworks may not yet be fully developed or conducive to the adoption of AI and blockchain technologies in the UAE Public Sector.

Lack of interoperability with legacy systems: Integration of AI and blockchain solutions with legacy systems can be a challenge, leading to technical issues and potential data security risks.

Security and privacy concerns: The use of AI and blockchain technologies can raise security and privacy concerns, particularly with sensitive data used in the public sector.

Lack of standards and guidelines: The lack of standards and guidelines can make it difficult to effectively evaluate and implement AI and blockchain solutions in the public sector.

Cultural barriers: There may be cultural barriers to the adoption of new technologies within public sector organizations, including concerns about job displacement or loss of control over processes and data.

Overall, addressing these internal and external barriers and obstacles to adopting/implementing and deploying AI or Blockchain technologies will require a comprehensive approach that includes technical expertise, stakeholder engagement, regulatory frameworks, and cultural change management.

40. What other comments do you have about improving the adopting/ implementing and deploying AI or Blockchain technologies and their related solutions within UAE Public Sector Entities?

In addition to addressing the barriers and obstacles mentioned earlier, there are several other considerations for improving the adoption, implementation, and deployment of AI or blockchain technologies and their related solutions within UAE Public Sector entities:

Collaboration and partnerships: Collaboration and partnerships with industry stakeholders, academia, and other government entities can provide opportunities to share best practices, resources, and expertise.

Capacity building and training: Providing training and capacity building opportunities for employees and stakeholders can help build the necessary skills and knowledge to effectively adopt and implement new technologies.

Pilots and experimentation: Piloting and experimenting with AI or blockchain solutions on a smaller scale can help to identify potential challenges, opportunities, and areas for improvement before scaling up.



Open data policies: Implementing open data policies can facilitate the sharing of data between public sector entities, improving interoperability and data quality for AI and blockchain solutions.

Standards and guidelines: Developing and implementing standards and guidelines can help ensure consistency, interoperability, and security across different AI or blockchain solutions and systems.

Citizen engagement: Engaging citizens in the development and implementation of AI or blockchain solutions can improve transparency, accountability, and trust in the public sector.

Continuous improvement and evaluation: Continuously monitoring, evaluating, and improving AI or blockchain solutions can ensure that they are meeting the needs and expectations of stakeholders and delivering the intended benefits.

Overall, improving the adoption, implementation, and deployment of AI or blockchain technologies and their related solutions within UAE Public Sector entities requires a multi-faceted and collaborative approach that involves addressing barriers and obstacles, building capacity and expertise, piloting and experimenting with solutions, and engaging citizens and stakeholders.

Appendix E.7: Response 7

41. Please consider the provisional model shown above – with 5 stages of change (initial to optimized) and four dimensions of change (Strategy, Technology, People and Processes). Do you think these are the most appropriate dimensions for evaluating the implementation and impact of AI/Blockchain Technologies in UAE Public Sector from your experience? Would you suggest other dimensions of change?

other dimensions of change that could be considered in the evaluation process may include:

1. Policy and Regulatory Framework: The regulatory and policy environment can significantly impact the implementation and adoption of AI/Blockchain technologies in the public sector. Therefore, it is important to evaluate how these technologies align with existing regulations and policies and whether any modifications are necessary.
2. Data Governance and Privacy: The use of AI/Blockchain technologies in the public sector requires the handling and management of sensitive data. Therefore, it is important to evaluate the data governance and privacy measures in place to ensure that the use of these technologies does not compromise the security and privacy of individuals.
3. Stakeholder Engagement: The successful implementation of AI/Blockchain technologies in the public sector requires the involvement and cooperation of multiple stakeholders. Therefore, it is important to evaluate the level of stakeholder engagement and collaboration in the implementation process.

Overall, the dimensions of change mentioned (Strategy, Technology, People, and Processes) are important for evaluating the implementation and impact of AI/Blockchain technologies in the UAE public sector. However, other dimensions such as policy and regulatory framework, data governance and privacy, and stakeholder engagement should also be considered.

I can provide an example of a table that includes the dimensions of change and relevant resources for evaluating the implementation and impact of AI/Blockchain technologies in the UAE public sector.

Dimensions of Change	Relevant Resources



Strategy	• UAE Artificial Intelligence Strategy 2031 • Dubai Blockchain Strategy • National Blockchain Strategy • Smart Dubai 2021 • Abu Dhabi Economic Vision 2030 • Dubai Data Law
Technology	• AI/Blockchain infrastructure and tools • Technical standards and guidelines • Cybersecurity and data protection measures • Digital transformation frameworks
People	• Skill development and training programs • Talent recruitment and retention strategies • Collaboration and partnership opportunities • User acceptance and adoption
Processes	• Business process optimization • Change management frameworks • Quality assurance and testing protocols • Agile project management methodologies
Policy and Regulatory Framework	• UAE Federal Law No. 2 of 2019 on the Use of AI in Healthcare • Dubai Data Law • Abu Dhabi Data Management Regulation • National AI Ethics and Code of Conduct • International standards and best practices
Data Governance and Privacy	• UAE Federal Law No. 5 of 2012 on Combatting Cybercrimes • GDPR and other international data protection regulations • ISO/IEC 27001 Information Security Management • UAE Personal Data Protection Regulation • UAE Federal Law No. 3 of 2021 on Data Protection
Stakeholder Engagement	• Public-private partnerships and collaborations • Multi-stakeholder forums and consultations • User feedback and engagement mechanisms • Stakeholder mapping and analysis

42. Do you think each stage above” Strategy governance , Technology, People and Processes” represent the overall stages and right description for levels of deployed AI & Blockchain within UAE Public Sector?



1. The deployment of AI and Blockchain technologies is a complex and iterative process that involves multiple stages of development, testing, implementation, and monitoring.

Illustration: A typical AI/Blockchain implementation lifecycle may involve several stages, such as ideation, feasibility assessment, prototyping, testing, deployment, and monitoring. Each stage may involve different activities, stakeholders, and metrics for success.

2. The impact of AI and Blockchain technologies can vary depending on various factors, such as the level of adoption, the quality of data, and the effectiveness of governance and regulatory frameworks.

Illustration: The impact of AI/Blockchain technologies can range from incremental improvements in efficiency and productivity to transformational changes in business models and societal outcomes. The impact can be influenced by various factors, such as the quality and availability of data, the level of adoption and usage by stakeholders, and the effectiveness of governance and regulatory frameworks.

3. The stages and dimensions outlined in the provisional model can provide a useful starting point for evaluating the implementation and impact of AI and Blockchain technologies in the UAE public sector.

Illustration: The provisional model can provide a structured approach for evaluating the implementation and impact of AI/Blockchain technologies in the UAE public sector. By assessing the different dimensions of change (strategy, technology, people, processes) and stages of change (initial to optimized), stakeholders can gain insights into the strengths and weaknesses of their implementation and identify areas for improvement.

4. However, it is important to adapt and tailor these frameworks to specific contexts and use cases.

Illustration: While the provisional model can provide a starting point, it may need to be adapted and customized to the specific context and use case of each AI/Blockchain implementation. For example, the dimensions of change and stages of change may differ depending on the sector, application, and stakeholders involved.

5. Ongoing monitoring, assessment, and adaptation are essential for evaluating and improving the implementation and impact of AI and Blockchain technologies.

Illustration: AI/Blockchain technologies are constantly evolving, and their impact can change over time. Therefore, it is important to continuously monitor, assess, and adapt the implementation to ensure that it is achieving the intended outcomes and is aligned with the changing needs and priorities of stakeholders. This can involve using a range of tools and techniques, such as performance metrics, user feedback, and stakeholder engagement.

43. From Your Experience, what are the Main Challenges behind Implementing AI & Blockchain Solutions within UAE Public Sector?

Based on my knowledge cutoff of September 2021 and general industry trends, here are some of the main challenges behind implementing AI and Blockchain solutions within the UAE public sector:

1. Data quality and availability: AI and Blockchain technologies rely heavily on data, and the quality and availability of data can significantly impact their effectiveness. In some cases, government entities may face challenges in accessing relevant and high-quality data, or may struggle to collect and manage data in a standardized and consistent manner.
2. Regulatory frameworks and governance: The implementation of AI and Blockchain technologies in the public sector is often subject to various legal and regulatory frameworks, which can vary depending on the jurisdiction, application, and sector. This can create challenges around compliance, privacy, and security, and may require significant coordination and alignment across multiple stakeholders.
3. Technical expertise and infrastructure: Implementing AI and Blockchain technologies requires specialized technical skills and infrastructure, such as data scientists, machine learning engineers, and cloud computing resources. These resources may not be readily available within the public sector, or may require significant investments in training and infrastructure.
4. Stakeholder engagement and buy-in: Successful implementation of AI and Blockchain technologies requires engagement and buy-in from a range of stakeholders, including government leaders, employees, citizens, and private sector partners. This can involve addressing concerns around privacy, security, and job displacement, and communicating the benefits and risks of these technologies in a transparent and accessible manner.



5. Funding and resource allocation: Implementing AI and Blockchain technologies can require significant investments in technology, infrastructure, and human resources. This can create challenges around funding and resource allocation, particularly in the context of competing priorities and limited budgets within the public sector.
6. Integration with existing systems and processes: Implementing AI and Blockchain technologies may require integrating with existing systems and processes, which can be complex and time-consuming. This can create challenges around interoperability, data migration, and user adoption, and may require significant planning and coordination.

Overall, addressing these challenges will require a coordinated and strategic approach that involves multiple stakeholders and considers the unique context and needs of each implementation.

44. From Your Experience, what are the Main Drivers to enhance Implementing AI & Blockchain Solutions within UAE Public Sector?

Based on my knowledge cutoff of September 2021 and general industry trends, here are some of the main drivers to enhance implementing AI and Blockchain solutions within the UAE public sector:

1. Efficiency and cost savings: AI and Blockchain technologies have the potential to significantly improve the efficiency and effectiveness of public sector operations, by automating repetitive tasks, improving decision-making processes, and reducing errors and fraud. This can result in significant cost savings and improved service delivery for citizens.
2. Improved data management and analysis: AI and Blockchain technologies can help government entities collect, manage, and analyze data more effectively, which can inform better policy-making and decision-making. This can result in more evidence-based and data-driven policies, programs, and services.
3. Improved transparency and accountability: Blockchain technology has the potential to improve transparency and accountability within the public sector, by enabling secure and tamper-proof record-keeping and data sharing. This can help increase public trust in government institutions and improve overall governance.
4. Enhanced citizen engagement and participation: AI and Blockchain technologies can provide new opportunities for citizen engagement and participation in the policy-making process, by enabling real-time feedback, data sharing, and collaboration between government entities and citizens.
5. Economic diversification and innovation: The UAE has made significant investments in developing its technology and innovation ecosystem, including initiatives focused on AI and Blockchain. Implementing these technologies within the public sector can help drive further innovation and economic diversification, and position the UAE as a global leader in technology and digital transformation.

Overall, these drivers highlight the potential benefits of implementing AI and Blockchain technologies within the public sector, and demonstrate the value of strategic and coordinated efforts to advance these technologies in the UAE.



45. What are the main Internal & External, barriers/obstacles of adopting/ implementing and deploying AI or Blockchain technologies and their related solutions to enhance efficiency and effectiveness of UAE Public Sector Transactions?

Based on my knowledge cutoff of September 2021 and general industry trends, here are some of the main internal and external barriers/obstacles of adopting, implementing, and deploying AI or Blockchain technologies and their related solutions to enhance efficiency and effectiveness of UAE public sector transactions:

Internal barriers:

1. Lack of awareness and understanding: There may be a lack of awareness and understanding of AI and Blockchain technologies among government leaders and employees, which can make it difficult to identify relevant use cases and effectively plan and execute implementation strategies.
2. Resistance to change: Implementing AI and Blockchain technologies may require changes to existing systems, processes, and ways of working, which can create resistance and pushback from employees and stakeholders who are comfortable with the status quo.
3. Limited resources and capacity: The public sector may have limited resources and capacity to invest in and support the implementation of AI and Blockchain technologies, particularly in terms of technical expertise and infrastructure.
4. Regulatory and legal constraints: The implementation of AI and Blockchain technologies may be subject to various regulatory and legal constraints, which can create challenges around compliance and data privacy.

External barriers:

1. Interoperability challenges: Integrating AI and Blockchain technologies with existing systems and processes may require significant coordination and alignment with other stakeholders, which can create challenges around interoperability and data sharing.
2. Cybersecurity and data privacy risks: Implementing AI and Blockchain technologies can create new cybersecurity and data privacy risks, particularly if the technology is not implemented and managed properly.
3. Cost considerations: Implementing AI and Blockchain technologies can require significant investments in technology, infrastructure, and human resources, which may not be feasible for all government entities or applications.
4. Limited access to funding and financing: Government entities may have limited access to funding and financing for technology investments, particularly in the context of competing priorities and budget constraints.

Overall, addressing these internal and external barriers will require a coordinated and strategic approach that involves multiple stakeholders and considers the unique context and needs of each implementation. This may involve addressing concerns around privacy, security, and job displacement, and communicating the benefits and risks of these technologies in a transparent and accessible manner.

Sure, here is a SWOT analysis of the internal and external factors affecting the adoption, implementation, and deployment of AI and Blockchain technologies in the UAE public sector:

Strengths	Weaknesses
- Potential to significantly improve efficiency and effectiveness of public sector operations.	- Lack of awareness and understanding among government leaders and employees.



Strengths	Weaknesses
- Improved data management and analysis capabilities.	- Resistance to change from employees and stakeholders.
- Potential to improve transparency and accountability within the public sector.	- Limited resources and capacity for technology investment and support.
- Potential for enhanced citizen engagement and participation.	- Regulatory and legal constraints around compliance and data privacy.
Opportunities	Threats
- Economic diversification and innovation opportunities.	- Interoperability challenges with existing systems and processes.
- Improved service delivery and cost savings potential.	- Cybersecurity and data privacy risks.
- Potential to establish UAE as a global leader in technology and digital transformation.	- Cost considerations and limited access to funding and financing.
- Improved evidence-based and data-driven policies, programs, and services.	- Concerns around privacy, security, and job displacement.

This SWOT analysis highlights the potential strengths and opportunities associated with AI and Blockchain adoption in the UAE public sector, while also acknowledging the weaknesses and threats that may impede successful implementation.

46. What other comments do you have about improving the adopting/ implementing and deploying AI or Blockchain technologies and their related solutions within UAE Public Sector Entities?

Here are a few additional comments on improving the adoption, implementation, and deployment of AI and Blockchain technologies and their related solutions within UAE public sector entities:



1. Foster collaboration and knowledge sharing: Collaboration among public sector entities, academia, industry, and civil society can foster knowledge sharing and innovation, and facilitate the development of effective AI and Blockchain solutions that are tailored to the specific needs of the UAE public sector.
2. Focus on user-centric design: AI and Blockchain solutions should be designed with the user in mind, and should prioritize user experience, accessibility, and usability. This can help ensure that these technologies are user-friendly and meet the needs of citizens, government employees, and other stakeholders.
3. Invest in training and capacity building: Investing in training and capacity building can help public sector employees develop the necessary skills and knowledge to effectively use and manage AI and Blockchain technologies. This can also help address concerns around job displacement and ensure that employees are equipped to adapt to new technologies and ways of working.
4. Develop a comprehensive governance framework: Developing a comprehensive governance framework can help ensure that AI and Blockchain solutions are deployed in a responsible, ethical, and transparent manner. This can involve establishing clear guidelines and standards for data privacy, security, and ethical use, as well as developing mechanisms for oversight, accountability, and risk management.
5. Prioritize interoperability and standardization: Prioritizing interoperability and standardization can help ensure that AI and Blockchain solutions can seamlessly integrate with existing systems and processes, and can enable data sharing and collaboration among different public sector entities.

Overall, improving the adoption, implementation, and deployment of AI and Blockchain technologies within the UAE public sector will require a multi-pronged approach that addresses technical, organizational, and societal challenges, and that prioritizes collaboration, innovation, and user-centric design.

Can you add more resources for that?

1. The UAE Artificial Intelligence Strategy: The UAE government has launched a comprehensive national strategy to promote the adoption and development of AI technologies across various sectors, including the public sector. The strategy includes initiatives aimed at developing AI talent, fostering innovation, and promoting the responsible and ethical use of AI.
2. The Dubai Blockchain Strategy: Dubai has launched a blockchain strategy aimed at making the emirate the world's first blockchain-powered government by 2020. The strategy includes initiatives to develop a blockchain-powered digital identity system, a blockchain-based payments platform, and a blockchain-based supply chain management system.
3. The Abu Dhabi Digital Authority: The Abu Dhabi Digital Authority is responsible for driving digital transformation across the Abu Dhabi government. The authority has launched initiatives aimed at developing AI and blockchain technologies, promoting innovation, and enhancing the user experience of government services.
4. The Dubai Future Foundation: The Dubai Future Foundation is a government initiative aimed at promoting innovation and developing future-oriented technologies. The foundation has launched initiatives related to AI, blockchain, and other emerging technologies, and has established partnerships with leading global technology companies and academic institutions.
5. The Mohammed bin Rashid Centre for Government Innovation: The Mohammed bin Rashid Centre for Government Innovation is a Dubai-based organization that works to promote innovation and improve government performance through the development and implementation of new technologies and processes. The center has launched initiatives related to AI and blockchain, and provides training and capacity-building programs for government employees.

Appendix F: Focus Groups Responses

Appendix F.1: Response 1

Appendix A-Focus Group Sessions – Discussions Pillars

Name of participant	Fatma Mahmoud Mohamed
Date of the sessions	
Private or Local Organization	
Emirate/Federal	



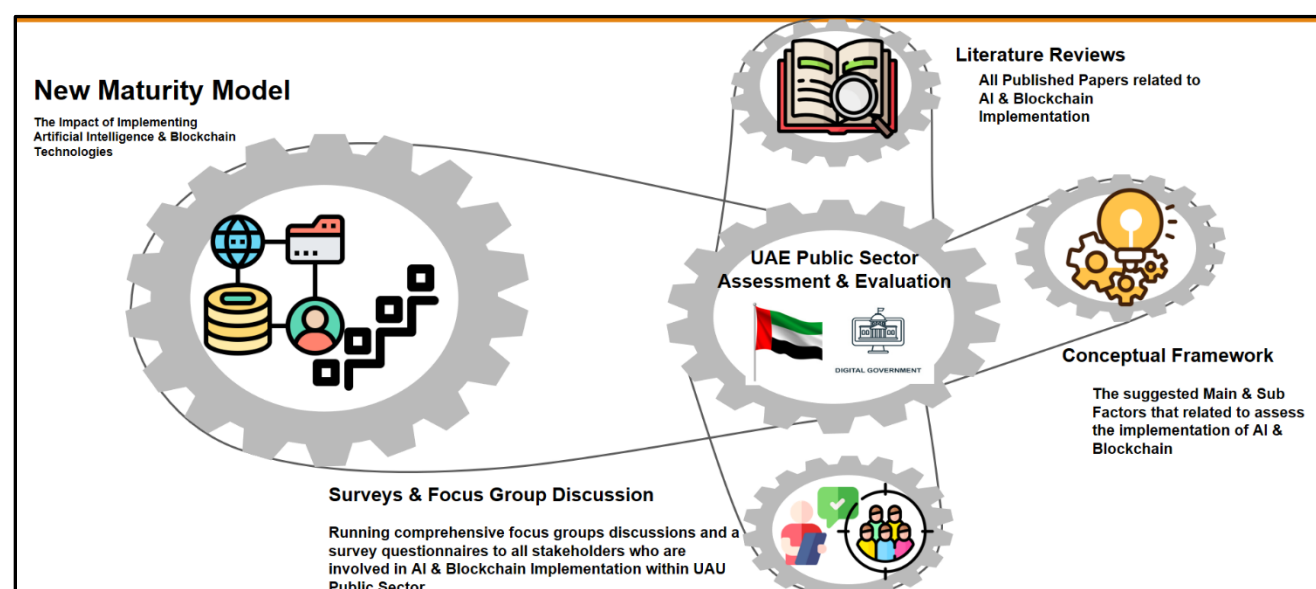
Position title	Blockchain Backend developer
Number of years' experience	3 years
Level of education	Bachelor's Degree
Role in implementing the AI / Blockchain Technologies	Developer

10. Introduction:

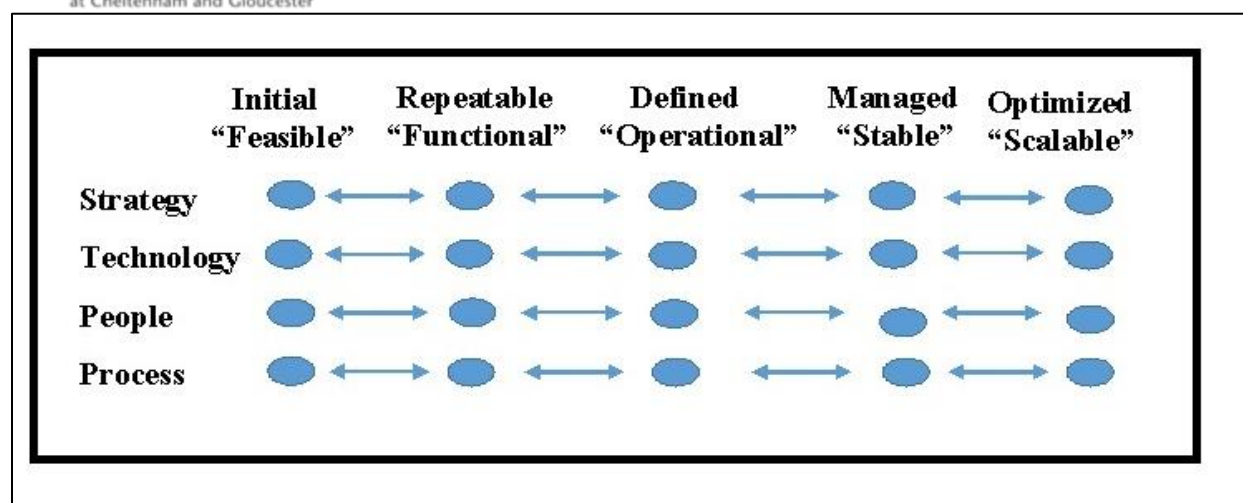
This project mainly aims to define a New Maturity Model for assessing the Implementation of Artificial Intelligence & Blockchain technologies, within UAE private Sector (UAE Federal Government, Abu Dhabi Local Government, Dubai Local Government, and Ajman Local Government), And Evaluate the Impact of two technologies to the public sector transactions productivity, efficiency of processes and systems & the effectiveness of achieving private sector targets.

11. Research Approach:

Through the published literature reviews and based on what researcher suggest the main factors that consist of conceptual framework, we will discuss with each subject matter expert within the fields to define the main and sub factors that formulate the conceptual framework and lead us to design the New Maturity Model that will be used by UAE private sector to evaluate the Implementation Impact of Artificial Intelligence & Blockchain Technologies.

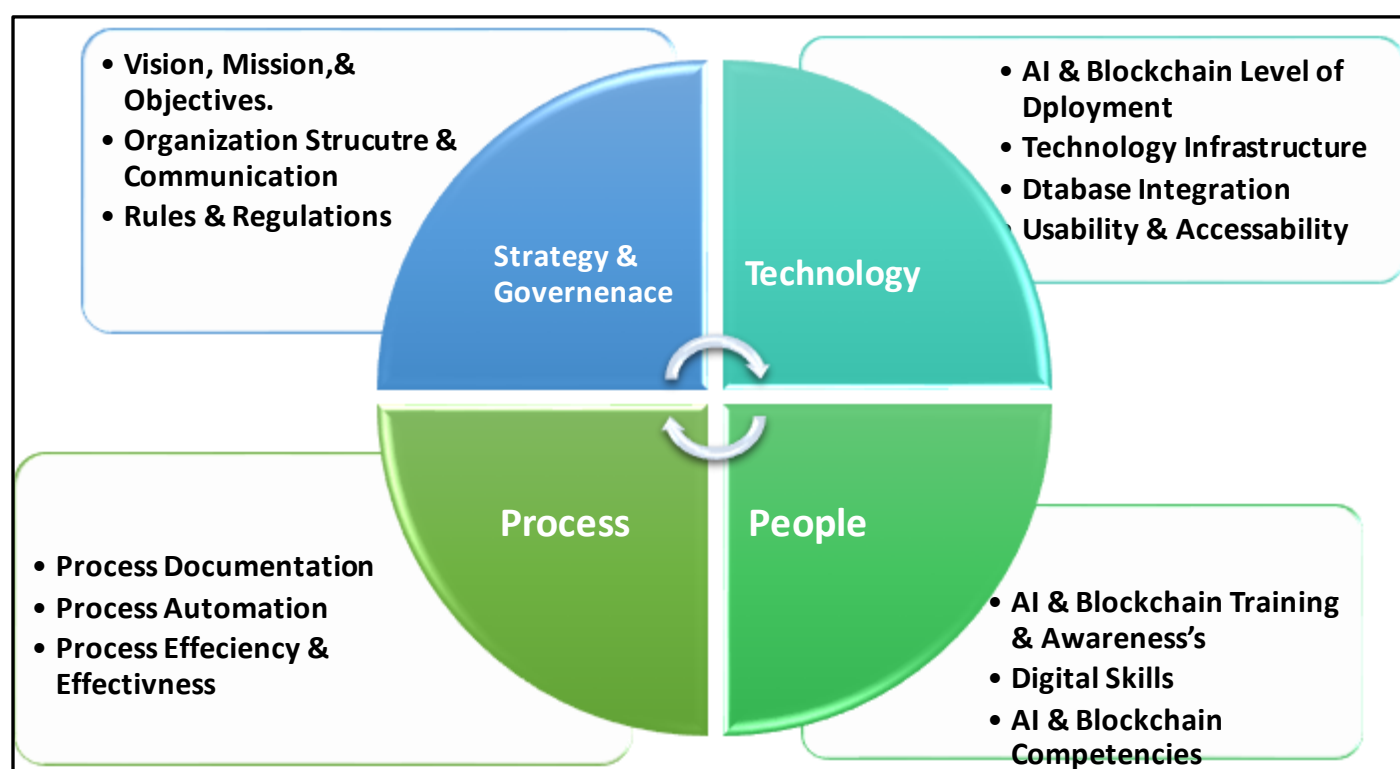


12. Suggested Conceptual Framework



47. Please consider the provisional model shown above – with 5 stages of change (initial to optimized) and four dimensions of change (Strategy, Technology, People and Processes). Do you think these are the most appropriate dimensions for evaluating the implementation and impact of AI/Blockchain Technologies in UAE private Sector from your experience? Would you suggest other dimensions of change? yes

48. Do you think each stage above represent the overall stages and right description for levels of deployed AI & Blockchain within UAE private Sector? yes



Quest.	From your Experience in Deploying AI & Blockchain within UAE Privet Sector, what would the "Vision, Mission, and Objectives" at the Initial Stage look like? What would they be like at the Optimized stage? And at the other stages?				
	Initial	Developed	Defined	Managed	Optimized
	Initial Stage: Vision: To leverage AI and blockchain technologies to enhance operational efficiency, improve	Vision: To become a leading organization in the UAE private sector, recognized	Vision: To be recognized as an industry leader and a catalyst for AI and	Vision: To maintain a sustainable and adaptable AI and blockchain	Vision: To drive continuous innovation and create new business models



	customer experience, and drive innovation within the organization. Mission: To explore and identify potential use cases for AI and blockchain in the organization's processes, systems, and services. Objectives: - Conduct a thorough assessment of the organization's current operations and identify areas where AI and blockchain can add value. - Educate and train employees about the benefits and potential applications of AI and blockchain. - Develop partnerships with technology providers and experts in the field to gain necessary support and expertise. - Pilot and test AI and blockchain solutions in selected areas to demonstrate their feasibility and benefits.	for successfully implementing AI and blockchain technologies to drive digital transformation and achieve competitive advantage. Mission: To integrate AI and blockchain solutions across various business functions and processes, optimizing efficiency, transparency, and security. Objectives: - Implement AI and blockchain solutions in core operational areas, such as supply chain management, customer relationship management, and financial processes. - Enhance data analytics capabilities by leveraging AI to gain valuable insights for better decision-making. - Establish a secure and scalable blockchain infrastructure to enable decentralized applications and smart contracts. - Foster collaboration with other industry players and government entities to create industry standards and regulatory frameworks for AI and blockchain adoption.	blockchain innovation, contributing to the growth and development of the UAE's private sector. Mission: To continuously improve and optimize AI and blockchain solutions, expanding their reach and impact across the organization and industry. Objectives: - Develop advanced AI models and algorithms to address complex business challenges and enable predictive analytics. - Explore opportunities for interoperability and integration of blockchain networks, fostering seamless data exchange and collaboration with partners and stakeholders. - Promote knowledge sharing and thought leadership by organizing industry events, conferences, and research initiatives. - Establish an innovation lab or research center to experiment with emerging AI and blockchain technologies and drive R&D efforts.	ecosystem, ensuring ongoing governance, risk management, and compliance. Mission: To continuously monitor and manage AI and blockchain deployments, ensuring their alignment with organizational goals, ethical standards, and regulatory requirements. Objectives: - Implement robust governance frameworks to oversee the use of AI and blockchain technologies, including data privacy and security measures. - Conduct regular audits and assessments to evaluate the effectiveness and efficiency of AI and blockchain systems. - Collaborate with relevant authorities and regulatory bodies to stay updated on legal and compliance requirements. - Foster a culture of responsible AI and blockchain usage through employee training and awareness programs.	by leveraging cutting-edge AI and blockchain technologies, positioning the organization as a global leader. Mission: To proactively explore emerging AI and blockchain trends and apply them strategically to disrupt markets, deliver exceptional customer experiences, and generate sustainable growth. Objectives: - Invest in research and development to stay at the forefront of AI and blockchain advancements. - Identify and seize new opportunities for AI and blockchain adoption, such as Internet of Things (IoT) integration or decentralized finance (DeFi) applications. - Establish strategic partnerships with startups, universities, and technology accelerators to access emerging technologies and talent. - Foster a culture of innovation and experimentation, encouraging employees to propose and implement AI and blockchain-driven initiatives.



Quest.	From your Experience in Deploying AI & Blockchain within UAE Privet Sector, what would the “Organization Structure & Communication” at the Initial Stage look like? What would they be like at the Optimized stage? And at the other stages?				
	Initial	Developed	Defined	Managed	Optimized
	Organization Structure: - Centralized structure with a dedicated team or department responsible for AI and blockchain initiatives. - The team may consist of project managers, data scientists, blockchain experts, AI engineers, and domain experts. - Collaboration with other departments or external consultants on a project basis. Communication: - Regular meetings and workshops to educate stakeholders about AI and blockchain technologies. - Communication channels include emails, presentations, and internal knowledge-sharing platforms. - Focus on building awareness and gathering initial buy-in from senior management and key decision-makers.	Organization Structure: - Enhanced team structure with specialized roles and increased expertise. - Formation of cross-functional teams consisting of members from different departments and business units. - Integration of AI and blockchain expertise into existing departments. Communication: - More structured communication channels to share progress and updates. - Introduction of regular project status reports and dashboards. - Collaboration with external partners, such as technology providers and industry experts, through conferences, forums, and industry events.	Organization Structure: - Dedicated AI and blockchain units or centers of excellence within the organization. - AI and blockchain expertise integrated into various departments, influencing decision-making and strategy. - Collaboration and coordination between different departments become more formalized. Communication: - Clear communication channels established between different departments and teams. - Increased focus on knowledge sharing and best practices through internal workshops and training sessions. - External communication to showcase successful AI and blockchain implementations through case studies, whitepapers, and industry publications	Organization Structure: - Fully integrated AI and blockchain capabilities throughout the organization. - Decentralized structure with AI and blockchain expertise embedded within departments and business units. - Clear roles and responsibilities for AI and blockchain governance and oversight. Communication: - Formalized reporting mechanisms to provide updates on AI and blockchain projects to senior management and board of directors. - Collaboration platforms and tools to facilitate communication, coordination, and knowledge sharing. - Increased engagement with industry associations, regulatory bodies, and government entities to shape industry standards and policies.	Organization Structure: - Agile and adaptive structure that enables continuous innovation and rapid adoption of emerging AI and blockchain technologies. - AI and blockchain expertise distributed across the organization, with a focus on interdisciplinary collaboration. - Continuous learning and upskilling programs to stay at the forefront of advancements. Communication: - Dynamic communication channels, such as online collaboration platforms and innovation hubs, for continuous knowledge exchange and ideation. - External thought leadership through participation in conferences, industry panels, and research collaborations. - Active engagement with startups, academic institutions, and technology partners to leverage emerging AI and blockchain trends.



