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Centricity in Project Risk Management: New Dimensions for Improved Practice

Jose Irizar
School of Business and Management
University of Gloucestershire
Cheltenham, UK
Jose.Irizar@googlemail.com

Martin Wynn
School of Computing and Technology
University of Gloucestershire
Cheltenham, UK
MWynn@glos.ac.uk

***Abstract* – Most organisations engage in major projects during their life cycle, and effective project management is increasingly accepted as a necessary competence in larger companies. Nevertheless, a considerable proportion of projects continue to fail to meet their due dates, exceed budget, do not deliver to specification, miss quality standards, or fall short on customer expectations. The effective management of project risk is a major component of this problem, and central to its resolution; and yet the theory of risk management remains relatively undeveloped and its practice is often poorly executed. This paper examines how the concept of centricity can be applied to some key elements of risk management to develop a conceptual framework that highlights some of the shortcomings of current practice and suggests alternative ways forward. The initial results of applying the model in three major projects in the automotive industry are discussed.**

Keywords - project management; centricity; risk; risk management; risk identification; risk assessment; risk ownership; risk treatment; subjective construct; conceptual model.

I. INTRODUCTION

The quest to improve the management of risk in project implementation has led researchers and practitioners to explore new ways of conceptualizing and classifying risk within project management [1]. Project management is regarded as being of strategic significance in a wide range of industries, and the management of risk is an integral part of the project management process. Despite the recognized criticality of project success for organizations, a considerable proportion of projects continue to either not meet their due dates, exceed budget, do not deliver to specification, fail quality standards, or do not meet customer requirements.

Project failure remains an area of considerable interest in contemporary project management literature, and effective risk management has been identified as one of the major criteria for project success [2]. Yet it remains an area where there is neither a clearly defined theoretical underpinning nor an agreed approach to support the development of a universally agreed method for managing risk. Nevertheless, risk management has become a central component of some of the most widely deployed industry standard methodologies, such as Project Management Body of Knowledge, PRINCE2®, Systems Development Life Cycle, Integrated Capability Maturity Model, and Information Technology Infrastructure Library. Comprehensive risk management is considered as the means by which the effects of unexpected events can be limited, or even how such events can be prevented from happening [3]. Risk management, as an integral component of project management, can thus make a significant contribution to overall project success [4]. This article attempts to develop some new directions in this debate through applying the concept of centricity to a number of themes that run through existing risk management literature – risk identification, risk assessment, risk ownership, and risk treatment. The overall aim of the research is to assess the validity of centricity as a key concept in the development of project management practice. This will also inform policies aimed at enhancing current project risk management, particularly in the automotive industry.

This introductory section is followed by a discussion of the theoretical framework for this paper. The application of the centricity concept to different aspects of risk management is presented in section three, and the base models are further elaborated in section four. Section five then analyses the risk registers of three major projects against these models. Finally, the concluding section summarises results to date and looks at how this research can be further progressed.

II. THEORETICAL FRAMEWORK AND RESEARCH METHOD

The risk management process is often viewed as comprising five main activities [5], and this provides a useful initial frame of reference for this study (Figure 1). Our focus is in the area encompassed by risk identification, risk assessment, risk allocation, and risk control, although our chosen terminology is a little different from that used in this model.

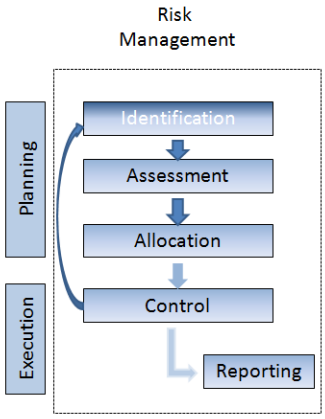

Figure 1. Project Risk Management Process based on PMBoK guide [5]

