Assembling The Project Compendium

P Meiers

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Department of Computing
Faculty of Mathematics, Computing and Technology
The Open University

Walton Hall, Milton Keynes, MK7 6AA
United Kingdom

http://computing.open.ac.uk
ASSEMBLING THE PROJECT COMPENDIUM

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Penny Meiers

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PREFACE

I would like to acknowledge Rob Walker for reviewing my draft literature review before the M801 course officially started and my supervisor Malcolm Jenner for his support. Further, I would like to acknowledge the survey respondents for allocating their valuable time to answer my questionnaire.
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Projects have a history of failure with many going over budget, finishing beyond expected completion dates or not meeting requirements. A successful project is generally referred to as a project that satisfies budget, schedule, scope and customer expectations. To reduce project failure there has been a movement towards using project methodologies accompanied by their tools, templates and instruments or what this dissertation refers to as project compendium components. Components help to facilitate the transfer of knowledge however much important knowledge is based on feeling and insights which cannot be captured by components. Further, face to face communication is often viewed as the best means of knowledge transfer although it is not always viable for dispersed teams. The question arises -

"Which project compendium components are perceived to contribute most towards project success in the minds of project managers (PMs)?"

The research involved analysing data from seventy-nine surveys completed by software and information technology (IT) PMs. The results showed that all components were thought to add value to project success providing they are used appropriately. Specifications, business briefs and project initiation documents were perceived to be most necessary and benefit realisation plans were thought to be the least necessary. Achievement of business objectives and delivery of business benefits were thought by more people to be highly relevant to project success compared with a project being on–budget, on-time and to scope.

Many interviewees thought that high quality components can be used to effectively manage project knowledge as they help to ensure transparency, availability and accessibility of information. For components to be most effective, it was viewed that they need to be used in conjunction with socialisation or personal exchange of knowledge and used in an environment where knowledge sharing is fostered. Collaborative software tools were thought to further aid management of components.
CHAPTER 1 INTRODUCTION

1.1 BACKGROUND TO THE RESEARCH

A short history of project management (PM) shows that projects were initially managed on an ad hoc basis. Project failures were frequent and to mitigate these failures project methodologies such as PRINCE2 were introduced. Applying project methodologies involved using project compendium components such as tools, templates and instruments (Azzopardi and Meyer, 2009). It is common practice to use components, despite their lack of use rarely being cited as project failure (Rose et al., 2007). Sometimes components are perceived as unnecessary administrative bureaucracy (Styhre, 2006).

*Here lies the question, are the components of a project compendium worthwhile or not?*

Assembling a project compendium involves identifying the most valuable components which will support the delivery of a successful project. Typical components include business case, project initiation documents/cost benefit realisation assessments, project plans/Gantt charts, specifications (requirements, technical & functional), meeting minutes, risk and issues logs, status reports and presentations, lessons learned, budget tracking tools, communication plans, benefit realisation plans and change control documents (Office of Government and Commerce, 2005).

*This dissertation aims to understand which of the components contribute to projects to maximise project success.*

The initial step involves determining how project success is defined. Ultimately, a project is deemed successful when the customer is satisfied and a project is delivered within the constraints of time, cost and scope. Scope refers to both functionality and quality (Agarwal and Rathod, 2006). Secondly, the intention is to understand the role of components in projects, with a core emphasis on examining them as a medium for knowledge management.
"Knowledge management in the context of a project is the application of principles and processes designed to make relevant knowledge available to the project team" (Reich, 2007). It involves identifying, capturing, storing, retrieving, sharing, applying, creating and using knowledge (Lee, 2001; Liebowitz and Megbolugbe, 2003; Raghu and Vinze, 2007). Knowledge management has been defined as a process of creating value from an organisation’s intangible assets (Liebowitz, 2001; Liebowitz and Megbolugbe, 2003; Rubenstein-Montano et al., 2001). Knowledge management is a core function of PM (Reich, 2007). Whether components facilitate knowledge management and lead to project success is debated in this dissertation. Components can act as a medium for knowledge transfer, whereas on the other hand it has been argued that socialisation or personal exchange is the most effective way of transferring knowledge. There is an abundance of knowledge that needs to be processed during a project’s lifespan (Reich, 2007).