Quest.	From your Experience in Deploying AI & Blockchain within UAE Private Sector, what would the “Rules & Regulations” at the Initial Stage look like? What would they be like at the Optimized stage? And at the other stages?				
	Initial	Developed	Defined	Managed	Optimized
	General Data Protection: Compliance with existing data protection laws and regulations, such as the UAE Data Protection Law and international standards, is crucial. Organizations need to ensure that personal data used in AI and blockchain systems is collected, stored, and processed in a lawful and secure manner. . Ethical Considerations: Guidelines and principles around ethical AI usage and responsible data handling may be established to address potential biases, fairness, and transparency in AI and blockchain technologies	1. Industry-Specific Regulations: As AI and blockchain become more prevalent in specific industries, industry-specific regulations may emerge. These regulations may address the unique challenges and requirements of deploying AI and blockchain technologies in sectors such as healthcare, finance, or transportation. 2. Interoperability Standards: Standards for interoperability and data exchange between different AI and blockchain systems may be developed to ensure compatibility and seamless integration across various platforms.	1. Regulatory Sandboxes: Regulatory sandboxes or innovation programs may be introduced to enable organizations to test and pilot AI and blockchain solutions in a controlled environment. These sandboxes provide an opportunity to assess the technologies' feasibility, identify risks, and refine regulatory approaches. 2. Licensing and Certification: Certain AI and blockchain applications, especially those involving critical infrastructure or sensitive data, may require licensing or certification to ensure compliance with regulatory standards and best practices.	1. Governance Frameworks: Organizations may establish internal governance frameworks to oversee AI and blockchain deployments. These frameworks outline roles, responsibilities, and processes for managing and governing the use of AI and blockchain technologies, including compliance, risk management, and accountability. 2. Audit and Compliance: Regular audits and compliance assessments may be conducted to ensure adherence to the established rules and regulations. This helps maintain transparency, accountability, and trust in the deployment of AI and blockchain solutions.	1. Mature Regulatory Framework: At the optimized stage, the regulatory framework for AI and blockchain technologies is well-developed and refined. It provides clear guidelines and policies for organizations to follow, ensuring the responsible and ethical use of AI and blockchain in the private sector. 2. International Collaboration: The UAE private sector may actively engage in international collaborations and partnerships to align regulatory approaches and standards with global best practices. This promotes interoperability, knowledge sharing, and harmonization of regulations across borders.
Quest.	From your Experience in Deploying AI & Blockchain within UAE Privet Sector, what would the “Level of Implemented AI & Blockchain” at the Initial Stage look like? What would they be like at the Optimized stage? And at the other stages?				
	Initial	Developed	Defined	Managed	Optimized
	At the initial stage, AI and blockchain implementation in the UAE private sector may be	In the developed stage, organizations have moved beyond	In the defined stage, AI and blockchain technologies are well-defined	In the managed stage, AI and blockchain implementations are integrated	In the optimized stage, AI and blockchain technologies have reached a high



	relatively limited. Organizations might be exploring the technology and conducting proof-of-concept projects or small-scale pilot initiatives. The focus is on understanding the capabilities and potential use cases of AI and blockchain, and the level of implementation would be in its infancy.	experimentation and have started integrating AI and blockchain into their operations. This stage involves the deployment of more mature and scalable AI and blockchain solutions. Companies may have implemented specific AI applications, such as chatbots for customer service or machine learning algorithms for data analysis. Regarding blockchain, organizations might have adopted distributed ledger technology to enhance supply chain transparency or streamline transaction processes.	within the organization's overall strategy and operations. This stage is characterized by broader adoption and standardization of AI and blockchain solutions. Organizations have a clear understanding of the benefits and limitations of these technologies. They have implemented AI systems across various departments and functions, leveraging advanced analytics, natural language processing, or computer vision. In terms of blockchain, companies may have established consortia or industry collaborations to develop shared blockchain infrastructure and protocols.	into the core business processes and are managed as part of the organization's overall technology ecosystem. This stage involves ongoing monitoring, governance, and optimization of AI and blockchain solutions. Companies have implemented robust data governance practices to ensure compliance and privacy. They have dedicated teams or departments responsible for managing and maintaining AI models and blockchain networks. Continuous improvement, security updates, and regulatory compliance are key considerations in this stage.	level of maturity and are fully optimized within the organization. This stage involves the use of advanced AI techniques, such as deep learning or reinforcement learning, to achieve superior performance and accuracy. Organizations have integrated AI across all levels of operations and decision-making processes. In terms of blockchain, companies may have implemented interoperable and scalable blockchain networks, enabling seamless data exchange and collaboration across multiple entities.
Quest.	From your Experience in Deploying AI & Blockchain within UAE Privat Sector, what would the "Technology Infrastructure" at the Initial Stage look like? What would they be like at the Optimized stage? And at the other stages?				
	Initial	Developed	Defined	Managed	Optimized
	At the initial stage, the technology infrastructure for AI and blockchain implementation in the UAE private sector may be relatively basic. Organizations might rely on existing infrastructure and cloud computing platforms to conduct	In the developed stage, as AI and blockchain implementations progress, organizations may invest in more robust and specialized technology infrastructure. This stage involves the	In the defined stage, as AI and blockchain technologies become more integrated into core operations, the technology infrastructure becomes more sophisticated and tailored to specific use	In the managed stage, organizations focus on managing and optimizing their technology infrastructure to ensure efficient and secure AI and blockchain operations. This stage involves	In the optimized stage, organizations strive for highly optimized and scalable technology infrastructure to support advanced AI and blockchain solutions. This stage may involve the adoption of



	initial experiments and proof-of-concept projects. The infrastructure requirements may be minimal, focusing on supporting small-scale data processing and storage needs.	deployment of dedicated hardware resources to support AI workloads. High-performance computing systems and graphics processing units (GPUs) might be utilized to accelerate AI training and inference tasks. For blockchain, organizations may set up private or consortium networks with dedicated nodes and servers to support decentralized data storage and transaction processing.	cases. Organizations may invest in advanced data storage systems, such as distributed file systems or object storage, to handle the increasing volume of data generated by AI and blockchain applications. Additionally, specialized hardware, such as application-specific integrated circuits (ASICs) or field-programmable gate arrays (FPGAs), might be deployed for AI acceleration.	implementing robust data management systems, including data lakes, data warehouses, or data pipelines, to handle the diverse data sources required for AI and blockchain applications. Companies may also invest in advanced networking infrastructure to ensure low-latency communication and high bandwidth for data transfer within AI and blockchain ecosystems.	emerging technologies such as edge computing, where AI processing is performed closer to the data source, reducing latency and improving real-time decision-making. For blockchain, organizations might explore sharding or other scalability solutions to handle the increasing transaction volumes and ensure high-performance networks.
Quest.	From your Experience in Deploying AI & Blockchain within UAE Privat Sector, what would the “Database Integration” at the Initial Stage look like? What would they be like at the Optimized stage? And at the other stages?				
	Initial	Developed	Defined	Managed	Optimized
	At the initial stage, database integration for AI and blockchain implementation in the UAE private sector may be relatively basic. Organizations might rely on existing databases and data storage systems to support initial experiments and proof-of-concept projects. The focus may be on integrating limited and structured data sources into the AI and blockchain solutions.	In the developed stage, as AI and blockchain implementations progress, organizations may invest in more comprehensive and specialized database integration. This stage involves integrating diverse data sources and systems into a unified data infrastructure. Companies may utilize data integration platforms or middleware	In the defined stage, as AI and blockchain technologies become more integrated into core operations, the database integration becomes more sophisticated and streamlined. This stage involves implementing robust data management systems to support AI and blockchain applications. Organizations	In the managed stage, organizations focus on managing and optimizing their database integration to ensure efficient and secure AI and blockchain operations. This stage involves implementing advanced data governance practices, data quality monitoring, and data access controls to maintain the integrity and reliability of the	In the optimized stage, organizations strive for highly optimized and scalable database integration to support advanced AI and blockchain solutions. This stage may involve the adoption of advanced data management technologies such as distributed databases, in-memory databases, or NoSQL



		solutions to connect and consolidate data from various databases and applications, enabling more extensive analysis and decision-making.	may adopt data lakes, data warehouses, or data pipelines to handle the diverse data types, such as structured, unstructured, and semi-structured data, required for AI and blockchain solutions.	integrated databases. Companies may also explore real-time data integration and stream processing techniques to enable near-real-time analytics and decision-making.	databases. Companies may also leverage data virtualization or data fabric technologies to provide a unified and agile view of the integrated databases, enabling seamless access and analysis of data for AI and blockchain applications.
Quest.	From your Experience in Deploying AI & Blockchain within UAE Privet Sector, what would the “Technology Usability & Accessibility” at the Initial Stage look like? What would they be like at the Optimized stage? And at the other stages?				
	Initial	Developed	Defined	Managed	Optimized
	At the initial stage, technology usability and accessibility for AI and blockchain implementation in the UAE private sector may be relatively limited. Organizations might be in the early stages of exploring these technologies and conducting proof-of-concept projects. The focus may be on understanding the capabilities and limitations of AI and blockchain, and their usability and accessibility might be limited to technical experts or specialists within the organization	In the developed stage, as AI and blockchain implementations progress, efforts are made to enhance technology usability and accessibility. This stage involves the development of user-friendly interfaces and tools to facilitate interaction with AI and blockchain systems. Organizations may invest in creating intuitive dashboards, visualization tools, or mobile applications that enable users to interact with and leverage AI and blockchain solutions more easily.	In the defined stage, as AI and blockchain technologies become more integrated into core operations, the focus on usability and accessibility intensifies. This stage involves refining user experiences and ensuring that AI and blockchain solutions are accessible to a broader range of users within the organization. User feedback and usability testing may be conducted to identify and address any pain points or barriers to adoption.	In the managed stage, organizations focus on ongoing management and optimization of technology usability and accessibility. This stage involves monitoring user experiences and continuously improving interfaces and tools based on user feedback and changing requirements. Organizations may establish user support systems, such as help desks or chatbots, to address user queries and provide assistance. Accessibility	In the optimized stage, technology usability and accessibility reach a high level of maturity. This stage involves a seamless and intuitive user experience across AI and blockchain systems. User interfaces are highly optimized, providing intuitive workflows and reducing the learning curve. Accessibility features are well-integrated, ensuring compliance with accessibility standards and making AI and blockchain solutions accessible to individuals with diverse needs.



		Documentation, tutorials, and training programs might also be provided to improve accessibility and ensure users can make the most of these technologies.	Organizations may also prioritize accessibility considerations, ensuring that AI and blockchain solutions can be accessed and used by individuals with diverse abilities and needs.	standards and guidelines may be followed to ensure compliance with accessibility regulations and to make AI and blockchain solutions inclusive to all users.	Organizations may conduct regular usability audits and user feedback sessions to continuously optimize the technology's usability and accessibility.
Quest.	From your Experience in Deploying AI & Blockchain within UAE private Sector, what would the “AI & Blockchain Training & Awareness’s” at the Initial Stage look like? What would they be like at the Optimized stage? And at the other stages?				
	Initial	Developed	Defined	Managed	Optimized
	At the initial stage, AI and blockchain training and awareness in the UAE private sector may be relatively limited. Organizations might be in the early stages of exploring these technologies and their potential use cases. Training initiatives may focus on providing basic awareness sessions and introductory workshops to key stakeholders within the organization. The goal is to build a foundational understanding of AI and blockchain and their potential benefits	In the developed stage, as AI and blockchain implementations progress, training and awareness efforts become more structured and comprehensive. Organizations may invest in specialized training programs, both internally and externally, to upskill employees and enhance their knowledge of AI and blockchain concepts, technologies, and best practices. Training may be provided to specific teams or departments involved in AI and blockchain projects, such as data scientists,	In the defined stage, as AI and blockchain technologies become more integrated into core operations, training and awareness efforts become more widespread and targeted. This stage involves establishing training frameworks and programs that cater to different roles and levels within the organization. Training initiatives may include hands-on workshops, certifications, or online courses that cover advanced topics related	In the managed stage, organizations focus on ongoing training and awareness to ensure continuous learning and proficiency in AI and blockchain technologies. This stage involves providing regular training updates and refresher sessions to keep employees up to date with the latest advancements and industry trends. Training programs may also include domain-specific knowledge related to the industry sector in which AI and blockchain are being deployed. Awareness	In the optimized stage, training and awareness become ingrained in the organization's culture and operations. This stage involves establishing a learning ecosystem that promotes continuous improvement and innovation in AI and blockchain. Organizations may have dedicated training departments or centers of excellence that offer advanced training programs and mentorship opportunities. Collaboration with academic institutions, research organizations, or



		developers, or project managers.	to AI algorithms, machine learning techniques, smart contract development, or blockchain governance models.	initiatives, such as internal newsletters, knowledge sharing sessions, or industry events, may be conducted to keep employees informed about the latest developments in AI and blockchain.	industry networks may be fostered to further enhance knowledge sharing and promote innovation in AI and blockchain.
Quest.	From your Experience in Deploying AI & Blockchain within UAE private Sector, what would the “Employee Digital Skills” at the Initial Stage look like? What would they be like at the Optimized stage? And at the other stages?				
	Initial	Developed	Defined	Managed	Optimized
	At the initial stage, employee digital skills in the UAE private sector may be relatively basic. Employees might have a general understanding of digital technologies but may lack specific skills related to AI and blockchain. The focus at this stage is on building awareness and familiarity with AI and blockchain concepts among employees.	In the developed stage, as AI and blockchain implementations progress, employees start acquiring more specialized digital skills. Organizations may invest in training programs to upskill employees in areas such as data analysis, machine learning, programming, or blockchain development. Employees may gain proficiency in using AI and blockchain tools and platforms, but their skills may still be limited to specific use cases or applications.	In the defined stage, as AI and blockchain technologies become more integrated into core operations, employee digital skills become more diverse and specialized. This stage involves providing training and upskilling opportunities tailored to specific roles and functions within the organization. Employees may acquire advanced skills in areas such as AI model development, data engineering, cybersecurity, blockchain architecture, or	In the managed stage, organizations focus on ongoing skill development and management to ensure a skilled workforce capable of effectively utilizing AI and blockchain technologies. This stage involves providing continuous learning opportunities, including workshops, seminars, or online courses, to keep employees updated with the latest trends and advancements in AI and blockchain. Skill assessments and	In the optimized stage, employee digital skills reach a high level of proficiency and agility. This stage involves fostering a culture of continuous learning and innovation. Employees may have advanced skills in AI and blockchain technologies and be capable of exploring new applications, experimenting with emerging tools, and driving innovation within the organization. Cross-functional collaboration and knowledge sharing may be encouraged to leverage the collective expertise of employees in different areas of



			smart contract programming.	performance evaluations may be conducted to identify skill gaps and address them through targeted training initiatives.	AI and blockchain.
Quest.	From your Experience in Deploying AI & Blockchain within UAE private Sector, what would the “Employee AI & Blockchain Competencies” at the Initial Stage look like? What would they be like at the Optimized stage? And at the other stages?				
	Initial	Developed	Defined	Managed	Optimized
	At the initial stage, employee competencies in AI and blockchain in the UAE private sector may be relatively limited. Employees might have a basic understanding of AI and blockchain concepts but may lack hands-on experience and specialized skills. The focus at this stage is on building foundational knowledge and creating awareness among employees about the potential applications and benefits of AI and blockchain.	In the developed stage, as AI and blockchain implementations progress, employees start acquiring more specialized competencies in these areas. Organizations may invest in training programs and workshops to develop employee skills related to AI algorithms, data analysis, machine learning techniques, blockchain fundamentals, and smart contract development. Employees gain practical experience through hands-on projects and become proficient in utilizing AI and blockchain tools and technologies.	In the defined stage, as AI and blockchain technologies become more integrated into core operations, employee competencies become more diverse and advanced. This stage involves developing competencies in specific roles and functions related to AI and blockchain. Employees may acquire in-depth knowledge in areas such as AI model development, natural language processing, computer vision, data engineering, blockchain architecture, consensus algorithms, or decentralized	In the managed stage, organizations focus on ongoing competency development and management to ensure employees are equipped with the necessary skills for AI and blockchain initiatives. This stage involves providing continuous learning opportunities and professional development programs to keep employees updated with the latest trends and advancements. Employees may receive training in areas such as AI ethics, cybersecurity, data privacy, and compliance to ensure responsible and secure implementation	In the optimized stage, employee competencies in AI and blockchain reach a high level of proficiency and specialization. This stage involves nurturing a culture of continuous learning and innovation. Employees are well-versed in advanced AI and blockchain techniques and are capable of driving innovation, problem-solving, and implementing cutting-edge solutions. Cross-functional collaboration and interdisciplinary competencies may be encouraged to foster a holistic understanding of AI and blockchain applications.



			application development.	of AI and blockchain solutions.	
Quest.	From your Experience in Deploying AI & Blockchain within UAE private Sector, what would the “Processes Documentation” at the Initial Stage look like? What would they be like at the Optimized stage? And at the other stages?				
	Initial	Developed	Defined	Managed	Optimized
	At the initial stage, processes documentation in the UAE private sector may be relatively limited. Organizations might be in the early stages of exploring AI and blockchain technologies and their potential applications. The focus at this stage is on understanding the basic principles and identifying potential use cases. Processes documentation may consist of high-level overviews, concept explanations, and initial exploratory reports.	In the developed stage, as AI and blockchain implementations progress, processes documentation becomes more structured and comprehensive. Organizations begin to document the specific processes and workflows involved in deploying AI and blockchain solutions. This stage involves capturing detailed process descriptions, step-by-step guides, and best practices for implementing AI and blockchain technologies. Documentation may include data flow diagrams, system architecture diagrams, and instructions on integrating AI and blockchain with existing systems.	In the defined stage, as AI and blockchain technologies become more integrated into core operations, processes documentation becomes more standardized and refined. This stage involves establishing clear and well-documented processes and methodologies for implementing AI and blockchain solutions. Documentation may include standardized templates, checklists, and guidelines for AI model development, data preparation, blockchain network setup, smart contract deployment, or data privacy and security protocols.	In the managed stage, organizations focus on the ongoing management and improvement of processes documentation. This stage involves regularly reviewing and updating the documentation based on feedback, lessons learned, and evolving industry standards. Processes documentation may be continuously refined to streamline workflows, optimize resource allocation, and improve efficiency in AI and blockchain implementation. Knowledge management systems or internal platforms may be established to ensure easy access and retrieval of processes documentation.	In the optimized stage, processes documentation reaches a high level of maturity and effectiveness. This stage involves a well-documented, standardized, and continuously improved set of processes and procedures for AI and blockchain implementations. Processes documentation may include comprehensive documentation on data governance, model monitoring, performance evaluation, regulatory compliance, and change management. Continuous process improvement methodologies, such as Six Sigma or Lean, may be applied to refine processes and maximize efficiency.



				for relevant stakeholders.	
Quest.	From your Experience in Deploying AI & Blockchain within UAE private Sector, what would the “Processes Automation” at the Initial Stage look like? What would they be like at the Optimized stage? And at the other stages?				
	Initial	Developed	Defined	Managed	Optimized
	At the initial stage, processes automation in the UAE private sector may be limited. Organizations might be in the early stages of exploring AI and blockchain technologies and their potential for automation. Automation initiatives at this stage may be small-scale and focused on proof-of-concept projects or pilot implementations. Organizations may identify and automate specific processes that are relatively simple and well-defined.	In the developed stage, as AI and blockchain implementations progress, processes automation becomes more widespread and integrated. Organizations begin to identify and automate a broader range of processes across different departments and functions. Automation initiatives may include using AI algorithms to automate data analysis tasks, deploying smart contracts for automating contract execution and enforcement, or utilizing blockchain for automating supply chain processes and verifying transactions.	In the defined stage, as AI and blockchain technologies become more integrated into core operations, processes automation becomes more strategic and systematic. This stage involves a comprehensive assessment of existing processes to identify automation opportunities and prioritize them based on business impact. Organizations may develop a roadmap for automation and create a framework for evaluating and selecting automation solutions. The focus is on standardizing and automating repeatable and rule-based processes.	In the managed stage, organizations focus on the ongoing management and optimization of processes automation. This stage involves monitoring and fine-tuning automated processes to ensure they are running smoothly and delivering expected results. Organizations may implement process monitoring tools, performance metrics, and exception handling mechanisms to track and manage automated processes. Continuous process improvement methodologies, such as robotic process automation (RPA), may be applied to identify further automation opportunities.	In the optimized stage, processes automation reaches a high level of maturity and effectiveness. This stage involves a highly automated environment where AI and blockchain technologies are seamlessly integrated into various processes across the organization. Automation initiatives at this stage include advanced techniques such as cognitive automation, machine learning-based process optimization, or decentralized autonomous organizations (DAOs) powered by blockchain. The focus is on achieving end-to-end automation, improving decision-making capabilities, and enabling self-executing and self-regulating processes.



				and increase efficiency.	
Quest.	From your Experience in Deploying AI & Blockchain within UAE private Sector, what would the “Processes Efficiency & Effectiveness” at the Initial Stage look like? What would they be like at the Optimized stage? And at the other stages?				
	Initial	Developed	Defined	Managed	Optimized
	At the initial stage, processes efficiency and effectiveness in the UAE private sector may be relatively low. Organizations might be in the early stages of exploring AI and blockchain technologies and their potential impact on business processes. The focus at this stage is on understanding the technologies and identifying potential use cases. Initial attempts to apply AI and blockchain may involve manual integration or limited automation, resulting in modest improvements in efficiency and effectiveness.	In the developed stage, as AI and blockchain implementations progress, processes efficiency and effectiveness start to improve. Organizations begin to leverage AI algorithms and blockchain technology to streamline operations and optimize processes. This stage involves automating repetitive and rule-based tasks, enabling faster data analysis, and enhancing decision-making capabilities. Processes become more accurate, reliable, and time-efficient, leading to improved operational efficiency and overall effectiveness.	In the defined stage, as AI and blockchain technologies become more integrated into core operations, processes efficiency and effectiveness become more standardized and optimized. This stage involves conducting comprehensive process assessments, reengineering workflows, and leveraging AI and blockchain to achieve process excellence. Organizations may identify bottlenecks, eliminate unnecessary steps, and implement intelligent automation solutions. Enhanced data analytics and real-time insights from AI and blockchain systems enable better decision-making, driving efficiency gains	In the managed stage, organizations focus on continuous monitoring and management of processes to ensure ongoing efficiency and effectiveness. This stage involves implementing performance metrics, process monitoring tools, and quality control mechanisms. Organizations may use AI-driven analytics to identify areas for further improvement and make data-driven decisions. Continuous process improvement methodologies, such as Lean Six Sigma, may be applied to eliminate waste, reduce variability, and enhance processes' efficiency and effectiveness	In the optimized stage, processes efficiency and effectiveness reach a high level of maturity and optimization. This stage involves a highly efficient and effective operational environment where AI and blockchain technologies are fully integrated. Processes are automated, streamlined, and continuously optimized to achieve optimal performance. AI algorithms and blockchain-based solutions enable advanced analytics, predictive capabilities, and autonomous decision-making. Continuous innovation and optimization ensure that processes remain agile, adaptive, and aligned with organizational goals.



			and improved business outcomes.		



13. Main Challenges, Drivers, barriers/obstacles behind implementing technologies

9. From Your Experience, what are the Main Challenges behind Implementing AI & Blockchain Solutions within UAE Private Sector?

While I don't have direct experience, I can provide insights into some of the main challenges that organizations in the UAE private sector may encounter when implementing AI and blockchain solutions:

1. **Limited Awareness and Understanding:** One of the primary challenges is the lack of awareness and understanding of AI and blockchain technologies. Many organizations may not fully grasp the potential benefits and practical applications of these technologies, which can hinder their adoption and implementation.
2. **Data Quality and Accessibility:** AI and blockchain heavily rely on data, and organizations may face challenges related to the quality, availability, and accessibility of data. Data silos, inconsistent data formats, and data privacy concerns can impede the effective utilization of AI and blockchain solutions.
3. **Regulatory and Legal Considerations:** The UAE private sector must navigate various regulatory and legal considerations when implementing AI and blockchain solutions. Compliance with data protection and privacy regulations, intellectual property rights, and cybersecurity standards pose challenges that organizations need to address.
4. **Talent and Skills Gap:** The availability of skilled professionals who understand AI and blockchain is a challenge. There is a shortage of talent with expertise in AI algorithms, machine learning, blockchain development, and related areas. Organizations may face difficulties in recruiting, retaining, and upskilling employees with the necessary competencies.
5. **Integration with Existing Systems:** Integrating AI and blockchain solutions with existing systems and infrastructure can be complex. Legacy systems, interoperability issues, and resistance to change within the organization can hinder the smooth integration and deployment of these technologies.
6. **Cost and Return on Investment:** Implementing AI and blockchain solutions often involves significant financial investments. Organizations need to carefully evaluate the costs associated with technology adoption, infrastructure upgrades, talent acquisition, and ongoing maintenance. Demonstrating a clear return on investment and tangible benefits can be a challenge in some cases.
7. **Trust and Adoption Barriers:** Trust is essential in adopting AI and blockchain solutions. Organizations may face challenges in gaining trust from customers, stakeholders, and employees due to concerns related to data security, transparency, and reliability. Encouraging adoption and overcoming resistance to change within the organization can also be a hurdle.
8. **Interoperability and Standards:** Interoperability and the lack of standardized protocols and frameworks can pose challenges when integrating different AI and blockchain solutions. Ensuring compatibility and seamless communication between systems and networks is crucial for successful implementation.



Overcoming these challenges requires a strategic approach, collaboration with industry stakeholders, investment in talent development, regulatory support, and a focus on building awareness and understanding of AI and blockchain technologies.

10. From Your Experience, what are the Main Drivers to enhance Implementing AI & Blockchain Solutions within UAE private Sector?

based on general industry trends and insights, the following are some of the main drivers that can enhance the implementation of AI and blockchain solutions in the UAE private sector:

1. **Government Support and Vision:** The UAE government has shown strong support for emerging technologies such as AI and blockchain. Through various initiatives, strategies, and investments, the government aims to position the UAE as a global hub for technology and innovation. This support creates an enabling environment and drives organizations in the private sector to adopt AI and blockchain solutions.
2. **Digital Transformation and Economic Diversification:** The UAE is actively pursuing a digital transformation agenda and aims to diversify its economy. AI and blockchain technologies play a crucial role in this transformation, enabling organizations to optimize operations, improve efficiency, and create new business models. Organizations recognize the need to embrace these technologies to stay competitive and thrive in a digital economy.
3. **Efficiency and Cost Savings:** AI and blockchain solutions offer the potential for significant efficiency gains and cost savings. Automation of repetitive tasks, improved data management, and streamlined processes lead to enhanced productivity and reduced operational costs. Organizations seek to leverage AI and blockchain to optimize their operations, improve resource utilization, and drive cost efficiency.
4. **Enhanced Data Security and Privacy:** Data security and privacy are critical concerns for organizations. Blockchain provides a tamper-proof and transparent platform for data storage and transactions, enhancing security and trust. AI technologies offer advanced capabilities in data security, fraud detection, and anomaly detection. The UAE private sector recognizes the importance of ensuring data privacy and security, driving the adoption of AI and blockchain solutions.
5. **Customer Experience and Personalization:** AI and blockchain technologies enable organizations to deliver personalized and seamless customer experiences. AI-powered analytics and machine learning algorithms provide insights for customer segmentation, behavior analysis, and targeted marketing. Blockchain can enhance customer trust by providing transparent and secure transactions. Organizations strive to enhance customer satisfaction and loyalty by leveraging AI and blockchain capabilities.
6. **Collaboration and Partnerships:** Collaboration and partnerships between organizations, technology providers, and academia foster innovation and accelerate the adoption of AI and blockchain solutions. Collaborative efforts create opportunities for knowledge sharing, resource pooling, and joint research and development. The UAE private sector actively engages in partnerships to leverage collective expertise and drive technology implementation.
7. **Access to Talent:** Availability of skilled talent is crucial for successful AI and blockchain implementation. The UAE government, in collaboration with academic institutions and industry stakeholders, has been investing in building a skilled workforce in these domains. Access to a pool of talented professionals with expertise in AI and blockchain motivates organizations to adopt these technologies.
8. **Competitive Advantage and Industry Leadership:** Implementing AI and blockchain solutions can provide a competitive advantage in the marketplace. Organizations that embrace these technologies early on can differentiate themselves, attract investment, and position themselves as industry leaders. The UAE private sector recognizes the strategic importance of AI and blockchain in driving innovation and aims to establish itself as a global leader in these domains.



11. What are the main Internal & External, barriers/obstacles of adopting/ implementing and deploying AI or Blockchain technologies and their related solutions to enhance efficiency and effectiveness of UAE private Sector Transactions?

When adopting and implementing AI or blockchain technologies in the UAE private sector to enhance the efficiency and effectiveness of transactions, organizations may encounter various internal and external barriers and obstacles. Some of the main ones include:

Internal Barriers/Obstacles:

1. **Lack of Awareness and Understanding:** One of the primary internal barriers is the limited awareness and understanding of AI and blockchain technologies within organizations. This lack of knowledge can create resistance to change and hinder the adoption of these technologies.
2. **Resistance to Change:** Resistance from employees and stakeholders to adopt new technologies can pose a significant obstacle. Fear of job displacement, lack of digital skills, and a reluctance to embrace unfamiliar technologies may impede the successful implementation of AI and blockchain solutions.
3. **Legacy Systems and Infrastructure:** Existing legacy systems and infrastructure can be a challenge when integrating AI or blockchain technologies. Outdated systems may not be compatible with the new technologies, requiring significant investments in system upgrades or replacements.
4. **Data Quality and Accessibility:** AI and blockchain technologies rely on high-quality and accessible data. Inadequate data quality, data silos, and limited accessibility to data across different departments or systems can hinder the effectiveness of implementing AI or blockchain solutions.
5. **Talent and Skills Gap:** The shortage of skilled professionals with expertise in AI and blockchain is a common challenge. Organizations may struggle to find or train employees with the necessary skills to implement and manage these technologies effectively.

External Barriers/Obstacles:

1. **Regulatory and Legal Frameworks:** Compliance with existing regulations and adapting to evolving legal frameworks can be complex. Organizations must navigate regulatory challenges related to data privacy, security, intellectual property, and cross-border transactions when deploying AI or blockchain solutions.
2. **Security and Trust Concerns:** AI and blockchain technologies raise concerns about data security, privacy, and trust. Organizations must address these concerns to gain acceptance from customers, partners, and other stakeholders.
3. **Interoperability and Standards:** Lack of interoperability and standardization across AI and blockchain platforms can hinder seamless integration and collaboration between different systems and organizations. Inconsistent standards and protocols may limit the scalability and effectiveness of technology implementations.
4. **Investment Costs:** Implementing AI and blockchain technologies often requires significant financial investments. Organizations may face challenges in securing adequate funding for technology adoption, infrastructure upgrades, talent acquisition, and ongoing maintenance.
5. **Industry Collaboration and Ecosystem:** Collaboration among industry stakeholders, such as technology providers, regulators, and industry associations, is crucial for a successful adoption. Insufficient collaboration and a fragmented ecosystem can slow down the implementation process.

12. What other comments do you have about improving the adopting/ implementing and deploying AI or Blockchain technologies and their related solutions within UAE private Sector Entities?



Here are some additional comments to further improve the adoption, implementation, and deployment of AI and blockchain technologies within UAE private sector entities:

1. **Foster an Innovation Culture:** Cultivate a culture of innovation within organizations by promoting a mindset of continuous learning, experimentation, and risk-taking. Encourage employees to explore new ideas, embrace emerging technologies, and actively participate in innovation initiatives.
2. **Conduct Pilot Projects:** Start with small-scale pilot projects to test the feasibility and effectiveness of AI and blockchain solutions. Pilots allow organizations to assess the potential benefits, identify challenges, and refine implementation strategies before scaling up to larger deployments.
3. **Seek External Expertise:** Consider partnering with external consultants or technology experts who specialize in AI and blockchain. Their experience and knowledge can provide valuable insights, help overcome implementation challenges, and ensure best practices are followed.
4. **Address Ethical Considerations:** Pay attention to ethical considerations when deploying AI and blockchain solutions. Ensure fairness, transparency, and accountability in algorithmic decision-making processes. Establish guidelines and frameworks to address potential biases and privacy concerns.
5. **Build Trust and User Acceptance:** Educate and engage stakeholders to build trust and acceptance of AI and blockchain technologies. Communicate the benefits, address concerns, and involve stakeholders in the decision-making process. User feedback and involvement in the design and development stages can lead to more successful deployments.
6. **Encourage Industry Collaboration:** Collaborate with industry peers, associations, and consortiums to drive sector-wide adoption of AI and blockchain. By working together, organizations can share insights, tackle common challenges, and collectively shape industry standards and frameworks.
7. **Invest in Data Governance:** Establish robust data governance frameworks to ensure the quality, integrity, and security of data used in AI and blockchain applications. Implement data management practices that prioritize data privacy, consent, and compliance with relevant regulations.
8. **Monitor Regulatory Developments:** Stay updated on regulatory developments related to AI and blockchain in the UAE. Engage with regulatory authorities to understand and comply with any legal requirements, certifications, or licensing that may be necessary for specific use cases or industries.
9. **Measure Impact and ROI:** Define clear metrics and key performance indicators to assess the impact and return on investment of AI and blockchain implementations. Regularly monitor and evaluate the results to identify areas for improvement and optimization.
10. **Embrace Continuous Learning:** Encourage employees to upskill and reskill in AI and blockchain domains through training programs, workshops, and certifications. Foster a learning environment where employees can stay updated on the latest technologies and industry trends.

Thank you so much for your time and consideration in this research.