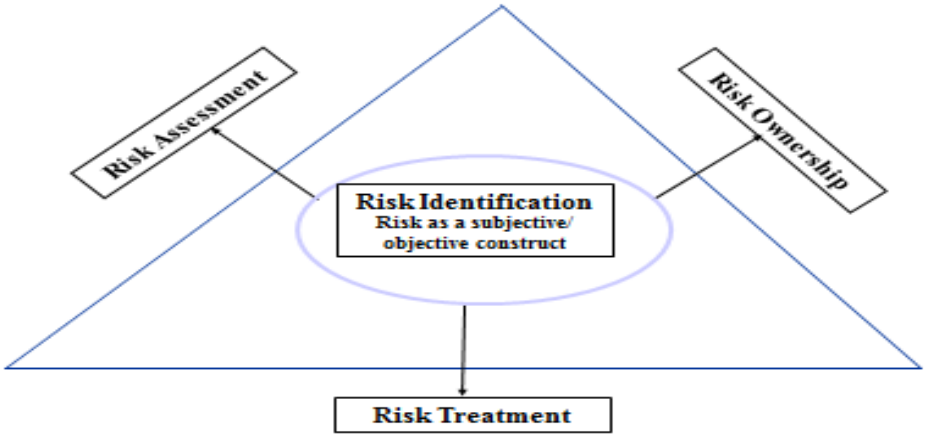

Figure 2. The main dimensions of risk studied using the centricity concept

Risk *identification* is the starting point for risk management in projects. It is considered to be the most influential risk management activity for project outcomes [6], it was found to be one of the most used risk related concepts by organizations [7], and it is recognized by project managers as one of the key areas in need of improvement in complex projects [8]. There are two main schools of thought regarding risk identification – "risk as an objective fact" and "risk as a subjective construct". The former considers risk as epistemologically probabilistic, whilst risk in the subjective construct perspective allows multiple epistemological dimensions of risk [9]. "Risk as an objective fact" considers risks to objectively exist. In the case of "risk as a subjective construct", risk phenomena are subjectively constructed by observers themselves. This subjective-objective construct dichotomy is particularly relevant to the identification of risk, which can also be associated with the concept of "centricity" [1]. Risk as a subjective construct may thus be considered as "person-centric", originating from a subjective perception of risk, rather than from an objective assessment of whether the risk exists and the significance of it.

As regards risk *assessment*, the choice of a particular industry prescribed project management methodology can have a major impact on how risks are assessed, and on overall project outcomes. Project management methodology can be defined as the application of knowledge, skills, tools, and techniques to project activities to meet the project requirements [10] or, using the widest definition given by Cockburn [11], anything that the project management team relies on in order to successfully deliver project results. All of the mainstream methodologies have their own techniques and tools for assessing risks. These methodologies include the Project Management Body of Knowledge (PMBoK), Project Risk Analysis and Management (PRAM), PRINCE2 and the Scrum Agile Standard. The first three of these are generally considered to belong to the so called traditional project management approach, whilst Scrum is the most prominent of the new project management approaches [11].

PMBoK, published by the Project Management Institute (PMI) is the project management guide most widely followed by international organizations. PMI's outreach, its proximity to project management core theories, and its formalization of processes compared to the other standards, make it the optimum standard guide for many authors [12]. One major criticism of PMBoK is its mechanistic approach, making it suitable for routine or technical situations [13], but not so appropriate for unusual or one-off situations. The methodology entails the use of its Probability and Impact Matrix for qualitative risk assessment. Some authors, such as Chapman and Ward [14], challenge the value of this tool for risk assessment. The experience of the risk assessor can determine the so-called probability estimate starting values, and thus estimates become biased. This effect is known as "anchoring" [15].

The development of risk matrices for assessment has taken place isolated from academic research in decision making – risk matrices can produce arbitrary decisions and risk-management actions. These problems are difficult to overcome because they are inherent in the structure of the matrices [16]. Their theoretical basis is superficial and the validity of the qualitative information they employ is highly suspect [17]. The use of risk matrices for assessment illustrates the potential impact of project management methodologies on risk management and project outcomes.

The allocation of *ownership* for identified risks is an essential element of the risk response plan. Ownership is concerned with allocating responsibility for managing project uncertainty to appropriate project parties. Risk

responsibility assignment is considered one of the most influential factors in project risk management success. Risk allocations are fundamental because allocations can strongly influence the motivation of parties and the extent to which project uncertainty is assessed and managed by each party [14]. Recognising that different parties have different objectives, varying perceptions of project risk, and uneven capability for managing associated sources of uncertainty, highlights the significance of risk ownership allocation in the overall risk management process [18].

Looking at the risk ownership allocation process, many risk management professionals see its control as being dependent on the project manager. This leads to the conclusion that the effectiveness of the risk allocation process depends on the project manager's skills, experience and management style. This can be viewed as project-centric risk ownership allocation, with the project manager seen as the key individual in operational delivery of project outcomes. An alternative perspective highlights the possible benefit of assigning risk ownership allocation control, and risk allocation itself, to a range of individuals, who may not be in regular contact with the project manager [14]. Practitioners' responses suggest that an alternative system that encourages all project members to participate in the risk management process is normally missing. A consequence may be the failure to create a collective responsibility to manage risk [18].