PMs can actively intervene to influence the way knowledge is managed and shared (Jackson and Klobas, 2008). A key role of PMs is to manage the knowledge base of project stakeholders by facilitating the creation and integration of knowledge, preventing the loss of knowledge and filling knowledge gaps. The knowledge management function of PMs involves creating channels to enable knowledge sharing. Components provide a means of channelling certain types of knowledge to the project team (Reich, 2007).

In support for components facilitating knowledge management, project members rely on access to stored knowledge and documented records when acquiring and assimilating knowledge and learning about things already known in other contexts (Ajmal and Koskinen, 2008). Components help address some of the knowledge management challenges faced by PMs, such as capturing knowledge from array of sources, embedding knowledge into organisations, storing, retrieving, synthesizing knowledge (Raghu and Vinze, 2007), transferring knowledge from business concepts to IT projects (Jackson and Klobas, 2008) and going beyond technology to support knowledge sharing (Fernie et al., 2003; Liebowitz and Megbolugbe, 2003; Rubenstein-Montano et al., 2001). Converting knowledge into a form that can be retrieved by others such as a document, is one way of managing knowledge flow (Ajmal and Koskinen, 2008; Sense, 2008).
Knowledge management and learning are affected by the situational context conditions of the project (Ajmal and Koskinen, 2008; Sense, 2007b). Often project members have never had a relationship with each other, therefore documented knowledge via components can provide avenues for knowledge transfer where social interaction is limited. Components may suit the cognitive learning styles of some people more than others. Components support a structured approach to learning which leads to better quality and quantity of learning as opposed to learning under an unstructured approach (Sense, 2007b). Components may help to mitigate some major knowledge risks to projects such as failure to learn from past projects, inadequate knowledge integration, incomplete knowledge transfer, loss of knowledge when team members leave, loss of knowledge between phases and failure to capture lessons learnt (Reich, 2007).

One of the major obstacles to knowledge management is the propensity of people wanting to hold back information rather than share it (Ajmal and Koskinen, 2008; Jewels, 2006). For effective knowledge transfer an environment that supports social interaction should be established in conjunction with the compendium (Reich, 2007). Project participants are dependent upon both codification (capturing and storing of knowledge) and personal forms of knowledge flow for effective learning (Sense, 2008).

Knowledge management is complicated through increased prevalence of project teams being dispersed at various locations around the world. A structure to represent knowledge is becoming increasingly important (Raghu and Vinze, 2007). Project team members need to collaborate across different geographical sites, time zones, organisations and cultures. Knowledge management within global teams brings additional complexities from a cultural perspective. For example, the propensity to share knowledge is different in cultures with a high as opposed to low sense of collectivism (Burchell and Gilden, 2008). Sharing knowledge in distributed teams situated at various locations can be facilitated by collaborative software. Collaborative software supports codification and storage of knowledge which are key functions of components and they can lead to improved collaboration decreased costs and increased productivity (Hedgebeth, 2007; Henry et al., 2007; Romano et al., 2002).
A large element of the knowledge management process involves deciphering the meaning from information. This activity is known as ‘sense-making’. A project can be seen as a continuous sense-making activity and PMs are responsible for the sense-making activities such as how meanings are created, selected, deconstructed, negotiated, elaborated, legitimised, encoded and institutionalised (Alderman et al., 2005; Papadimitriou and Pellegrin, 2007). Components can aid the sense-making process. The transition from customer requirements to technical specifications is an example of how components are used to make sense about particular set of information in order to progress the project to the next stage (Papadimitriou and Pellegrin, 2007).

A benefit of using components is that they support traceability. Traceability refers to ability to track requirements backwards and forwards, from where they originated and what they lead into, for example, business requirements to technical requirements and test cases according to Gotel cited in Arkley and Riddle (2005). Traceability allows the impact of changes to requirements to be assessed. Changes to requirements are likely to impact project success factors of time, cost and scope.