Appendix F.2: Response 2

Appendix A-Focus Group Sessions – Discussions Pillars

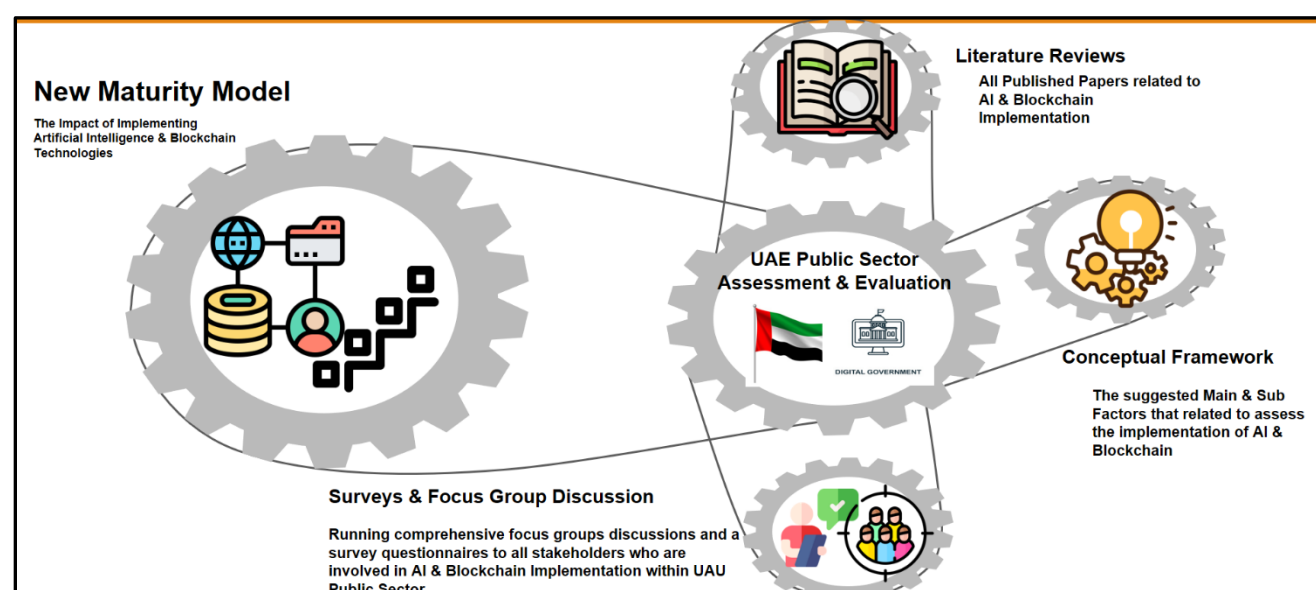
Name of participant	Fatma Mahmoud Mohamed
Date of the sessions	
Private or Local Organization	
Emirate/Federal	
Position title	Blockchain Backend developer
Number of years' experience	3 years
Level of education	Bachelor's Degree
Role in implementing the AI / Blockchain Technologies	Developer

14. Introduction:

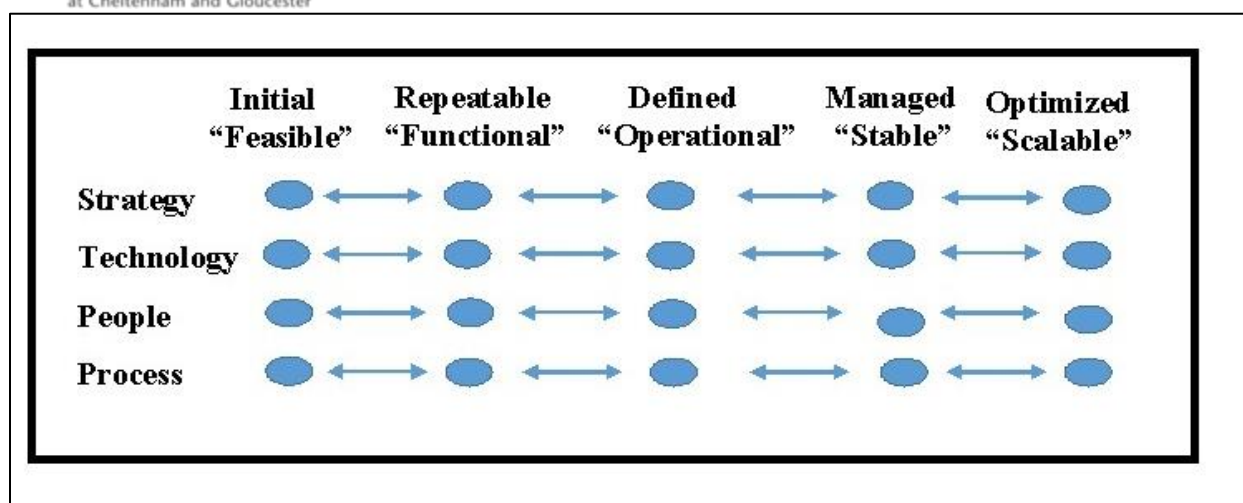
This project mainly aims to define a New Maturity Model for assessing the Implementation of Artificial Intelligence & Blockchain technologies, within UAE Public Sector (UAE Federal Government, Abu Dhabi Local Government, Dubai Local Government, and Ajman Local Government), And Evaluate the Impact of two technologies to the public sector transactions productivity, efficiency of processes and systems & the effectiveness of achieving public sector targets.

15. Research Approach:

Through the published literature reviews and based on what researcher suggest the main factors that consist of conceptual framework, we will discuss with each subject matter expert within the fields to define the main and sub factors that formulate the conceptual framework and lead us to design the New Maturity Model that will be used by UAE public sector to evaluate the Implementation Impact of Artificial Intelligence & Blockchain Technologies.

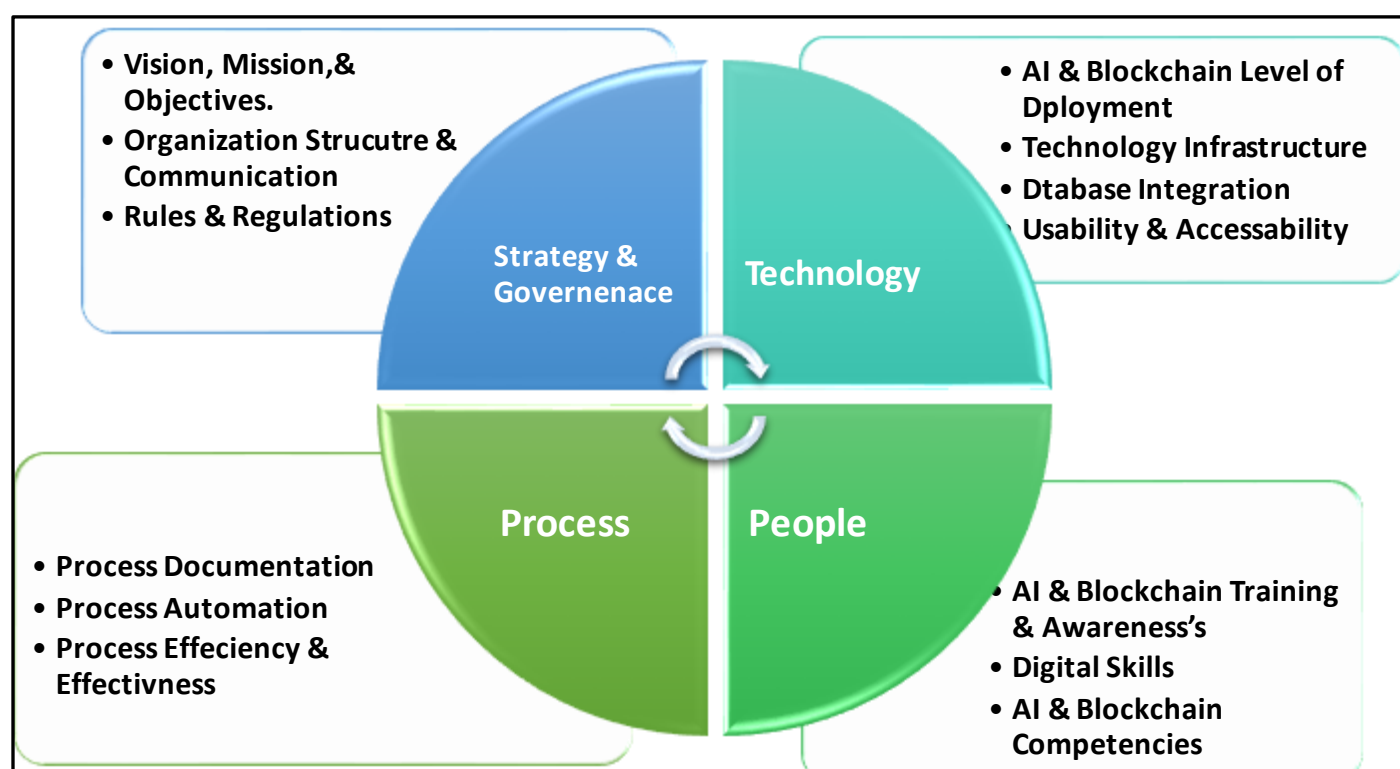


16. Suggested Conceptual Framework



49. Please consider the provisional model shown above – with 5 stages of change (initial to optimized) and four dimensions of change (Strategy, Technology, People and Processes). Do you think these are the most appropriate dimensions for evaluating the implementation and impact of AI/Blockchain Technologies in UAE Public Sector from your experience? Would you suggest other dimensions of change? yes

50. Do you think each stage above represent the overall stages and right description for levels of deployed AI & Blockchain within UAE Public Sector? yes



Quest.	From your Experience in Deploying AI & Blockchain within UAE Public Sector, what would the "Vision, Mission, and Objectives" at the Initial Stage look like? What would they be like at the Optimized stage? And at the other stages?				
	Initial	Developed	Defined	Managed	Optimized
	the Vision, Mission, and Objectives may focus on exploring the potential of these technologies and identifying	the Vision, Mission, and Objectives may focus on scaling up the implementation	the Vision, Mission, and Objectives may focus on establishing clear policies	the Vision, Mission, and Objectives may focus on optimizing the performance	the Vision, Mission, and Objectives may focus on maximizing the benefits of AI



	relevant use cases. The Vision could be to leverage AI and Blockchain technologies to enhance efficiency, reduce costs, and improve services in the public sector. The Mission could be to conduct a comprehensive analysis of the opportunities and challenges associated with implementing these technologies in the UAE Public Sector. The Objectives could include identifying priority areas for implementation, building awareness and knowledge about these technologies, and establishing partnerships with relevant stakeholders.	of AI and Blockchain technologies across different departments and agencies. The Vision could be to establish a culture of innovation and collaboration, leveraging these technologies to improve public services and promote economic growth. The Mission could be to develop standardized processes and procedures for implementing these technologies, and to establish a framework for measuring their impact. The Objectives could include identifying key performance indicators (KPIs) for tracking progress, establishing governance structures for managing these technologies, and providing training and support for staff.	and procedures for implementing AI and Blockchain technologies in the UAE Public Sector. The Vision could be to ensure that these technologies are implemented in a secure, ethical, and transparent manner, and to maximize their benefits while minimizing risks. The Mission could be to develop a comprehensive framework for managing these technologies, including policies for data privacy and security, governance and accountability, and stakeholder engagement. The Objectives could include establishing compliance frameworks for regulatory requirements, conducting risk assessments, and developing guidelines for ethical and responsible use of these technologies.	and reliability of AI and Blockchain technologies. The Vision could be to continuously improve the effectiveness and efficiency of these technologies, while ensuring that they remain aligned with the needs of the UAE Public Sector. The Mission could be to establish a culture of continuous improvement, leveraging feedback and data to make informed decisions about these technologies. The Objectives could include establishing monitoring and evaluation frameworks, conducting regular audits of these technologies, and providing ongoing training and support for staff.	and Blockchain technologies. The Vision could be to position the UAE Public Sector as a global leader in innovation and technology, leveraging these technologies to create new opportunities and drive economic growth. The Mission could be to foster a culture of innovation and collaboration, promoting the adoption of emerging technologies and continuous improvement. The Objectives could include fostering a culture of innovation, establishing strategic partnerships with leading technology companies, and leveraging data to drive decision-making and innovation.
Quest.	From your Experience in Deploying AI & Blockchain within UAE Public Sector, what would the “Organization Structure & Communication” at the Initial Stage look like? What would they be like at the Optimized stage? And at the other stages?				
	Initial	Developed	Defined	Managed	Optimized
	the Organization Structure & Communication may be relatively flat and informal, with	the Organization Structure & Communication may become	the Organization Structure & Communication may become	the Organization Structure & Communication may become	the Organization Structure & Communication may become more agile and



	limited resources allocated to these technologies. Communication may be ad-hoc, with limited collaboration among different departments and agencies. The focus may be on exploring the potential of these technologies and identifying relevant use cases.	more formalized, with dedicated resources allocated to these technologies. The organizational structure may become more hierarchical, with specialized roles and functions related to the implementation of AI and Blockchain technologies. Communication may become more structured, with regular meetings and reporting mechanisms established. The focus may be on scaling up the implementation of these technologies across different departments and agencies.	more centralized and standardized, with clear roles and responsibilities defined for managing AI and Blockchain technologies. Communication may become more formalized, with regular reporting and feedback mechanisms established. The focus may be on establishing policies and procedures for implementing these technologies in a secure, ethical, and transparent manner.	more collaborative and flexible, with a focus on optimizing the performance and reliability of AI and Blockchain technologies. Communication may become more dynamic, with real-time feedback mechanisms established to monitor and evaluate the effectiveness of these technologies. The focus may be on developing a culture of continuous improvement and innovation, with regular training and support provided to staff.	decentralized, with a focus on maximizing the benefits of AI and Blockchain technologies. Communication may become more data-driven, with advanced analytics and predictive models used to inform decision-making. The focus may be on fostering a culture of innovation and collaboration, with cross-functional teams established to drive new initiatives and create new opportunities. The organizational structure may become more flexible and adaptable, with an emphasis on agility and responsiveness to changing market conditions.
Quest.	From your Experience in Deploying AI & Blockchain within UAE Public Sector, what would the “Rules & Regulations” at the Initial Stage look like? What would they be like at the Optimized stage? And at the other stages?				
	Initial	Developed	Defined	Managed	Optimized
	the Rules & Regulations may be limited or non-existent. There may be a lack of clarity around how these technologies should be used and what legal frameworks apply. The focus may be on exploring the potential of these technologies and identifying relevant use cases.	the Rules & Regulations may become more formalized, with basic guidelines and policies established for the use of AI and Blockchain technologies. There may be some basic regulations in place around data protection and	the Rules & Regulations may become more comprehensive, with clear policies and procedures established for the use of AI and Blockchain technologies. There may be formal regulations in place around data privacy, security, and	the Rules & Regulations may become more dynamic, with real-time monitoring and evaluation mechanisms in place to ensure compliance with relevant laws and regulations. There may be advanced regulations in place around data sharing	the Rules & Regulations may become more adaptive, with advanced analytics and machine learning algorithms used to optimize the legal frameworks that govern the use of AI and Blockchain technologies. The focus may be on creating legal frameworks that are agile



		cybersecurity. The focus may be on scaling up the implementation of these technologies across different departments and agencies while ensuring compliance with relevant laws and regulations.	ethical considerations. The focus may be on establishing legal frameworks that support the use of these technologies in a secure, ethical, and transparent manner.	and collaboration across different departments and agencies. The focus may be on creating a culture of compliance and accountability, with regular audits and assessments conducted to ensure the effectiveness of these regulations.	and responsive to changing market conditions, with a focus on enabling innovation and growth in these sectors. There may be more advanced regulations in place around issues such as algorithmic bias and data ownership, with a focus on balancing innovation with ethical and social considerations.
Quest.	From your Experience in Deploying AI & Blockchain within UAE Public Sector, what would the “Level of Implemented AI & Blockchain” at the Initial Stage look like? What would they be like at the Optimized stage? And at the other stages?				
	Initial	Developed	Defined	Managed	Optimized
	the Level of Implemented AI & Blockchain may be very limited. There may be some experimental projects or proof-of-concept initiatives being explored, but they may not be fully integrated into the core business processes of the organization. The focus may be on identifying potential use cases and understanding the capabilities of these technologies.	the Level of Implemented AI & Blockchain may become more widespread, with some basic applications of these technologies being deployed across different departments and agencies. These applications may be focused on automating routine tasks or enhancing data analytics capabilities. The focus may be on establishing the foundational infrastructure required for the widespread adoption of these technologies.	the Level of Implemented AI & Blockchain may become more advanced, with more sophisticated applications of these technologies being deployed across different business functions. These applications may be focused on optimizing business processes, enhancing decision-making capabilities, or improving customer experiences. The focus may be on establishing governance models and policies that enable the effective	the Level of Implemented AI & Blockchain may become more integrated, with these technologies being fully embedded into the core business processes of the organization. There may be a strong focus on collaboration and data sharing across different departments and agencies to drive innovation and achieve strategic objectives. The focus may be on establishing robust monitoring and evaluation mechanisms that enable the organization to	the Level of Implemented AI & Blockchain may become more innovative, with these technologies being used to drive new business models and revenue streams. There may be a strong focus on leveraging data and analytics to gain insights into customer behavior and preferences. The focus may be on fostering a culture of innovation and experimentation, with a willingness to take risks and embrace new technologies to stay ahead of the competition.



			management of these technologies.	measure the impact of these technologies on its operations and outcomes.	
Quest.	From your Experience in Deploying AI & Blockchain within UAE Public Sector, what would the “Technology Infrastructure” at the Initial Stage look like? What would they be like at the Optimized stage? And at the other stages?				
	Initial	Developed	Defined	Managed	Optimized
	the Technology Infrastructure may be relatively basic, with limited hardware and software capabilities. There may be a lack of standardization across different departments and agencies, and limited integration between different systems. The focus may be on exploring the potential of these technologies and identifying the most appropriate use cases.	the Technology Infrastructure may become more robust, with more powerful hardware and software capabilities being deployed across different departments and agencies. There may be a focus on standardizing technology platforms and enhancing the interoperability between different systems. The focus may be on establishing a solid technology foundation that enables the widespread adoption of these technologies.	the Technology Infrastructure may become more advanced, with the deployment of more sophisticated hardware and software solutions. There may be a focus on integrating AI and Blockchain technologies into the core technology architecture of the organization, and establishing a seamless user experience across different applications. The focus may be on establishing the necessary security and privacy protocols to ensure the protection of sensitive data.	the Technology Infrastructure may become more integrated, with the deployment of advanced cloud-based solutions and the integration of AI and Blockchain technologies with other emerging technologies such as the Internet of Things (IoT) and Big Data. There may be a focus on enhancing the scalability and flexibility of the technology infrastructure to support the needs of the organization. The focus may be on developing a robust disaster recovery plan to ensure business continuity in the event of any technological failures.	the Technology Infrastructure would be highly advanced, with a comprehensive and integrated IT architecture that enables seamless data exchange and analysis across the organization. The organization would be leveraging the latest emerging technologies to drive operational efficiencies and improve business outcomes, with a particular focus on AI and Blockchain technologies. The Technology Infrastructure would be scalable, flexible, and highly secure, with a robust disaster recovery and business continuity plan in place to ensure the continuity of operations in the event of a disruption. Overall, the Technology Infrastructure at the Optimized Stage would be a key enabler of the organization's success in deploying AI and Blockchain



					technologies to achieve its strategic objectives.
Quest.	From your Experience in Deploying AI & Blockchain within UAE Public Sector, what would the “Database Integration” at the Initial Stage look like? What would they be like at the Optimized stage? And at the other stages?				
	Initial	Developed	Defined	Managed	Optimized
	the Database Integration may involve basic integration of databases, with limited interoperability and limited ability to share data across different systems. The databases may be managed independently by different departments, resulting in data silos and potential inconsistencies in data quality.	there may be an effort to standardize data formats and improve data quality, with increased collaboration and communication between departments. This may involve implementing data governance policies and procedures to ensure that data is properly managed and controlled across the organization.	there may be a more comprehensive integration of databases, with standardized data models and more advanced data management tools. This may include implementing a master data management system to ensure that data is consistent across different systems and departments.	there may be an increased focus on data analytics and using data to inform decision-making, with more advanced analytics tools and techniques being deployed to extract insights from the data.	the Database Integration would be highly advanced, with a comprehensive and integrated data architecture that enables seamless data exchange and analysis across the organization. The organization would be able to leverage advanced analytics techniques such as machine learning and artificial intelligence to derive valuable insights from the data, which would inform strategic decision-making and drive operational efficiencies. Overall, the Database Integration at the Optimized Stage would be a key enabler of the organization's success in deploying AI and Blockchain technologies to achieve its strategic objectives.
Quest.	From your Experience in Deploying AI & Blockchain within UAE Public Sector, what would the “Technology Usability & Accessibility” at the Initial Stage look like? What would they be like at the Optimized stage? And at the other stages?				
	Initial	Developed	Defined	Managed	Optimized



Quest.	From your Experience in Deploying AI & Blockchain within UAE Public Sector, what would the “AI & Blockchain Training & Awareness’s” at the Initial Stage look like? What would they be like at the Optimized stage? And at the other stages?				
	Initial	Developed	Defined	Managed	Optimized
	AI and Blockchain Training & Awareness would be limited to a small group of individuals, likely those directly involved in the implementation process. There may be some initial training provided to these individuals, but overall awareness and understanding of the technologies may be limited.	there may be more formal training programs put in place to educate a wider range of employees on AI and Blockchain technologies. These programs would likely focus on the basics of the technologies and their potential applications within the organization.	training and awareness programs would become more advanced and tailored to specific roles within the organization. This would ensure that employees have a deeper understanding of the technologies and are equipped with the skills and knowledge needed to use them effectively in their work.	there would be ongoing training and awareness initiatives to keep employees up-to-date on new developments and best practices in AI and Blockchain. These programs would be designed to support ongoing learning and development, helping to keep the organization at the forefront of these technologies.	training and awareness programs would be fully integrated into the organization's culture and processes. Employees at all levels would be well-versed in AI and Blockchain technologies, and training programs would focus on advanced topics and cutting-edge applications. Additionally, the organization may have established partnerships with universities or other educational institutions to ensure a steady pipeline of skilled employees in these areas.
Quest.	From your Experience in Deploying AI & Blockchain within UAE Public Sector, what would the “Employee Digital Skills” at the Initial Stage look like? What would they be like at the Optimized stage? And at the other stages?				
	Initial	Developed	Defined	Managed	Optimized
	employees may have basic digital skills but lack specialized skills related to AI and blockchain technologies. There may also be a lack of awareness of the potential impact of these technologies on their roles and responsibilities.	employees may receive some training and development opportunities to enhance their digital skills, with a focus on AI and blockchain technologies. However, this may be a reactive approach to address immediate needs.	the organization may have a formal training and development program in place, with a focus on providing employees with the necessary skills to work with AI and blockchain technologies effectively. This may include internal and	the organization may have a comprehensive talent management strategy in place to identify, develop, and retain employees with the necessary digital skills. This may involve ongoing training and development opportunities,	the organization may have a culture of continuous learning and development, with employees proactively seeking out new skills and knowledge related to AI and blockchain technologies. The organization may also have a system in place to share best practices and



			external training, certification programs, and mentorship opportunities.	performance management, and career progression planning.	lessons learned across teams and departments.
Quest.	From your Experience in Deploying AI & Blockchain within UAE Public Sector, what would the “Employee AI & Blockchain Competencies” at the Initial Stage look like? What would they be like at the Optimized stage? And at the other stages?				
	Initial	Developed	Defined	Managed	Optimized
	employees may have little to no knowledge or experience in AI and Blockchain technologies. They may require extensive training and upskilling to understand the potential of these technologies and how they can be integrated into their work.	employees may have received some training on AI and Blockchain technologies and have a basic understanding of their potential uses. However, they may still require further training and support to fully integrate these technologies into their work.	employees may have a good understanding of the potential uses of AI and Blockchain technologies and may have received specialized training to develop their competencies in these areas. They may also have access to ongoing learning opportunities to stay up-to-date with the latest developments in the field	employees may have a high level of competency in AI and Blockchain technologies, with specialized skills and experience in deploying and managing these technologies in their work. They may also play a role in training and upskilling other employees in the organization.	employees may be considered experts in AI and Blockchain technologies, with a deep understanding of their potential uses and applications. They may actively seek out new and innovative ways to apply these technologies to improve organizational processes and drive business outcomes. Additionally, they may also be involved in research and development initiatives to advance the state-of-the-art in AI and Blockchain.
Quest.	From your Experience in Deploying AI & Blockchain within UAE Public Sector, what would the “Processes Documentation” at the Initial Stage look like? What would they be like at the Optimized stage? And at the other stages?				
	Initial	Developed	Defined	Managed	Optimized
	Processes Documentation may be informal and inconsistent, with limited documentation of processes and procedures related to AI and blockchain technologies. There may be a lack of standardization, and processes may be unclear or subject to interpretation. At	processes may be documented and standardized to some extent, with some level of consistency in procedures related to AI and blockchain technologies. There may be some automation of processes, but	processes related to AI and blockchain technologies are fully documented and standardized, with clear and consistent procedures in place. There may be a higher level of automation of	processes related to AI and blockchain technologies are continuously monitored and improved, with a focus on increasing efficiency and reducing errors. Processes are optimized	processes related to AI and blockchain technologies are fully optimized, with a high degree of automation and little to no reliance on manual processes. Processes are continuously monitored and



	this stage, there may be a heavy reliance on manual processes and little automation.	there may still be a heavy reliance on manual processes as well.	processes, reducing the reliance on manual processes.	through automation and other process improvements.	improved to maintain efficiency and effectiveness. Documentation is thorough and easily accessible, and there is a strong culture of process improvement and innovation.
Quest.	From your Experience in Deploying AI & Blockchain within UAE Public Sector, what would the “Processes Automation” at the Initial Stage look like? What would they be like at the Optimized stage? And at the other stages?				
	Initial	Developed	Defined	Managed	Optimized
	processes automation may be minimal or non-existent. Manual processes and paperwork may still be prevalent, with some basic automation tools in place.	processes automation may be more frequent, with some routine processes being automated to improve efficiency and reduce errors.	processes automation may be a significant focus, with a clear roadmap for automation initiatives and a dedicated team to manage them. Automation may be used to streamline complex processes and reduce the need for manual intervention.	processes automation may be well-established, with a culture of continuous improvement and a focus on optimizing processes through automation. Advanced automation tools such as machine learning and AI may be used to improve decision-making and enhance process efficiency.	processes automation may be at its highest level, with almost all routine and complex processes automated. Advanced AI and blockchain technologies may be used to streamline processes and optimize outcomes, with a focus on continuous improvement and innovation.
Quest.	From your Experience in Deploying AI & Blockchain within UAE Public Sector, what would the “Processes Efficiency & Effectiveness” at the Initial Stage look like? What would they be like at the Optimized stage? And at the other stages?				
	Initial	Developed	Defined	Managed	Optimized
	processes efficiency and effectiveness may be limited, with manual and traditional processes in place. The focus may be on understanding and documenting current processes before any optimization can take place. There may be a lack of data analysis and decision-making support tools.	processes may become more streamlined and automated. Basic AI and blockchain technologies may be implemented to improve efficiency and reduce errors. However, processes may not be fully optimized, and	processes may be well-documented, and there may be a focus on identifying and eliminating bottlenecks and inefficiencies. More advanced AI and blockchain technologies may be deployed to	processes may be continuously monitored and optimized, with a focus on data-driven decision-making and continuous improvement. There may be a high level of automation and integration between	processes may be highly efficient and effective, with the use of advanced AI and blockchain technologies, such as machine learning and smart contracts. There may be a high level of automation and integration between



		there may still be room for improvement.	streamline processes and provide decision-making support.	different processes and technologies.	different systems and processes, with a focus on real-time data analysis and decision-making support.



17. Main Challenges, Drivers, barriers/obstacles behind implementing technologies

13. From Your Experience, what are the Main Challenges behind Implementing AI & Blockchain Solutions within UAE Public Sector?

Implementing AI and blockchain solutions within the UAE public sector can be challenging due to various reasons, including:

1. Resistance to change: Employees may be resistant to change and may not be comfortable with new technologies, which can make the implementation process slow.
2. Lack of expertise: Implementing AI and blockchain solutions requires specialized skills and expertise that may not be readily available in the workforce. This may lead to delays in the implementation process.
3. Data privacy and security concerns: The UAE government is committed to protecting the privacy and security of citizens' data. Therefore, implementing AI and blockchain solutions requires measures to ensure data privacy and security, which can be challenging.
4. Integration with legacy systems: The UAE public sector has a vast number of legacy systems, which can be challenging to integrate with new AI and blockchain solutions.
5. Cost: Implementing AI and blockchain solutions can be costly, and the UAE public sector may not have the budget to implement large-scale projects.
6. Regulations: Regulations surrounding the use of AI and blockchain in the public sector are still evolving, which can create uncertainty and hinder adoption.
7. Cultural factors: Cultural factors, such as a preference for paper-based processes or a lack of trust in new technologies, can also hinder the adoption of AI and blockchain solutions in the UAE public sector.

14. From Your Experience, what are the Main Drivers to enhance Implementing AI & Blockchain Solutions within UAE Public Sector?

There are several main drivers that enhance the implementation of AI & blockchain solutions within UAE Public Sector, including:

1. Digital transformation agenda: The UAE government has been actively promoting digital transformation in various sectors, including the public sector, to improve efficiency, reduce costs, and enhance services.
2. Strategic vision: The UAE has a strategic vision to become a leader in the adoption of AI & blockchain technologies, which is reflected in initiatives such as the UAE Strategy for Artificial Intelligence 2031 and the Dubai Blockchain Strategy.
3. Economic benefits: Implementing AI & blockchain solutions can result in significant economic benefits, such as cost savings, increased productivity, and job creation.
4. Enhanced security: The UAE government recognizes the potential of blockchain technology to enhance security and reduce fraud in various areas, such as identity verification, supply chain management, and financial transactions.
5. Increased innovation: The UAE government is committed to promoting innovation and entrepreneurship, and AI & blockchain technologies are seen as key enablers for innovation in various sectors.

Overall, these drivers reflect the UAE's commitment to leveraging technology to improve services, drive economic growth, and enhance its position as a global leader in innovation.

15. What are the main Internal & External, barriers/obstacles of adopting/ implementing and deploying AI or Blockchain technologies and their related solutions to enhance efficiency and effectiveness of UAE Public Sector Transactions?



The main internal barriers to adopting and implementing AI and Blockchain technologies in the UAE public sector include:

1. Resistance to change: There may be a reluctance to change established processes and systems, particularly if employees lack familiarity with new technologies.
2. Lack of technical expertise: The implementation of new technologies requires a workforce that is well-versed in their operation and maintenance, which may not exist in the public sector.
3. Data privacy and security concerns: The use of AI and Blockchain technologies may expose sensitive data to potential threats, which can raise concerns about data privacy and security.
4. Budget constraints: Implementing new technologies can be expensive, and the public sector may face budgetary constraints that limit their ability to invest in new solutions.
5. Legacy systems: Existing legacy systems may not be compatible with new technologies, which can make integration difficult and costly.

The main external barriers to adopting and implementing AI and Blockchain technologies in the UAE public sector include:

1. Regulatory challenges: The legal and regulatory frameworks may not be fully developed to accommodate the use of new technologies in the public sector.
2. Lack of interoperability: There may be a lack of standardization and interoperability between different systems and technologies, making it difficult to integrate new solutions.
3. Limited collaboration and partnerships: Collaboration between public and private sectors and academic institutions is crucial for the development and implementation of AI and Blockchain solutions, but this may be limited in the UAE.
4. Limited awareness and understanding: The public sector may lack a clear understanding of the potential benefits and drawbacks of new technologies, which can impede their adoption.
5. Cultural barriers: Cultural factors such as a preference for traditional methods of doing things may impede the adoption of new technologies.

16. What other comments do you have about improving the adopting/ implementing and deploying AI or Blockchain technologies and their related solutions within UAE Public Sector Entities?

Here are some additional comments on improving the adoption and implementation of AI and Blockchain technologies within UAE Public Sector entities:

1. Foster collaboration and partnerships: The public sector entities should collaborate with technology companies, universities, and other organizations to develop innovative solutions that meet the specific needs of UAE's public sector. Collaborating with technology startups can also help in promoting the innovation culture and promoting the development of new technologies and applications.
2. Address regulatory and legal challenges: The adoption of AI and Blockchain technologies in the public sector is subject to regulatory and legal challenges, including data protection, privacy, and security concerns. It is essential to establish legal frameworks that support the use of these technologies while safeguarding citizens' rights and interests.
3. Develop a skilled workforce: Developing the necessary workforce with the required digital and technical skills is essential to drive successful AI and Blockchain initiatives within the public sector. This can be achieved by investing in training and development programs and providing opportunities for upskilling and reskilling existing employees.
4. Promote awareness and education: There is a need to educate and inform the public about the benefits and challenges of AI and Blockchain technologies. Public sector entities can organize workshops, training programs, and seminars to raise awareness about these technologies and their applications in the public sector.
5. Establish clear objectives and priorities: To ensure successful adoption and implementation of AI and Blockchain technologies, public sector entities should establish clear objectives, priorities, and timelines. This will help in guiding the selection and deployment of these technologies and enable effective monitoring and evaluation of the outcomes.



Overall, the successful adoption and implementation of AI and Blockchain technologies require a comprehensive approach that considers the technology, people, processes, and regulatory factors. By addressing these factors and leveraging the opportunities presented by these technologies, UAE Public Sector entities can enhance their efficiency and effectiveness, and ultimately deliver better services to citizens.

Thank you so much for your time and consideration in this research.