A further risk dimension discussed here is risk *treatment*. Project risk treatment is the stage at which the risk strategy is defined. The strategy defines how to manage risk. This can be anywhere in a spectrum from reduce exposure or mitigate impact to transfer/externalize risk or accept risk. The decision to choose any of these responses can be supported by tools that provide risk factor dependencies and priorities [19]. Risk treatment thus depends on the risk propensity or attitude to taking risks. Behaviour towards taking risks may change over time through education, training and experience. A balanced risk treatment will probably increase the threshold at which point the organization is willing to take risks. As a result, an organization may enhance its competitive edge. If it is averse centric in its treatment of risk, it will be less likely to take risks, having a lower propensity for risk taking.

A balanced approach to risk treatment would be one focusing both on risk and reward. An overemphasized focus on risk versus reward may have considerable influence on strategic decisions such as entering new markets, developing new products or targeting new mergers and acquisitions [20].

Executive inaction may result in loss of potential revenue growth. Education and training in project risk management, with subsequent additional experience in the organization, may lead to a better understanding of risk and reward. People themselves are a major source of risk, and education, training and experience can make them part of the solution. Proper risk management can be seen as a protective shield for the organisation, rather than an action stopper. Management and employees together learn through education and training to take and manage risks, not to avoid them. The organization can thereby treat risk appropriately and not circumvent it.

The aim of this research is to explore how the concept of centricity can be applied to the four dimensions of risk management discussed above (see Figure 2). Centricity in a managerial context can be defined as the mind set or attitude that characterises the managers' or organisation's outlook and motivation in the relationship to others [21] [22]. In recent years, qualitative research has found increasing recognition in many areas of project management practice. A large number of empirical studies using qualitative data are available in academic literature and specialized journals [2] [4] [9]. At the same time, management researchers and practitioners in particular rely on evidence-based policy. In fact, most of the existing generally accepted standards in the project management field as a whole are built around evidence-based policy and best practice.

Through an analysis of existing literature, allied to empirical data and observations in large project environments, this paper looks to develop a conceptual framework for research in the following areas:

- Person-centric risk identification vs. objective risk identification
- Methodology-centric risk assessment vs. multi-disciplinary/eclectic risk assessment
- Project-centric risk ownership allocation vs. devolved ownership allocation
- Averse-centric risk treatment vs. balanced risk treatment

This approach assumes that it is feasible and sensible to cumulate findings and generalize results to create new knowledge. The application of the centricity concept to the aspects of risk management discussed in this paper will be tested and developed further through primary research case studies as part of an on-going research project.

III. Concept Development

The identification of risk as a subjective phenomenon coincides with its creation – the risk exists only once the stakeholder has identified it. This is particularly noticeable for risks linked to an organization's own qualities and deficiencies [23]. This subjective or person-centric risk identification can often produce inefficiencies in the management of risk that may impact detrimentally on project cost and overall project success (see Figure 3).

The analysis of risks associated with different information systems (IS) by Ward and Griffiths [24] uses a strategic grid depiction of risk categories (Figure 4) that can be used in the application of the centricity concept for project risk management. If we view risk identification against risk assessment in grid format, many projects - arguably the majority - adopt a person-centric approach to risk identification and a methodology centric approach to risk assessment. Yet we suggest, as an initial standpoint, that a combination of objective risk identification and eclectic risk assessment is likely to produce the most successful project outcomes (see Figure 5).

The use of risk matrices for risk assessment illustrates this well. Their apparent simplicity and transparency are reasons for their popularity; however, they potentially entail

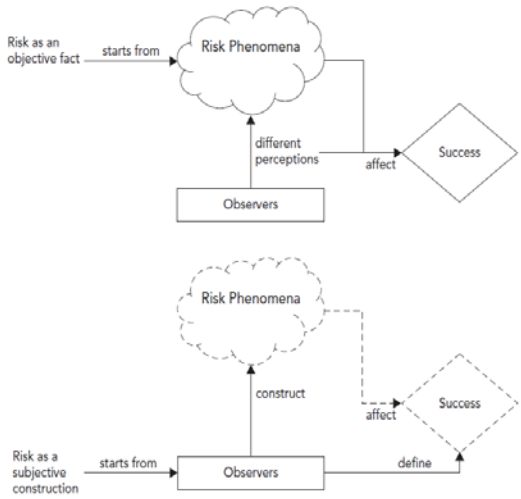

Figure 3. The two means of risk identification [9].

serious mathematical defects and inconsistencies. Different risk assessors may assign greatly different ratings to the same risk exposure [25]. Such different ratings are due to fundamentally different worldviews, beliefs, and other psychosocial factors, the consequences of which are not significantly changed through reflection and learning.