In conclusion, components appear valuable for project success because they support knowledge management, dispersed global teams, sense-making and traceability.

It is suggested by Sense (2008) that further research into knowledge management within projects be undertaken. This dissertation will look at components as a medium for knowledge management and investigate which components are perceived to contribute most towards project success. There do not appear to be any published studies on such topics and therefore the results should contribute to the academic knowledge.
1.2 AIMS AND OBJECTIVES OF THE RESEARCH PROJECT

The aim of the research was to investigate the relationship of components in regards to knowledge management and capture PMs' opinions and perceptions about which components are perceived to contribute most towards project success.

The objectives of this study were:

- To clarify the meaning of project success
- To identify which components of the project compendium are perceived to contribute most and least towards project success
- To identify the perceived reasons why there is a resistance to using components
- To understand how components of a project compendium can be used as a means for knowledge management
- To investigate the role of technology in managing components.
CHAPTER 2 LITERATURE REVIEW

2.1 INTRODUCTION

The literature review provides an overview of various definitions of project success, the role of components to aid knowledge management in projects, the importance of components to support knowledge management in global and virtual teams and the function of components in sense-making and traceability.

2.2 REVIEW OF CURRENT BODY OF KNOWLEDGE

2.2.1 PROJECT SUCCESS

There is a consensus within the literature that there is no common clear understanding regarding the definition of project success. Three reviewed articles refer to 1995 and 1998 publications of Wateridge when discussing the lack of a common definition (Agarwal and Rathod, 2006; Fortune and White, 2006; Thomas and Fernández, 2008). Perhaps indicating that there is little research superseding Wateridge’s in the past ten years. Although the definition of project success is unclear, the most common definition in a literature review done by Agarwal and Rathod (2006) incorporates internal project characteristics such as time, cost and quality. However, they contend that the most appropriate definition is one that expands scope to not only include meeting quality expectations but also functional requirements and further also incorporates external characteristics such as customer satisfaction. Drucker cited in Hidding and Nicholas (2009), supports the notion of defining project success from an internal and external perspective. The internal perspective – ‘efficiency’ is concerned with PM being successful, for example meeting budget and time scales. The external perspective – ‘effectiveness’ views success related to outcomes and stakeholders (Hidding and Nicholas, 2009).

Several research papers included customer satisfaction in their definition of project success despite excluding customers in their research sample. Argawal and Rathod (2006) acknowledge that their research about perceptions of project success was limited by a small sample of internal project resources. Customers were not included in Thomas and Fernández’s (2008) research sample which identified a comprehensive list of IT project...
success factors. However, the research sample was sufficiently large as thirty-six organisations from various sectors and of various sizes were included in the case study. The authors believed they overcome limitations of bias self reporting Chief Operating Officers by reviewing documentations and creating an unthreatening environment during the interviews whereby interviewees could talk openly (Thomas and Fernández, 2008).

Project success in this dissertation is defined as a project meeting time, cost, scope and customer expectations. The definition is justified as all four characteristics are incorporated in the list of success criteria identified by Thomas and Fernández’s (2008) and they are commonly included in definitions of project success (Agawal and Rathod, 2006). Less commonly cited definitions of project success include sponsors seeing survival of their project, according Wilson cited in Thomas and Fernández, (2008), profitability and business success (Agarwal and Rathod, 2006).

Success is difficult to measure due to reasons such as a project may have succeeded in some aspects although not others according to Remenyi cited in Thomas and Fernández (2008), the pre-agreed time and cost may have been incorrectly estimated and there maybe cloudiness about whether success should be measured against the original or revised budget (Agarwal and Rathod, 2006; Thomas and Fernández, 2008). Further it was concluded by Fortune and White (2006) after reviewing sixty-three research papers to identify the most cited project critical success factors, that there is little consistency amongst what is thought to be the most important project critical success factors.

