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Management Guidelines for Better Application of Business Process Management in SAP ERP Projects

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Abstract — The SAP Enterprise Resource Planning (ERP) system is a leading software solution for corporate business functions and processes. Business Process Management (BPM) is a management approach designed to create and manage organizations' business processes. Both promise an improvement of business processes in companies and can be used together in organizations. In conjunction with the SAP ERP system and BPM approach, BPM maturity models can be used as diagnostic tools that allow an organization to assess and monitor the maturity of its business processes. The aim is to investigate and analyse the interaction between the use of the SAP ERP software package and the utilization of BPM. Findings derive from an analysis of eleven semi-structured expert interviews and a validation of the guidelines via an online survey with 151 participants that use SAP, BPM and/or BPM maturity models. This research analyses the complex relationships between SAP, BPM and BPM maturity models and develops management guidelines for improved use of BPM in SAP ERP projects.

Keywords — SAP; ERP; BPM; Business Process Management; Maturity Models; BPM Maturity Models; Management Guidelines.

I. Introduction

This article builds upon previously published research [1] to provide a more detailed presentation and assessment of a set of management guidelines for the utilization of BPM in SAP ERP projects. SAP (Systeme, Anwendungen und Produkte) is a German company created in 1972 and the world's largest provider of enterprise software that, in 2019, had more than 437,000 customers in over 180 countries [2]. The SAP ERP package provides software solutions for the full range of business functions in companies – from human resource management, back office finance processes, the full sales order processing cycle and manufacturing, supply chain and distribution functions [3]. SAP ERP is usually installed on a database platform that handles several different business functions supported by the range of software modules that make up the SAP product suite. The implementation of an ERP system is often seen as a major strategic investment that may encompass innovative change, which may enhance a company's core capabilities [4].

BPM is a methodology for the definition and operation of company business processes, and can be used without any information technology (IT) systems or infrastructure [5]. In practice, however, companies often use IT software tools to administer the BPM of an organisation. Additionally, software such as SAP ERP can assist a company in standardizing and automating processes to make them as efficient as possible [6]. BPM will usually start with a process analysis of the actual business processes [7] by the application of specific methods, techniques and tools [8]. The following definition is assumed in this research: BPM is a process-oriented management approach to create, support and analyse an organisation's business processes. It is also worth noting that, for an optimum BPM outcome, an IT tool - to analyse and support BPM behaviour – may be usefully deployed.

BPM maturity models can be used to support the application of BPM. A maturity model is described by Saco [9] as a diagnostic tool for an organization, which provides a framework to test, analyse and improve business quality [10]. A BPM maturity model analyses the quality of a company process and classifies business quality into different levels such as 'Initial', 'Repeatable', 'Defined', 'Managed' and 'Optimizing' [11]. Each maturity model has formal descriptions to guide the use regarding how to reach the next level of a maturity. The purpose of such models is to reach the highest maturity level for all organisation processes [12].

Fig. 1 illustrates some of the concepts that are shared by the SAP ERP system, BPM and BPM maturity models. The SAP ERP system includes its own business process models; BPM has the objective of improving business processes in an organisation; both have the same aim of optimizing an organisation's processes.
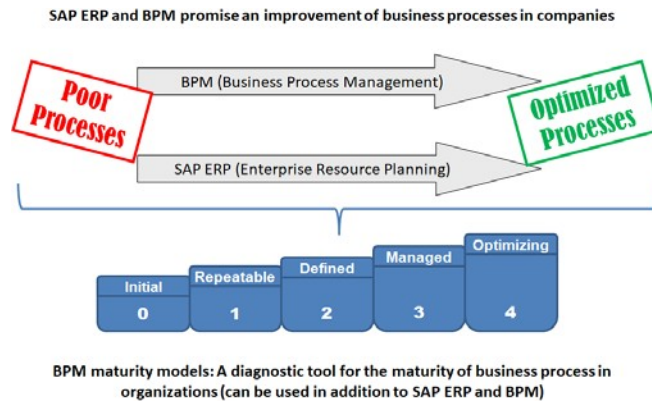
Figure 1. SAP ERP, BPM and BPM maturity models: overview

Diagnostic tools like BPM maturity models can be used alongside SAP ERP and BPM to measure the effectiveness of processes in organisations. Van Looy [13] states that most BPM maturity models favour the use of an IT system (such as SAP ERP) to improve the BPM approach of an organisation [14]. This study examines the relationship between these concepts and derives management guidelines for their use. These guidelines are based on views expressed in one-to-one interviews combined with feedback from online surveys and are geared to supporting to business managers.