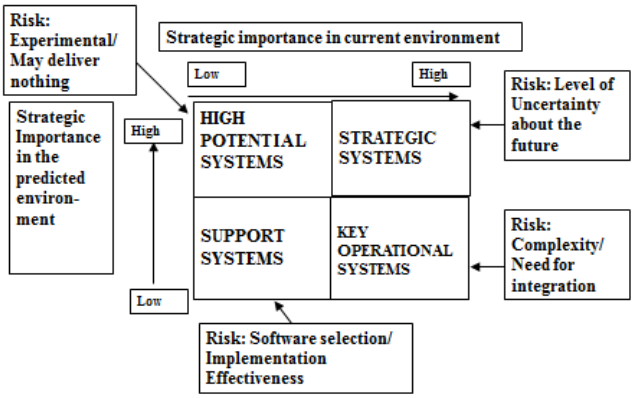

Figure 4. Quadrant grid depiction of IS risk categories [24]

There are a number of evident shortcomings in the use of these matrices. These include instability resulting from categorization differences, and the lie factor, which suggest that they can obscure rather than enlighten communication. The rankings produced have been shown to be unduly influenced by the matrix design, which is ultimately arbitrary. It is suggested that other means of assessing risk based on decision-analytical methods could produce improved outcomes [17]. An example of a decision-making

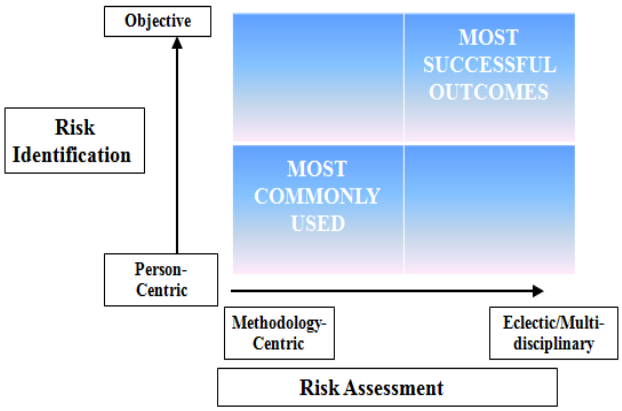

Figure 5. Risk identification and risk assessment: basic model

tool applicable to new product development (NPD), designed to help the project manager choose the best way to improve project success rates while controlling the level of risks, is presented by Marmier, Gourc and Laarz [26]. Other authors combine content analysis with cluster analysis of existing historical data, to develop the Risk Breakdown Structure which can be used to build risk management guidelines [27]. These scientific decision analysis tools could be an alternative to the popular but inefficient use of risk matrices for risk prioritization. The establishment of systematically maintained lessons learned datasets could also provide quantitative reliable data to estimate the likelihood of potential events.

There are some similarities in an initial assessment of risk identification and risk ownership using the centricity concept (see Figure 6). Risk ownership centricity is viewed as an overdependence on centralised control and allocation of risks, and their subsequent management and resolution. The different approaches to the ownership of risk management often appear as a conflict between centralized project risk management and the empowerment of sub-project teams [28]. The complexity of certain projects makes it difficult to understand the consequences of central decisions for the team members. The project manager alone will struggle to comprehend the details of all potential risks, oversee these and control their management. Yet many projects are project centric in terms of risk management process and person-centric as regards risk identification. The on-going monitoring and maintenance of the risk register in which project risks are listed is often controlled by the central project manager [29]. It is suggested that overall project outcomes would be improved by appropriately combining centralized and decentralized ownership of risk management, especially in complex projects. More particularly, project management practitioners in industries which require intense collaboration - such as automotive product development - complain about the insufficient development of risk management methods and processes not being integrated and synchronized. Lack of

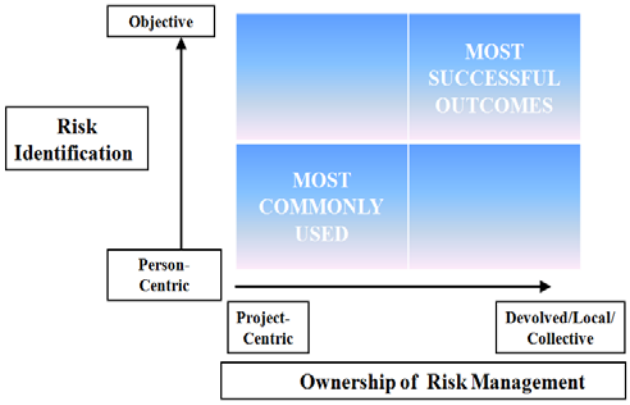

Figure 6. Risk identification and ownership: basic model

collaborative risk management, together with poor communication, is the main reason for project failure in the automotive industry [30].