2.2.2 KNOWLEDGE MANAGEMENT
There is substantial literature about knowledge management and its association with projects (Frey et al., 2009). In articles written in 2001 by Liebowitz, an author of many publications on the topic, it was questioned whether the discipline of knowledge management was going to be another management theory fad (Liebowitz, 2001; Rubenstein-Montano et al., 2001). Eight years on, reputable project management journals are dedicating many articles to knowledge management.
Projects require knowledge to be managed within, from and between projects. This involves coordination and integration of internal and external knowledge held by project resources and environments. Due to the temporary nature of projects, knowledge is stored differently from the way knowledge is stored in the rest of the organisation. The conclusion of the research conducted by Frey et al., (2009) indicated there is much scope to improve knowledge management within projects. Managing knowledge within projects is closely associated with PM methodology and communication practices and therefore is associated with components. In research, specifically relating to the Software Development Lifecycle (SDLC), it was found that the SDLC is important in aiding the communication amongst developers, between managers and user and that reviewing and learning from old documentation reduces budget and schedule overruns (Nasution and Weistroffer, 2009). As much of the SDLC documentation is incorporated in the project compendium such conclusions are directly related to this dissertation.

Many publications about knowledge management refer to Nonaka (1995) and or Polanyi (1962) to distinguish between the terms explicit and tacit knowledge (Ajmal and Koskinen, 2008; Fernie et al., 2003; Henry et al., 2007; Raghu and Vinze, 2007) Grover in Henry et al., McCray et al. (2007). Some articles do not acknowledge tacit knowledge (Jackson and Klobas, 2008; Malkinson, 2001) while Sense (2008) only acknowledges tacit knowledge. Explicit knowledge is public, structured, externalised and conscious. It can easily be codified (captured and stored), articulated and documented. Tacit knowledge is difficult to extract, capture and document and it relies on personal exchange or socialisation for the knowledge to be transferred from one person to another. Explicit knowledge can be found in lessons learned, documents, reports and templates whereas tacit knowledge is extracted from people’s perceptions, intuitions and feelings. Tacit knowledge relies on personal exchange for knowledge to be transferred. Some publications distinguish between knowledge and information. Information is meaningful aggregation of data which has little worth until it is converted into knowledge according to Ash cited in Ajmal and Koskinen (2008) and Liewbowitz (2001). Knowledge is interpreted information which has been processed via people’s perception, skills and experiences according to Kirchner in Ajmal and Koskinen (2008), Liebowitz (2001), Baumad in Fernie, Green et al. (2003) and Jackson, Klobas (2008).
Based on these definitions of knowledge, most authors believe that technological knowledge management systems can only support explicit knowledge (Ajmal and Koskinen, 2008; Fernie et al., 2003; Jackson and Klobas, 2008; Jewels, 2006; Lee, 2001). Further, as indicated by Goldblatt in Fernie et al. (2003), eighty percent of knowledge is tacit knowledge, therefore projects and organisations should not rely on technology alone in establishing knowledge management. Somewhat contradictory in the literature is that the majority of articles directly refer to 1995 publications from Nonaka and Takeuchi in their writings about tacit and explicit knowledge even though Nonaka and Tekuchi contrarily theorise that technology can support tacit knowledge (Ajmal and Koskinen, 2008; Fernie et al., 2003; Jackson and Klobas, 2008; Jewels, 2006; Lee, 2001). Nonaka and Tekuchi’s research shows that tacit knowledge can be turned into explicit knowledge and hence codified. Fernie et al (2003) specifically refute Nonaka and Tekuchi’s theory and agree with the majority of authors that the only means tacit knowledge can be shared is through socialisation and that tacit knowledge cannot be turned into explicit knowledge.