Following this introductory Section, Section II discusses relevant literature. In Section III, the research methodology is outlined, and this is followed in Section IV by a summary of findings. Section V presents a further analysis of findings leading to the development of a number of management guidelines to support the use of BPM maturity models within an SAP systems environment. Section VI then details how these guidelines have been validated through an online survey and finally, in Section VII, the main themes of the paper are drawn together to provide overall conclusions regarding the research project.

II. **Literature Review**

BPM and process integration have been discussed for over 25 years [15], but existing literature is largely confined to general findings about the relationship between IT and the use of business processes, or about the relationship between ERP systems and business processes. For example, vom Brocke et al. [16] explain that the selection, acceptance and use of IT are a fundamental part of BPM, and Wynn [17] highlights the importance of a range of process issues in achieving successful ERP project implementation. Business and IT need to connect with each other in order to realize better business value. Neubauer [18] also notes that ERP systems generally influence a company's business processes.

Saco [9] explains that a maturity model is a diagnostic tool for an organisation to improve its processes. Such assessment can be used in conjunction with SAP ERP and BPM. Most authors view the use of an ERP system as a means of integrating business processes within one system, which is, used company-wide [18]. For example, an ERP system can hold all documents in relation to an invoice number or purchase order, and can show the document flow or action log for data changes that directly belong to a business transaction. Through the use of ERP systems, companies are expected to reduce costs by improving efficiencies and widening the availability of accurate and up to date business information, thereby enhancing overall company performance [19]. Antonucci et al. [20] indicate that ERP systems produce the data and information that are the basis for business decisions and strategies.

The extant literature demonstrates that an IT application like SAP ERP can enable higher process maturity [13]; but these studies focus on the general company level and IT systems as a whole. Van Looy [13] suggests the deployment of IT for business process maturity, concluding that most maturity models recommend IT to improve process modelling and optimization. She emphasises that, in general, IT deployment enables higher process maturity. Other literature illustrates that BPM maturity models measure and aggregate capabilities that can culminate in a road map for better business process management [21].

The literature research confirms that companies often simply apply maturity models blindly instead of addressing organizational needs [22]. Additionally, maturity models do not usually consider any link between, for example, an SAP system and the BPM approach. This research develops a set of guidelines embodied in management guidelines for the better collaboration of BPM in SAP ERP projects – this being in addition to, or instead of, the use of a BPM maturity model.

III Research Methodology

Fig. 2 depicts the main elements of the research methodology used in this project, selected from a body of methods that can be used to gather and process data [23] [24].
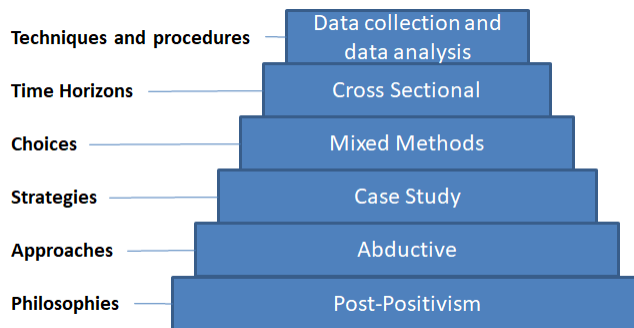

Figure 2. Research Methodology Layers [22] [23]

The research philosophy adopted here is post-positivist, based on the perspectives of Ryan [25] and Guba [26]. The goal of post-positivist research is the generation of "new knowledge that other people can learn from and even base decisions on" [27]. The development of management guidelines emanates from this research and aims to support a company for informed decisions in the context of SAP and the BPM approach. The post-positivist position takes the view that the world is much more complex than when the project was embarked upon, and that it is quite possible that, for example, the inclusion of other experts in the interview process would have led to different results. This research starts with some cases on organisations that use BPM maturity models, and concludes with generalised guidelines about the application of BPM and SAP ERP. As described by Thomas [28], this exploration uses the abductive approach to collect facts from the interviewees, followed by judgment about the best explanation of these, before producing a generalized output in the form of guidelines and management guidelines.