Similarly, in major IS projects, the IT function has traditionally owned and led information risk management and security operations. However, the move to user ownership of systems requirements, process improvement issues and data access and maintenance, have changed the risk and security paradigm. Business managers, systems users and the IT function are now required to understand and learn others risk-reward trade-offs. The IT function must now share ownership of the risk management process and transfer accountability for some key areas of risk to business partners [31].

The final dimension considered here is risk treatment, again juxta positioned against the central theme of risk identification (Figure 7). As noted above, centricity in a managerial context can be viewed as a mind-set or attitude that characterises the managers' or organisation's outlook and motivation in their relationship with others. Averse centric organizations will be less likely to take risks in their treatment of risk as they show a lower propensity for risk taking. Risk averse organisations may even avoid managing risks or limit resources available for risk management activities, which will work against effective risk management making these organisations, paradoxically, more vulnerable to risk [32].

IV. Model Progression and Implications

The basic conceptual model can be developed further in the light of literature analysis and project experience, indicating the downsides and upsides of operating in each quadrant of the model (see Figures 8, 9 and 10). This may also have implications for the use of some of the mainstream project management methodologies in their treatment of risk issues.

For example, PMI's project management guide, although considered as the best in class among all available methodologies and guides, could be enhanced with some early risk identification tools and techniques from more minor project management methodologies such as Scrum.

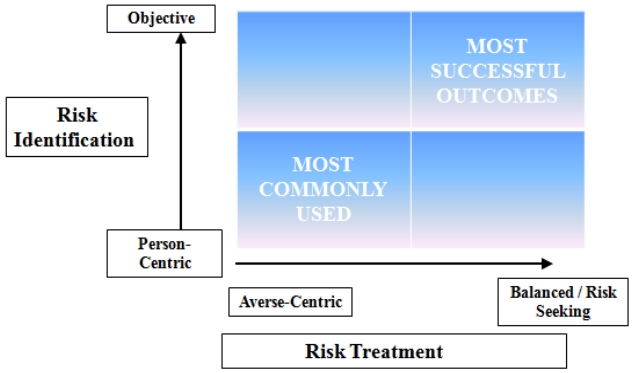

Figure 7. Risk identification and risk treatment: basic model

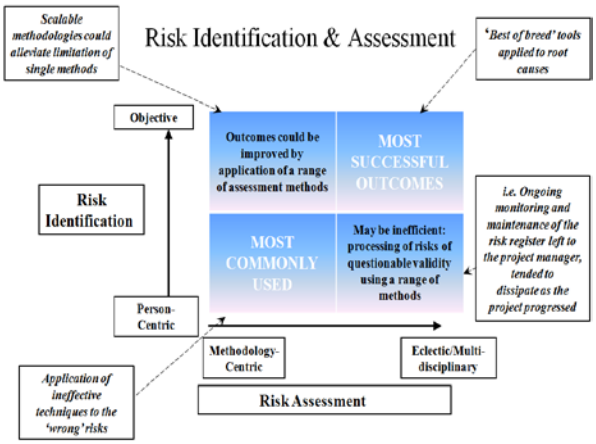

Figure 8. Risk identification and risk assessment: model development

Such enhancements would help reduce project uncertainty. In addition, experience gained by specific industries' customized methodologies can increase risk management effectiveness. These could provide quantitative data to support estimations of the probabilities of risks occurring. Equally, decision analysis tools are an alternative or complement to the inconsistent but widely used risk matrices. Decision analysis tools may be initially difficult to adopt; however, they can provide objective data to support risk assessment as an alternative to the use of risk matrices with all their inherent deficiencies.

The popularity of new project management approaches, such as that embodied in Scrum, resides in their adaptability to accommodate change and the unexpected, as opposed to the quest for risk predictability, which is the basis of the traditional approaches [12]. These new approaches also highlight the importance of both formal and informal communication, collaboration between project team members, and their involvement in decision making, suggesting that a more devolved and collective risk management process is generally beneficial.