Some publications promote the use of socialisation for explicit knowledge in addition to tacit knowledge, Grover cited in Henry et al. (2007), Nonka and Takeuchi, McKinlay and Lanzara cited in Fernie et al., (Sense 2008). Socialisation refers to the personal exchange of knowledge. One study shows that socialisation is required for effective sharing of explicit knowledge across sectors, because without socialisation explicit knowledge is meaningless. The research found that it was very difficult to separate knowledge from the knower and therefore suggests personalised approaches are required for effected knowledge transfer. The research was based on projects in the construction industry and should still be applicable to information systems projects due to the focus being on cross sector knowledge transfer (Fernie et al., 2003). These conclusions are open to debate due to the research method limitations which were based on semi structured interviews and workshops. Such limitations include inability to accurately measure how much knowledge has transferred through socialisation, the complex knowledge topic, absence of a control group and inaccurate assumption that a piece of knowledge that was found to be interesting meant that knowledge had been passed on.
Another study suggests that often PMs rely on socialisation of explicit knowledge to avoid the effort involved in extracting knowledge which is sometimes stored in a disorderly fashion, too much, too little, difficult to analyse or take in (Henry et al., 2007). Their research was explicitly related to PMs and included a wide sample size. Sense (2008; 2007a; 2007b), an author of many articles on the subject of learning within project teams shares a similar view to that advocated by Fernie et al, (2003) that is personalisation, for example project team meetings are required for effective knowledge sharing. The way in which knowledge is transferred affects how knowledge is learned by project teams. Sense’s (2008) view about the importance of personalisation for knowledge sharing was not supported by any primary research, although it was supported by many secondary literature sources.

Knowledge sharing is a heavily documented topic under the knowledge management umbrella. Knowledge sharing is defined as the activity of transferring knowledge from one person to another or to group or to an organisation according to Nonaka and Takeuchi cited in Lee (Lee, 2001). Effective knowledge transfer within projects can help projects to quickly achieve their objectives (Jackson and Klobas, 2008). Knowledge sharing highly depends on an individual’s willingness to share knowledge (Ajmal and Koskinen, 2008; Raghu and Vinze, 2007). One study found that financial reward and status do not influence people’s propensity to share knowledge, rather people are motivated to share knowledge if they believe it would help team success, feel that they are expected to do so and believe sharing is valued. The limitation to these finding is that the sample group was culturally mixed (Jewels, 2006). Culture is believed to have a large influence on one’s propensity to share knowledge (Lee, 2001). Lee (2001) and Jewels (2006) do not believe that culture impacted their results however with such a small sample size such a statement is difficult to validate.

Knowledge management and knowledge sharing appear to be supported by technology in most circumstances (Jackson and Klobas, 2008; Jewels, 2006; Liebowitz and Megbolugbe, 2003). Despite such support, technology should not solely be relied upon for effective knowledge sharing or other knowledge management activities. According to Bobbitt cited in Rubenstein- Montano et al. (2001) and Raghu Vinze (2007) the influence of culture (sociological and anthropological) on knowledge management must be taken into account.
Results from one published survey showed that eighty percent of respondents found culture to be the biggest hindrance to effective knowledge management (Ajmal and Koskinen, 2008). Technology applications aimed at facilitating knowledge management have been more successful in dealing with explicit knowledge. Attempts at facilitating tacit knowledge transfer and acquisition have focused on communication and networking technologies. Technical systems facilitate explicit knowledge more so than tacit knowledge. They support knowledge management functions including storage and retrieval, knowledge sharing and knowledge synthesis (Raghu and Vinze, 2007).

Knowledge management is pertinent for effective PM (Ajmal and Koskinen, 2008; Henry et al., 2007; Liebowitz, 2001; Reich, 2007). Project members need to acquire and assimilate knowledge across contexts and extract stored knowledge from documented records (Ajmal and Koskinen, 2008). PMs have a responsibility to manage social and technical relationships in order to facilitate the availability of knowledge, minimise the loss of knowledge and fill knowledge gaps (Ajmal and Koskinen, 2008; Reich, 2007). PMs can implement and apply knowledge management systems to enhance the running of their projects. Knowledge management systems can be used to extract, share and integrate knowledge in order to help compile project budget and schedule estimates (Henry et al., 2007). They assist with decision making (Raghu and Vinze, 2007). They aid communication within the project team as well as external communication which provide opportunities for clearer understanding of goals and objectives, which is one of the top three success factors for project success identified by Fortune and White (Liebowitz and Megbolugbe, 2003).