As an explanatory study [29], this research investigates the relationship between SAP, BPM, and BPM maturity models in ERP projects. Based on semi-structured expert interviews, a small number of organisations are examined in depth. In line with the use of documentation of BPM maturity models, a qualitative research approach was pursued. According to Saunders et al. [24], the use of different data sources in combination with secondary data collection techniques allows a form of triangulation to confirm the obtained data from the interviews. The aim of this work is to evaluate whether SAP can affect the use of BPM in companies.

Through the use of semi-structured interviews with experts in their field, and the analysis of secondary literature such as user manuals of BPM maturity models, this research used mixed-methods to address the research objectives, thereby providing greater depth in a complex environment [30]. The time horizon for this research was a cross-sectional snapshot study [24]. The research analyses the current SAP impact on BPM and BPM maturity models in practice, and evaluates the picture at the time of the study [31].

The interviewees were selected with the objective of gleaning the greatest amount of expert knowledge possible from practice. The semi-structured interviews allowed a degree of flexibility that engendered an understanding and explanation of the experts' opinions regarding important issues, events and patterns in the complex interaction of SAP, BPM, and BPM maturity models in ERP projects [32]. The software tool MAXQDA was used for the qualitative data analysis and comparison of the interviews, and in arranging, organising and analysing all transcribed interviews, and also for analysing secondary literature sources. This allowed a special type of methodological triangulation through the use of more than one method to collect and analyse the data. A thematic analysis was used for the identification of topics. For this purpose, statements from the interviews were manually coded in order to recognize and interpret connections [32].

The final step of the data triangulation of this study examines, through an online survey, the guidelines that were previously developed. The online survey was created to consider questions about the developed guidelines and to confirm their acceptance. Potential participants for this online survey were users, process managers, researchers and consultants with a business background encompassing SAP, BPM and/or BPM maturity models in different industry sectors.

Fig. 3 depicts the research strategy and the different data sources for this research.
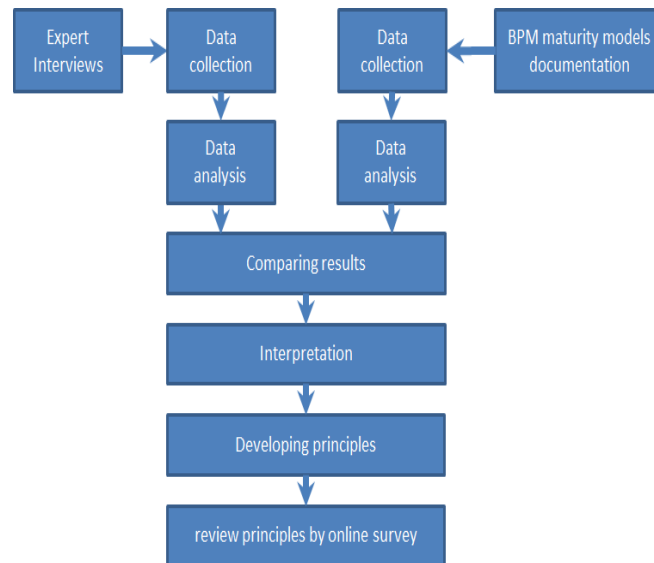

Figure 3. Research Strategy and Data Sources

IV. **Findings**

The search for potential interview partners was a difficult process and resulted in many rejections. The search utilised existing networks of business and personal contacts, resulting in 64 people in Germany, Austria and Switzerland being identified as potential experts, who were then invited for an interview. From this initial pool, eleven people confirmed that they were willing to be interviewed for this research project. Most refusals were based on the fact that the experts did not have the necessary practical experience of the use of a BPM maturity model. Nevertheless, three of the experts interviewed are currently using no BPM maturity model, but perform some form of quality process assessment already at their company, or would like to apply a BPM maturity model in the future.

Baker and Edwards [33] explain that, within qualitative research, the attainment of a sufficient quantity of interviews cannot be set at a certain number. It is crucial to achieve saturation and try to gain new knowledge through additional interviews. In this research, there appeared to be a degree of saturation with the tenth interview, as no new knowledge surfaced. Interview findings are discussed in more detail below.

A. Management

Almost every interviewee recommends that senior management should be involved in driving forward the introduction of BPM, BPM maturity models and even SAP ERP. The introduction of these technologies and techniques can only be successful if the management proactively supports their introduction and operation. The motivation to increase the degree of process maturity has more influence if the top management is involved. It is important for employees as a whole to support their implementation, but they must also know that the management supports these initiatives and will provide the budget, time and resources for these projects. Management must actively support initiatives such as the introduction of BPM and SAP software implementation if they are to be successful.