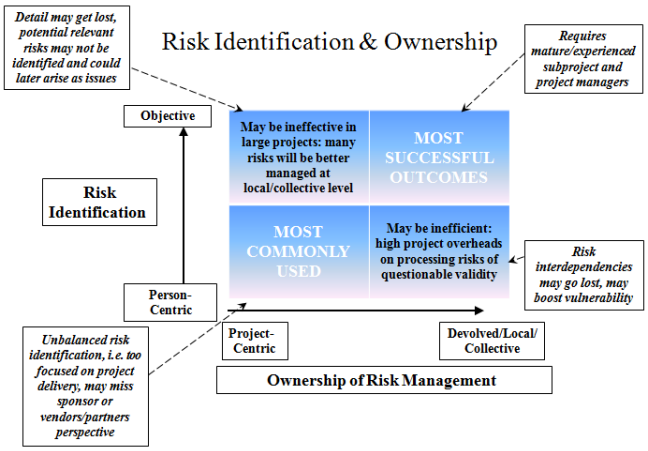

Figure 9. Risk identification and risk ownership: model development

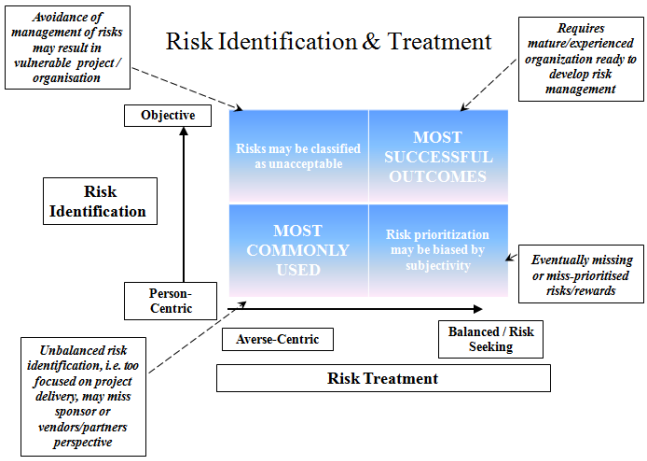

Figure 10. Risk identification and risk treatment: model development

Context, such as the project organization's size and complexity, may play a significant role in tailoring and adapting any project risk management methodology when applying the different standards. Generally speaking, the traditional approach is more appropriate for projects with a very low level of uncertainty in which emphasis will be on planning. Conversely, agile project management, with a more flexible approach to a collective risk management process, fits best in environments characterized by a high level of uncertainty [12].

The two standards with a greater emphasis upon early risk identification are PRINCE2 and Scrum. Traditional project management practices struggle to deal effectively with uncertainty. In highly uncertain environments, approaches such as Scrum and lean methods can help manage residual uncertainty about risk not addressed by traditional project management practices [33].

The model developed using centricity concepts suggests that a combination of risk management based on traditional standards and more flexible approaches typified by Scrum would be beneficial for most projects. However, this would imply significant mindset changes in the organisation [34]. Project teams need to be empowered to effectively use a range of different methodologies and techniques, which may involve team members adopting new roles. This may result in teams creating their own, tailored, risk management process and activities [35].

V. Preliminary Research Results

The provisional conceptual framework has been used in assessing risk in three major projects in the automobile sector. Two of these projects relate to the implementation of a mainstream ERP packaged software product (projects 1 and 2); and the third (project 3) concerns the development of a mechanical steering gear product for an international automotive Original Equipment Manufacturer (OEM). The main source of data has been the risk registers in these three projects, which detail 15, 20, and 48 risks respectively.

These risks were first classified against risk identification and risk assessment criteria (Table I and Figure 11). The majority of risks fall into the top left quadrant (Quadrant 1), signifying objective identification of risk, and methodology centric in terms of assessment. Most risks can be considered to have been objectively identified - after discussion and agreement with the project manager and other colleagues. Yet there remains a degree of subjectivity in most risk identification, particularly in the first ERP project, where many risks were registered individually by the team member or group. Although these were validated or completed by the project manager, there was still a certain degree of subjectivity in the item description, its cause, assumptions, probability estimation or estimated impact on objectives.