Appendix F.3: Response 3

Appendix A-Focus Group Sessions – Discussions Pillars

Name of participant	
Date of the sessions	
Private or Local Organization	
Emirate/Federal	
Position title	
Number of years' experience	
Level of education	
Role in implementing the AI / Blockchain Technologies	

18. Introduction:

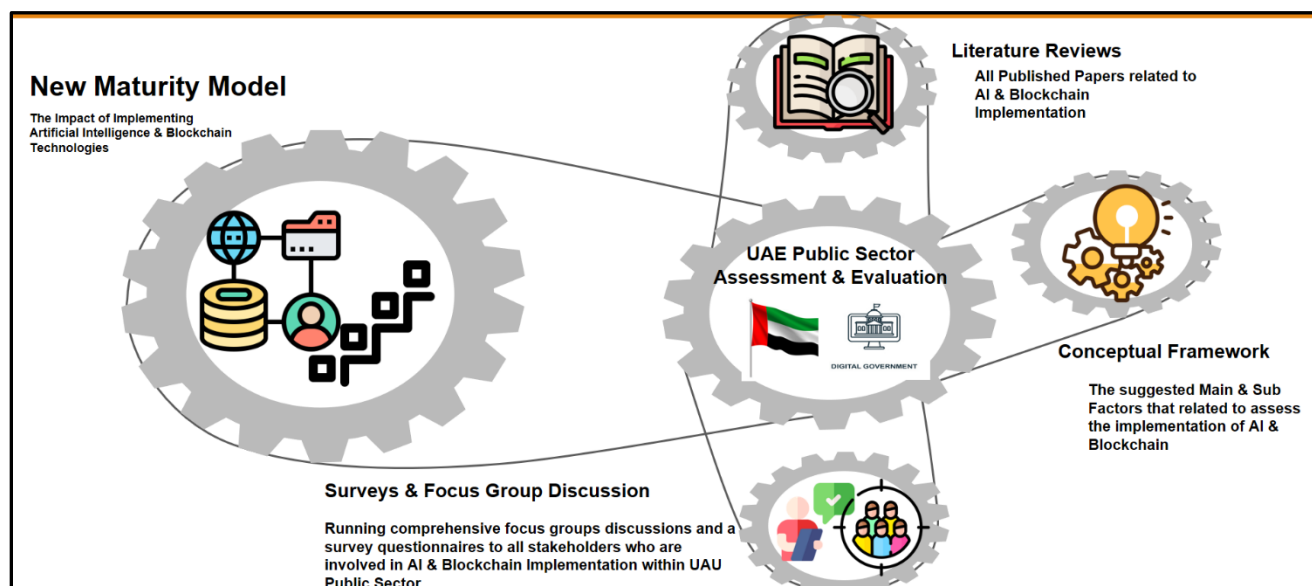
This project mainly aims to define a New Maturity Model for assessing the Implementation of Artificial Intelligence & Blockchain technologies, within UAE Public Sector (UAE Federal Government, Abu Dhabi Local Government, Dubai Local Government, and Ajman Local Government), And Evaluate the Impact of two technologies to the public sector transactions productivity, efficiency of processes and systems & the effectiveness of achieving public sector targets.

19. Research Approach:

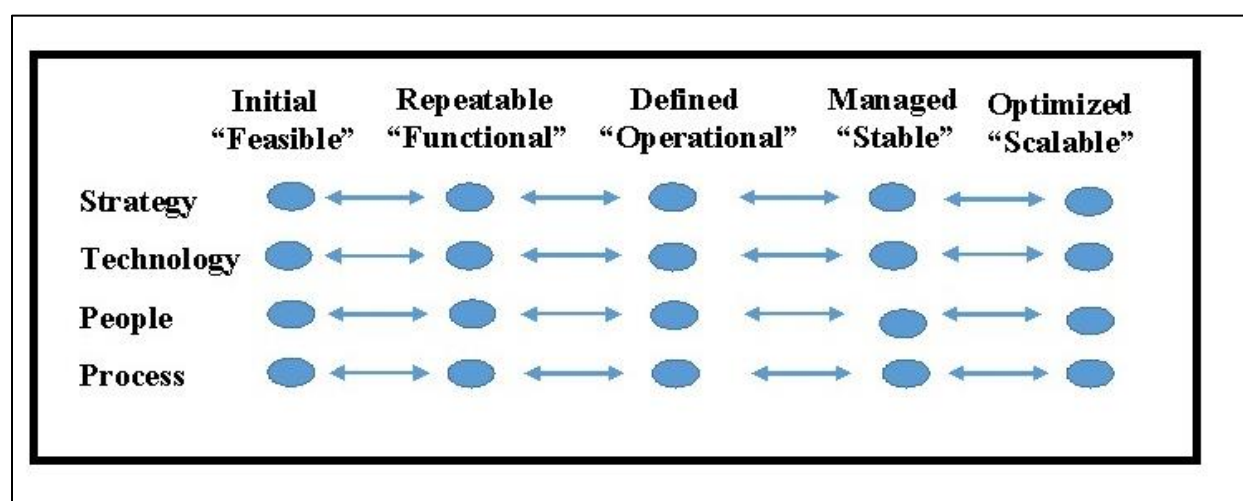
Through the published literature reviews and based on what researcher suggest the main factors that consist of conceptual framework, we will discuss with each subject matter expert within the fields to define the main and sub factors that



formulate the conceptual framework and lead us to design the New Maturity Model that will be used by UAE public sector to evaluate the Implementation Impact of Artificial Intelligence & Blockchain Technologies.

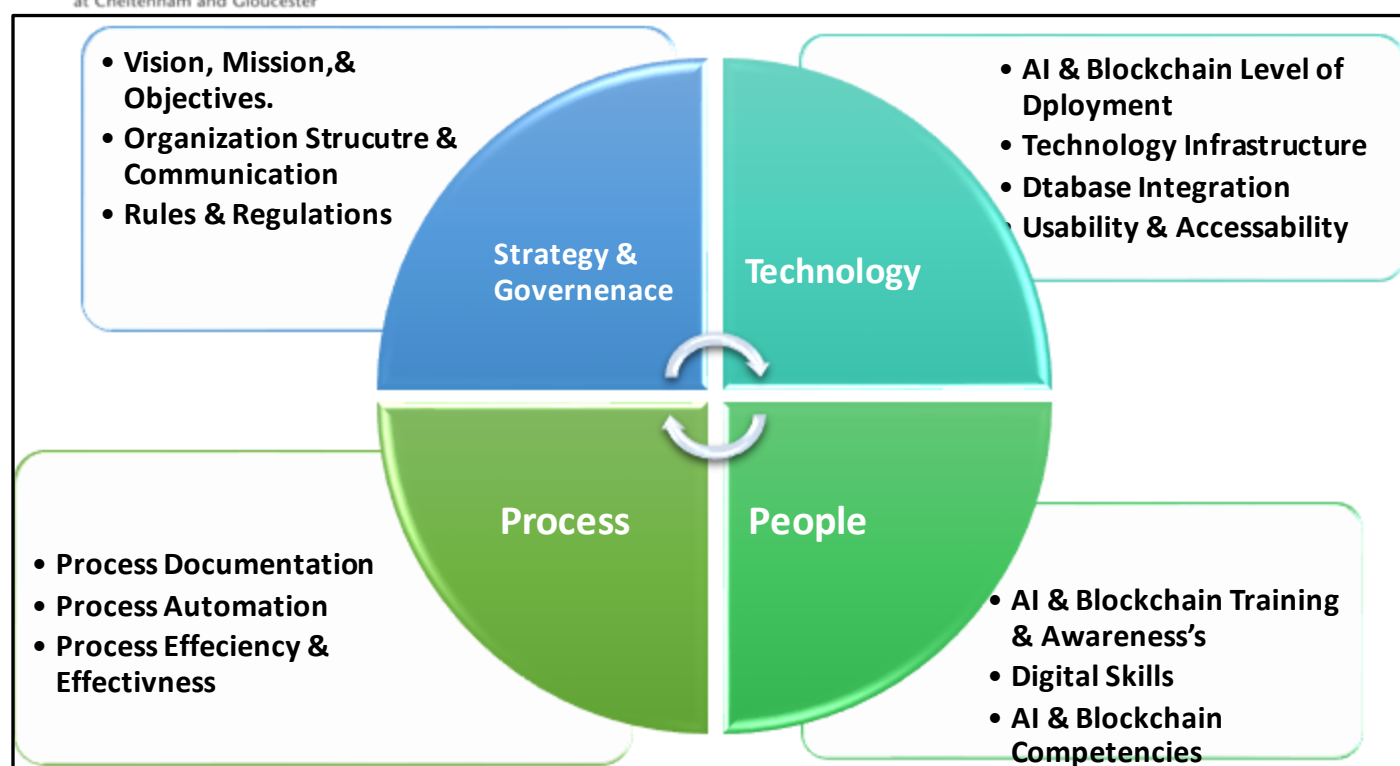


20. Suggested Conceptual Framework



51. Please consider the provisional model shown above – with 5 stages of change (initial to optimized) and four dimensions of change (Strategy, Technology, People and Processes). Do you think these are the most appropriate dimensions for evaluating the implementation and impact of AI/Blockchain Technologies in UAE Public Sector from your experience? Would you suggest other dimensions of change?

52. Do you think each stage above represent the overall stages and right description for levels of deployed AI & Blockchain within UAE Public Sector?



Quest.	From your Experience in Deploying AI & Blockchain within UAE Public Sector, what would the "Vision, Mission, and Objectives" at the Initial Stage look like? What would they be like at the Optimized stage? And at the other stages?				
	Initial	Developed	Defined	Managed	Optimized
	Initial Stage: Vision: To leverage AI and blockchain technologies to enhance efficiency, transparency, and citizen services in the public sector. Mission: To explore and identify potential use cases for AI and blockchain in Ajman's public sector and initiate pilot projects to assess their feasibility and benefits. Objectives: - Conduct a comprehensive assessment of existing processes and identify areas that can benefit from AI and blockchain integration. - Establish partnerships with relevant stakeholders, including government agencies, technology	Development Stage: Vision: To become a regional leader in the adoption and implementation of AI and blockchain technologies in the public sector, setting new standards for efficiency, security, and citizen-centric services. Mission: To scale up successful pilot projects and deploy AI and blockchain solutions across various government departments in Ajman. Objectives: Expand the use of AI and blockchain solutions to	Defined Stage: Vision: To create an ecosystem of interconnected AI and blockchain solutions that enable seamless collaboration, data sharing, and innovation within Ajman's public sector. Mission: To establish standardized frameworks, regulations, and governance structures for the responsible and ethical use of AI and blockchain technologies. Objectives: Develop policies and guidelines for the ethical collection, use, and storage of data within the public sector.	Managed Stage: Vision: To continuously monitor, manage, and optimize AI and blockchain solutions to adapt to evolving technological advancements and meet the dynamic needs of Ajman's public sector. Mission: To establish a dedicated center of excellence for AI and blockchain within the public sector, responsible for research, development, training, and support. Objectives: Establish a governance framework to oversee the	Optimized Stage: Vision: To achieve maximum efficiency, effectiveness, and citizen satisfaction through continuous optimization and innovation of AI and blockchain solutions in the public sector. Mission: To leverage emerging technologies and data-driven insights to deliver personalized, seamless, and citizen-centric services. Objectives: Explore emerging technologies, such as machine learning, natural language processing, and Internet of Things (IoT), to enhance



	providers, and research institutions. c. Develop a roadmap for pilot projects and allocate necessary resources for their implementation. d. Build awareness and capacity among employees and citizens about the benefits and implications of AI and blockchain.	streamline and automate administrative processes, such as document management, identity verification, and financial transactions. b. Enhance data security and privacy by leveraging blockchain's decentralized and immutable nature. c. Foster collaboration among government entities by establishing interoperable systems and shared data platforms. d. Continuously evaluate the impact and effectiveness of deployed solutions and make necessary improvements.	b. Implement interoperability standards to ensure compatibility and exchange of data between different government systems. c. Promote transparency and accountability by leveraging blockchain for auditing, tracking, and monitoring government transactions. d. Encourage innovation by facilitating partnerships with the private sector, startups, and academic institutions.	ethical and responsible deployment of AI and blockchain solutions. b. Conduct regular assessments of deployed solutions to ensure compliance with regulations and address any potential risks. c. Provide ongoing training and upskilling programs for government employees to enhance their knowledge and proficiency in AI and blockchain technologies. d. Foster collaboration and knowledge sharing with other emirates and international counterparts to exchange best practices and lessons learned.	the capabilities of existing AI and blockchain solutions. b. Utilize advanced analytics
Quest.	From your Experience in Deploying AI & Blockchain within UAE Public Sector, what would the “Organization Structure & Communication” at the Initial Stage look like? What would they be like at the Optimized stage? And at the other stages?				
	Initial	Developed	Defined	Managed	Optimized
	Initial Stage: Organization Structure: - A small team or department focused on exploring and researching AI and blockchain applications within the public sector. - The team may consist of experts in AI, blockchain, data analytics, and project management. - The team reports to a senior government official or a	Development Stage: Organization Structure: - The team responsible for AI and blockchain deployment expands to include dedicated specialists for each technology and project management. - Cross-functional teams are	Defined Stage: Organization Structure: - A dedicated AI and blockchain department is established within the public sector organization, responsible for strategy, implementation, and governance. - The department consists of specialized teams focusing	Managed Stage: Organization Structure: - The AI and blockchain department evolves into a center of excellence (CoE) with expanded capabilities and resources. - The CoE oversees the deployment of AI and blockchain solutions across various	Optimized Stage: Organization Structure: - The CoE becomes a mature and self-sustaining entity with well-defined roles and responsibilities. - Specialized teams focus on continuous improvement, emerging technologies, and strategic partnerships.



	designated project sponsor.	formed to work on pilot projects in collaboration with specific government departments.	on different aspects, such as technology integration, data management, policy development, and compliance.	government departments.	- The CoE drives innovation, sets industry standards, and acts as a consultative body for government entities seeking AI and blockchain integration.
	Communication: - Communication channels are informal and primarily take place within the team. - Regular meetings are held to share progress updates, brainstorm ideas, and discuss potential use cases. - Information is disseminated through email, face-to-face discussions, and internal communication tools.	- A project management office (PMO) may be established to oversee and coordinate multiple initiatives. - The team reports to a project director or a senior official responsible for technology adoption. Communication: - Regular project meetings involving the extended team and government department representatives. Communication becomes more structured, with formal project reporting and progress tracking. - Information is shared through project management tools, dedicated collaboration platforms, and departmental meetings.	- Senior management oversees the department, supported by advisory boards or committees comprising industry experts and stakeholders. Communication: - Communication becomes more formalized and standardized. - Regular reporting and updates are shared with senior management and relevant stakeholders. Communication channels include departmental meetings, presentations, official reports, and policy documents. - Collaboration platforms and digital tools are used to facilitate communication and knowledge sharing within the department and across government entities.	- The department establishes partnerships with external organizations, academia, and industry experts to foster innovation and knowledge exchange. - The CoE reports to a high-level executive or board responsible for technology-driven transformation within the public sector. Communication: - Communication practices become more structured and formalized. - Regular reporting and updates are shared with senior executives and the board. - Communication channels include formal presentations, executive briefings, and strategic planning sessions. - The CoE facilitates workshops, conferences, and knowledge-sharing events to promote collaboration and exchange of best practices.	- The CoE reports to the highest levels of government, providing insights and recommendations for policy formulation and strategic decision-making. Communication: - Communication practices are well-established and integrated into the organization's culture. - Strategic communication plans are developed to engage stakeholders and the public on AI and blockchain initiatives. - The CoE takes an active role in thought leadership, publishing research papers, and participating in conferences and international forums. - Communication channels include high-level presentations, public



Quest.	From your Experience in Deploying AI & Blockchain within UAE Public Sector, what would the “Rules & Regulations” at the Initial Stage look like? What would they be like at the Optimized stage? And at the other stages?				
	Initial	Developed	Defined	Managed	Optimized
	. Initial Stage: Rules & Regulations: - Limited or basic regulations may be in place to ensure compliance with existing laws, regulations, and privacy standards. - The focus is on conducting feasibility studies, research, and pilot projects to understand the implications and potential benefits of AI and blockchain. - Risk assessments and impact analyses may be conducted to identify potential legal, ethical, and security concerns.	Development Stage: Rules & Regulations: - The need for specific rules and regulations becomes evident as pilot projects progress and stakeholders recognize the potential of AI and blockchain in the public sector. - Regulatory frameworks may be established to address data privacy, security, intellectual property, and accountability. - Standards and guidelines for AI and blockchain implementation may be developed to ensure interoperability, transparency, and fairness. - Collaboration with regulatory bodies and legal experts is crucial to adapt existing regulations or develop new ones to address emerging challenges and opportunities.	Defined Stage: Rules & Regulations: - Regulatory frameworks and guidelines become more comprehensive and detailed to address the unique characteristics and challenges of AI and blockchain within the public sector. - Legal frameworks may be established to govern data collection, usage, and sharing, ensuring compliance with privacy and security requirements. - Specific regulations may be put in place to address AI algorithm transparency, explainability, and bias mitigation. - Smart contract frameworks and regulations may be developed to provide legal enforceability and consumer protection for blockchain-based transactions.	Managed Stage: Rules & Regulations: - Regulatory frameworks are refined and enhanced based on the experiences and lessons learned from the deployment of AI and blockchain solutions. - Clear rules and guidelines exist for government agencies, private sector partners, and citizens to ensure responsible and ethical use of AI and blockchain technologies. - Compliance requirements, certification processes, and auditing mechanisms may be established to ensure adherence to regulatory standards. - Regulatory bodies and oversight authorities play an active role in monitoring and enforcing compliance.	Optimized Stage: Rules & Regulations: - Regulatory frameworks are mature and regularly updated to keep pace with technological advancements and emerging challenges. - Adaptive regulatory frameworks are in place to address emerging AI and blockchain applications, such as autonomous systems, decentralized finance, or AI-driven decision-making. - Continuous evaluation and review of regulations are conducted to balance innovation, privacy, security, and societal impact. - International collaboration and harmonization of regulations may occur to facilitate cross-border AI and blockchain implementations and interoperability.
Quest.	From your Experience in Deploying AI & Blockchain within UAE Public Sector, what would the “Level of Implemented AI & Blockchain” at the Initial Stage look like? What would they be like at the Optimized stage? And at the other stages?				
	Initial	Developed	Defined	Managed	Optimized
	. Initial Stage:	Developed Stage:	Defined Stage:	Managed Stage:	Optimized Stage:



	At the initial stage, the implementation of AI and blockchain within the UAE public sector would typically involve pilot projects and proof-of-concepts. AI applications might include chatbots for basic citizen queries or data analytics for improving operational efficiency. In terms of blockchain, it could involve creating digital ledgers for certain processes, such as record keeping or identity management. The focus would be on exploring the technology's capabilities and feasibility.	As the implementation progresses, the AI and blockchain solutions would move to a developed stage. AI applications would become more sophisticated, leveraging machine learning and natural language processing techniques. For example, AI-powered systems might be used for sentiment analysis to gauge public opinion, or for predictive analytics to optimize resource allocation. In terms of blockchain, more complex decentralized applications (DApps) could be developed for areas like supply chain management or transparent governance.	At the defined stage, AI and blockchain implementations would be well-established within the UAE public sector. AI systems would be integrated into various processes and decision-making workflows, driving automation and improving service delivery. Natural language understanding would be more advanced, enabling complex interactions with citizens and enabling personalized services. Blockchain implementations would be securely integrated across multiple government entities, facilitating transparent and auditable transactions.	In the managed stage, AI and blockchain solutions would be actively monitored and optimized. AI systems would be continuously trained and updated to improve performance and accuracy. This stage would involve a strong governance framework to ensure ethical and responsible use of AI technologies. Blockchain networks would be regularly audited for security and scalability, and necessary upgrades would be implemented to meet evolving requirements.	At the optimized stage, the implementation of AI and blockchain within the UAE public sector would have reached a high level of maturity. AI systems would be self-learning and adaptive, leveraging advanced techniques like deep learning and reinforcement learning. Decision-making processes would be significantly optimized, enabling proactive and data-driven policy-making. Blockchain would be a foundational technology, ensuring secure, immutable, and interoperable data sharing across government entities and even international collaborations.
Quest.	From your Experience in Deploying AI & Blockchain within UAE Public Sector, what would the “Technology Infrastructure” at the Initial Stage look like? What would they be like at the Optimized stage? And at the other stages?				
	Initial	Developed	Defined	Managed	Optimized
	Initial Stage: At the initial stage, the technology infrastructure for AI and blockchain within the UAE public sector would typically involve setting up basic components. For AI, this may include establishing a cloud-	Developed Stage: As the implementation progresses, the technology infrastructure for AI and blockchain would become more sophisticated.	Defined Stage: At the defined stage, the technology infrastructure would be well-established and optimized for the specific AI and blockchain use cases within the UAE public	Managed Stage: In the managed stage, the technology infrastructure would be actively monitored and managed to ensure optimal performance and security. AI	. Optimized Stage: At the optimized stage, the technology infrastructure would be highly advanced and tailored to the specific requirements of AI and blockchain within the UAE



	based infrastructure to support data storage and processing. It may also involve the deployment of initial AI algorithms and models on servers or dedicated hardware. Regarding blockchain, a network infrastructure with nodes and validators would be set up to support the decentralized nature of the technology.	For AI, there would be a need for increased computational power and storage capacity to handle larger datasets and more complex algorithms. High-performance computing resources and specialized hardware, such as GPUs or TPUs, might be employed to accelerate AI training and inference tasks. In terms of blockchain, the infrastructure would expand to support a larger number of nodes and facilitate secure data validation and consensus mechanisms.	sector. AI infrastructure would involve a scalable and distributed architecture, capable of handling large volumes of data and supporting real-time analytics. It may include advanced data management systems, automated data pipelines, and robust security measures to protect sensitive information. Blockchain infrastructure would be designed to ensure high performance, scalability, and interoperability across multiple government entities, potentially utilizing permissioned or hybrid blockchain networks.	infrastructure would involve continuous monitoring of resource utilization, performance metrics, and data quality. It may include advanced monitoring and management tools, automated deployment pipelines, and comprehensive data governance frameworks. Blockchain infrastructure would be monitored for network health, security vulnerabilities, and compliance with established standards. Upgrades and optimizations would be implemented as needed to maintain reliability and efficiency.	public sector. AI infrastructure would leverage cutting-edge technologies such as edge computing, federated learning, or distributed AI systems for enhanced privacy and efficiency. It would be integrated with other emerging technologies like Internet of Things (IoT) devices or big data platforms for more comprehensive insights. Blockchain infrastructure would be highly scalable, utilizing sharding, sidechains, or interoperability protocols to handle large-scale deployments and international collaborations.
Quest.	From your Experience in Deploying AI & Blockchain within UAE Public Sector, what would the “Database Integration” at the Initial Stage look like? What would they be like at the Optimized stage? And at the other stages?				
	Initial	Developed	Defined	Managed	Optimized
	Initial Stage: At the initial stage, database integration within the UAE Public Sector in Ajman would typically involve connecting and integrating basic data sources. This could include integrating existing databases, spreadsheets, or data repositories into a centralized system that can be accessed and used	Developed Stage: As the implementation progresses, the database integration would become more sophisticated. Multiple data sources from various departments or entities within the Ajman public sector would be	Defined Stage: At the defined stage, the database integration within the Ajman public sector would be well-established and governed by clear standards and protocols. Data sharing and interoperability would be prioritized to enable seamless information	Managed Stage: In the managed stage, the database integration would be actively monitored and managed to ensure data integrity, security, and reliability. Data governance practices would be implemented to establish policies, roles,	Optimized Stage: At the optimized stage, the database integration within the Ajman public sector would be highly advanced and optimized for performance and agility. Real-time data integration and synchronization capabilities would be implemented to enable up-to-date and accurate



	for AI and blockchain applications. The focus would be on consolidating data and ensuring basic connectivity between the various data sources.	integrated to create a comprehensive data ecosystem. This may involve data cleansing, data transformation, and data standardization processes to ensure consistency and quality across integrated databases. The integration could be achieved through middleware, data integration platforms, or custom-built connectors.	exchange between different departments and systems. This would involve implementing standardized data models, APIs, or data exchange formats to ensure compatibility and ease of integration. The integration process would be more automated and scalable, reducing manual effort and improving efficiency.	and responsibilities for data management and integration. Data quality checks, validation processes, and error handling mechanisms would be in place to maintain the accuracy and consistency of integrated data. Data access controls and encryption measures would be applied to protect sensitive information.	information across systems. Integration with emerging technologies such as IoT devices, edge computing, or cloud services may be considered to expand data sources and enhance real-time insights. Advanced analytics and data management tools would be integrated to support AI-driven decision-making processes. The database integration process would require collaboration between IT teams, data managers, and domain experts to identify data sources, establish integration protocols, and ensure data consistency and security. It would also involve continuous monitoring, maintenance, and optimization to adapt to changing data requirements and technological advancements.
Quest.	From your Experience in Deploying AI & Blockchain within UAE Public Sector, what would the “Technology Usability & Accessibility” at the Initial Stage look like? What would they be like at the Optimized stage? And at the other stages?				
	Initial	Developed	Defined	Managed	Optimized
	Initial Stage: At the initial stage, technology usability and accessibility within the Ajman public sector would typically focus on basic functionality	Developed Stage: As the implementation progresses, technology usability and accessibility	Defined Stage: At the defined stage, technology usability and accessibility within the Ajman public	Managed Stage: In the managed stage, technology usability and accessibility would be actively	Optimized Stage: At the optimized stage, technology usability and accessibility within the Ajman public sector would reach a



	and availability. Usability would be limited, and the applications may require technical expertise to operate. Accessibility could be limited to a smaller group of users within the organization, and the technology might be accessible only through specific devices or interfaces. The focus would be on getting the technology up and running and demonstrating its potential.	would improve. User interfaces and workflows would be designed with user experience (UX) principles in mind, making the applications more intuitive and user-friendly. Accessibility would be expanded to reach a wider range of users within the Ajman public sector, ensuring compatibility with different devices and screen sizes. Training programs and user support mechanisms would be established to facilitate adoption and efficient usage.	sector would be well-established and standardized. User interfaces would be optimized for ease of use, incorporating feedback from users and stakeholders. The applications would support multiple languages, accommodate diverse user needs, and adhere to accessibility standards to ensure inclusivity. Documentation, tutorials, and self-help resources would be readily available to support users in navigating the technology effectively.	monitored and managed to ensure continuous improvement. User feedback and analytics would be collected to identify areas for enhancement and address any usability or accessibility issues. User-centered design methodologies may be employed to continuously refine the user interfaces and workflows. Support channels, such as help desks or online forums, would be in place to promptly assist users with their queries or issues.	high level of maturity and optimization. The applications would provide a seamless and intuitive user experience, requiring minimal training or technical expertise. Accessibility features would be comprehensive, ensuring compliance with accessibility standards and catering to users with diverse needs. User feedback and sentiment analysis would be used to further enhance usability and accessibility, with regular updates and refinements implemented based on user insights.
Quest.	From your Experience in Deploying AI & Blockchain within UAE Public Sector, what would the “AI & Blockchain Training & Awareness’s” at the Initial Stage look like? What would they be like at the Optimized stage? And at the other stages?				
	Initial	Developed	Defined	Managed	Optimized
	Initial Stage: At the initial stage, training and awareness initiatives for AI and blockchain within the UAE Public Sector would typically focus on building foundational knowledge and awareness among relevant stakeholders. This could include organizing workshops, seminars, or training sessions to introduce the concepts of AI and blockchain and their potential applications. The objective would be	Developed Stage: As the implementation progresses, training and awareness initiatives would become more comprehensive and targeted. Training programs would be designed to upskill employees and stakeholders in specific AI and blockchain technologies, tools, and methodologies. This could	Defined Stage: At the defined stage, training and awareness initiatives would be well-established and integrated into the organizational culture. Training programs would cater to different levels of expertise, from basic awareness programs for general staff to advanced technical training for AI and blockchain	Managed Stage: In the managed stage, training and awareness initiatives would be actively managed and monitored to ensure continuous learning and skill development. Training needs assessments would be conducted periodically to identify skill gaps and tailor training programs accordingly.	Optimized Stage: At the optimized stage, training and awareness initiatives would be highly advanced and aligned with the specific needs of the UAE Public Sector. Continuous learning and professional development would be encouraged through mentorship programs, collaboration with academia, and participation in



	to create a general understanding of the technologies and their benefits, fostering a sense of curiosity and interest.	involve conducting specialized training sessions, certifications, or online courses. Awareness campaigns may include showcasing successful AI and blockchain use cases within the UAE Public Sector, highlighting their impact, and generating enthusiasm among stakeholders.	professionals. The focus would be on practical implementation, including hands-on training, case studies, and simulation exercises. Awareness initiatives would include regular communication channels, newsletters, or internal knowledge-sharing platforms to keep stakeholders updated on AI and blockchain advancements and best practices.	Awareness initiatives would involve regular updates on emerging AI and blockchain trends, regulations, and ethical considerations. Feedback mechanisms, such as surveys or feedback sessions, would be in place to gather insights and improve the effectiveness of training and awareness initiatives.	conferences or industry events. Specialized training programs would be offered to develop expertise in cutting-edge AI and blockchain technologies. Awareness initiatives would focus on fostering innovation and exploring new possibilities for AI and blockchain within the public sector.
Quest.	From your Experience in Deploying AI & Blockchain within UAE Public Sector, what would the “Employee Digital Skills” at the Initial Stage look like? What would they be like at the Optimized stage? And at the other stages?				
	Initial	Developed	Defined	Managed	Optimized
	Initial Stage: At the initial stage, training and awareness initiatives for AI and blockchain within the UAE Public Sector would typically focus on building foundational knowledge and awareness among relevant stakeholders. This could include organizing workshops, seminars, or training sessions to introduce the concepts of AI and blockchain and their potential applications. The objective would be to create a general understanding of the technologies and their benefits, fostering a sense of curiosity and interest.	Developed Stage: As the implementation progresses, training and awareness initiatives would become more comprehensive and targeted. Training programs would be designed to upskill employees and stakeholders in specific AI and blockchain technologies, tools, and methodologies. This could involve conducting specialized training sessions, certifications, or online courses. Awareness	Defined Stage: At the defined stage, training and awareness initiatives would be well-established and integrated into the organizational culture. Training programs would cater to different levels of expertise, from basic awareness programs for general staff to advanced technical training for AI and blockchain professionals. The focus would be on practical implementation, including hands-on training, case studies, and simulation	Managed Stage: In the managed stage, training and awareness initiatives would be actively managed and monitored to ensure continuous learning and skill development. Training needs assessments would be conducted periodically to identify skill gaps and tailor training programs accordingly. Awareness initiatives would involve regular updates on emerging AI and blockchain trends, regulations, and	Optimized Stage: At the optimized stage, training and awareness initiatives would be highly advanced and aligned with the specific needs of the UAE Public Sector. Continuous learning and professional development would be encouraged through mentorship programs, collaboration with academia, and participation in conferences or industry events. Specialized training programs would be offered to develop expertise in cutting-edge AI



		campaigns may include showcasing successful AI and blockchain use cases within the UAE Public Sector, highlighting their impact, and generating enthusiasm among stakeholders.	exercises. Awareness initiatives would include regular communication channels, newsletters, or internal knowledge-sharing platforms to keep stakeholders updated on AI and blockchain advancements and best practices.	ethical considerations. Feedback mechanisms, such as surveys or feedback sessions, would be in place to gather insights and improve the effectiveness of training and awareness initiatives.	and blockchain technologies. Awareness initiatives would focus on fostering innovation and exploring new possibilities for AI and blockchain within the public sector.
Quest.	From your Experience in Deploying AI & Blockchain within UAE Public Sector, what would the “Employee AI & Blockchain Competencies” at the Initial Stage look like? What would they be like at the Optimized stage? And at the other stages?				
	Initial	Developed	Defined	Managed	Optimized
	Initial Stage: At the initial stage, employee AI and blockchain competencies within the UAE Public Sector would typically reflect a basic understanding of the technologies. Employees would have a general awareness of AI and blockchain concepts, their potential applications, and the benefits they offer. The focus would be on building foundational knowledge and developing a preliminary understanding of the technologies.	Developed Stage: As the implementation progresses, employee AI and blockchain competencies would be enhanced and expanded. Training programs would focus on developing technical skills and competencies specific to AI and blockchain applications. This could include understanding data analysis techniques, machine learning algorithms, blockchain protocols, or smart contract development. Employees would gain proficiency in using relevant tools and platforms	Defined Stage: At the defined stage, employee AI and blockchain competencies would be well-defined and aligned with the specific requirements of the UAE Public Sector's AI and blockchain initiatives. Competency frameworks would be established to outline the necessary skills and knowledge for different roles within the organization. Training programs would be tailored to different job functions and levels of expertise. Employees would develop competencies in areas such as AI model development, data	Managed Stage: In the managed stage, employee AI and blockchain competencies would be actively managed and continuously updated. Training and development programs would be regularly evaluated and enhanced to address emerging technologies and industry trends. Employees would participate in specialized training programs, attend conferences or workshops, and engage in continuous learning opportunities to stay abreast of advancements in AI and blockchain.	Optimized Stage: At the optimized stage, employee AI and blockchain competencies would be highly advanced and aligned with the cutting-edge developments in the field. Employees would have deep expertise in specialized areas of AI and blockchain. They would possess advanced skills in AI algorithm design, deep learning, blockchain architecture, AI and blockchain integration, or AI-driven decision-making. They would actively contribute to research and development efforts, publish papers, and participate in industry forums to showcase their expertise.



		associated with AI and blockchain.	governance, blockchain implementation, or AI and blockchain project management.	Competency assessments and performance evaluations would be conducted to measure and track employee proficiency.	
Quest.	From your Experience in Deploying AI & Blockchain within UAE Public Sector, what would the “Processes Documentation” at the Initial Stage look like? What would they be like at the Optimized stage? And at the other stages?				
	Initial	Developed	Defined	Managed	Optimized
	Initial Stage: At the initial stage, processes documentation within the UAE Public Sector would typically be minimal. The focus would be on understanding the requirements and objectives of the AI and blockchain initiatives. Documentation may include high-level process diagrams or flowcharts to outline the intended workflow and identify key stakeholders. The documentation may also capture basic guidelines and protocols related to data handling, security, and privacy.	Developed Stage: As the implementation progresses, processes documentation would become more comprehensive and detailed. Processes would be documented in greater depth, including the specific tasks, responsibilities, and decision points within the AI and blockchain workflows. Documentation may include standard operating procedures (SOPs), process maps, data flow diagrams, or business process models. These documents would serve as a reference for employees involved in the AI and blockchain projects, ensuring consistency and adherence to defined processes.	Defined Stage: At the defined stage, processes documentation would be well-established and standardized. Processes would be thoroughly documented, including step-by-step instructions, guidelines, and best practices. The documentation would cover various aspects of AI and blockchain implementation, such as data acquisition, preprocessing, model development, blockchain integration, and compliance considerations. Documentation would align with recognized process frameworks and may incorporate industry standards or regulatory requirements specific to the UAE Public Sector.	Managed Stage: In the managed stage, processes documentation would be actively managed and continuously updated. Processes and workflows would be regularly reviewed and refined based on feedback, lessons learned, and emerging best practices. Documentation would include version control mechanisms to track changes and updates. The documentation would also capture troubleshooting guidelines, FAQs, and known issues to support efficient problem-solving and decision-making during the AI and blockchain initiatives.	Optimized Stage: At the optimized stage, processes documentation would be highly advanced and optimized for efficiency and effectiveness. Processes would be documented in a comprehensive and streamlined manner, eliminating redundancies and bottlenecks. Documentation would be user-friendly, accessible, and searchable, facilitating knowledge sharing and collaboration. The documentation would incorporate automation opportunities, leveraging AI and blockchain technologies to streamline processes further. Documentation would also include key performance indicators (KPIs) and metrics to measure the effectiveness and efficiency of the AI and blockchain workflows.