B. Standard SAP processes

The introduction of an SAP system can be used strategically to remodel business processes. Each company should consider whether a standardisation of business processes is an important thing for their organisation. The application of standard processes and especially SAP standard processes could be helpful. The use of SAP does not generally lead to improved process maturity levels, but this depends on how intensively and professionally SAP is deployed as a corporate-wide business system. The practical experience of the interviewees shows that the use of standard processes can be very beneficial, reducing time, costs, resources and other expenses. Many processes are similar across different industries and therefore many experts recommend the use of the standard processes which are provided by an SAP ERP system.

However, the use of standard processes never releases a company from the obligation to precisely analyse these processes and test them against their own requirements. Each company must agree a procedure and determine how far

a company should adapt to a standard process or whether the process must modified to accommodate the company's requirements. With sufficient time and money, an SAP system can be customized to meet the process requirements of a company. In practice, however, the budget is often quite limited and a company must determine whether standard processes should be adopted or not.

C. Process analysis and documentation

The introduction of any significant process change should always be analysed, documented and understood, whether it is an SAP standard solution or a customer driven solution. In addition, a well-documented interface description (of both the software modules and the processes themselves) can provide a solid basis for the development of process improvements. Frequently used processes should be analysed more thoroughly, and standard processes should be analysed carefully because these processes can be used in an incorrect manner.

Some interviewees suggested that some of the more traditional and well-established business processes, such as those supporting finance or human resource management, can be represented very well by using standard SAP software. This is because they are core company functions, and the software has been implemented in many different industry sectors.

D. Interfaces

The interviewees were of the view that it is useful to consider the interfaces to and from an SAP system in more detail. They suggested that a process that is supported by one system is likely to have a higher maturity than processes that run over several systems boundaries. Frequently, in this case, not only different systems but also different employees are affected by process deficiencies, in part caused by the need to understand and handle several systems that may not be well integrated.

Processes should always be considered as a set of end-to- end activities. The more IT systems that are affected, the more employees are usually involved. These employees must then find a way to identify and analyse which data are necessary to support process improvements. All systems interfaces need to be assessed, and a well-documented interface description can provide a solid basis for the development of process optimisation. Even with standard interfaces or online services which are provided by SAP, a successful BPM project will still need to analyse and document these interfaces.

E. Process maps

All significant business processes should be described and depicted within an overall top-level company process map. Regardless of whether processes are supported by an IT system or not, they should be recorded and drawn in order to better understand the process flow and to store knowledge about the process. The modeling of a process map should be a basic requirement to introduce efficient BPM in a company. Of course, this is alone not enough and more activities will be required which deal with the establishment of process management in the company.

A significant risk - that must be avoided - is that a BPM team design a process map, which differs from the process map owned by the SAP project team operating within the same company. This can sometimes happen when different initiatives are introduced in different management areas. This may result, for example, in the purchasing process being designed both within the BPM project team and in the SAP team. This means that two teams will have independently developed this process with their own experts, with a knock- on effect on subsequent remodeling and overall costs. The BPM team should know what knowledge is already present in the company and be ready to build on it.

F. *Measurement of key performance indicators (KPIs)*

It is generally worth considering whether it is more effective in the long term to measure results generated directly from SAP reporting tools rather than via specialist standalone business intelligence software. It is even quite possible to effectively use an Excel spreadsheet or Access database for data analysis. In many cases, such a solution is only intended for the short term. But if data has to be specially prepared and processed for export to an Excel file, for example, it is likely to be more effective to analyze it immediately in the source system (such as SAP). This raises the issue of end-user access to SAP data and its reporting tools, which needs to be proactively and sensitively managed.

The experts reported that financial transactions usually constitute key information that is well supported within a company deploying the SAP system. This means that, for many companies, SAP is an important strategic IT component. Consistent business intelligence reporting and associated analytics is another benefit from using SAP as the core company IT system.

V. **Analysis**

For this research, the BPM approach encompassed a strong focus on IT systems and infrastructure. Even though, in theory, IT should play only a subordinate role, the expert interviews conveyed a contradictory opinion. All the

interviews, which involved practitioners, confirmed that the SAP and BPM concepts are closely related. Theoretically, there is often no such link found in the documentation, but in practice the SAP system is the leading ERP system in many companies and therefore there is a practical connection.