Based on the assumption that ‘shared understanding’ is a project critical success factor, Jackson and Klobas (2008) were motivated to investigate whether a model of knowledge sharing helps to conceptualise how project teams reach a shared understanding. A core conclusion of their research is that PMs can actively intervene to influence the way in which knowledge is gained and shared amongst the project team and its individuals. This conclusion was based on a variety of research methods including literature reviews, case studies, surveys, expert opinions and a field test about information systems projects and therefore directly applicable to the dissertation. The authors propose the value of their research is that the model helps PMs with the complex concept of social construction of
knowledge ("the process of continual sense-making, in which people build, communicate, verify and commit to mutually agree views of the world") by providing a tool that allows them to understand the processes of knowledge construction and assess the knowledge management health of an information systems project. Most organisations ignore social constructivism while implementing systems (Jackson and Klobas, 2008, p.329).

Liewbowitz and Megbolugbe's (2003) knowledge management implementation framework incorporates social constructivism as it makes reference to organisational culture. The framework can aid PMs in conceptualising and implementing knowledge management initiatives. Although application of the framework seems unclear, the framework may be valuable from a theoretical standpoint as it could stimulate the thought process of PMs. Further, it would allow sharing of best practice documents, lessons learned, PM and system engineering methodology as well it provides opportunities for improving leadership and teamwork. The example of NASA's PM system was used to support their argument for implementing knowledge management system.

One commercially funded research reviewed a large number of knowledge management frameworks and made the recommendation that systems-thinking should be applied to knowledge management frameworks (Rubenstein-Montano et al., 2001). They highlighted criteria that should be used to access knowledge management frameworks.

2.2.3 GLOBAL AND VIRTUAL TEAMS

Personal exchange or socialisation of knowledge in virtual or global projects is difficult due to distance, time zones, costs, language and culture (Dafoulas et al., 2009; Romano et al., 2002). Consequently reliance on codification of knowledge seems more likely. Similar to projects based at one location, solely relying on technology for knowledge transfer within cross location projects will not be sufficient (Gassman, 2001). Gassman's (2001) paper about multicultural teams on R&D projects advocates that transferring employees from one location to another is the most effective way of transferring tacit knowledge from one location to another and that job rotation is the best way of building a common knowledge base. Such conclusions were supported by references to several large multi-national organisations. The disadvantages of transferring project staff across locations, such as time
and costs were not acknowledged in the paper. A study on engineering projects in the automotive industry found that if resources did not travel but relied on technology aided communication for cross location projects, then time spent on some project activities was reduced by twenty percent (May and Carter, 2001). The study still supported the notion that face to face personal exchange of information is the best method of knowledge transfer.

In addition to the complexities of managing knowledge across distributed locations, global project teams also face the added complexity of cultural influences. In some cultures tacit knowledge and accompanying stimuli (eye contact, body language) have a strong influence over how a message is interpreted. In other cultures explicit knowledge and verbal information have a high influence over how a message is interpreted and because language is used more precisely it is easier to codify (Burchell and Gilden, 2008; Gassman, 2001).

2.2.4 SENSE-MAKING

Sense-making is the process of understanding an ambiguous situation. PMs have a responsibility to align sense-making activities with project stakeholders for effective communication (Alderman et al., 2005). A study by Papadimitriou and Pellegrin (2007) on the topic of sense-making suggests that the most appropriate medium for knowledge transfer depends upon the phase of the project lifecycle. Oral medium should be used at the beginning, written throughout the duration and codified techniques used the end of the project. The study was about the dynamics of projects through intermediary objects design (IOD) and how IODs could be used as a vehicle for sense-making in projects. The term IOD could be interchanged with ‘components’, they can be defined as a set of sub deliverables that make up the final project deliverable, are tangible, and can be circulated and acted upon by the project team. The findings suggest that a sequence of components should be aligned with the project lifecycle and as projects change over time different sequences are appropriate at different times depending on the dynamics of the project. Components specified in the compendium at the beginning of a project may not be relevant during later phases of the project due to changes in project dynamics throughout its lifecycle.
2.2.5 TRACEABILITY

There is a general agreement about the value of traceability, however, it is rarely used and when it is used it is done so ineffectively (Arkley and Riddle, 2005; Bashir and Qadir, 2006; Neumuller and Grunbacher, 2006). Reasons why traceability is lacking in organisations include scale and complexity of traceability, lack of perceived benefit in comparison to effort, lack of personal motivation for providing traceability information as the benefits are not reaped by the provider, according to Ramesh cited in Neumuller and Grunbacher (2006) and traceability techniques are deficient. The literature suggests that there is scope for industry improvement in traceability and perhaps a project compendium which supports the capturing, storing and retrieving of traceable information would lead to industry improvement (Arkley and Riddle, 2005; Bashir and Qadir, 2006; Neumuller and Grunbacher, 2006).