Quest.	From your Experience in Deploying AI & Blockchain within UAE Public Sector, what would the “Processes Automation” at the Initial Stage look like? What would they be like at the Optimized stage? And at the other stages?				
	Initial	Developed	Defined	Managed	Optimized
	Initial Stage: At the initial stage, processes automation within the UAE Public Sector would typically be limited. The focus would be on identifying opportunities for automation and exploring the potential benefits. Basic processes, such as data entry, data preprocessing, or basic calculations, may be automated using simple tools or scripts. This stage would serve as a foundation for understanding automation possibilities and laying the groundwork for further automation efforts.	Developed Stage: As the implementation progresses, processes automation would become more sophisticated and integrated. Automation techniques, such as robotic process automation (RPA), may be utilized to automate repetitive and rule-based tasks across different departments or functions. This could involve automating data extraction from documents, generating reports, or automating data transfers between systems. The automation solutions may involve custom development or the utilization of commercial automation tools.	Defined Stage: At the defined stage, processes automation would be well-defined and aligned with the specific requirements of the UAE Public Sector's AI and blockchain initiatives. Automation opportunities would be systematically identified and evaluated. The focus would be on automating end-to-end processes and integrating various systems and applications. Intelligent automation techniques, such as AI-driven process automation (AIDPA) or machine learning algorithms, may be employed to handle more complex tasks, such as data analysis, decision-making, or anomaly detection.	Managed Stage: In the managed stage, processes automation would be actively managed and monitored to ensure efficiency and effectiveness. Automation efforts would be integrated into the organizational culture and strategy. The automation solutions would be regularly evaluated and optimized based on performance metrics and feedback. The focus would be on continuous improvement and leveraging emerging technologies and tools for automation, such as natural language processing (NLP), computer vision, or blockchain-based smart contracts.	Optimized Stage: At the optimized stage, processes automation would be highly advanced and optimized for maximum efficiency and value generation. Automation would be embedded throughout the organization, supporting a digital workforce and enhancing operational agility. Intelligent automation solutions would be deployed to handle complex decision-making processes, predictive analytics, or cognitive tasks. Automation would be seamlessly integrated with AI and blockchain technologies to enable end-to-end automation and secure, transparent process execution.
Quest.	From your Experience in Deploying AI & Blockchain within UAE Public Sector, what would the “Processes Efficiency & Effectiveness” at the Initial Stage look like? What would they be like at the Optimized stage? And at the other stages?				
	Initial	Developed	Defined	Managed	Optimized
	Initial Stage: At the initial stage, processes efficiency and effectiveness within the UAE Public Sector would typically be in the early stages of	Developed Stage: As the implementation progresses, processes efficiency and effectiveness	Defined Stage: At the defined stage, processes efficiency and effectiveness would be well-defined and	Managed Stage: In the managed stage, processes efficiency and effectiveness would be actively managed and	Optimized Stage: At the optimized stage, processes efficiency and effectiveness would be highly advanced and continuously



	assessment and improvement. The focus would be on identifying inefficiencies and bottlenecks in existing processes. Key performance indicators (KPIs) may be defined to measure process cycle times, resource utilization, or error rates. Baseline data would be collected to establish a benchmark for future improvements.	would be enhanced through targeted improvements. Process optimization techniques, such as Lean Six Sigma or process reengineering, may be employed to streamline workflows, reduce waste, and improve productivity. KPIs would be actively tracked and analyzed to identify areas for improvement. Automation and digitalization efforts would be introduced to eliminate manual errors, reduce processing times, and enhance data accuracy.	aligned with the specific requirements of the UAE Public Sector's AI and blockchain initiatives. Key processes would be thoroughly documented, and performance metrics would be clearly established. Continuous improvement methodologies, such as Kaizen or Agile, would be applied to identify and implement process enhancements. Automation and AI technologies would be integrated to automate routine tasks, increase process accuracy, and enable real-time data analysis for decision-making.	monitored to ensure ongoing improvement. Process performance would be measured against established KPIs, and regular performance reviews would be conducted. Feedback from stakeholders and end-users would be gathered to identify pain points and areas for further optimization. Optimization efforts would be data-driven, leveraging analytics and AI algorithms to identify patterns, anomalies, and optimization opportunities.	optimized for maximum performance. Continuous process monitoring and analysis would be conducted to identify emerging improvement areas. Advanced technologies like AI, machine learning, and predictive analytics would be leveraged to proactively identify process bottlenecks, anticipate issues, and enable data-driven decision-making. Processes would be agile, adaptable, and able to handle evolving requirements and changing circumstances.



21. Main Challenges, Drivers, barriers/obstacles behind implementing technologies

17. From Your Experience, what are the Main Challenges behind Implementing AI & Blockchain Solutions within UAE Public Sector?

there are several challenges commonly associated with their implementation in any public sector context. Here are some of the main challenges that organizations may face:

1. **Regulatory and Legal Frameworks:** Implementing AI and blockchain solutions in the public sector requires navigating complex regulatory and legal frameworks. Ensuring compliance with data protection, privacy, security, and other relevant regulations can be challenging, particularly when handling sensitive citizen information.
2. **Data Availability and Quality:** AI and blockchain solutions heavily rely on data availability and quality. Public sector organizations may face challenges in accessing and aggregating relevant data from multiple sources, ensuring its accuracy, completeness, and interoperability. Data silos and legacy systems can hinder the seamless integration of data required for effective AI and blockchain applications.
3. **Change Management and Workforce Transformation:** Implementing AI and blockchain solutions often requires significant changes in organizational processes, roles, and responsibilities. Public sector organizations may face challenges in managing the cultural and workforce transformations necessary for successful implementation. Upskilling employees, addressing resistance to change, and ensuring the workforce is ready to leverage new technologies can be complex.
4. **Integration with Existing Systems:** Integrating AI and blockchain solutions with existing IT infrastructure and legacy systems can be a challenge. Ensuring seamless integration, data interoperability, and compatibility with diverse systems and platforms can require significant technical expertise and investment.
5. **Ethical and Bias Considerations:** AI solutions raise concerns related to ethics, fairness, and bias. Ensuring that AI algorithms and models are transparent, explainable, and free from biases is crucial in the public sector. Developing governance frameworks and ethical guidelines to address these concerns can be challenging.
6. **Interagency Collaboration and Data Sharing:** Implementing AI and blockchain solutions in the public sector often involves collaboration among multiple agencies and departments. Ensuring seamless data sharing, establishing data governance protocols, and aligning processes and objectives across agencies can present challenges, particularly in highly bureaucratic environments.
7. **Cost and Return on Investment:** Implementing AI and blockchain solutions may involve significant upfront costs, including technology infrastructure, talent acquisition, and training. Public sector organizations need to carefully assess the return on investment (ROI) and justify the allocation of resources for these initiatives.

Addressing these challenges requires a comprehensive strategy that encompasses regulatory compliance, data management, change management, collaboration, and careful planning. Public sector organizations need to collaborate with relevant stakeholders, build the necessary capabilities, and develop robust governance frameworks to overcome these challenges and successfully implement AI and blockchain solutions.

18. From Your Experience, what are the Main Drivers to enhance Implementing AI & Blockchain Solutions within UAE Public Sector?

there are several drivers that commonly motivate public sector organizations to adopt these technologies. Here are some of the main drivers:

1. **Efficiency and Cost Savings:** AI and blockchain solutions have the potential to streamline processes, automate repetitive tasks, and reduce operational costs. By leveraging AI algorithms and machine learning, public sector organizations can optimize resource allocation, improve decision-making, and achieve greater efficiency in service delivery.



2. Enhanced Citizen Services: AI and blockchain solutions can enable the delivery of personalized and citizen-centric services. Chatbots and virtual assistants powered by AI can provide instant support and information to citizens, improving their experience. Blockchain can facilitate secure and transparent transactions, identity verification, and records management, enhancing trust and accountability in public services.

3. Data-Driven Decision-Making: AI technologies can analyze large volumes of data, uncover patterns, and generate insights that support evidence-based decision-making in the public sector. By leveraging AI algorithms, public sector organizations can gain a deeper understanding of citizen needs, identify trends, and develop targeted policies and interventions.

4. Improved Governance and Transparency: Blockchain technology offers decentralized and immutable records that enhance transparency, traceability, and accountability in the public sector. By leveraging blockchain, public sector organizations can create tamper-proof records, streamline auditing processes, and enable secure data sharing across agencies, enhancing governance and reducing fraud.

5. Accelerated Digital Transformation: AI and blockchain technologies are key enablers of digital transformation in the public sector. By adopting these technologies, organizations can modernize their infrastructure, improve interoperability, and enable seamless integration across systems. This enables the transition to digital processes, reduces paperwork, and enhances collaboration among government entities.

6. Economic Diversification and Innovation: The adoption of AI and blockchain solutions aligns with the UAE's vision for economic diversification and innovation. By embracing emerging technologies, the UAE Public Sector aims to position itself as a leader in the digital economy, attract foreign investments, and foster innovation and entrepreneurship.

7. International Standards and Best Practices: The adoption of AI and blockchain aligns with global standards and best practices in governance, data security, and digital transformation. By embracing these technologies, the UAE Public Sector can align itself with international benchmarks, enhance its reputation, and facilitate collaboration and data exchange with other countries.

These drivers provide compelling reasons for the UAE Public Sector to explore and implement AI and blockchain solutions. By leveraging these technologies strategically, public sector organizations can transform their operations, deliver better services to citizens, and contribute to the country's vision of a digital and innovative government.

19. What are the main Internal & External, barriers/obstacles of adopting/ implementing and deploying AI or Blockchain technologies and their related solutions to enhance efficiency and effectiveness of UAE Public Sector Transactions?

Adopting and implementing AI and blockchain technologies in the UAE Public Sector may face both internal and external barriers and obstacles. Here are some of the main challenges that organizations may encounter:

Internal Barriers:

1. Lack of Awareness and Understanding: One of the internal barriers is a lack of awareness and understanding of AI and blockchain technologies among decision-makers and employees. This can hinder the adoption and implementation process as there may be resistance to change and a reluctance to embrace new technologies.

2. Limited Technical Expertise: Implementing AI and blockchain technologies requires specialized technical expertise. Public sector organizations may face challenges in recruiting and retaining professionals with the necessary skills and knowledge to develop and manage these technologies effectively.

3. Legacy Systems and Infrastructure: Legacy systems and outdated IT infrastructure can pose challenges to the adoption of AI and blockchain technologies. Integrating these technologies with existing systems may require significant modifications or even a complete overhaul of the infrastructure, which can be costly and time-consuming.

4. Data Quality and Accessibility: AI and blockchain technologies rely on high-quality and accessible data. Public sector organizations may face challenges in ensuring data quality, cleaning and preprocessing data, and making it accessible for AI algorithms or blockchain applications. Data silos and inconsistent data formats can further complicate the implementation process.

5. Change Management and Organizational Culture: Implementing AI and blockchain technologies often necessitates changes in workflows, roles, and organizational culture. Resistance to change, lack of buy-in from employees, and a hierarchical organizational structure can hinder the adoption and deployment of these technologies.

External Barriers:

1. Regulatory and Legal Frameworks: Compliance with regulatory and legal frameworks is crucial in the public sector. AI and blockchain technologies raise various legal and ethical concerns, such as data privacy, security, liability, and intellectual property. Navigating these complex frameworks and ensuring compliance can be challenging.



2. Interoperability and Standardization: Achieving interoperability and standardization across different government entities and systems is essential for the effective deployment of AI and blockchain technologies. Lack of common standards, data formats, and protocols can impede data sharing and integration, limiting the potential benefits of these technologies.

3. Data Privacy and Security Concerns: AI and blockchain technologies require handling and storing sensitive citizen data. Public sector organizations must address concerns related to data privacy and security, ensuring that proper safeguards are in place to protect citizens' information from unauthorized access, breaches, or misuse.

4. Public Trust and Acceptance: Gaining public trust and acceptance is crucial for the successful implementation of AI and blockchain technologies in the public sector. Addressing concerns related to transparency, fairness, bias, and accountability is essential to build public confidence in these technologies and their applications.

5. Financial and Resource Constraints: Implementing AI and blockchain technologies requires significant financial investment and allocation of resources. Public sector organizations may face budget constraints or limited resources, which can impact the pace and scale of implementation.

Overcoming these barriers and obstacles requires a comprehensive approach. It involves raising awareness, building technical expertise, addressing regulatory challenges, fostering collaboration, and establishing clear governance frameworks. Engaging stakeholders, investing in training programs, and creating a culture of innovation and agility are also vital to successfully adopt and deploy AI and blockchain technologies in the UAE Public Sector.

20. What other comments do you have about improving the adopting/ implementing and deploying AI or Blockchain technologies and their related solutions within UAE Public Sector Entities?

When it comes to improving the adoption, implementation, and deployment of AI and blockchain technologies in the UAE Public Sector, there are a few additional points to consider:

1. Foster Collaboration and Knowledge Sharing: Encouraging collaboration and knowledge sharing among public sector entities is crucial. Establishing platforms, forums, and communities of practice where organizations can exchange experiences, best practices, and lessons learned can accelerate the adoption and implementation process.

2. Develop Clear Governance Frameworks: Establishing clear governance frameworks for AI and blockchain technologies is essential. These frameworks should address issues such as data privacy, security, ethical considerations, accountability, and compliance with regulatory requirements. Having robust governance structures in place builds trust and ensures responsible use of these technologies.

3. Prioritize Data Management and Infrastructure: Data is at the core of AI and blockchain technologies. Public sector organizations should invest in data management strategies, including data quality, data governance, and data interoperability. Additionally, modernizing IT infrastructure to support the seamless integration and processing of data is crucial for effective implementation.

4. Create Sandboxes and Testbeds: Creating sandboxes and testbeds allows public sector entities to experiment with AI and blockchain technologies in a controlled environment. This enables organizations to understand the potential applications, identify challenges, and test solutions before scaling up the implementation. Sandboxes also facilitate collaboration with academia, startups, and industry experts to explore innovative use cases.

5. Foster Public-Private Partnerships: Collaborating with the private sector, startups, and research institutions can bring in expertise, innovation, and resources to accelerate the implementation of AI and blockchain technologies. Public-private partnerships can foster knowledge exchange, co-creation of solutions, and sharing of investment costs.

6. Emphasize Continuous Learning and Training: Investing in continuous learning and training programs is crucial to build the necessary skills and knowledge among employees. Training programs should target not only technical skills but also encompass areas such as data ethics, change management, and cybersecurity. This enables employees to embrace and leverage AI and blockchain technologies effectively.

7. Promote Citizen Engagement and Education: Engaging citizens and educating them about the benefits, impact, and responsible use of AI and blockchain technologies is important. Providing clear communication channels, seeking public input, and addressing concerns regarding privacy, security, and transparency can foster public acceptance and trust.

8. Foster an Innovation Ecosystem: Creating an innovation ecosystem that supports research and development, entrepreneurship, and technology transfer can stimulate the adoption and implementation of AI and blockchain technologies. Offering funding opportunities, innovation challenges, and incubation programs can attract innovators and startups to develop solutions tailored to the public sector's needs.



By considering these points, the UAE Public Sector can create an enabling environment for the successful adoption, implementation, and deployment of AI and blockchain technologies.

effective services to its citizens.

This will support the government's vision of a digital and innovative public sector that delivers efficient and

Thank you so much for your time and consideration in this research.

Appendix F.4: Response 4

Appendix A-Focus Group Sessions – Discussions Pillars

Name of participant	
Date of the sessions	
Private or Local Organization	
Emirate/Federal	
Position title	
Number of years' experience	
Level of education	
Role in implementing the AI / Blockchain Technologies	

22. Introduction:

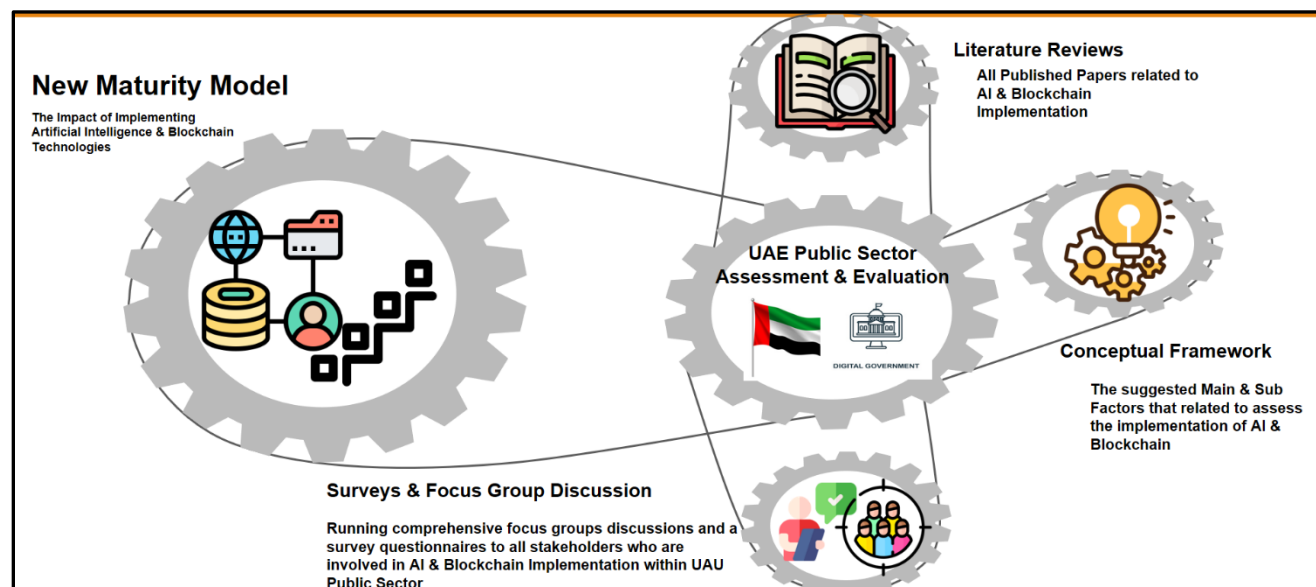
This project mainly aims to define a New Maturity Model for assessing the Implementation of Artificial Intelligence & Blockchain technologies, within UAE Public Sector (UAE Federal Government, Abu Dhabi Local Government, Dubai Local



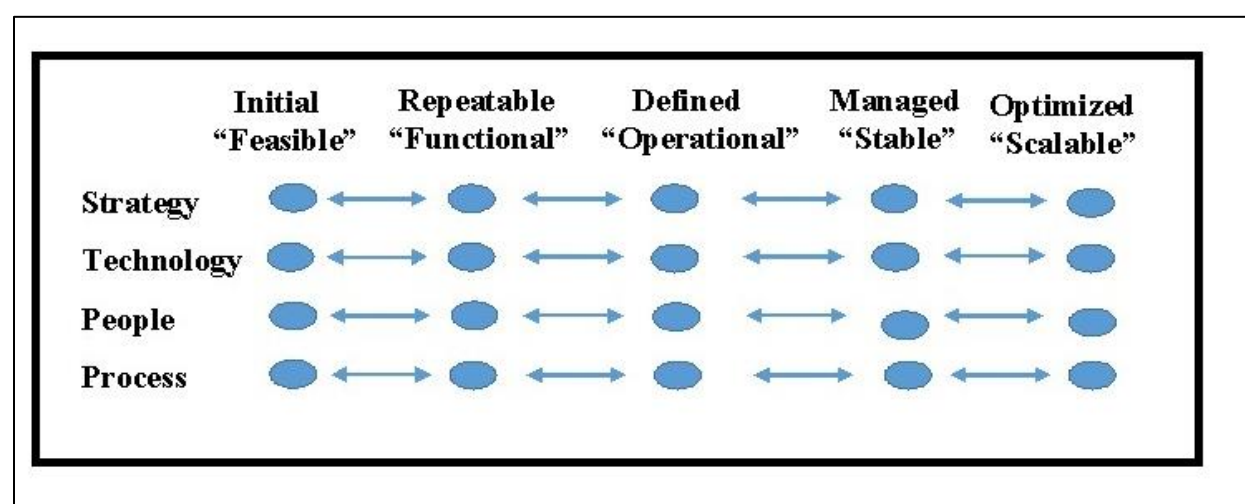
Government, and Ajman Local Government), And Evaluate the Impact of two technologies to the public sector transactions productivity, efficiency of processes and systems & the effectiveness of achieving public sector targets.

23. Research Approach:

Through the published literature reviews and based on what researcher suggest the main factors that consist of conceptual framework, we will discuss with each subject matter expert within the fields to define the main and sub factors that formulate the conceptual framework and lead us to design the New Maturity Model that will be used by UAE public sector to evaluate the Implementation Impact of Artificial Intelligence & Blockchain Technologies.



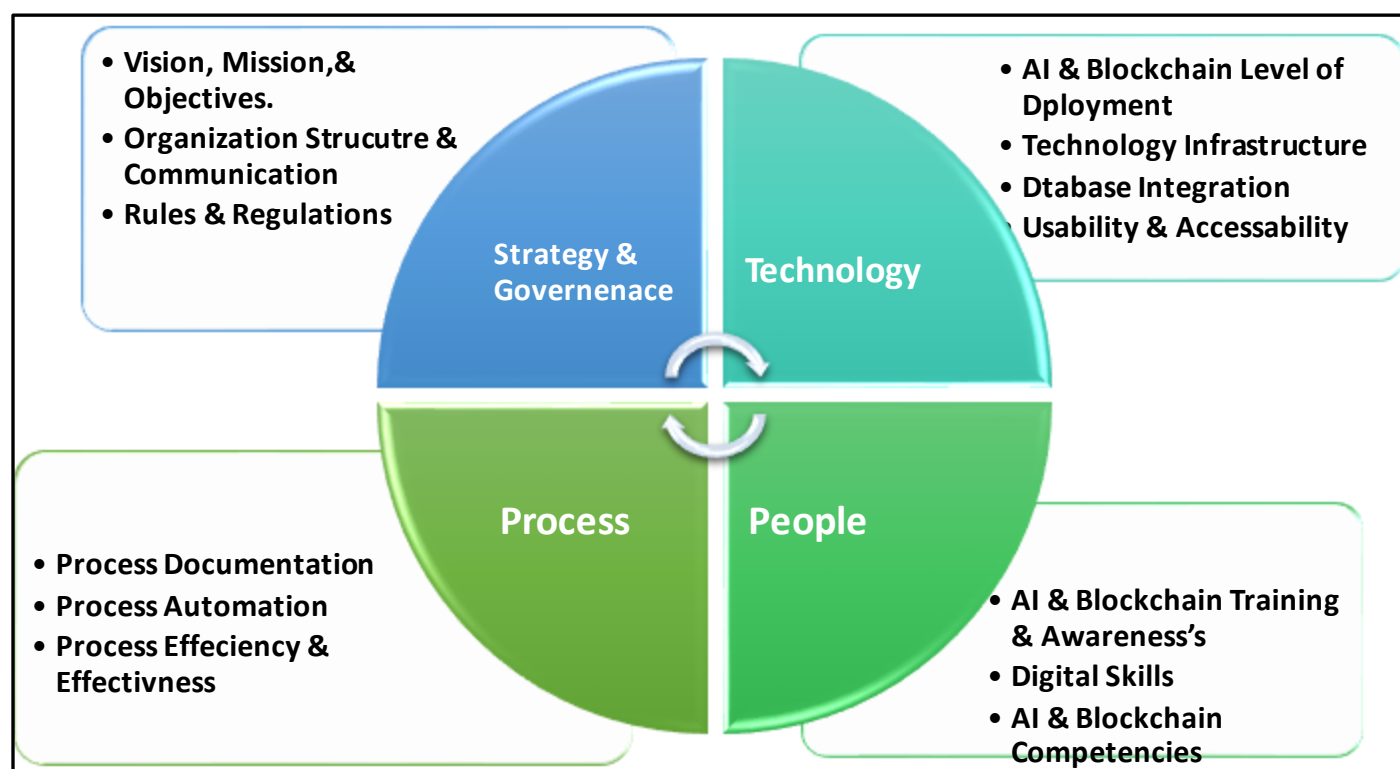
24. Suggested Conceptual Framework



53. Please consider the provisional model shown above – with 5 stages of change (initial to optimized) and four dimensions of change (Strategy, Technology, People and Processes). Do you think these are the most appropriate dimensions for evaluating the implementation and impact of AI/Blockchain Technologies in UAE Public Sector from your experience? Would you suggest other dimensions of change?



54. Do you think each stage above represent the overall stages and right description for levels of deployed AI & Blockchain within UAE Public Sector?



Quest.	From your Experience in Deploying AI & Blockchain within UAE Public Sector, what would the “Vision, Mission, and Objectives” at the Initial Stage look like? What would they be like at the Optimized stage? And at the other stages?				
	Initial	Developed	Defined	Managed	Optimized
	The vision at the initial stage could be to explore and leverage the potential of AI and blockchain technologies to enhance government services, improve efficiency, and promote transparency and trust in the public sector. Mission: The mission could be to conduct pilot projects and proof-of-concepts to evaluate the feasibility and benefits of AI and blockchain in specific areas of the public sector. Objectives: The objectives might include identifying use cases where AI and blockchain can bring value, building partnerships with relevant	The vision at the developed stage could be to have implemented AI and blockchain solutions across multiple government departments, enabling improved service delivery, data sharing, and decision-making processes. Mission: The mission could be to implement AI and blockchain technologies in a scalable manner, foster collaboration between government entities, and ensure interoperability and standardization of systems.	The vision at the defined stage could be to have a well-defined and optimized AI and blockchain ecosystem that is aligned with the UAE government's strategic objectives, promoting innovation, efficiency, and citizen-centric services. Mission: The mission could be to establish a governance framework for AI and blockchain technologies, create policies and regulations, and develop a skilled workforce to support their implementation and management. Objectives: The objectives might include	The vision at the managed stage could be to have a mature and well-managed AI and blockchain ecosystem that is continuously monitored, optimized, and responsive to evolving technological advancements and citizen needs. Mission: The mission could be to ensure the effective management and maintenance of AI and blockchain systems, monitor performance and security, and drive continuous	The vision at the optimized stage could be to have a fully integrated and efficient AI and blockchain ecosystem across various government departments, enabling seamless data sharing, streamlined processes, and enhanced citizen services. Mission: The mission could be to implement and operationalize AI and blockchain solutions at scale, ensuring interoperability, security, and compliance with regulations.



	stakeholders, creating awareness and understanding among government officials, and developing a roadmap for future implementation.	Objectives: The objectives might include deploying AI-powered applications for specific government services, integrating blockchain for secure data management and transactions, establishing data-sharing protocols and frameworks, and fostering partnerships with industry experts and academia.	implementing AI and blockchain solutions across all relevant government services, ensuring data privacy and security, establishing standards and best practices, providing training and capacity building for government employees, and fostering public-private collaborations to drive innovation	improvement and innovation. Objectives: The objectives might include establishing a dedicated team for managing AI and blockchain initiatives, conducting regular audits and assessments, implementing measures to address emerging risks and challenges, staying abreast of technological advancements, and fostering a culture of innovation and collaboration within the public sector.	Objectives: The objectives might include developing robust AI models and algorithms tailored to specific government functions, establishing secure and decentralized blockchain networks, integrating AI and blockchain with existing systems, training and upskilling government employees, and continuously monitoring and optimizing the technology stack.
Quest.	From your Experience in Deploying AI & Blockchain within UAE Public Sector, what would the “Organization Structure & Communication” at the Initial Stage look like? What would they be like at the Optimized stage? And at the other stages?				
	Initial	Developed	Defined	Managed	Optimized
	Initial Stage: Organization Structure: At the initial stage, the organization structure might be relatively flat and flexible. It could include a small team or task force responsible for exploring the potential of AI and blockchain technologies within the public sector. This team could be composed of individuals with diverse backgrounds, including technology experts, policy advisors, and representatives from relevant government departments. Communication: Communication at this stage would focus on information gathering, research, and awareness building. The team members would collaborate closely to conduct	Developed Stage: Organization Structure: At the developed stage, the organization structure could be more departmentalized, with distinct teams or divisions responsible for different aspects of AI and blockchain implementation. For example, there might be teams focusing on AI model development, blockchain infrastructure management, data governance, and policy formulation. Each team would have designated leaders and members with specialized skills and expertise.	Defined Stage: Organization Structure: At the defined stage, the organization structure might be more hierarchical, with clearly defined roles, responsibilities, and reporting structures. There could be specialized divisions or units within the AI and blockchain department, focusing on areas such as research and development, operations and maintenance, compliance, and training and capacity building. Communication: Communication processes would be streamlined and optimized for efficiency and effectiveness.	Managed Stage: Organization Structure: At the managed stage, the organization structure would be mature and well-integrated with the overall government structure. The AI and blockchain department would have well-defined divisions and units responsible for specific functions. There might be senior-level executives overseeing the department's operations, with specialized teams managing different aspects of AI and blockchain initiatives.	Optimized Stage: Organization Structure: At the optimized stage, as the implementation expands, there might be a dedicated department or unit within the UAE government responsible for overseeing AI and blockchain initiatives. This department could be led by a director or senior official and staffed with professionals with expertise in technology, project management, and policy development. Cross-functional teams could be formed to focus on specific



	feasibility studies, identify potential use cases, and explore partnerships with technology providers. Communication channels might include regular team meetings, workshops, and knowledge-sharing sessions to disseminate information and gather insights.	Communication: Communication processes would be well-established and formalized to enable effective coordination and collaboration across different teams and departments. Regular communication channels would include departmental meetings, cross-team coordination sessions, project management tools, and digital platforms for sharing knowledge and best practices. Clear reporting lines and communication protocols would ensure efficient information flow and decision-making.	Communication channels would include regular progress reports, executive briefings, strategic planning sessions, and inter-departmental coordination meetings. Communication would also extend to external stakeholders, such as technology vendors, industry experts, and academia, through partnerships, conferences, and forums.	Communication: Communication processes would be robust and agile, enabling proactive management and monitoring of AI and blockchain projects. Regular performance evaluations, risk assessments, and strategic planning sessions would ensure continuous improvement. Communication channels would include strategic meetings, regular reports to senior leadership, stakeholder engagement events, and knowledge-sharing platforms to foster innovation and?	domains or projects related to AI and blockchain. Communication: Communication channels would become more formalized and structured to support the growing scale of AI and blockchain implementation. Regular reporting mechanisms, such as progress updates, performance metrics, and impact assessments, would be established to ensure transparency and accountability. Communication would occur through various channels, including departmental meetings, progress reports, presentations, and collaboration platforms.
Quest.	From your Experience in Deploying AI & Blockchain within UAE Public Sector, what would the “Rules & Regulations” at the Initial Stage look like? What would they be like at the Optimized stage? And at the other stages?				
	Initial	Developed	Defined	Managed	Optimized
	Initial Stage: Rules & Regulations: At the initial stage, rules and regulations might focus on exploring the potential of AI and blockchain technologies while ensuring ethical and responsible use. The emphasis would be on conducting pilot projects and proof-of-concepts, data privacy and security, and compliance with existing regulations related to data protection, intellectual property, and cybersecurity.	Developed Stage: Rules & Regulations: At the developed stage, rules and regulations would be more comprehensive to address the specific challenges and risks associated with AI and blockchain implementation. This might include regulations related to data governance, data sharing, consent management, interoperability, algorithmic transparency, and accountability. The government may	Defined Stage: Rules & Regulations: At the defined stage, rules and regulations would become more refined and standardized. The government might introduce specific legislation and regulations tailored to AI and blockchain technologies. This could include sector-specific regulations, standards for data management and protection, guidelines for responsible AI deployment, and frameworks for auditing and certification of AI and blockchain systems.	Managed Stage: Rules & Regulations: At the managed stage, rules and regulations would be well-established and regularly updated to address emerging challenges and technology advancements. The government might introduce regulatory sandboxes or innovation zones to encourage experimentation with AI and blockchain while	Optimized Stage: Rules & Regulations: At the optimized stage, rules and regulations would be highly mature and adaptive. The government might establish regulatory bodies or agencies specializing in overseeing AI and blockchain implementation and ensuring compliance. This could include frameworks for



		establish frameworks to ensure fairness, non-discrimination, and unbiased decision-making in AI systems.		ensuring compliance with regulatory requirements. The focus would be on continuous monitoring, evaluation, and adaptation of regulations to keep pace with the evolving technology landscape.	auditing, certification, and licensing of AI and blockchain systems and professionals. The government may collaborate with international organizations and regulatory bodies to align regulations with global best practices and standards
Quest.	From your Experience in Deploying AI & Blockchain within UAE Public Sector, what would the “Level of Implemented AI & Blockchain” at the Initial Stage look like? What would they be like at the Optimized stage? And at the other stages?				
	Initial	Developed	Defined	Managed	Optimized
	Initial Stage: Level of Implemented AI & Blockchain: At the initial stage, the level of implemented AI and blockchain technologies might be limited to pilot projects, proof-of-concepts, and experimental initiatives. These implementations could be focused on specific use cases within a few government departments or agencies. The scope might be narrow, and the scale of deployment would be relatively small.	Developed Stage: Level of Implemented AI & Blockchain: At the developed stage, the level of implemented AI and blockchain technologies would see expansion and diversification. The government would have moved beyond pilot projects and started deploying AI and blockchain solutions in operational environments. This could include the integration of AI-powered applications and systems in various government services and the adoption of blockchain for secure data management and transactions. The scale of deployment would increase across multiple government departments and agencies.	Defined Stage: Level of Implemented AI & Blockchain: At the defined stage, the level of implemented AI and blockchain technologies would become more standardized and well-established. AI and blockchain solutions would be integrated into core government functions, processes, and systems. The level of implementation would be widespread, covering a significant portion of the public sector. The government would have defined frameworks, policies, and guidelines to ensure consistency and interoperability of AI and blockchain systems.	Managed Stage: Level of Implemented AI & Blockchain: At the managed stage, the level of implemented AI and blockchain technologies would be highly mature and managed proactively. AI and blockchain systems would be fully integrated across the public sector, and their deployment would be a routine practice. The government would have established dedicated teams or departments responsible for managing and maintaining AI and blockchain initiatives. The level of implementation would be characterized by continuous monitoring, optimization, and risk management.	Optimized Stage: Level of Implemented AI & Blockchain: At the optimized stage, the level of implemented AI and blockchain technologies would be at its peak. AI and blockchain systems would be fully integrated and optimized across all relevant government services and processes. The government would have achieved a high level of automation, efficiency, and transparency through AI-driven decision-making, data analytics, and secure blockchain-based transactions. The level of implementation would be characterized by advanced AI models, cutting-edge blockchain infrastructure, and continuous innovation.