Maturity models are already very complex, but companies are often interested in guidelines that are less complex and require a smaller budget. The guidelines developed in this research project will help companies to analyse and understand the interconnection of the SAP ERP system with the BPM approach. The goal is not to develop a more complex and comprehensive maturity model; indeed the success of easy to use maturity models is due to the fact that those models has less criteria and are easy to handle. The experts explained within the interviews that many companies prefer a checklist instead of a complex maturity model. For these reasons, it is not necessary to develop a separate and new BPM maturity model to understand and show possible dependencies.

On the basis of the interview analysis, the following SAP- specific guidelines have been developed to enable company management and all relevant stakeholders to determine and understand possible connections between an SAP system and a BPM approach. These guidelines can be used to maximise the benefits of both the SAP system and BPM methods and techniques. They are not meant to be comprehensive, but are rather intended to allow the practitioner to start to think about the connections and to develop them later on for specific environments as appropriate.

Guideline 1: Ensure that management fully support the optimal deployment of SAP in the organisation.

The use of SAP ERP as the central IT software system within a company is usually a strategic decision. In this case, the company should decide how to integrate the system with the adopted BPM approach of the company. What does the SAP specification imply? Does that mean that only key figures have to be generated from the SAP system? Could there be other systems besides the SAP system? Should a company use as many standard SAP processes as possible? The company must determine who decides possible solutions or any adaptations of the SAP system. The successful implementation of an SAP system is only possible if the senior management are aware of and confront these issues.

Guideline 2: Establish as many SAP ERP standard processes as possible at the company in order to minimize the complexity of system upgrades or enhancements.

If the company wants to use SAP, and the management supports this, then companies should also decide whether, and to what extent, standard SAP processes should be used. The use of standard SAP processes reduces the time, cost, resources and other operational constraints, and supports the introduction of new SAP enhancement packages or release changes. Each change or upgrade makes it necessary to test customised solutions and adjust the customer-specific programming to the new version of the SAP system. It is important to prioritize when the standard SAP processes should be used, and when it is better to use self-defined solutions. A BPM team should not accept processes as given and must analyse which approach is best suited to a specific company environment. Not all standard processes are the optimal solutions for every company, and a company should not necessarily submit to the dictates of a rule-based IT system. However, the use of standard process solutions could also be very helpful and reduce the budget required to operate an IT system. Regular consideration should be given to whether IT innovations in the system could lead to process improvements. For example, mobile device applications can now operate in conjunction with SAP modules, and such mobile functionality is now integrated into the standard SAP system.

Guideline 3: Ensure that all processes have been documented, analysed and understood, even if they are pre-defined by the SAP system.

The use of SAP standard processes does not absolve a company from the duty to document, analyse and understand each process. It can be the case that standard processes, which run in a single system like SAP, run with an optimised composition, and are better coordinated than other processes; but each process should be analysed. Unfortunately, it is not always obvious which data is being stored and used within an SAP process. Technically, it is currently not possible to get a fast and actual process flowchart from an existing SAP system, and see how customizing settings within an SAP system may change a process flow. Therefore, it is very important to understand and analyse these SAP processes in detail. This is the only way to avoid incorrect or error-prone process operations. A company should know exactly how its processes are running, and therefore a company should not be dictated to by an IT system or by the opinion of an ERP system provider. An analysis of each pre-defined process should enable a company to decide whether these standard processes are usable, or whether an individual process should be developed for their specific company environment.

Guideline 4: Establish a procedure that ensures that all interfaces are analysed for their BPM relevance, including those between non-SAP systems and interfaces between those systems and the SAP system itself.

Interfaces between different systems often offer opportunities for systems optimization and process improvement. Many experts recommend considering the processes from an end-to-end perspective. They have learned from their practical experience that, especially when there are different systems with bespoke interfaces, data are often transmitted in formats that differ from that which is required. It is important to analyse the standard interfaces provided by the software provider, which may not be the best and optimal for the user organisation.

Guideline 5: Ensure that all teams within a company, especially the BPM team and the SAP team, contribute to the development of the same processes and process maps, and that only one process map exists within the organisation.