This can be better understood by looking at the five risks from Project 3 that fall in Quadrant 4 in Figure 11 - where risk identification is adjudged person centric and risk assessment remains methodology centric. Four out of these five risks can be classified as "project schedule risks" (where timescale is a major uncertainty), and the fifth one can be classified as a "specification risk", (where completeness of specification is at risk). A lack of collective, objective assessment is indicated by the fact that, in the risk register, the risk type or risk category was not adequately maintained or updated by the project manager or any other team member during the project life cycle; and once the countermeasures agreed to mitigate the risk items were completed, these risks were then eliminated from the register without adequate consideration. From the risk register, examples of "project schedule risks" include "risk of delay in design verification due to component prototype timing" and "potential misalignment between supplier key product characteristics matrices". In the first example, once the manufacturing team had confirmed the prototype timing was not an issue for design verification, the risk item was closed. In a similar manner, for the second item, after the engineering representatives confirmed that there was no misalignment between the two lists with the responsible suppliers, the risk item was closed, the result of this confirmation being risk "elimination". These are examples of how person centric risk identification and methodologically centric risk assessment

can combine to produce decisions that may be neither properly objective nor likely to engender sound project management outcomes.

Risks were then mapped against risk identification and risk ownership. More mature organizations may deal with risk in a more devolved manner – sub-project teams may be accustomed to having exposure to risks and have the knowledge and experience to manage them effectively. There was some evidence of this in the project to develop the mechanical steering gear product (project 3 – see Table II). The project team members and the project stream leads or sub-project leads were experienced enough to identify, record and suggest counter measures to a small number of risks, which were managed in this way (the 2% in Quadrant 2 in Figures 12 and 13).

These two risk items were managed by the engineering sub-group with no or minor involvement from the project manager. They represent two objectively identified risks that were owned and managed in a devolved/local manner. The risks were associated with two new components which failed two critical quality criteria - process validation and design verification. Both risk items reflected a lack of experience in the organization in general regarding the design and conception of the mentioned components. The engineering sub-group arguably had most experience in managing projects and dealing with risks. Counter measures suggested and pursued for the management of these risks were early sourcing, early involvement of suppliers in the design process, and adequate testing using an accepted standard – the Failure Mode and Effect Analysis (FMEA) process. The majority of risks across all three projects were, however, largely owned by the central project team. Organizations with less of a project management culture are more dependent on the project manager skills when dealing with risks.

A classification of risks on the risk identification-risk treatment axes indicates that a balanced attitude to risk taking was prevalent across all three projects. This reflects the relatively mature nature of these organisations, where calculated risk-taking is recognized as an element of overall management. The fact that the vast majority of the risks were identified *after* project approval in itself indicates a confidence in these organisations that all groups involved are able to work together to develop a response plan to deal with identified risks. This is reflected in Figure 14, indicating that all risks, however identified, were dealt with in a "balanced" or "risk seeking" manner, as opposed to risk averse centric.

VI. Concluding Remarks

This article has explored how the concept of centricity can be applied to some key aspects of project risk management to aid understanding and develop alternative perspectives. The concept of centricity has been used as a key component in the development of a conceptual model that is now being tested and refined through primary case study research of risk management processes in IS and new product development projects in the automotive industry. This entails action research, through which the conceptual framework is being applied and developed in major pan-

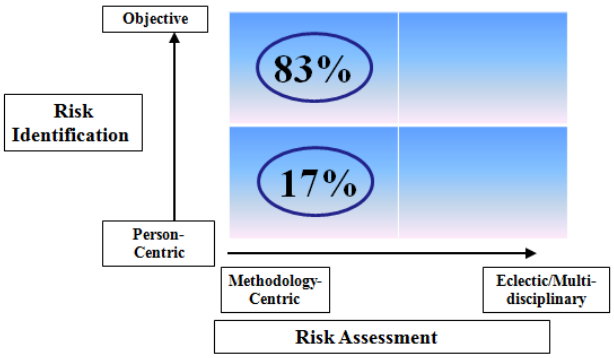

Figure 11. Risk identification and risk assessment: preliminary mapping of first research results
(Quadrant 1 – top left; Quadrant 2 – top right; Quadrant 3 – bottom right; Quadrant 4 – bottom left)

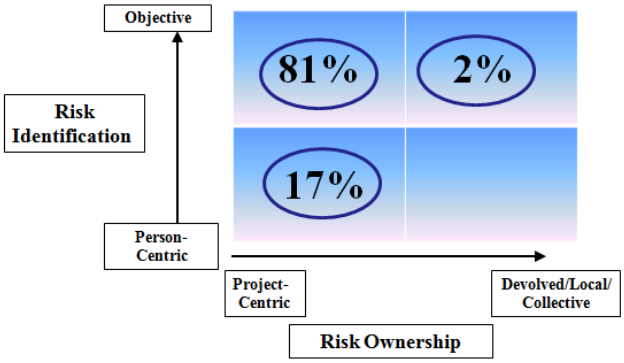

Figure 12. Risk identification and risk ownership: preliminary mapping of first research results

European projects.