Quest.	From your Experience in Deploying AI & Blockchain within UAE Public Sector, what would the “Technology Infrastructure” at the Initial Stage look like? What would they be like at the Optimized stage? And at the other stages?				
	Initial	Developed	Defined	Managed	Optimized
	Initial Stage: At the initial stage, the technology infrastructure for AI and blockchain deployment might be in the early phases of development. It could include basic hardware and software components necessary for conducting pilot projects and proof-of-concepts. This might involve setting up servers, computing resources, storage systems, and development tools to support initial experimentation and exploration of AI and blockchain technologies.	Developed Stage: At the developed stage, the technology infrastructure for AI and blockchain deployment would have expanded and matured. It would involve more advanced hardware and software components to support the increased scale and complexity of AI and blockchain applications. This could include: 1. Robust Cloud Infrastructure: The government might invest in cloud-based infrastructure or data centers to handle the growing computational and storage requirements. This would provide scalability, flexibility, and on-demand resource allocation for AI and blockchain workloads. 2. Advanced Networking: The infrastructure would include advanced networking equipment to ensure efficient data transmission and communication between different components of the system. This might involve high-speed network switches, routers, and load balancers to handle increased data traffic. 3. High-performance Computing: The infrastructure would feature	Defined Stage: At the defined stage, the technology infrastructure would become more standardized and well-defined to ensure interoperability and efficiency. The government would establish frameworks and guidelines for technology implementation. This might involve: 1. Standardized Software Stack: The infrastructure would incorporate standardized software frameworks and tools for AI and blockchain development and deployment. This would ensure consistency, compatibility, and ease of integration across different government departments and use cases. 2. Data Interoperability: The infrastructure would facilitate seamless data sharing and interoperability between AI and blockchain systems. This could involve the use of standardized data formats, APIs (Application Programming Interfaces), and data integration platforms. 3. Secure Connectivity: The infrastructure would prioritize security measures, including encryption protocols, firewalls, intrusion detection systems, and access controls. This would protect	Managed Stage: At the managed stage, the technology infrastructure would be highly optimized and actively managed to support ongoing operations and maintenance of AI and blockchain systems. This might involve: 1. Automated Deployment and Monitoring: The infrastructure would include automated deployment frameworks and monitoring tools to streamline the deployment and management of AI and blockchain applications. This would ensure efficient resource allocation, performance monitoring, and issue detection. 2. Scalability and Elasticity: The infrastructure would be designed for scalability and elasticity to accommodate fluctuating workloads. This might involve the use of containerization technologies like Docker and orchestration platforms like Kubernetes to efficiently scale resources up or down as needed. 3. Disaster Recovery and Backup: The infrastructure would implement	Optimized Stage: At the optimized stage, the technology infrastructure would be highly advanced and optimized to support large-scale AI and blockchain deployment. This could involve the establishment of robust cloud-based infrastructure or data centers capable of handling significant computational requirements, storage demands, and network bandwidth. The infrastructure would be designed for high performance, scalability, and reliability to support real-time processing, advanced analytics, and secure blockchain transactions.



		powerful servers and computing resources to support AI model training, inference, and data processing. This could involve the use of GPUs (Graphics Processing Units) or other specialized hardware accelerators for faster and more efficient AI computations.	sensitive data and ensure secure communication between different components of the system.	robust disaster recovery mechanisms, backup systems, and data redundancy measures. This would ensure business continuity and data integrity in case of system failures or emergencies.	
Quest.	From your Experience in Deploying AI & Blockchain within UAE Public Sector, what would the “Database Integration” at the Initial Stage look like? What would they be like at the Optimized stage? And at the other stages?				
	Initial	Developed	Defined	Managed	Optimized
	Initial Stage: At the initial stage, the database integration for AI and blockchain deployment might be in the early phases of development. It could involve basic integration approaches and limited data sources. This might include: 1. Limited Data Sources: The initial stage might involve integrating a few primary data sources relevant to the specific AI or blockchain project being undertaken. The focus would be on identifying and connecting databases that contain relevant data for the use case at hand. 2. Simple Data Pipelines: The integration might involve simple data pipelines or scripts to extract data from the source databases and prepare it for AI or blockchain processing. This could include basic data transformation and cleansing steps as needed.	Developed Stage: At the developed stage, the integration of databases would have expanded to include more data sources and refined integration methods. This could involve: 1. Multiple Data Sources: The integration would encompass a broader range of data sources, including structured and unstructured databases, data warehouses, and external data feeds. This would allow for a more comprehensive and holistic view of the data relevant to the AI and blockchain initiatives. 2. Middleware Solutions: To facilitate data integration and interoperability, middleware solutions might be employed. These could act as a layer between different databases and applications, enabling efficient data exchange,	Defined Stage: At the defined stage, the database integration would become more standardized and well-defined to ensure consistency and efficiency. This might involve: 1. Data Governance Framework: The integration would adhere to a defined data governance framework that establishes policies, standards, and guidelines for data integration across different databases. This would ensure data quality, security, and compliance with relevant regulations. 2. Data Integration Platforms: The integration might utilize dedicated data integration platforms or tools that provide comprehensive features for data extraction, transformation, and loading (ETL). These platforms would streamline the integration process and offer advanced capabilities like data mapping, data	Managed Stage: At the managed stage, the database integration would be actively managed and optimized to support ongoing operations and maintenance. This might involve: 1. Real-time Data Integration: The integration would enable real-time or near real-time data integration, ensuring that AI and blockchain systems have access to the most up-to-date data for analysis and decision-making. This could involve technologies like change data capture (CDC) and event-driven architectures. 2. Data Catalog and Metadata Management: The integration would involve the use of data catalogs and metadata management systems to provide a centralized view	Optimized Stage: At the optimized stage, the database integration would be highly mature and optimized for performance, scalability, and advanced analytics. This might involve: 1. Big Data Integration: The integration would encompass big data technologies and frameworks to handle large volumes, varieties, and velocities of data. This could involve the use of distributed file systems, such as Apache Hadoop or Apache Spark, and data processing frameworks like Apache Kafka for high-throughput data ingestion. 2. Data Virtualization and Federation: The integration might leverage data virtualization techniques and data federation approaches to



		transformation, and synchronization.	lineage, and data synchronization.	of available data sources, their attributes, and relationships. This would facilitate efficient data discovery and understanding.	provide a unified view of data from disparate sources. This would enable efficient data access and analysis without physically moving or duplicating data.
Quest.	From your Experience in Deploying AI & Blockchain within UAE Public Sector, what would the “Technology Usability & Accessibility” at the Initial Stage look like? What would they be like at the Optimized stage? And at the other stages?				
	Initial	Developed	Defined	Managed	Optimized
	Initial Stage: At the initial stage, the technology usability and accessibility for AI and blockchain deployment might be limited and focused on early experiments and pilot projects. This could include: 1. Limited User Base: The usage of AI and blockchain technology might be limited to a small group of technical experts or researchers who are directly involved in the initial experimentation. 2. Technical Expertise Required: Using the technology might require a certain level of technical expertise or specialized knowledge. The initial stage could involve a learning curve as users familiarize themselves with the technology and its capabilities.	Developed Stage: At the developed stage, the usability and accessibility of AI and blockchain technology would have progressed significantly. This could involve: 1. User-Friendly Interfaces: The technology would have user-friendly interfaces and intuitive workflows to facilitate easier adoption and usage. This could include graphical user interfaces (GUIs) and interactive dashboards that simplify complex tasks. 2. Training and Support: Adequate training and support materials would be provided to users to help them understand and effectively utilize the technology. This might include documentation, tutorials, and user guides to promote self-learning.	Defined Stage: At the defined stage, the usability and accessibility of AI and blockchain technology would be well-defined and standardized. This might involve: 1. User-Centric Design: The technology would prioritize user-centric design principles, taking into account the needs and preferences of the intended users. This could include user research, user feedback, and iterative design processes to optimize usability. 2. Standardized Workflows: Standardized workflows and best practices would be established to guide users in using the technology effectively and consistently. This would promote efficiency and minimize errors or confusion.	Managed Stage: At the managed stage, the usability and accessibility of AI and blockchain technology would be actively managed to ensure smooth operations and user satisfaction. This could involve: 1. Continuous Improvement: User feedback and insights would be gathered and used to continuously improve the technology's usability and accessibility. Regular updates and enhancements would be implemented based on user needs and emerging trends. 2. User Support Channels: Dedicated user support channels, such as help desks or online forums, would be available to address user queries, provide assistance, and troubleshoot any issues that may arise during usage.	Optimized Stage: At the optimized stage, the usability and accessibility of AI and blockchain technology would be highly refined and optimized for maximum user satisfaction and productivity. This could involve: 1. Personalization and Customization: The technology would provide options for personalization and customization to cater to different user preferences and requirements. Users could tailor their interfaces, settings, and workflows to suit their specific needs. 2. Automation and Intelligent Assistants: Advanced features like automation and intelligent assistants could be integrated into the technology to streamline tasks, provide proactive suggestions, and assist users in achieving their goals more efficiently.



Quest.	From your Experience in Deploying AI & Blockchain within UAE Public Sector, what would the “AI & Blockchain Training & Awareness’s” at the Initial Stage look like? What would they be like at the Optimized stage? And at the other stages?				
	Initial	Developed	Defined	Managed	Optimized
	Initial Stage: At the initial stage, the focus of AI and blockchain training and awareness initiatives would be on building foundational knowledge and creating awareness among key stakeholders. This could include: 1. Awareness Programs: Workshops, seminars, and awareness campaigns would be organized to introduce the concepts of AI and blockchain to decision-makers, government officials, and relevant staff. The objective would be to familiarize them with the potential benefits, challenges, and applications of these technologies. 2. Training for Technical Teams: Technical teams involved in AI and blockchain projects would receive specialized training to acquire the necessary skills and knowledge. This could include training on programming languages, algorithms, data analytics, smart contracts, and blockchain protocols.	Developed Stage: At the developed stage, the training and awareness initiatives would expand to cater to a broader audience and address specific roles and functions. This might involve: 1. Role-Specific Training: Training programs would be designed for different roles involved in AI and blockchain implementation, such as data scientists, developers, project managers, legal experts, and cybersecurity professionals. The focus would be on developing specialized skills and knowledge relevant to their respective roles. 2. Collaboration with Educational Institutions: Collaborations with universities, research institutions, and training centers would be established to offer specialized courses, certifications, or degree programs related to AI and blockchain. This would help develop a skilled workforce and foster innovation in these areas.	Defined Stage: At the defined stage, the training and awareness initiatives would become more structured and standardized. This could involve: 1. Training Frameworks and Curriculum: A standardized framework or curriculum would be developed to guide AI and blockchain training programs. This would define the learning objectives, competencies, and assessment criteria for different training modules or courses. 2. Continuous Learning Programs: Continuous learning programs, such as online courses, webinars, or workshops, would be established to keep stakeholders updated on the latest advancements, trends, and best practices in AI and blockchain. This would support ongoing professional development.	Managed Stage: At the managed stage, the training and awareness initiatives would be actively managed and monitored to ensure effectiveness and relevance. This might involve: 1. Training Needs Assessment: Regular assessments would be conducted to identify skill gaps and training needs within the organization. This would help tailor training programs to address specific requirements and keep pace with evolving technologies. 2. Knowledge Sharing Platforms: Knowledge sharing platforms, such as internal portals, communities of practice, or discussion forums, would be established to facilitate information exchange, collaboration, and peer learning among stakeholders involved in AI and blockchain projects.	Optimized Stage: At the optimized stage, the training and awareness initiatives would be highly refined and optimized to support advanced applications and adoption of AI and blockchain. This could involve: 1. Specialized Certification Programs: Advanced certification programs would be available to recognize and validate expertise in AI and blockchain. These certifications could be aligned with international standards and frameworks, providing credibility and ensuring a standardized skill set. 2. Centers of Excellence: Centers of excellence or innovation hubs might be established to foster research, experimentation, and knowledge dissemination in AI and blockchain. These centers would serve as focal points for collaboration, showcasing best practices, and driving innovation within the organization.
Quest.	From your Experience in Deploying AI & Blockchain within UAE Public Sector, what would the “Employee Digital Skills” at the Initial Stage look like? What would they be like at the Optimized stage? And at the other stages?				
	Initial	Developed	Defined	Managed	Optimized



	Initial Stage: At the initial stage, employee digital skills related to AI and blockchain within the UAE public sector might be limited, as these technologies are newly introduced. This could include: 1. Awareness and Familiarization: Employees would be introduced to the concepts and basics of AI and blockchain. They would gain a general understanding of the technologies, their potential applications, and their impact on their work areas. 2. Foundational Digital Skills: Employees would be expected to have basic digital literacy skills, including proficiency in using computers, internet navigation, and common software applications. These skills would form the foundation for further development in AI and blockchain.	Developed Stage: At the developed stage, employee digital skills related to AI and blockchain would progress, allowing for more specialized tasks and responsibilities. This might involve: 1. Technical Competencies: Employees would acquire more specialized technical skills relevant to AI and blockchain, such as data analysis, programming languages, machine learning, cryptography, smart contract development, and blockchain protocols. 2. Collaboration and Communication: Employees would develop skills for effective collaboration and communication within cross-functional teams involved in AI and blockchain projects. This would include skills like teamwork, effective communication, and the ability to work in multidisciplinary environments.	Defined Stage: At the defined stage, employee digital skills related to AI and blockchain would be well-defined and aligned with specific job roles and responsibilities. This might involve: 1. Role-Specific Skills: Employees would develop role-specific skills based on their involvement in AI and blockchain projects. This could include skills for data scientists, AI developers, blockchain specialists, project managers, and policy-makers, among others. 2. Ethical and Legal Understanding: Employees would be trained to understand the ethical and legal implications of AI and blockchain technologies. They would develop knowledge of privacy, security, data protection, and compliance regulations to ensure responsible use of these technologies.	Managed Stage: At the managed stage, employee digital skills related to AI and blockchain would be actively managed and supported to drive effective implementation and continuous improvement. This might involve: 1. Ongoing Training and Development: Employees would have access to continuous training and development programs to enhance their digital skills. These programs might include workshops, seminars, online courses, and certifications to keep employees updated on the latest advancements and best practices in AI and blockchain. 2. Performance Evaluation and Feedback: Performance evaluation mechanisms would be in place to assess and provide feedback on employee digital skills. This would help identify areas for improvement and support individual development plans to bridge any skill gaps.	Optimized Stage: At the optimized stage, employee digital skills related to AI and blockchain would be highly advanced and well-integrated into the organization's overall digital transformation strategy. This could involve: 1. Leadership and Management Skills: Employees in leadership and managerial roles would possess advanced skills in AI and blockchain to effectively lead and manage projects, teams, and organizational strategies related to these technologies. 2. Innovation and Entrepreneurship: Employees would be encouraged to develop innovation and entrepreneurial skills within the context of AI and blockchain. This would involve fostering a culture of innovation, encouraging creativity, and empowering employees to explore new opportunities enabled by these technologies.
Quest.	From your Experience in Deploying AI & Blockchain within UAE Public Sector, what would the “Employee AI & Blockchain Competencies” at the Initial Stage look like? What would they be like at the Optimized stage? And at the other stages?				
	Initial	Developed	Defined	Managed	Optimized
	. Initial Stage: - Awareness: Employees have a basic	Developed Stage: - Technical Skills: Employees have	Defined Stage: - Specialized Roles: The organization has	Managed Stage: - Cross-functional Collaboration:	Optimized Stage: - Innovation Culture: The



	understanding of AI and blockchain technologies, their potential applications, and their benefits for the organization. - Education and Training: Employees receive introductory training sessions or workshops to familiarize themselves with the fundamental concepts and terminology related to AI and blockchain.	acquired practical skills in using AI and blockchain tools and platforms. They can deploy and operate basic AI and blockchain applications. - Integration: Employees understand how to integrate AI and blockchain technologies into existing systems and processes. - Collaborative Mindset: Employees are encouraged to collaborate and share knowledge across departments to identify potential use cases and explore innovative solutions using AI and blockchain.	identified specific roles related to AI and blockchain, such as data scientists, AI engineers, blockchain developers, and project managers, who possess advanced skills in their respective domains. - Advanced Knowledge: Employees have in-depth knowledge of AI and blockchain concepts, algorithms, and frameworks. They can develop and implement complex AI and blockchain applications. - Governance and Standards: The organization has established governance frameworks, policies, and standards for the responsible and ethical use of AI and blockchain technologies.	Employees from different departments work together to develop AI and blockchain solutions that address specific organizational challenges. - Continuous Learning: Employees engage in ongoing training programs, attend conferences, and stay updated with the latest advancements in AI and blockchain to enhance their skills and knowledge. - Risk Management: Employees understand the potential risks and challenges associated with AI and blockchain, such as data privacy, security, and bias, and are capable of mitigating those risks effectively.	organization fosters a culture of innovation, encouraging employees to propose and implement novel AI and blockchain solutions to improve efficiency, effectiveness, and citizen services. - Thought Leadership: Employees actively contribute to AI and blockchain research, publish papers, participate in industry forums, and share their expertise to establish the organization as a leader in the field. - Continuous Improvement: The organization regularly assesses the performance and impact of AI and blockchain initiatives, identifies areas for improvement, and implements iterative enhancements to maximize the value derived from these technologies.
Quest.	From your Experience in Deploying AI & Blockchain within UAE Public Sector, what would the “Processes Documentation” at the Initial Stage look like? What would they be like at the Optimized stage? And at the other stages?				
	Initial	Developed	Defined	Managed	Optimized
	Initial Stage: - High-Level Process Overview: At the initial stage, the processes documentation provides a high-level overview of the organization's existing processes and identifies areas where AI and blockchain technologies could	Developed Stage: - Detailed Process Mapping: The documentation includes detailed process mapping for the identified AI and blockchain use cases. It outlines the current processes,	Defined Stage: - Standardized Process Documentation: The documentation provides standardized and well-defined process documentation templates and guidelines for AI	Managed Stage: - Integrated Processes: The documentation reflects the integration of AI and blockchain technologies into existing processes, with clear workflows,	Optimized Stage: - Continuous Improvement: The processes documentation incorporates mechanisms for continuous improvement, such as feedback loops, iterative enhancements,



	potentially be integrated. - Use Case Exploration: The documentation focuses on identifying potential AI and blockchain use cases and their alignment with the organization's strategic objectives. - Feasibility Assessment: The processes documentation may outline a feasibility assessment framework to evaluate the technical and operational viability of integrating AI and blockchain technologies.	inputs, outputs, and potential integration points for AI and blockchain technologies. - Data Requirements: The documentation specifies the data requirements for AI and blockchain applications, including data sources, formats, quality, and security considerations. - Resource and Technology Assessment: It includes an assessment of the resources, skills, and technologies needed to implement AI and blockchain solutions, considering factors such as infrastructure, software, and expertise.	and blockchain initiatives. - Process Optimization: It includes recommendations for process optimization and reengineering to leverage the capabilities of AI and blockchain technologies effectively. - Compliance and Governance: The processes documentation addresses compliance requirements and governance frameworks related to AI and blockchain, such as data privacy, security, and regulatory considerations.	decision points, and dependencies. - Change Management: It includes change management strategies and plans to address the organizational and cultural challenges associated with implementing AI and blockchain solutions. - Performance Metrics: The documentation defines key performance indicators (KPIs) and metrics to assess the effectiveness and efficiency of AI and blockchain-enabled processes.	and lessons learned from previous deployments. - Best Practices and Lessons Learned: It includes documented best practices, case studies, and lessons learned from previous AI and blockchain deployments within the organization. - Scalability and Sustainability: The documentation addresses scalability and sustainability considerations, providing guidance on how to scale AI and blockchain initiatives across the organization while ensuring long-term success.
Quest.	From your Experience in Deploying AI & Blockchain within UAE Public Sector, what would the “Processes Automation” at the Initial Stage look like? What would they be like at the Optimized stage? And at the other stages?				
	Initial	Developed	Defined	Managed	Optimized
	Initial Stage: - Process Identification: At the initial stage, the focus is on identifying processes within the organization that can benefit from automation using AI and blockchain technologies. This involves conducting process assessments and feasibility studies. - Proof of Concept: The organization may develop small-scale proof-of-concept	Developed Stage: - Automation Tools and Platforms: The organization starts exploring and adopting automation tools and platforms that are specifically designed for AI and blockchain applications. - Pilot Projects: The organization selects a few processes for automation and develops pilot	Defined Stage: - Process Standardization: The organization defines standardized workflows and procedures for the identified automated processes. This includes streamlining and optimizing the processes before automation. - Integration and Scaling: Automation solutions are integrated with	Managed Stage: - Process Optimization: The organization focuses on continuous improvement and optimization of automated processes. This involves monitoring and analyzing performance metrics and making iterative enhancements to	Optimized Stage: - End-to-End Automation: The organization achieves end-to-end automation of selected processes, eliminating manual intervention and achieving higher levels of efficiency and accuracy. - Intelligent Automation: The organization



	projects to demonstrate the potential value and feasibility of automating selected processes. These projects serve as prototypes and learning experiences for further development.	projects to test and refine the automation solutions. The projects may involve limited deployment within specific departments or functions.	existing systems and processes to ensure smooth data flow and interoperability. The organization begins to scale up automation efforts across multiple departments or functions.	achieve better efficiency and effectiveness. - Change Management: The organization implements change management strategies to manage the transition from manual to automated processes. This includes training employees, addressing concerns, and fostering a culture of automation.	leverages advanced AI techniques, such as machine learning and natural language processing, to enable intelligent decision-making and automation. This includes automating more complex processes and tasks that require cognitive capabilities. - Continuous Innovation: The organization encourages a culture of continuous innovation in process automation, exploring emerging technologies and staying up-to-date with the latest advancements in AI and blockchain to identify new automation opportunities.
Quest.	From your Experience in Deploying AI & Blockchain within UAE Public Sector, what would the “Processes Efficiency & Effectiveness” at the Initial Stage look like? What would they be like at the Optimized stage? And at the other stages?				
	Initial	Developed	Defined	Managed	Optimized
	Initial Stage: - Process Identification: At the initial stage, the organization identifies processes that have the potential for improvement through AI and blockchain technologies. These processes may have existing inefficiencies or challenges that can be addressed through automation or enhanced data management.	Developed Stage: - Automation Implementation: The organization begins implementing AI and blockchain technologies to automate selected processes. This can include streamlining workflows, automating repetitive tasks, and enhancing data management and analysis.	Defined Stage: - Standardized Processes: The organization defines standardized processes and workflows, leveraging AI and blockchain technologies. This reduces variations and inconsistencies, leading to improved efficiency and effectiveness across the organization. - Process Optimization: The	Managed Stage: - Continuous Monitoring: The organization implements robust monitoring systems to track process performance in real-time. This allows for proactive identification of issues or deviations from desired efficiency and effectiveness levels.	Optimized Stage: - Advanced Analytics and AI Techniques: The organization leverages advanced AI techniques, such as machine learning, predictive analytics, and natural language processing, to further optimize processes. This enables



	- Baseline Assessment: The organization establishes baseline metrics and performance indicators to measure the efficiency and effectiveness of the identified processes before any AI or blockchain implementation. - Proof of Concept: The organization develops small-scale proof-of-concept projects to test the impact of AI and blockchain on process efficiency and effectiveness. These projects serve as initial indicators of the potential benefits.	- Performance Metrics: The organization establishes more robust metrics and key performance indicators (KPIs) to track the efficiency and effectiveness of the automated processes. This allows for better monitoring and evaluation of the improvements achieved.	organization focuses on process optimization and continuous improvement. It identifies bottlenecks, streamlines workflows, and eliminates unnecessary steps to enhance efficiency and effectiveness further. - Enhanced Data Analytics: The organization leverages AI and blockchain to gather and analyze data from multiple sources, enabling better decision-making and process optimization based on data-driven insights	- Iterative Enhancements: The organization continuously evaluates and iteratively enhances the automated processes based on data analysis and user feedback. This ensures that efficiency and effectiveness improvements are ongoing and aligned with evolving needs.	proactive decision-making, predictive maintenance, and personalized user experiences. - Continuous Innovation: The organization fosters a culture of continuous innovation, encouraging employees to propose and implement process enhancements using AI and blockchain technologies. This ensures that the organization stays at the forefront of efficiency and effectiveness in its operations.



25. Main Challenges, Drivers, barriers/obstacles behind implementing technologies

21. From Your Experience, what are the Main Challenges behind Implementing AI & Blockchain Solutions within UAE Public Sector?

Implementing AI and blockchain solutions in the public sector of the UAE can be a complex task due to several challenges. Based on general knowledge up until September 2021, here are some of the main challenges that organizations may face:

1. ****Regulatory and legal framework:**** Developing a suitable regulatory and legal framework for AI and blockchain technologies is crucial. It involves defining guidelines, standards, and compliance requirements that ensure data privacy, security, and ethical use of these technologies. Establishing such a framework may require collaboration between government entities, legal experts, and industry stakeholders.
2. ****Data availability and quality:**** AI and blockchain solutions heavily rely on accurate and reliable data. However, accessing high-quality data can be a challenge, especially in the public sector where data may be scattered across different departments or agencies. Data governance policies, data sharing agreements, and data integration efforts are necessary to ensure the availability and quality of data for AI and blockchain applications.
3. ****Interoperability and integration:**** Public sector organizations in the UAE often operate with diverse legacy systems and databases. Integrating AI and blockchain solutions with existing systems can be challenging, requiring careful planning and coordination. Ensuring interoperability between different systems and technologies is essential to achieve seamless data exchange and functionality.
4. ****Lack of technical expertise:**** Building and implementing AI and blockchain solutions require specialized technical skills and expertise. There might be a shortage of professionals with the necessary knowledge and experience in these technologies. Organizations need to invest in training programs, attract talent, and collaborate with universities and research institutions to bridge the skills gap.
5. ****Change management and cultural shift:**** Adopting AI and blockchain technologies in the public sector often necessitates a significant cultural shift and changes in work processes. Resistance to change, fear of job displacement, and skepticism towards new technologies can hinder successful implementation. Effective change management strategies, awareness campaigns, and stakeholder engagement are essential to overcome these challenges.
6. ****Scalability and cost considerations:**** Scaling AI and blockchain solutions to accommodate the needs of a large and diverse public sector can be demanding. Ensuring scalability, reliability, and cost-effectiveness of the infrastructure and platforms requires careful planning, resource allocation, and consideration of long-term sustainability.
7. ****Security and trust:**** The public sector deals with sensitive data and critical services, making security and trust paramount. Ensuring the security of AI algorithms, blockchain networks, and data storage systems is crucial to prevent breaches or unauthorized access. Building trust among citizens and stakeholders by maintaining transparency and accountability is essential for successful adoption.



It's important to note that the challenges and the state of AI and blockchain adoption in the UAE public sector might have evolved since September 2021. To get the most up-to-date and accurate information, it is advisable to consult recent reports, case studies, and experts specializing in the field.

22. From Your Experience, what are the Main Drivers to enhance Implementing AI & Blockchain Solutions within UAE Public Sector?

Based on general knowledge up until September 2021, here are some of the main drivers that can enhance the implementation of AI and blockchain solutions in the public sector of the UAE:

1. **Efficiency and cost savings:** AI and blockchain technologies have the potential to automate and streamline processes, resulting in increased efficiency and cost savings. By leveraging AI for tasks such as data analysis, decision-making, and customer service, public sector organizations can optimize resource allocation and improve service delivery while reducing operational expenses.
2. **Transparency and accountability:** Blockchain technology, with its inherent transparency and immutability, can enhance accountability in the public sector. By recording transactions and data in a tamper-resistant manner, blockchain can increase transparency, reduce fraud, and improve trust among citizens. It can also facilitate auditing and tracking of government expenditures and enhance the overall integrity of public sector operations.
3. **Data-driven decision-making:** AI enables public sector organizations to leverage large volumes of data to gain insights and make data-driven decisions. By analyzing vast amounts of information, AI algorithms can identify patterns, predict trends, and provide actionable recommendations to inform policy-making and enhance service delivery. This can lead to more effective and evidence-based decision-making processes.
4. **Citizen-centric services:** AI and blockchain solutions can contribute to the development of citizen-centric services in the UAE public sector. Chatbots, virtual assistants, and automated systems powered by AI can provide personalized and round-the-clock assistance to citizens, enhancing their overall experience. Blockchain can enable secure and efficient identity management, enabling citizens to access government services seamlessly and securely.
5. **Innovation and competitiveness:** Embracing AI and blockchain technologies can position the UAE public sector as an innovative and forward-thinking entity. By adopting these emerging technologies, the UAE can foster a culture of innovation, attract tech companies and startups, and become a hub for cutting-edge solutions. This can enhance the country's competitiveness on a global scale and stimulate economic growth.
6. **Partnerships and collaboration:** Collaboration between the public sector, private sector, academia, and research institutions is crucial for successful implementation. The UAE has demonstrated a commitment to fostering partnerships with



technology companies and startups to drive innovation. Collaborative efforts can leverage expertise, share resources, and accelerate the implementation of AI and blockchain solutions in the public sector.

7. **National strategies and initiatives:** The UAE has developed national strategies and initiatives to promote the adoption of AI and blockchain technologies. For example, the UAE Strategy for Artificial Intelligence aims to position the country as a leader in AI adoption across various sectors, including the public sector. Such strategic frameworks provide a roadmap and support for organizations to implement AI and blockchain solutions effectively.

It's important to note that the drivers for implementing AI and blockchain solutions in the UAE public sector might have evolved since September 2021. To get the most up-to-date and accurate information, it is advisable to consult recent reports, government publications, and experts specializing in the field.

23. What are the main Internal & External, barriers/obstacles of adopting/ implementing and deploying AI or Blockchain technologies and their related solutions to enhance efficiency and effectiveness of UAE Public Sector Transactions?