SAP is a very powerful tool that communicates with many different sub-modules and other systems. The early versions of SAP had a functional structure but with the application of BPM, the package is now more process-oriented in design. It is important to avoid different teams working in isolation and developing different process configurations within a company. The BPM team should consist of a variety of different stakeholders, to represent different requirements and knowledge inputs.

Guideline 6: Ensure that all key information is generated directly from the SAP system.

SAP provides many instruments for the generation and monitoring of KPIs and most BPM maturity models encompass the analysis of KPIs. For many experts in this study, the SAP system was often the leading financial system in their company contexts. This offers many advantages for the analysis of KPIs. Much financial information is already stored in the SAP system, which can be used to support the BPM approach. Some companies, when trying to implement quick solutions or consultancy generated analysis, may turn to creating Excel spreadsheets rather than using the "one view of the truth" available in the SAP system. SAP provides many predefined reports, and can employ business intelligence tools to provide customised reports from the SAP database. It may take longer to determine the required fields for an analysis within the SAP system, but for frequent use, it is much faster to retrieve the numbers directly from the SAP system.

VI.   **Validation**

The guidelines discussed above provide a basis on which companies can make some judgements about the use of their SAP system when combined with a BPM approach. For further practical confirmation of the guidelines, an online survey was used to validate the general applicability of the developed guidelines and the general feasibility of the findings of the interviews. A questionnaire was presented as an online survey on the internet, allowing the collection of a larger amount of data from more participants in a shorter time and in a more flexible manner than the personal face-to-face interviews [24].

Potential participants for this online survey were those such as users, process managers, researchers and consultants with a business background in SAP process management or BPM in general. Respondents had to have several years of practical experience in at least two of the three investigated subject areas of SAP, BPM and BPM maturity models. In general, the online survey was created in a way that allowed each participant to answer the questions themselves in the form of a self-completion survey. Every question about the evaluation of the guidelines was followed by an open question in which the participant had the opportunity to make a comment about the established guideline or to list possible improvements about that guideline.

To facilitate a general classification of the participants, the first questions in the web survey asked about the personal background of the participant. This revealed that the participants have many years of experience in the field of SAP and BPM and come from different industries.

Table I shows the average experience of all participants in the three areas of expertise, and Table II illustrates the different industry sectors in which the participants work. This indicates that the participants represent the opinions of a variety of different industry sectors.

The online survey was intended to be answered by business professionals, and so participants were asked to assign themselves to a given professional position. Table III reveals that over 82 percent of all respondents claimed that they work as users, (process) managers, researchers or consultants within an organisation.

Table I. Years of experience

Area	Average years of experience
SAP	12.41 years
BPM	9.37 years
BPM maturity models	4.35 years

Table II Industry sector

Industry sector	No. of Persons
Automation	1
Automotive	3
Aviation	18
Construction	1
Engineering	9
Finance	7
Food	1
Health Service	2
Insurance	1
IT	42
Logistics	2
Management Consulting	42
Medical engineering	2
Pharma	2
Power	2
Production	9
Telecommunications	2
University	5

Table III. Current position of respondents

Current Position	No. of Persons
Consultants	68
(Process-) Managers	44
(System-) Users	8
Researchers	5
Others	26

The main purpose of the online survey was to achieve a degree of validation of the guidelines, and to ascertain whether these guidelines were considered practicable by the business community. All guidelines were evaluated using a Likert Scale approach [34], establishing whether the participant agreed to the guideline or not by using the following classification.

Table IV. Classification

Classification
Agree Strongly
Agree
Disagree
Disagree Strongly
Don't know

This form of classification provides a simple validation method that has been applied to each of the six guidelines. The questions regarding the evaluations of the guideline also offered the answer 'don't know' to show that an answer did not have to be given. The literature illustrates that closed questions exhibit certain disadvantages if, for example, the question irritates the respondent or they want to explain their answer [32]. For this reason, every question about the evaluation of the guideline was followed by an open question in which the participant had the opportunity to make a comment about the established guideline or to list possible improvements regarding that guideline.
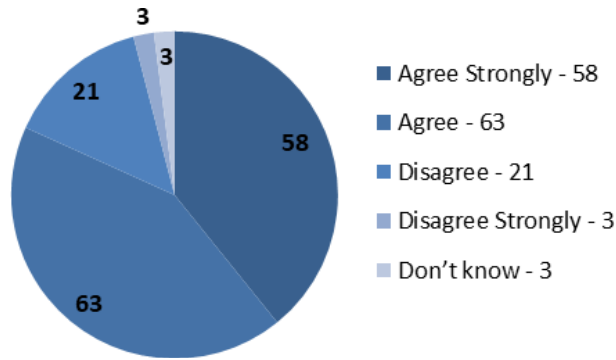