2.3 RESEARCH QUESTION

This dissertation aims to address the following research question:

“Which project compendium components are perceived to contribute most towards project success in the minds of PMs?”

2.4 SUMMARY

From the literature review it can be implied that a project compendium is justified because of its inferred support for explicit knowledge management/sharing, communication between global and virtual teams, sense-making and traceability.

Effective project knowledge management relies on making relevant knowledge available to the project team. Components provide a means of transferring codified knowledge between project stakeholders. Collaborative knowledge management software can support management of codified knowledge. Many experts believe that only explicit knowledge can be codified and implicit knowledge requires personal exchange for transfer to occur. Some experts argue that socialisation is also needed for effective knowledge transfer of explicit knowledge.
Several studies indicate that face to face personal exchange of information is the best method of knowledge transfer. This is difficult in global or virtual project teams due to distance, time zones, cost, language and culture. A study about sense-making reveals the most appropriate medium for knowledge transfer depends upon the phase of the project lifecycle and that different sequences of components are appropriate at different times depending on the dynamics of the project. Components are used to make sense of information in order to progress the project to the next stage. Components also support traceability which is viewed as a valuable function.

The literature review highlights the value of components particularly in regards to knowledge management and the dissertation aims to identify which specific components are most valuable. To be considered valuable they must ultimately contribute towards project success.
CHAPTER 3 RESEARCH METHODS

3.1 INTRODUCTION

Determining the most appropriate research method involved identifying selection criteria and evaluating methods against the criteria. Questionnaires were identified as the most appropriate method. Vendors who supported questionnaires were accessed and then one was selected. The questionnaire was designed and tested before finally being distributed.

3.2 RESEARCH METHOD SELECTION CRITERIA

To identify selection criteria, the type of data required and how it would be analysed and collected was considered. The research question was thought to require capturing qualitative data and analysing it in a quantitative way. Capturing PM’s opinions is qualitative data capture. Quantitative analysis such as statistical analysis, finding relationships and applying generalisations to the data would require converting the qualitative data into numerical values (Trochim, 2006; Wiersma, 2000). Qualitative and quantitative research techniques complement each other and they should be combined for optimal results (Bell, 2005; Wellington, 2000).

Defining how the data was to be analysed involved identifying the dependent and independent variables. As ‘project success’ was the desired outcome, it was the dependent variable. Project failure or other variants of project success would be analysed. Components are the independent or the experimental variables, meaning that the effects of changing these was to be analysed (de Vaus, 2002, p.22-26; Oppenheim, 1972, p.9-10). The purpose of analysis was to describe the data by classifying the independent variables (components) into categories that are perceived to contribute most towards different attributes of project success (Sharp, 2002). Components are nominal data (data that can be counted or categorised but not ordered or measured). Data captured about the necessity of components for project success was ordinal data (data logically ordered into categories) which was assumed to be interval in nature. By assigning a scale to various degrees of necessity multivariate quantitative analysis such as calculating central tendency and scatter diagrams was possible (Arkley and Riddle, 2005; de Vaus, 2002; Trochim, 2006; Sharp,
Frequency distributions quantitative techniques would also be used to present the data. Qualitative methods such as noting patterns and themes, clustering, making contrasts and comparisons and noting relationships between variables were also used to present the data (Huberman, A.M, and Miles M.B., 1994).

Determining the manner of data collection involved reviewing the advantages and disadvantages of various research methods.