When considering the adoption, implementation, and deployment of AI or blockchain technologies in the UAE public sector to enhance efficiency and effectiveness of transactions, there are several internal and external barriers or obstacles that organizations may face. Here are some of the main ones:

Internal Barriers/Obstacles:

1. **Lack of awareness and understanding:** There may be a lack of awareness and understanding among decision-makers and stakeholders within the public sector about the potential benefits and applications of AI and blockchain technologies. This can hinder their adoption and implementation.
2. **Legacy systems and infrastructure:** Public sector organizations often operate with legacy systems and infrastructure that may not be compatible with AI or blockchain solutions. The integration of new technologies with existing systems can be challenging, requiring substantial investment and technical expertise.
3. **Data quality and availability:** AI and blockchain solutions heavily rely on accurate and reliable data. In some cases, the quality of data within the public sector may be poor, fragmented, or outdated. Ensuring data quality and availability for AI and blockchain applications may require significant data cleansing, integration, and sharing efforts.
4. **Skills and expertise gap:** Implementing AI and blockchain technologies requires specialized skills and expertise. There may be a shortage of professionals with the necessary technical knowledge and experience within the public sector. Upskilling existing staff or attracting new talent can be a barrier to adoption.



5. **Resistance to change:** The introduction of AI or blockchain technologies can disrupt existing work processes and job roles, leading to resistance to change among employees.

Addressing concerns, providing training, and demonstrating the benefits of these technologies are crucial to overcome resistance and foster a positive attitude towards implementation.

External Barriers/Obstacles:

1. **Regulatory and legal challenges:** The implementation of AI and blockchain technologies in the public sector must comply with existing regulatory frameworks and legal requirements. Developing appropriate regulations, addressing data privacy concerns, and ensuring compliance can be complex and time-consuming.
2. **Data privacy and security concerns:** The public sector deals with sensitive citizen data, and ensuring privacy and security is paramount. AI and blockchain solutions require robust security measures to protect against data breaches and unauthorized access. Addressing privacy concerns and building trust among citizens is crucial for successful adoption.
3. **Interoperability and standardization:** Interoperability between different systems and platforms is essential for seamless data exchange and functionality. However, achieving interoperability can be challenging due to the presence of diverse systems, standards, and protocols within the public sector. Developing common standards and protocols is necessary to enable interoperability.
4. **Vendor lock-in and dependency:** Adopting AI or blockchain solutions often involves partnering with technology vendors. There may be concerns about vendor lock-in, where organizations become heavily dependent on specific vendors or platforms. Ensuring vendor neutrality, open standards, and flexibility in contracts can help mitigate this risk.
5. **Cost and resource constraints:** Implementing AI or blockchain technologies can require significant financial resources, especially for large-scale deployments. Public sector organizations may face budget constraints or limited resources, making it challenging to allocate funds for technology adoption and infrastructure upgrades.

Overcoming these barriers and obstacles requires a comprehensive approach involving stakeholder engagement, capacity building, regulatory support, and a well-defined roadmap for implementation. The UAE government has been actively working to address these challenges through initiatives, partnerships, and strategic planning.

24. What other comments do you have about improving the adopting/ implementing and deploying AI or Blockchain technologies and their related solutions within UAE Public Sector Entities?

Improving the adoption, implementation, and deployment of AI and blockchain technologies within UAE public sector entities requires a multi-faceted approach. Here are some additional comments on how to enhance the process:



1. ***Collaboration and knowledge-sharing:*** Encouraging collaboration and knowledge-sharing between public sector entities, technology companies, academia, and research institutions is crucial. Establishing platforms or forums for sharing best practices, success stories, and lessons learned can accelerate the adoption and implementation of AI and blockchain solutions.
2. ***Pilot projects and proof of concepts:*** Conducting pilot projects and proof of concepts can provide valuable insights and practical experience before scaling up. Public sector entities can identify specific use cases within their operations and test AI or blockchain solutions in controlled environments. Learning from these pilot projects can inform decision-making and help mitigate risks associated with large-scale deployment.
3. ***Capacity building and training:*** Investing in capacity building and training programs is essential to equip public sector employees with the necessary skills and knowledge to leverage AI and blockchain technologies. Training initiatives should target both technical and non-technical staff, enabling them to understand the potential applications, benefits, and ethical considerations of these technologies.
4. ***Public-private partnerships:*** Collaborating with the private sector can bring expertise, resources, and innovation to the public sector. Establishing public-private partnerships can facilitate technology transfer, foster innovation, and support the implementation of AI and blockchain solutions. These partnerships can also help address challenges such as skills gaps, infrastructure requirements, and funding constraints.
5. ***Agile and adaptive regulatory frameworks:*** As AI and blockchain technologies continue to evolve, regulatory frameworks need to be agile and adaptable. The UAE government should regularly assess and update regulations to accommodate technological advancements while ensuring data privacy, security, and ethical use. Engaging with experts, industry stakeholders, and international standards bodies can aid in developing forward-thinking regulations.
6. ***Citizen engagement and feedback:*** Involving citizens in the adoption and deployment of AI and blockchain technologies is crucial for their acceptance and success. Public sector entities should engage citizens through feedback mechanisms, public consultations, and awareness campaigns. Soliciting input and addressing concerns can build trust and ensure that AI and blockchain solutions align with the needs and expectations of the community.
7. ***Continuous monitoring and evaluation:*** Monitoring and evaluating the performance and impact of AI and blockchain solutions is essential. Public sector entities should establish mechanisms to assess the effectiveness, efficiency, and outcomes of the technologies. Feedback loops and continuous improvement processes can drive iterative development and ensure that the implementation remains aligned with the desired goals.

By considering these suggestions and taking a holistic approach, the UAE public sector can enhance its adoption, implementation, and deployment of AI and blockchain technologies. It can lead to improved efficiency, transparency, and citizen-centric services, contributing to the overall development and advancement of the country.



Thank you so much for your time and consideration in this research.

Appendix F.5: Response 5

Appendix A-Focus Group Sessions – Discussions Pillars

Name of participant	
Date of the sessions	
Private or Local Organization	
Emirate/Federal	
Position title	
Number of years' experience	
Level of education	
Role in implementing the AI / Blockchain Technologies	

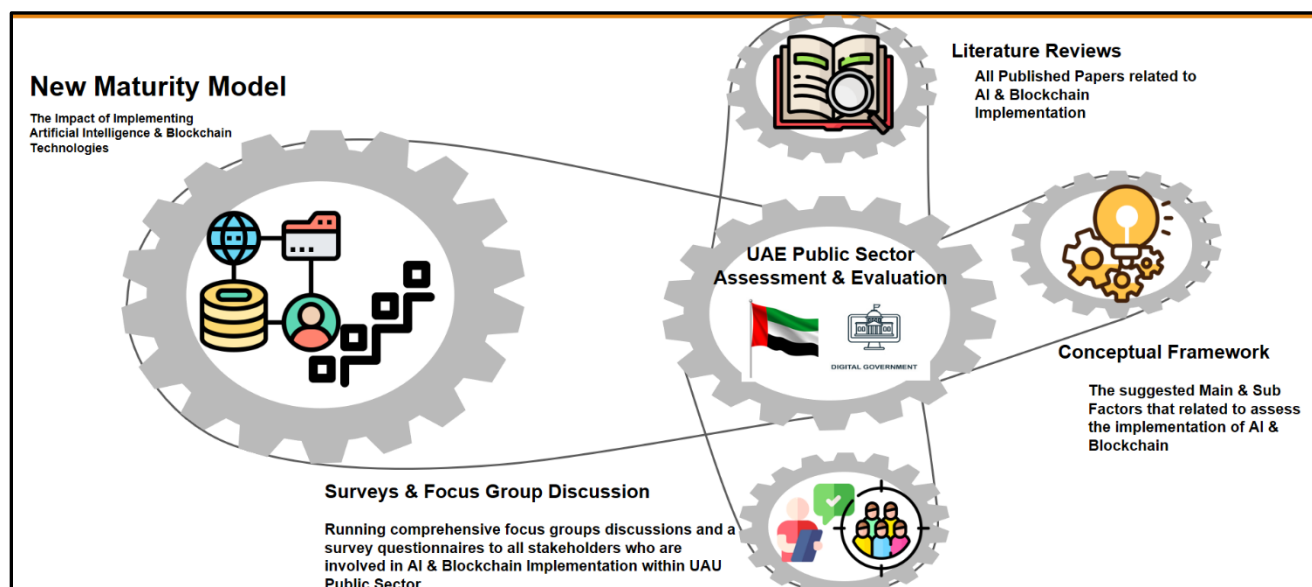
26. Introduction:

This project mainly aims to define a New Maturity Model for assessing the Implementation of Artificial Intelligence & Blockchain technologies, within UAE Public Sector (UAE Federal Government, Abu Dhabi Local Government, Dubai Local Government, and Ajman Local Government), And Evaluate the Impact of two technologies to the public sector transactions productivity, efficiency of processes and systems & the effectiveness of achieving public sector targets.

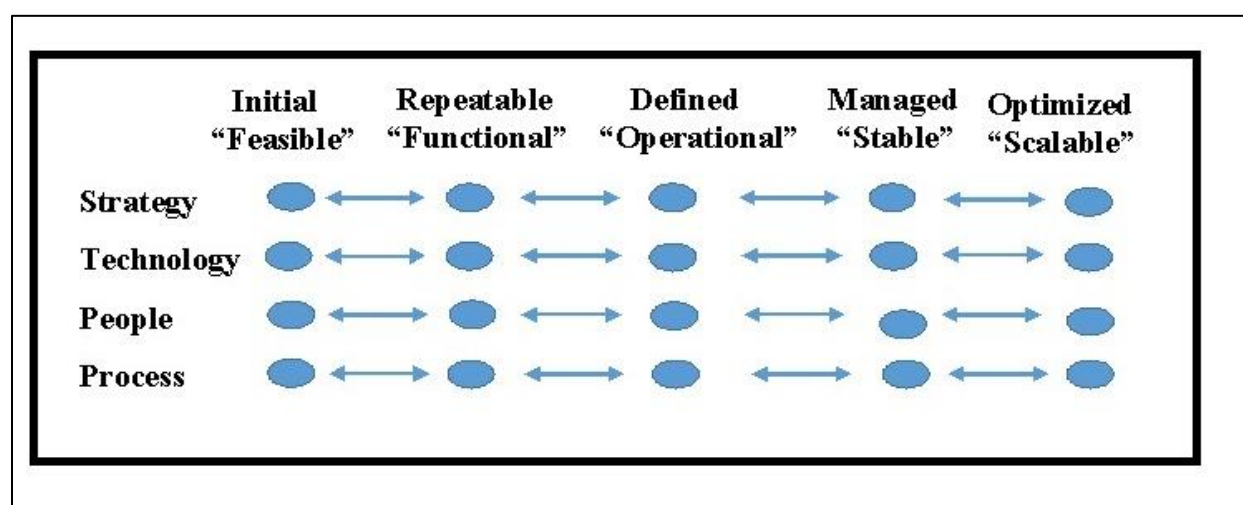


27. Research Approach:

Through the published literature reviews and based on what researcher suggest the main factors that consist of conceptual framework, we will discuss with each subject matter expert within the fields to define the main and sub factors that formulate the conceptual framework and lead us to design the New Maturity Model that will be used by UAE public sector to evaluate the Implementation Impact of Artificial Intelligence & Blockchain Technologies.

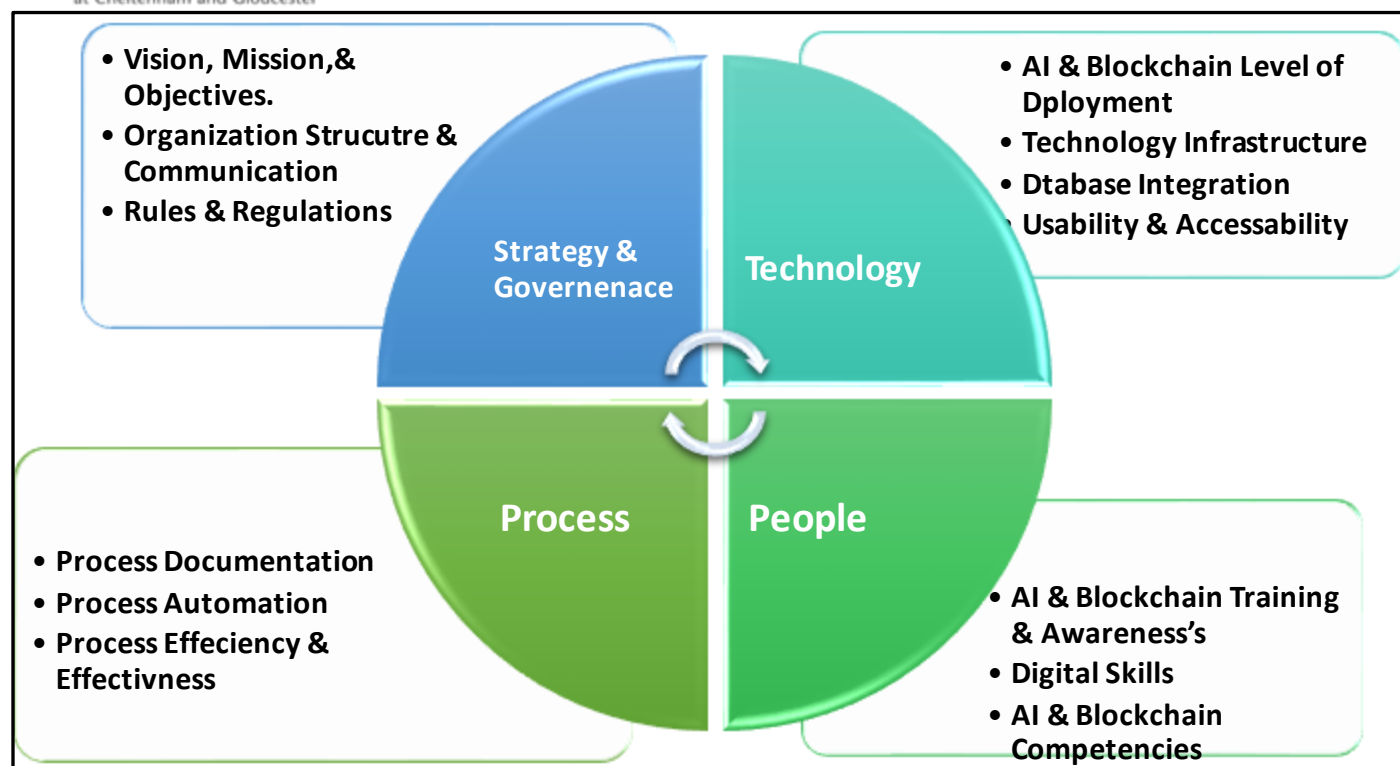


28. Suggested Conceptual Framework



55. Please consider the provisional model shown above – with 5 stages of change (initial to optimized) and four dimensions of change (Strategy, Technology, People and Processes). Do you think these are the most appropriate dimensions for evaluating the implementation and impact of AI/Blockchain Technologies in UAE Public Sector from your experience? Would you suggest other dimensions of change?

56. Do you think each stage above represent the overall stages and right description for levels of deployed AI & Blockchain within UAE Public Sector?



Quest.	From your Experience in Deploying AI & Blockchain within UAE Public Sector, what would the “Vision, Mission, and Objectives” at the Initial Stage look like? What would they be like at the Optimized stage? And at the other stages?				
	Initial	Developed	Defined	Managed	Optimized
	Initial Stage: Vision: To leverage AI and blockchain technologies to enhance efficiency, transparency, and innovation in the UAE public sector. Mission: To pilot and evaluate the potential applications of AI and blockchain technologies within specific government domains, while building foundational knowledge and expertise. Objectives: - Identify key areas within the public sector where AI and blockchain can bring value and streamline processes. - Conduct pilot projects to assess the feasibility and effectiveness of AI and blockchain solutions. - Establish partnerships with	Developed Stage: Vision: To establish AI and blockchain as core components of the UAE public sector infrastructure, promoting digital transformation and citizen-centric services. Mission: To implement AI and blockchain solutions across various government departments, fostering interoperability, data sharing, and secure transactions. Objectives: - Develop comprehensive AI and blockchain strategies that align with	Defined Stage: Vision: To become a global leader in AI and blockchain adoption, setting industry standards and driving economic growth through cutting-edge technologies. Mission: To continuously advance AI and blockchain capabilities, enabling intelligent decision-making, decentralized governance, and enhanced citizen services. Objectives: - Establish clear guidelines, policies, and regulations for AI and blockchain adoption within	Managed Stage: Vision: To ensure the sustainable and responsible use of AI and blockchain, addressing emerging challenges and societal implications. Mission: To actively manage the risks associated with AI and blockchain technologies, ensuring ethical deployment, data privacy, and security. Objectives: - Continuously monitor and evaluate the social, ethical, and legal implications of AI and blockchain deployment.	Optimized Stage: Vision: To continuously optimize and evolve AI and blockchain technologies to meet the dynamic needs of the UAE public sector and its citizens. Mission: To drive innovation, collaboration, and talent development, establishing the UAE as a global center of excellence in AI and blockchain.



	relevant stakeholders, including government entities, technology providers, and academia.	national priorities and regulatory frameworks. - Implement scalable AI and blockchain solutions within government departments, prioritizing efficiency, transparency, and citizen satisfaction. - Foster collaboration between public and private sectors to drive innovation and share best practices.	the public sector. - Integrate advanced AI algorithms and decentralized networks to create intelligent and self-governing systems. - Foster a culture of innovation, research, and development in AI and blockchain technologies.	- Establish frameworks and standards for data privacy, security, and governance in AI and blockchain systems. - Promote transparency, accountability, and responsible AI practices within the public sector.	
Quest.	From your Experience in Deploying AI & Blockchain within UAE Public Sector, what would the “Organization Structure & Communication” at the Initial Stage look like? What would they be like at the Optimized stage? And at the other stages?				
	Initial	Developed	Defined	Managed	Optimized
	Initial Stage: Organization Structure: - Small dedicated team focused on AI and blockchain initiatives, consisting of subject matter experts, project managers, and technical staff. - The team may report to a designated department or division within the organization or work under a central innovation or digital transformation unit. Communication: - Communication is primarily internal, with regular meetings and coordination among team members and stakeholders. - External communication may involve initial engagement with technology vendors,	Developed Stage: Organization Structure: - Expanded team with additional specialists in AI, blockchain, data science, cybersecurity, and other relevant fields. - The team may be organized into specific workstreams or project teams based on different use cases or functional areas. - The team may have direct access to senior management and collaborate closely with various departments or entities within the organization.	Defined Stage: Organization Structure: - Dedicated AI and blockchain department or unit within the organization, with clearly defined roles and responsibilities. - The department may have specialized teams focusing on AI development, blockchain implementation, data governance, compliance, and strategy. - The department may have decision-making authority and work closely with senior management to drive AI and	Managed Stage: Organization Structure: - Mature and integrated AI and blockchain function within the organization, with cross-functional teams and specialized roles. - Clear governance structure and policies to manage risks, ethics, and compliance related to AI and blockchain deployment. - Continuous improvement and innovation are embedded within the organization's culture, with dedicated resources for	Optimized Stage: Organization Structure: - AI and blockchain integration across the organization, with embedded teams and experts in various departments and functions. - Strong leadership and governance mechanisms to ensure responsible and strategic deployment of AI and blockchain technologies. - Continuous talent development and recruitment strategies to attract top AI and blockchain professionals.



	academic institutions, and government entities to gather insights and explore collaboration opportunities. - The emphasis is on knowledge sharing, brainstorming ideas, and building a common understanding of AI and blockchain technologies.	Communication: - Increased collaboration and communication within the team and across departments. - Regular project meetings, progress updates, and sharing of best practices. - External communication may involve engaging with technology providers, research organizations, and industry experts to explore partnerships and stay updated on emerging trends and advancements.	blockchain initiatives. Communication: - Enhanced communication channels, including formal reporting structures and regular communication with senior management and stakeholders. - Collaboration and knowledge sharing within the organization are promoted through workshops, training programs, and communities of practice. - External communication involves active participation in industry events, conferences, and partnerships with technology providers, academic institutions, and government entities.	research and development. Communication: - Effective communication channels established to disseminate information and updates on AI and blockchain projects to all stakeholders. - Regular reporting to senior management and governing bodies on project progress, key milestones, and impact assessment. - Active participation in industry collaborations, standards bodies, and regulatory discussions to shape the future direction of AI and blockchain in the sector.	Communication: - Seamless communication and collaboration across the organization, with AI and blockchain being integrated into everyday operations and decision-making processes. - External communication focuses on sharing success stories, thought leadership, and promoting the organization as a leader in AI and blockchain adoption. - Active participation in international conferences, partnerships, and research collaborations to drive innovation and stay at the forefront of AI and blockchain advancements.
Quest.	From your Experience in Deploying AI & Blockchain within UAE Public Sector, what would the “Rules & Regulations” at the Initial Stage look like? What would they be like at the Optimized stage? And at the other stages?				
	Initial	Developed	Defined	Managed	Optimized
	Initial Stage: Rules & Regulations: - Limited specific regulations focused on emerging technologies like AI and blockchain in the public sector. - General data protection, privacy, and security regulations are applicable. - Informal guidelines and best practices may be followed to ensure ethical and	Developed Stage: Rules & Regulations: - The introduction of guidelines and frameworks specific to AI and blockchain deployment in the public sector. - Emphasis on data protection, privacy, and security	Defined Stage: Rules & Regulations: - Well-defined regulations specific to AI and blockchain adoption in the public sector. - Comprehensive data governance frameworks, addressing data privacy, security, and ethics. - Regulatory guidelines for AI	Managed Stage: Rules & Regulations: - Mature and comprehensive regulatory framework governing AI and blockchain in the public sector. - Robust data protection and privacy laws, with strict enforcement mechanisms.	Optimized Stage: Rules & Regulations: - Advanced and adaptive regulatory ecosystem catering to the complex AI and blockchain landscape in the public sector. - Proactive regulations addressing emerging



	responsible use of AI and blockchain technologies. - Collaborations with regulatory bodies and legal experts to understand potential legal and regulatory considerations.	regulations, including guidelines for handling sensitive data. - Standards and protocols for interoperability and data exchange between different government entities and systems. - Collaborations with regulatory bodies to address emerging legal and regulatory challenges. - Clear governance frameworks for AI and blockchain projects within the organization.	algorithm transparency, explainability, and fairness. - Industry standards and protocols for data sharing, interoperability, and smart contract implementation. - Collaborations with regulatory bodies, industry associations, and international organizations to align with global best practices. - Regular audits and assessments of AI and blockchain projects for compliance.	- Well-established protocols for ensuring the integrity and security of blockchain networks and transactions. - Clear guidelines for AI system accountability, including transparency, fairness, and human oversight. - Continuous monitoring and updating of regulations to keep pace with technological advancements. - Regulatory bodies actively engaged in providing guidance, resolving disputes, and promoting responsible AI and blockchain practices.	challenges and risks associated with AI and blockchain. - Comprehensive legal frameworks for smart contracts, digital identities, and autonomous systems. - Collaborations with international regulatory bodies and organizations to establish global standards and harmonization. - Continuous regulatory innovation to foster innovation while ensuring public trust and societal benefits.
Quest.	From your Experience in Deploying AI & Blockchain within UAE Public Sector, what would the “Level of Implemented AI & Blockchain” at the Initial Stage look like? What would they be like at the Optimized stage? And at the other stages?				
	Initial	Developed	Defined	Managed	Optimized
	Initial Stage: Level of Implemented AI & Blockchain: - Limited implementation of AI and blockchain technologies in the public sector. - Pilot projects and proof-of-concepts may be conducted to explore potential use cases. - Adoption may be limited to specific departments or domains within the public sector. - Use cases may include basic	Developed Stage: Level of Implemented AI & Blockchain: - Increased implementation of AI and blockchain technologies across various departments within the public sector. - Broader adoption of AI-powered systems for process automation, data analysis,	Defined Stage: Level of Implemented AI & Blockchain: - AI and blockchain technologies are well-integrated into the public sector's infrastructure and operations. - AI-driven systems are widely deployed for data analytics, predictive modeling, and citizen services.	Managed Stage: Level of Implemented AI & Blockchain: - Mature implementation of AI and blockchain technologies across the entire public sector ecosystem. - AI systems are deeply integrated into decision-making processes, policy development,	Optimized Stage: Level of Implemented AI & Blockchain: - AI and blockchain are ubiquitous and seamlessly integrated into the public sector's infrastructure. - AI systems exhibit advanced capabilities such as natural language processing, computer



	automation, data analytics, or small-scale blockchain implementations for specific purposes.	and decision support. - Blockchain solutions may be implemented for enhancing data integrity, supply chain management, or identity verification. - Integration of AI and blockchain technologies may lead to improved efficiency, streamlined workflows, and enhanced data security.	- Blockchain implementations span multiple domains, including healthcare, finance, procurement, and smart cities. - Interoperability between different AI systems and blockchain networks may be established. - AI and blockchain solutions contribute to increased transparency, improved governance, and optimized service delivery.	and resource allocation. - Blockchain networks may be extensively used for secure and transparent transactions, data sharing, and decentralized governance. - AI and blockchain technologies are regularly updated and optimized to align with evolving needs and emerging trends. - The public sector benefits from enhanced efficiency, citizen-centric services, and data-driven policy-making.	vision, and autonomous decision-making. - Blockchain networks are widely adopted, with interoperability across multiple sectors and jurisdictions. - AI and blockchain solutions contribute to significant advancements in sectors like healthcare, transportation, education, and governance. - Ongoing research and development efforts ensure continuous innovation and adaptation to emerging technologies and challenges.
Quest.	From your Experience in Deploying AI & Blockchain within UAE Public Sector, what would the “Technology Infrastructure” at the Initial Stage look like? What would they be like at the Optimized stage? And at the other stages?				
	Initial	Developed	Defined	Managed	Optimized
	Initial Stage: Technology Infrastructure: - Basic infrastructure to support initial pilot projects and proof-of-concepts. - Limited computing resources and storage capacity dedicated to AI and blockchain initiatives. - Data may be stored in traditional databases or cloud-based solutions. - Limited integration and interoperability between systems and data sources. - Basic cybersecurity measures to protect data and systems.	Developed Stage: Technology Infrastructure: - Expanded technology infrastructure to support wider adoption of AI and blockchain technologies. - Increased computing power, storage capacity, and network capabilities. - Integration of AI frameworks and tools for data analysis and machine learning.	Defined Stage: Technology Infrastructure: - Robust and scalable technology infrastructure to support advanced AI and blockchain deployments. - High-performance computing clusters for AI training and processing large datasets. - Distributed and decentralized infrastructure for blockchain networks.	Managed Stage: Technology Infrastructure: - Mature technology infrastructure to support a wide range of AI and blockchain applications. - Advanced hardware and software solutions for AI, such as specialized processors (GPUs, TPUs) and deep learning frameworks. - Adoption of advanced distributed	Optimized Stage: Technology Infrastructure: - Cutting-edge technology infrastructure to support advanced AI and blockchain capabilities. - Utilization of emerging technologies like edge computing and quantum computing for AI and blockchain applications. - Highly scalable and fault-tolerant



		- Implementation of cloud-based solutions for scalable and flexible infrastructure needs. - Improved data connectivity and APIs for seamless data exchange between systems. - Enhanced cybersecurity measures to protect against potential threats.	- Implementation of advanced data management platforms for efficient data processing and storage. - Enhanced integration and interoperability between systems and data sources. - Advanced cybersecurity measures, including encryption, intrusion detection, and access controls.	- ledger technologies for blockchain networks, such as permissioned or hybrid blockchains. - Data lakes or data warehouses for unified and centralized data storage. - Robust integration and interoperability frameworks for seamless data sharing and system integration. - Continuous monitoring and optimization of infrastructure performance and scalability.	- infrastructure to handle massive data volumes and high transaction throughput. - Integration of AI systems with IoT devices for real-time data processing and decision-making. - Advanced cybersecurity measures, including AI-driven threat detection and response mechanisms. - Continuous research and exploration of new technologies to maintain a competitive edge.
Quest.	From your Experience in Deploying AI & Blockchain within UAE Public Sector, what would the “Database Integration” at the Initial Stage look like? What would they be like at the Optimized stage? And at the other stages?				
	Initial	Developed	Defined	Managed	Optimized
	Initial Stage: Database Integration: - Limited database integration in the initial stage of AI and blockchain deployment. - Data may be stored in separate databases across different departments or systems. - Limited data sharing and interoperability between databases. - Basic data extraction and transformation processes to prepare data for AI and blockchain applications. - Minimal integration of databases with AI	Developed Stage: Database Integration: - Increased efforts towards database integration to enable broader AI and blockchain adoption. - Data consolidation and centralization into a unified data platform or data warehouse. - Integration of databases through data connectors, APIs, or middleware solutions.	Defined Stage: Database Integration: - Well-defined and comprehensive database integration strategies and processes. - Integration of diverse data sources, both structured and unstructured, into a centralized data repository. - Advanced data management platforms or data lakes for efficient data processing and storage. - Enhanced ETL processes, data quality controls,	Managed Stage: Database Integration: - Mature database integration capabilities to support a wide range of AI and blockchain applications. - Seamless integration of data from multiple internal and external sources. - Advanced data processing techniques, such as data streaming and real-time analytics. - Integration of AI systems with databases	Optimized Stage: Database Integration: - Cutting-edge database integration approaches to leverage the full potential of AI and blockchain technologies. - Advanced data integration techniques, such as data virtualization and distributed databases. - Real-time data synchronization and replication across multiple systems and databases. - Deep integration of AI systems with



	and blockchain systems.	- Improved data extraction, transformation, and loading (ETL) processes for data preparation. - Integration of AI systems with databases for real-time data retrieval and analysis. - Basic integration of blockchain networks with databases for data verification and storage.	and data governance frameworks. - Integration of AI systems with databases for advanced analytics, predictive modeling, and real-time decision-making. - Integration of blockchain networks with databases for secure and immutable data storage and transaction verification.	through APIs or direct database access. - Deep integration of blockchain networks with databases for efficient data storage and retrieval. - Continuous monitoring and optimization of database performance, scalability, and data security.	databases, including AI model deployment and inference capabilities within the database infrastructure. - Advanced integration of blockchain networks with databases, leveraging smart contracts and decentralized data storage mechanisms. - Continuous exploration of emerging database technologies and integration methodologies for further optimization.
Quest.	From your Experience in Deploying AI & Blockchain within UAE Public Sector, what would the “Technology Usability & Accessibility” at the Initial Stage look like? What would they be like at the Optimized stage? And at the other stages?				
	Initial	Developed	Defined	Managed	Optimized
	. Initial Stage: Technology Usability & Accessibility: - Limited usability and accessibility of AI and blockchain technologies in the initial stage. - Adoption may be limited to technical experts or specialized teams. - User interfaces may be basic and require technical knowledge to operate. - Limited user training and support available. - Accessibility considerations may not be a primary focus at this stage.	Developed Stage: Technology Usability & Accessibility: - Improved usability and accessibility as AI and blockchain technologies mature. - User interfaces are designed to be more intuitive and user-friendly. - Increased emphasis on user experience and user-centered design. - User training and support materials are available to facilitate adoption.	Defined Stage: Technology Usability & Accessibility: - Well-defined usability and accessibility standards and guidelines are in place. - User interfaces are designed with a focus on simplicity and ease of use. - User training and support resources are comprehensive and readily available. - Efforts made to ensure accessibility for users with disabilities. - Continuous feedback loops	Managed Stage: Technology Usability & Accessibility: - Continuous improvements in technology usability and accessibility. - User interfaces are highly intuitive and customizable. - Comprehensive user documentation and training programs are provided. - Accessibility features are implemented to accommodate a wide range of user needs. - User feedback and usability	Optimized Stage: Technology Usability & Accessibility: - Advanced usability and accessibility across AI and blockchain technologies. - Seamless integration of AI and blockchain systems into existing workflows. - Intuitive interfaces with personalized user experiences. - Extensive user training and support resources cater to diverse user needs.