Figure 4. Guideline 1: Ensure that management fully support the optimal deployment of SAP in the organization - online responses

More than 81 percent agreed with the first guideline by selecting 'Agree Strongly' or 'Agree' and confirmed that the management should support the use of SAP in the organisation to the full extent. (Fig. 4) Some comments suggested that management could more effectively set out 'framework conditions', e.g., a basic systems or requirements specification. However, when it comes to the financial parameters of a system implementation, respondents were clear that the management must determine this scope. Similarly, over 85 percent agreed with the second guideline: establish as many SAP ERP standard processes as possible at the company in order to minimise the complexity of system upgrades or enhancements (Fig. 5). Participants noted that it is not easy, in some circumstances, to decide between a standard process or a process designed and customised to suite a company's specific requirements. The guideline does not indicate that standard processes must be used, but rather that as many as makes overall sense should be used. The decision on what to use must still be made by the user. Respondents noted that experience and knowledge play an important role in the implementation of processes.
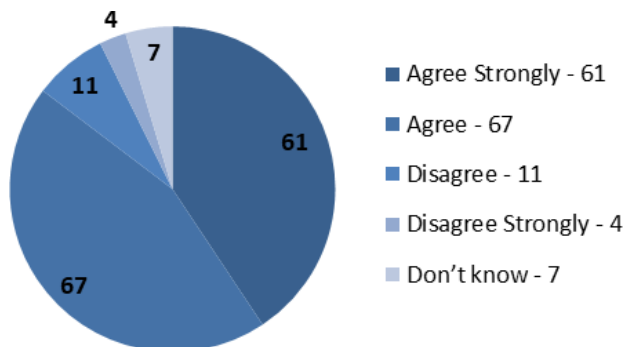

Figure 5. Guideline 2: Establish as many SAP ERP standard processes as possible to minimize the complexity of system upgrades - online responses.

The third guideline had one of the highest approval ratings in the survey (Fig. 6). Participants considered that it is important to analyse processes and that there exist different methods to support process descriptions or process depictions.
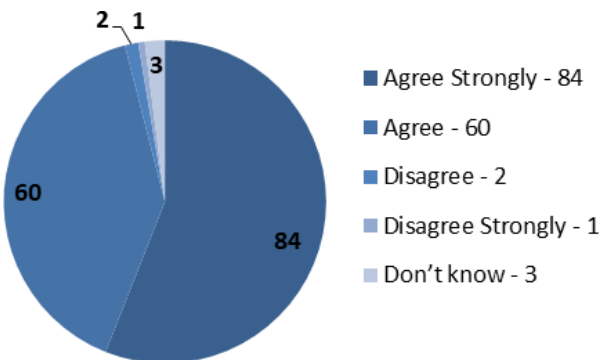

Figure 6. Guideline 3: Ensure that all processes have been documented, analysed and understood - online responses

It is very difficult to find the right level of detail for the process documentation and every company has to find its own way. It was very important for the respondents that the processes were regularly analysed.
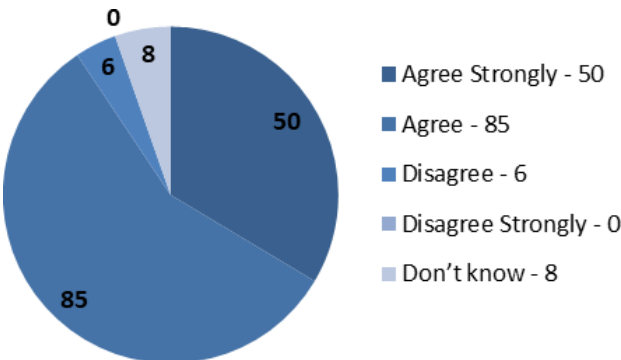

Figure 7. Guideline 4: Establish a procedure that ensures that all interfaces are analysed for their BPM relevance - online responses