Our initial assumptions were that in most projects, risk identification is person-centric, risk assessment is methodology-centric, and the overall risk management process is project-centric. Yet current literature, recent trends and personal observation suggest that a move away from centricity in these components of risk management would benefit project outcomes. The integration of traditional and agile project management methodologies and their tailoring to the specific needs of the organization is gaining wide practitioner and academic attention. The initial results from primary research case studies in organisations with a strong management culture and significant project experience generally support the initial assumptions. However, they also raise a number of issues that are now being pursued through more detailed analysis of each of the three cases. The various dimensions of risk management will be matched against different aspects of each project – project focus, duration, budget, resourcing, ownership, expectation, and tolerances for example – as well as with project outcomes; and a wider range of more in-depth interviews is being conducted to

TABLE I. RISK IDENTIFICATION AND ASSESSMENT IN THE THREE PROJECTS: QUADRANT ALLOCATION

Risk identification and assessment				
Project 1	**Quadrant1**	**Quadrant 2**	**Quadrant 3**	**Quadrant 4**
Total	13			7
Total %	65%			35%
Project 2	1	**2**	**3**	**4**
Total	13			2
Total %	87%			13%
Project 3	1	**2**	**3**	**4**
Total	43			5
Total %	90%			10%
TOTAL	1	**2**	**3**	**4**
Total	69			14
Total %	83%			17%

widen perspectives and more firmly ground assessments in first hand interview material. Once this further research stage is completed, the contribution of the centricity concept to improved risk management practice will be clearer, but initial research results suggest that this is a new way of looking at risk management that can add value to the overall process.

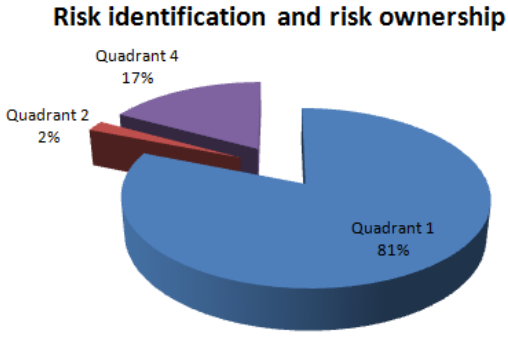

Figure 13 . Risk identification and risk ownership: quadrant allocation

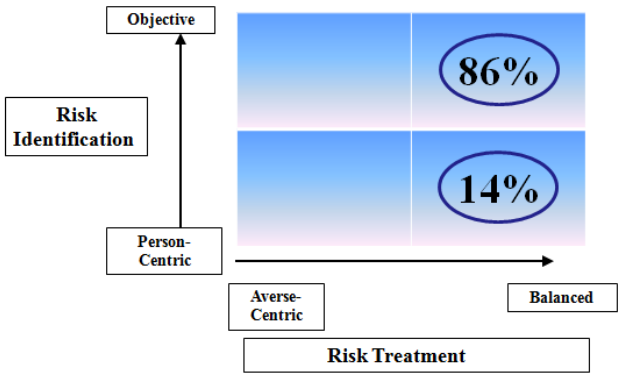

Figure 14. Risk identification and risk treatment: preliminary mapping of first research results

TABLE II. RISK IDENTIFICATION AND OWNERSHIP IN THE THREE PROJECTS: QUADRANT ALLOCATION

Risk identification and ownership				
Project 1	**Quadrant1**	**Quadrant 2**	**Quadrant 3**	**Quadrant 4**
Total	13			7
Total %	65%			35%
Project 2	**1**	**2**	**3**	**4**
Total	13			2
Total %	87%			13%
Project 3	**1**	**2**	**3**	**4**
Total	41	2		5
Total %	85%	4%		10%
TOTAL	**1**	**2**	**3**	**4**
Total	67	2		14
Total %	81%	2%		17%

This is illustrated by the challenge facing the project manager considering how to manage overall risk. The question is not just which project management risk approach should be adopted, but more how to select a “best of breed approach”, choosing the most suitable techniques, templates,

tools and artifacts out of the different standards and methodologies that are available. It is hoped that this research, by introducing the concept of centricity to analyse current practice, will engender this process and lead to better overall project outcomes. As Peter Drucker has put it, "when intelligent, moral, and rational people make decisions that appear inexplicable, it's because they see a reality different to the one seen by others" [36]. This phenomenon, in the case of risk management, requires further research into the interaction and communication between individuals, project teams and their contexts. If the centricity concept can be successfully harnessed to underpin this research, it has the potential to significantly enhance eventual project outcomes.

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