		- Efforts made to address accessibility requirements, such as compliance with accessibility standards.	and user engagement to enhance usability and address user needs.	testing play a crucial role in driving enhancements.	- Accessibility features are robust and compliant with accessibility standards. - Regular user feedback and usability testing drive ongoing improvements.
Quest.	From your Experience in Deploying AI & Blockchain within UAE Public Sector, what would the “AI & Blockchain Training & Awareness’s” at the Initial Stage look like? What would they be like at the Optimized stage? And at the other stages?				
	Initial	Developed	Defined	Managed	Optimized
	Initial Stage: AI & Blockchain Training & Awareness: - Limited training and awareness initiatives in the initial stage. - Awareness sessions and introductory training programs may be conducted to familiarize stakeholders with AI and blockchain concepts. - Training may focus on basic understanding of AI and blockchain technologies, their potential benefits, and initial use cases. - Limited resources dedicated to training, with a primary focus on technical experts or specialized teams.	Developed Stage: AI & Blockchain Training & Awareness: - Increased emphasis on training and awareness as AI and blockchain technologies mature. - Training programs cover a broader range of stakeholders, including employees, decision-makers, and end-users. - Training sessions include hands-on workshops, case studies, and demonstrations to showcase real-world applications. - Awareness campaigns highlight successful AI and blockchain use cases, benefits, and potential challenges. - Resources for self-learning, such as online tutorials or documentation, are made available.	Defined Stage: AI & Blockchain Training & Awareness: - Well-defined training and awareness strategies in place. - Training programs tailored to different stakeholder groups based on their roles and responsibilities. - Training covers technical aspects of AI and blockchain, as well as their implications on business processes and decision-making. - Regular workshops, seminars, and conferences are organized to share best practices, lessons learned, and emerging trends. - Dedicated training resources, such as online learning platforms or knowledge repositories, are established.	Managed Stage: AI & Blockchain Training & Awareness: - Ongoing training and awareness initiatives to keep stakeholders up-to-date with advancements in AI and blockchain. - Training programs incorporate advanced topics, such as AI ethics, data privacy, and security in AI and blockchain applications. - Training is integrated into onboarding processes for new employees. - Continuous professional development opportunities are provided for existing staff. - Collaborative forums and communities of practice foster knowledge sharing and peer learning.	Optimized Stage: AI & Blockchain Training & Awareness: - Highly mature training and awareness ecosystem for AI and blockchain technologies. - Training programs encompass a wide range of stakeholders, including citizens, businesses, and government officials. - Training resources and programs cater to diverse skill levels and learning preferences. - Advanced training programs cover emerging technologies, cutting-edge research, and industry-specific applications. - Thought leadership initiatives, such as conferences and research partnerships, contribute to global



					knowledge sharing.
Quest.	From your Experience in Deploying AI & Blockchain within UAE Public Sector, what would the “Employee Digital Skills” at the Initial Stage look like? What would they be like at the Optimized stage? And at the other stages?				
	Initial	Developed	Defined	Managed	Optimized
	Initial Stage: Employee Digital Skills: - Limited digital skills related to AI and blockchain technologies in the initial stage. - Basic awareness of digital tools and technologies among employees. - Limited understanding of AI and blockchain concepts and their potential applications. - Minimal expertise in data analysis, data management, or programming skills related to AI and blockchain. - Employees may require training and upskilling to adapt to the new technology landscape.	Developed Stage: Employee Digital Skills: - Increased emphasis on developing digital skills as AI and blockchain technologies mature. - Basic training programs to improve digital literacy and proficiency among employees. - Introduction to data analysis, data management, and basic programming skills relevant to AI and blockchain. - Awareness of AI and blockchain applications in specific departments or functions. - Supportive learning resources and opportunities for employees to acquire digital skills.	Defined Stage: Employee Digital Skills: - Well-defined digital skills development strategies and programs. - Training programs tailored to specific roles and responsibilities. - Advanced training in data analysis, machine learning, and programming languages relevant to AI and blockchain. - Employees equipped with the skills to handle and leverage data for AI and blockchain applications. - Departments have dedicated teams with advanced digital skills to drive AI and blockchain initiatives.	Managed Stage: Employee Digital Skills: - Ongoing focus on enhancing employee digital skills to keep pace with technological advancements. - Continuous professional development programs to upskill employees in emerging AI and blockchain trends. - Advanced training in specialized areas like deep learning, natural language processing, or smart contract development. - Cross-functional collaboration and knowledge sharing to foster a culture of continuous learning. - Employees empowered to leverage AI and blockchain technologies to improve productivity and decision-making.	Optimized Stage: Employee Digital Skills: - Highly developed and specialized digital skills across the organization. - Continuous investment in employee skills development to maintain a competitive edge. - Expertise in cutting-edge AI and blockchain technologies and their applications. - Skilled employees capable of leading AI and blockchain projects and driving innovation. - Culture of digital proficiency and adaptability, where employees embrace emerging technologies.
Quest.	From your Experience in Deploying AI & Blockchain within UAE Public Sector, what would the “Employee AI & Blockchain Competencies” at the Initial Stage look like? What would they be like at the Optimized stage? And at the other stages?				
	Initial	Developed	Defined	Managed	Optimized
	Initial Stage:	Developed Stage:	Defined Stage:	Managed Stage:	Optimized Stage:



	Employee AI & Blockchain Competencies: - Limited competencies related to AI and blockchain technologies in the initial stage. - Basic awareness of AI and blockchain concepts among employees. - Limited understanding of how AI and blockchain can be applied to solve specific problems. - Minimal experience with AI and blockchain tools and platforms. - Employees may require training and upskilling to develop competencies in AI and blockchain.	Employee AI & Blockchain Competencies: - Increased emphasis on developing competencies as AI and blockchain technologies mature. - Basic training programs to improve understanding of AI and blockchain concepts and applications. - Introduction to tools, frameworks, and platforms used in AI and blockchain projects. - Employees capable of discussing potential use cases and benefits of AI and blockchain in their areas of work. - Supportive learning resources and opportunities for employees to enhance their competencies.	Employee AI & Blockchain Competencies: - Well-defined competency frameworks and development programs in place. - Training programs tailored to specific roles and responsibilities. - Advanced training in AI and blockchain methodologies, algorithms, and technologies. - Proficiency in using AI and blockchain tools, frameworks, and platforms for data analysis and decision-making. - Employees capable of contributing to AI and blockchain projects and collaborating with technical teams.	Employee AI & Blockchain Competencies: - Ongoing focus on enhancing employee competencies to leverage AI and blockchain technologies effectively. - Continuous professional development programs to deepen expertise in AI and blockchain trends and applications. - Advanced training in specialized areas such as machine learning, deep learning, smart contract development, or blockchain governance. - Cross-functional collaboration and knowledge sharing to foster a culture of innovation and expertise. - Employees capable of independently leading AI and blockchain projects within their domain.	Employee AI & Blockchain Competencies: - Highly developed and specialized competencies across the organization. - Continuous investment in employee competencies to stay at the forefront of AI and blockchain advancements. - Expertise in cutting-edge AI and blockchain technologies, methodologies, and applications. - Employees capable of driving AI and blockchain innovation, exploring new use cases, and identifying optimization opportunities. - Culture of AI and blockchain excellence, where employees actively contribute to the organization's strategic goals.
Quest.	From your Experience in Deploying AI & Blockchain within UAE Public Sector, what would the “Processes Documentation” at the Initial Stage look like? What would they be like at the Optimized stage? And at the other stages?				
	Initial	Developed	Defined	Managed	Optimized
	Initial Stage: Processes Documentation: - Limited documentation of processes related to AI and blockchain in the initial stage. - Processes may be loosely defined and subject to change as	Developed Stage: Processes Documentation: - Increased emphasis on documenting processes as AI and blockchain technologies mature.	Defined Stage: Processes Documentation: - Well-defined processes documentation strategies and practices in place. - Processes are documented in a	Managed Stage: Processes Documentation: - Ongoing focus on maintaining and managing processes documentation for AI and blockchain initiatives.	Optimized Stage: Processes Documentation: - Highly optimized and mature processes documentation framework in place.



	the technology is being explored and tested. - Basic documentation may include high-level overviews of objectives, data sources, and preliminary workflows. - Documentation may primarily focus on capturing initial insights, lessons learned, and basic project requirements.	- Processes are defined with more clarity and detail, including data acquisition, processing, and algorithmic implementation. - Documentation includes workflows, data flow diagrams, and guidelines for implementing AI and blockchain solutions. - Best practices and standard operating procedures (SOPs) are documented to ensure consistency and quality. - Documentation may also cover data governance, privacy, and security considerations.	structured and comprehensive manner, covering all aspects of AI and blockchain implementation. - Detailed workflows, data pipelines, and decision-making frameworks are documented and regularly updated. - Documentation includes step-by-step guidelines, checklists, and templates for consistent and efficient execution. - Quality assurance processes and methodologies are documented to ensure accuracy and reliability.	- Documentation is regularly reviewed, updated, and refined based on evolving technologies and organizational needs. - Comprehensive documentation includes both technical and non-technical aspects of AI and blockchain projects. - Knowledge management systems and repositories are established to store and share processes documentation. - Documentation may also include post-implementation analyses, impact assessments, and lessons learned.	- Documentation is a central component of AI and blockchain initiatives, guiding all stages of the project lifecycle. - Processes are documented with a focus on scalability, efficiency, and continuous improvement. - Comprehensive documentation includes best practices, benchmarks, and industry standards. - Knowledge sharing platforms and communities facilitate collaboration and exchange of processes documentation.
Quest.	From your Experience in Deploying AI & Blockchain within UAE Public Sector, what would the “Processes Automation” at the Initial Stage look like? What would they be like at the Optimized stage? And at the other stages?				
	Initial	Developed	Defined	Managed	Optimized
	Initial Stage: Processes Automation: - Limited processes automation in the initial stage. - Basic automation tools may be used to streamline simple and repetitive tasks. - Manual intervention and human decision-making are still prevalent in most processes. - Processes automation is primarily focused on proof-of-concept	Developed Stage: Processes Automation: - Increased emphasis on automation as AI and blockchain technologies mature. - Automation tools and platforms are integrated into key processes to improve efficiency. - Basic robotic process	Defined Stage: Processes Automation: - Well-defined automation strategies and practices in place. - Comprehensive analysis of processes to identify automation opportunities. - RPA and AI technologies are used more extensively to automate	Managed Stage: Processes Automation: - Ongoing focus on managing and optimizing processes automation initiatives. - Automation efforts are integrated into the organization's digital transformation roadmap. - RPA and AI technologies are extensively	Optimized Stage: Processes Automation: - Highly optimized and mature processes automation framework in place. - Automation is embedded as a core component of the organization's operations. - Advanced AI techniques, such as deep



	projects or small-scale implementations.	automation (RPA) may be implemented for routine and rule-based tasks. - Some AI technologies, such as machine learning algorithms, may be employed for data analysis and decision support. - Automation initiatives are scoped and implemented in specific areas to demonstrate value and feasibility.	repetitive and rule-based tasks. - Advanced machine learning algorithms are applied to optimize decision-making processes. - Automation projects are implemented in collaboration with relevant stakeholders and departments.	employed to automate various complex processes. - Integration with other technologies, such as natural language processing or computer vision, may enhance automation capabilities. - Continuous monitoring, evaluation, and refinement of automated processes to ensure effectiveness and adaptability.	learning or cognitive automation, are employed for complex tasks. - Intelligent automation solutions are implemented to support end-to-end processes and decision-making. - Continuous improvement practices and advanced analytics drive further optimization of automated processes.
Quest.	From your Experience in Deploying AI & Blockchain within UAE Public Sector, what would the “Processes Efficiency & Effectiveness” at the Initial Stage look like? What would they be like at the Optimized stage? And at the other stages?				
	Initial	Developed	Defined	Managed	Optimized
	Initial Stage: Processes Efficiency & Effectiveness: - Processes at the initial stage may have limited efficiency and effectiveness. - Manual and traditional methods are predominantly used, leading to potential inefficiencies and delays. - Data management and analysis may be performed manually, resulting in slower decision-making. - Limited automation and optimization may hinder overall process efficiency. - The focus is on exploring AI and blockchain technologies and understanding their potential impact.	Developed Stage: Processes Efficiency & Effectiveness: - Increased focus on improving process efficiency and effectiveness. - Basic automation tools and technologies may be implemented to streamline certain tasks. - Data analytics capabilities are introduced, enabling better insights and informed decision-making. - Standardization and best practices start to emerge,	Defined Stage: Processes Efficiency & Effectiveness: - Well-defined strategies and initiatives are in place to enhance process efficiency and effectiveness. - Comprehensive automation and optimization tools are deployed, reducing manual efforts and errors. - AI and machine learning algorithms are leveraged to analyze data, extract insights, and improve decision-making. - Processes are streamlined and optimized, leading to reduced costs,	Managed Stage: Processes Efficiency & Effectiveness: - Ongoing focus on managing and optimizing processes for maximum efficiency and effectiveness. - Advanced automation and AI technologies are utilized to achieve process excellence. - Real-time data analytics and predictive modeling help identify bottlenecks and optimize resource allocation. - Agile methodologies are adopted to adapt to changing requirements	Optimized Stage: Processes Efficiency & Effectiveness: - Processes are highly efficient and effective, driven by AI and blockchain technologies. - End-to-end automation, intelligent decision-making, and autonomous processes are implemented. - Advanced analytics and AI-driven insights drive continuous process improvement. - Integration with emerging technologies, such as Internet of Things (IoT) or edge



		leading to improved efficiency in specific processes. - Performance metrics and key performance indicators (KPIs) are established to monitor process effectiveness.	improved productivity, and faster cycle times. - Continuous improvement methodologies, such as Six Sigma or Lean, are implemented to drive efficiency gains.	and improve responsiveness. - Performance metrics and continuous monitoring enable proactive identification and resolution of process inefficiencies.	computing, further enhances efficiency. - Processes are agile, scalable, and adaptable to meet changing demands and drive innovation.

29. Main Challenges, Drivers, barriers/obstacles behind implementing technologies

25. From Your Experience, what are the Main Challenges behind Implementing AI & Blockchain Solutions within UAE Public Sector?

Based on my knowledge cut-off in September 2021, I can provide you with some insights into the challenges that may be encountered when implementing AI and blockchain solutions within the public sector in the UAE. However, please note that specific developments and changes in policies or technology after my knowledge cut-off may not be reflected in my response.

1. ****Lack of Awareness and Understanding****: One of the main challenges is the lack of awareness and understanding of AI and blockchain technologies among government officials and decision-makers. It is essential to educate stakeholders about the potential benefits, limitations, and implications of these technologies to gain their support and ensure successful implementation.
2. ****Regulatory Frameworks****: Developing appropriate regulatory frameworks and policies that govern the use of AI and blockchain in the public sector is crucial. Regulations need to address issues such as data privacy, security, ethical considerations, liability, and interoperability to build trust and ensure compliance.
3. ****Data Accessibility and Quality****: AI and blockchain solutions heavily rely on accurate and reliable data. The public sector often faces challenges related to data accessibility and quality, including fragmented data sources, inconsistent formats, and data silos across different government entities. Establishing data governance frameworks and mechanisms to ensure data sharing, integration, and quality control is necessary for successful implementation.
4. ****Legacy Systems and Infrastructure****: Integrating AI and blockchain solutions into existing legacy systems and infrastructure can be complex and challenging. Public sector organizations may have outdated systems that lack the necessary capabilities to support new technologies. Upgrading or replacing legacy systems and ensuring interoperability can require significant time, resources, and coordination.
5. ****Skill Gap and Talent Acquisition****: Implementing AI and blockchain solutions requires a skilled workforce with expertise in these technologies. The public sector may face challenges in recruiting and retaining professionals with the necessary skills and knowledge. Investments in training programs and collaborations with academic institutions and industry experts can help address this challenge.
6. ****Collaboration and Coordination****: Implementing AI and blockchain solutions in the public sector often involves multiple government entities and stakeholders. Achieving collaboration, coordination, and alignment of objectives across different departments can be challenging. Establishing clear governance structures, communication channels, and coordination mechanisms is crucial for successful implementation.
7. ****Costs and Return on Investment****: Implementing AI and blockchain solutions can involve significant upfront costs, including technology infrastructure, talent acquisition, and ongoing maintenance. Demonstrating a clear return on investment (ROI) and cost-effectiveness of these solutions is essential to gain support from decision-makers and secure funding.

It is important to note that the UAE government has been actively embracing digital transformation and promoting the adoption of emerging technologies. While these challenges exist, the government has also taken steps to address them by establishing initiatives, regulatory frameworks, and partnerships to promote the adoption of AI and blockchain solutions in the public sector.

26. From Your Experience, what are the Main Drivers to enhance Implementing AI & Blockchain Solutions within UAE Public Sector?

Based on my knowledge cutoff in September 2021, here are some of the main drivers that can enhance the implementation of AI and blockchain solutions within the UAE public sector:

1. ****Government Vision and Support****: The UAE government has shown a strong commitment to digital transformation and innovation. Initiatives such as the UAE Strategy for Artificial Intelligence and the Dubai Blockchain Strategy demonstrate the government's vision to leverage advanced technologies for the benefit of the public sector. Clear support and endorsement from government leaders play a vital role in driving the implementation of AI and blockchain solutions.
2. ****Efficiency and Cost Savings****: AI and blockchain technologies have the potential to streamline processes, automate tasks, and reduce administrative burdens within the public sector. These technologies can enhance operational efficiency, resulting in cost savings for government entities. Improved efficiency and cost-effectiveness are strong drivers for the adoption of AI and blockchain solutions.
3. ****Improved Service Delivery****: AI and blockchain solutions can enhance the delivery of public services by providing faster, more accurate, and personalized services to citizens. For example, AI-powered chatbots can handle citizen inquiries and provide support, while blockchain can enable secure and transparent transactions for government services. Improved service delivery and citizen satisfaction are key motivators for implementing these technologies.
4. ****Data-Driven Decision Making****: AI enables data analysis and predictive modeling, providing valuable insights to inform decision-making within the public sector. By harnessing the power of AI, government entities can make data-driven decisions, optimize resource allocation, and develop evidence-based policies and strategies. This data-driven approach can lead to better outcomes and improved governance.
5. ****Enhanced Security and Trust****: Blockchain technology offers enhanced security, immutability, and transparency, making it well-suited for applications that require secure data management, such as identity verification, supply chain management, and smart contracts. By leveraging blockchain, the UAE public sector can enhance data security, reduce fraud, and foster trust among stakeholders.
6. ****International Competitiveness****: The UAE aims to position itself as a global leader in technology adoption and innovation. By implementing AI and blockchain solutions within the public sector, the UAE can enhance its competitiveness on the international stage. The government's commitment to embracing cutting-edge technologies serves as a motivator to drive implementation and demonstrate leadership in the region.
7. ****Partnerships and Collaboration****: Collaboration between government entities, private sector organizations, and academic institutions plays a crucial role in driving the implementation of AI and blockchain solutions. Partnerships can bring together diverse expertise, resources, and knowledge to overcome challenges and accelerate implementation efforts. Collaborative initiatives and ecosystems can serve as drivers for the adoption of these technologies.

It's important to note that the UAE government has been actively promoting the adoption of AI and blockchain solutions, recognizing the potential benefits they offer. The drivers mentioned above align with the government's strategic vision and initiatives to transform the public sector and drive innovation in the UAE.

27. What are the main Internal & External, barriers/obstacles of adopting/ implementing and deploying AI or Blockchain technologies and their related solutions to enhance efficiency and effectiveness of UAE Public Sector Transactions?

When it comes to adopting, implementing, and deploying AI and blockchain technologies in the UAE public sector to enhance the efficiency and effectiveness of transactions, there are several internal and external barriers and obstacles that may be encountered. Here are some of the main ones:

Internal Barriers/Obstacles:

1. ****Resistance to Change****: Resistance to change within government entities can be a significant barrier. Some stakeholders may be hesitant to adopt new technologies due to concerns about job displacement, lack of familiarity with emerging technologies, or fear of the unknown. Overcoming resistance to change and fostering a culture of innovation and digital transformation is essential.
2. ****Lack of Awareness and Expertise****: Limited awareness and understanding of AI and blockchain technologies among government employees and decision-makers can hinder adoption. Many individuals may not be familiar with the potential benefits, use cases, or implementation challenges associated with these technologies. Bridging the knowledge gap through training programs and awareness campaigns is crucial.
3. ****Legacy Systems and Infrastructure****: The presence of legacy systems and outdated infrastructure within government entities can pose challenges for implementing AI and blockchain technologies. Integrating new technologies with existing systems may require significant upgrades or replacements, which can be time-consuming and costly. Compatibility and interoperability issues may also arise.
4. ****Data Accessibility and Quality****: Data accessibility and quality can be a hurdle in implementing AI and blockchain solutions. Government entities may face challenges related to fragmented data sources, inconsistent formats, and data silos. Achieving data integration, standardization, and ensuring data quality are important for successful implementation of these technologies.
5. ****Budget Constraints****: Limited budget allocation for technology adoption and implementation can be a barrier. Implementing AI and blockchain solutions often involves upfront costs, including infrastructure investments, talent acquisition, and ongoing maintenance. Securing adequate funding and demonstrating the long-term cost-effectiveness of these technologies is crucial.

External Barriers/Obstacles:

1. ****Regulatory and Legal Challenges****: The regulatory landscape surrounding AI and blockchain technologies is continuously evolving. Government entities need to navigate regulatory challenges related to data privacy, security, intellectual property, and liability. Adapting and aligning regulations to accommodate new technologies can be a complex process that requires collaboration between government bodies and regulatory agencies.
2. ****Cybersecurity Concerns****: As AI and blockchain technologies become more prevalent, cybersecurity threats and vulnerabilities also increase. Government entities must address concerns related to data security, privacy breaches, hacking attempts, and the potential misuse of technology. Ensuring robust cybersecurity measures and building trust in the security of these technologies is crucial.
3. ****Interoperability and Standardization****: Interoperability and standardization challenges can hinder the seamless integration and adoption of AI and blockchain solutions. Developing common standards, protocols, and frameworks for data sharing, interoperability, and communication between different systems and government entities is essential to avoid fragmentation and maximize the benefits of these technologies.
4. ****Collaboration and Coordination****: Effective collaboration and coordination among government entities, private sector organizations, and other stakeholders are necessary for successful implementation. Lack of coordination, siloed approaches, and limited collaboration can impede progress. Establishing partnerships, sharing best practices, and fostering a collaborative ecosystem are important for overcoming these barriers.
5. ****Ethical and Social Implications****: AI and blockchain technologies raise ethical and social concerns that need to be addressed. Issues related to bias, fairness, accountability, transparency, and the impact on employment need careful consideration. Developing ethical guidelines, frameworks, and governance mechanisms is crucial to ensure responsible and inclusive use of these technologies.

Overcoming these internal and external barriers requires a comprehensive approach that includes stakeholder engagement, capacity building, regulatory frameworks, infrastructure upgrades, and a clear vision for digital transformation. The UAE government has been actively working to address these obstacles through various initiatives, policies, and partnerships aimed at promoting the adoption

28. What other comments do you have about improving the adopting/ implementing and deploying AI or Blockchain technologies and their related solutions within UAE Public Sector Entities?

To further improve the adoption, implementation, and deployment of AI and blockchain technologies within UAE public sector entities, the following comments can be considered:

1. ****Collaboration and Knowledge Sharing****: Encouraging collaboration and knowledge sharing among government entities, academia, private sector organizations, and international partners is crucial. Establishing platforms for sharing best practices, success stories, and lessons learned can accelerate the implementation process and foster innovation.
2. ****Capacity Building and Skill Development****: Investing in capacity building programs to develop a skilled workforce with expertise in AI and blockchain technologies is essential. Training programs, workshops, and certifications can help equip government employees with the necessary knowledge and skills to effectively leverage these technologies.
3. ****Pilot Projects and Proof of Concepts****: Conducting pilot projects and proof of concepts can help demonstrate the value and feasibility of AI and blockchain solutions in the UAE public sector. These initiatives can provide valuable insights, address implementation challenges, and build confidence among decision-makers and stakeholders.
4. ****Engaging Startups and SMEs****: The UAE has a thriving startup ecosystem, and engaging startups and small and medium-sized enterprises (SMEs) can bring innovative solutions and fresh perspectives to the public sector. Creating platforms, such as innovation challenges and sandboxes, to foster collaboration between startups, government entities, and investors can drive the adoption of AI and blockchain technologies.
5. ****Data Governance and Collaboration****: Establishing clear data governance frameworks, data sharing protocols, and data standards is vital for the successful implementation of AI and blockchain solutions. Collaboration between government entities to create centralized data repositories and promote data sharing can improve data accessibility, quality, and interoperability.
6. ****User-Centric Approach****: Adopting a user-centric approach is crucial when implementing AI and blockchain solutions. Understanding the needs and expectations of citizens and government employees is essential to develop solutions that address their pain points and provide tangible benefits. User feedback and usability testing should be incorporated throughout the development and deployment process.
7. ****International Collaboration and Benchmarking****: Collaborating with international counterparts and leveraging global best practices can provide valuable insights and benchmarking opportunities. Participating in international forums, conferences, and research collaborations can help the UAE public sector stay updated on the latest advancements and identify areas for improvement.
8. ****Monitoring and Evaluation****: Establishing robust monitoring and evaluation mechanisms is important to assess the impact and effectiveness of AI and blockchain implementations. Regular evaluation of projects, collecting feedback, and analyzing performance indicators can identify areas for improvement and guide future initiatives.
9. ****Public Awareness and Engagement****: Conducting public awareness campaigns to educate citizens about the benefits, usage, and impact of AI and blockchain technologies is essential. Building trust and addressing concerns related to data privacy, security, and ethical implications can foster public support and acceptance of these technologies.

By considering these comments, the UAE public sector can further enhance its adoption, implementation, and deployment of AI and blockchain technologies, leading to improved efficiency, effectiveness, and innovation across various government entities and services.

Thank you so much for your time and consideration in this research.

Appendix G: Maturity Model Validation Questionnaire

A PHD Questionnaire to Study: A new Maturity Model for Implementing Artificial Intelligence and Blockchain Technologies within UAE Public Sector

Introduction

Dear Respondent,

We put in your generous hands this questionnaire prepared to validate a New Maturity Model has been developed based on Feedback from All Subject Matter Experts from UAE Public & Private Sector who are involved in AI & Blockchain Projects Implementation, for a PHD study: **A new Maturity Model for Implementing Artificial Intelligence and Blockchain Technologies within UAE Public Sector.**

Your cooperation with us in answering all questions accurately, honestly and objectively will have a great impact on enriching the research and achieving the desired goals.

Thank you for your cooperation.

Introduction to Maturity Model Development

The Model was suggested within the conceptual framework with 4 pillar (1. Strategy & Governance, 2. Technology, 3. Process, 4. People) that affected by AI & Blockchain Implementation projects ... and based on that we run a survey, focus groups and interviews with all stakeholders within UAE Public Sector & Private sector.

After reviewing and revising their feedback we come up with New Maturity Model, by adding new 6 Pillars (1. Legal & regulation Framework, 2. Data, 3. Finance, 4. Customization, 5. Impact Evaluation, 6. Collaboration and Coordination), that also affected by AI & Blockchain Implementation projects.

So based on that we need your opinion by answering the below questionnaire to ensure and validate all related pillars that should be within our Finalized Comprehensive AI & Blockchain Maturity Model.

Demographic Data

A. Gender						
☐ Male			☐ Female			
B. Age						
☐ <20	☐ 21–30	☐ 31–40	☐ 41–50	☐ 51–60	☐ 61–70	☐ >70
C. Education						
☐ Under Senior	☐ Vocational	☐ Bachelor	☐ Master	☐ Doctorate		
D. UAE Public & Private Sector						
☐ UAE Federal Government Employee	☐ Abu Dhabi Local Government Employee	☐ Dubai Local Government Employee	☐ Ajman Local Government Employee	☐ Private Sector Expert working with UAE Public Sector	☐ Other Organizations/Entities /Freelancer	
E. Occupation						
☐ AI Specialist/Expert	☐ Blockchain Specialist/Expert	☐ Digital Transformation Specialist/Expert	☐ IT Technical Engineer	☐ Strategy, Excellence, Productivity, Efficiency & Effectiveness Specialist/Expert	☐ Other Occupation	
F. Level of understanding of the study research subject						
☐ None or Poor	☐ Little	☐ Fair	☐ Good	☐ Specialized		

The name of your organization/company/public authority/international organization:

Your full name (first name, last name):

Email address:

The Project Related Questions

The questionnaire was built in the light of validation for the new added pillars to the Maturity Model Assessment Framework – to Assess & Evaluate the Implementation of AI & Blockchain Technologies within UAE Public Sector.

Scale	Strongly Disagree لا أوافق بشدة	Disagree لا أوافق	Neutral محايد	Agree موافق	Strongly Agree موافق بشدة

Qes. No.	Questions / Choices of Answers
Part 1	New Added Pillar – Legal & Regulation Framework
	The Comprehensive Maturity Model Assessment for Implanting AI & Blockchain Projects within UAE Public Sector should include a New Pillar of Legal & Regulation Framework - Establishment of New Rules & Regulations That Related to AI & Blockchain Technologies?
	Strongly Disagree Disagree Neutral Agree Strongly Agree

	موافق بشدة	موافق	محايد	لا أوافق	لا أوافق بشدة
	The Comprehensive Maturity Model Assessment for Implanting AI & Blockchain Projects within UAE Public Sector should include a New Pillar of Legal & Regulation Framework - Compliance with Public Sector existing Regulations that related to AI & Blockchain Technologies?				
	Strongly Disagree لا أوافق بشدة	Disagree لا أوافق	Neutral محايد	Agree موافق	Strongly Agree موافق بشدة
Part 2	New Added Pillar – Data				
	The Comprehensive Maturity Model Assessment for Implanting AI & Blockchain Projects within UAE Public Sector should include a New Pillar of Data - Data Governance & Privacy, that related to AI & Blockchain Technologies?				
	Strongly Disagree لا أوافق بشدة	Disagree لا أوافق	Neutral محايد	Agree موافق	Strongly Agree موافق بشدة
	The Comprehensive Maturity Model Assessment for Implanting AI & Blockchain Projects within UAE Public Sector should include a New Pillar of Data - Data Quality & Availability, that related to AI & Blockchain Technologies?				
	Strongly Disagree لا أوافق بشدة	Disagree لا أوافق	Neutral محايد	Agree موافق	Strongly Agree موافق بشدة
Part 3	New Added Pillar – Finance				
	The Comprehensive Maturity Model Assessment for Implanting AI & Blockchain Projects within UAE Public Sector should include a New Pillar of Finance - Budget & Investments, that related to AI & Blockchain Technologies?				
	Strongly Disagree لا أوافق بشدة	Disagree لا أوافق	Neutral محايد	Agree موافق	Strongly Agree موافق بشدة
	The Comprehensive Maturity Model Assessment for Implanting AI & Blockchain Projects within UAE Public Sector should include a New Pillar of Finance - Return on Investments (ROI), that related to AI & Blockchain Technologies?				
	Strongly Disagree لا أوافق بشدة	Disagree لا أوافق	Neutral محايد	Agree موافق	Strongly Agree موافق بشدة
Part 4	New Added Pillar – Organization Specialty/Customization				
	The Comprehensive Maturity Model Assessment for Implanting AI & Blockchain Projects within UAE Public Sector should include a New Pillar of Customization – Industry Type Organization, that capable to Implement Projects related to AI & Blockchain Technologies?				
	Strongly Disagree لا أوافق بشدة	Disagree لا أوافق	Neutral محايد	Agree موافق	Strongly Agree موافق بشدة
	The Comprehensive Maturity Model Assessment for Implanting AI & Blockchain Projects within UAE Public Sector should include a New Pillar of Customization - Specific-Context & Customers Use-Cases “Type of Customers” for the Government Entity, that capable to Implement Projects related to AI & Blockchain Technologies?				
	Strongly Disagree لا أوافق بشدة	Disagree لا أوافق	Neutral محايد	Agree موافق	Strongly Agree موافق بشدة
Part 5	New Added Pillar – Impacts Evaluation				
	The Comprehensive Maturity Model Assessment for Implanting AI & Blockchain Projects within UAE Public Sector should include a New Pillar of Impacts Evaluation – Level of Adaption, that related to adapted projects in AI & Blockchain Technologies?				
	Strongly Disagree لا أوافق بشدة	Disagree لا أوافق	Neutral محايد	Agree موافق	Strongly Agree موافق بشدة
Part 6	Conceptual Framework – Collaboration & Coordination				
	The Comprehensive Maturity Model Assessment for Implanting AI & Blockchain Projects within UAE Public Sector should include a New Pillar of Collaboration & Coordination – Trust & Communications between Digital Transformation Entities & Other Government Entities, that related to implement projects in AI & Blockchain Technologies?				
	Strongly Disagree لا أوافق بشدة	Disagree لا أوافق	Neutral محايد	Agree موافق	Strongly Agree موافق بشدة
	The Comprehensive Maturity Model Assessment for Implanting AI & Blockchain Projects within UAE Public Sector should include a New Pillar of Collaboration &				

	Coordination – Organization Culture, that can play a crucial role to support and facilitate the implementation of projects in AI & Blockchain Technologies?				
	Strongly Disagree لا أوافق بشدة	Disagree لا أوافق	Neutral محايد	Agree موافق	Strongly Agree موافق بشدة

Appendix H: Table of Research Paper's Published and Under Review

Article	Journal	Status	link
1- BLOCKCHAIN AND ARTIFICIAL INTELLIGENCE INTEGRATION IN PUBLIC SECTOR SERVICES: A LITERATURE REVIEW AND BIBLIOMETRIC ANALYSIS	INTERNATIONAL JOURNAL OF INTELLIGENT APPLICATIONS IN ENGINEERING. ISSN:21476799	<u>Published</u>	Blockchain and Artificial Intelligence Integration in Public Sector Services: A Literature Review and Bibliometric Analysis International Journal of Intelligent Systems and Applications in Engineering
2- CAPABILITY ASSESSMENT FRAMEWORK FOR AI AND BLOCKCHAIN ADOPTION IN PUBLIC SECTOR OF U.A.E.	INTERNATIONAL JOURNAL OF ADVANCED COMPUTER SCIENCE AND APPLICATIONS (IJACSA	<u>published</u>	IJACSA Volume 15 Issue 6 - thesai.org Capability Assessment Framework for Artificial Intelligence and Blockchain Adoption in Public Sector of United Arab Emirates (UAE)
3- A NEW MATURITY MODEL FOR AI &BLOCKCHAIN IMPLEMENTATION WITHIN THE UAE PUBLIC SECTOR	JOURNAL OF ELECTRICAL ENGINEERING ISSN:1112-52093	<u>Accepted</u>	
4- EVALUATING THE FEASIBILITY OF AI AND BLOCKCHAIN TECHNOLOGY IN PUBLIC SERVICES TRANSACTIONS :A CASE STUDY OF THE UAE	BUSINESS PRESPECTIVES	<u>Under review</u>	
5- The Impact of Digital Transformation Strategy on Human Resource Development in Commercial Banks	BUSINESS PRESPECTIVES	<u>accepted</u>	