In the context of the fourth guideline, the survey responses confirmed that additional systems and interfaces are likely to be necessary and need to be analysed for their BPM relevance (Fig. 7). An interface can be very maintenance intensive and should therefore be regularly analysed and tested. The participants referred to the use of standard processes in connection with this guideline, but this is already evidenced in guideline 2: a regular assessment and analysis of systems interfaces is important.
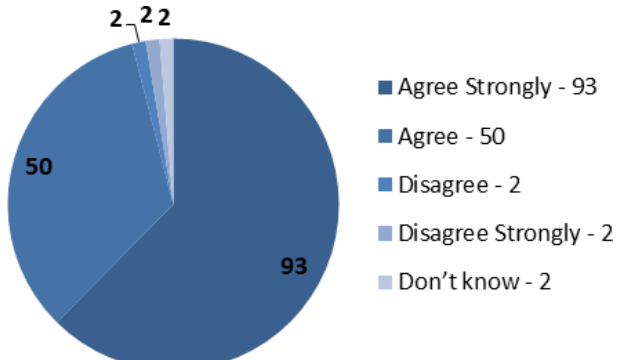

Figure 8. Guideline 5: Ensure that all teams within a company contribute to the development of the same processes and process maps - online responses

The fifth guideline also received a high approval of over 95% (Fig. 8). Participants agreed that an attempt should be made to adhere to this guideline, although this is not always possible in practice. For example, there may be more than one BPM team in a company, and inter-team communication and interaction are of the utmost importance. Political factors may also impede the pursuit of this guideline, and the survey results suggest that, contrary to the interview evidence, it can - in certain circumstances - make sense to have more than one process map for a short time. In in the end, however, these process maps should be combined and any contradictions resolved.
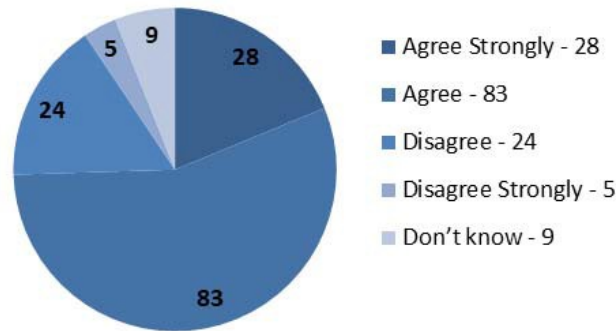

Figure 9. Guideline 6: Ensure that all key information is generated directly from the SAP system - online responses

The sixth guideline had marginally the lowest overall support, but 75% were still in agreement (Fig. 9). This guideline assumes that SAP is the main system in the company, but some survey respondents pointed out that SAP is sometimes just a financial management system and that key data is often created in other systems, and they thus did not share this assumption. They also suggest that only the KPIs that are really needed should be reported on, and that this is often fewer than initially thought.

VII.   **Conclusion**

One view evident in the existing literature is that no specific IT system should determine the design and deployment of BPM tools and techniques, but should simply support the business transactions of a company [35]. However, the practical experience of the experts interviewed in this research provides a different perspective. Neubauer [18] asserts that ERP systems can influence a company's business processes and this is confirmed by this research as regards the SAP ERP system. All the interviews, which involved many practitioners, confirmed that the SAP and BPM concepts are closely related. Theoretically, there is often no such link found in the documentation, but in practice the SAP system is the leading ERP system in many companies, and therefore there is a practical connection. An IT system such as SAP ERP can influence a company and its processes. In many companies, SAP is the dominant system, and a BPM maturity model needs to accommodate this reality.

The interviewees confirmed that, from their practical experience, a deployed SAP system is usually well in-bedded in the culture and operations of a company. On the one hand, employees often think about their personal SAP process experience and how SAP handles processes in general. One reason for this is that companies have used an SAP ERP system for many years. On the other hand, financial information is also stored within an SAP system, which provides a sound basis for the analysis of key metrics within business processes.

Some BPM maturity models are very complex and not easy to use. To help address this issue, this research has developed a set of guidelines, which can be used by practising managers and other relevant stakeholders. They provide practical guidance for companies using SAP and BPM, and can lead to an improvement in business performance to the benefit of many stakeholders. The online survey demonstrated considerable support for the validity of these, but every organisation is different and guidelines should always be evaluated and applied, according to the particular requirements of the organisation concerned. In a wider context, this research underscores the value of a process management approach to analysing and assessing technology issues, and suggests that this may usefully be adapted and applied to look at other key change issues in the business-IT environment.

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