### 3.3 ASSESSMENT OF RESEARCH METHODS

Several research methods were thought to be inappropriate. Experiments were disregarded due to the time and cost impacts of establishing a control project and because they require a hypothesis which is not part of the research question (Davies, 2007). Only from the perspective that experiments allow cause and effect relationship analysis, would such research method have been considered (Bell, 2005). The observation method would have been impractical to carry out within the timeframe of an MSc and difficult to identify a typical representative project (Bell, 2005). Field research is context specific and complex to extract the data and organisations may not be open to outsiders ‘living amongst’ their employees (Bell, 2005).

An organisation case study was shortlisted as an appropriate research method. Case studies provide rich data reflecting actual occurrences rather than perceptions of what happens, which in turn provide less biased data. Case studies would have allowed review of the components used in a successful project versus an unsuccessful project. One organisation where there may have been an opportunity to conduct a case study enforces all projects to use specific components and therefore the data captured would be context specific and unfeasible for making generalisations. The major obstacle with carrying out a case study in circumstances where the researcher has no prior relationship with the organisation is gaining permission from an organisation to access and publish data. This was the key reason for not pursuing the case study research method. Case studies are also subject to selective reporting which distorts the data and are difficult to cross check information (Bell, 2005; Sharp, 2002).
The survey method seemed advantageous on many fronts. Surveys are cheap and fast. They enable data to be easily extracted to conduct quantitative analysis, make generalisation and analyse relationships and effects occurring between variables (Wiersma, 2000). They also provide the opportunity to gain rich data through open ended questions which subsequently can be quoted in research papers (Wisker, 2008). The disadvantages with surveys are it is difficult to gain a representative sample, design and word questions and code answers to open ended questions (Wisker, 2008). Further, there is a requirement to pilot the survey (Bell, 2005). Under the umbrella of the survey method, lays a continuum of very structured to unstructured survey approaches. The continuum begins with self administered questionnaires, to very structured interviews such as interviewer administered questionnaires where the interviewer captures respondents responses verbatim, to structured qualitative interviews where the interviewer is able to make interpretations, to unstructured in depth interviews where the interviewer shares his or her own feelings by building a report to extract deep hidden information (Denzin, N.K. and Lincoln, Y.S., 2003; Gubrium, J.F. and Holstein, J.A., 2002).

Interviews can be conducted in a group or with one person at a time, they can vary in the level of structure and by the medium by which they are carried out. Group interviews were disregarded primarily due to the logistics of gathering a large sample of PMs in the one place at the same time. Although group surveys are inexpensive, provide rich data and aid participant recall, they are more complex to administer, require a proficient interviewer and are generally associated with testing a methodology (Denzin, N.K. and Lincoln, Y.S., 2003).

Structured interviews were thought to be a better approach compared with unstructured interviews. As the data intended to be gathered through the interview process is not necessarily deep, hidden or complex, unstructured or in depth interviews were not required. Unstructured interviews require the interviewer to have greater expertise in interpreting the data and building intimacy (Denzin, N.K. and Lincoln, Y.S., 2003; Gubrium, J.F. and Holstein, J.A., 2002). The advantages of structured interviews are that there is less room for interviewer error and coding answers is easier. The issues resulting from different interviewers are irrelevant as all interviews would have been carried out by the same person. The disadvantages associated with structured interviews are that the respondents
may try to please the interviewer, the interview technique may lead to errors and the time and effort involved in designing the questions (Denzin, N.K. and Lincoln, Y.S., 2003). Interviewer administered surveys did not appear to add any advantages above the web based questionnaire. There was no scope for the interviewer to add additional benefit, further there would be more administrative work involved.

Qualitative structured interviews allow for the interviewer to derive interpretations and probe when necessary while still following a set list of questions (Gubrium, J.F. and Holstein, J.A., 2002). Qualitative interviews are also flexible as to the medium by which they are carried out because they are not concerned with controlling the social context (Gubrium, J.F. and Holstein, J.A., 2002). Although qualitative interviews are effective in capturing rich data, the disadvantages are they are time consuming to administer, difficult to gain a sufficient sample size and hence generalise from, difficult to record all the data obtained and they require a proficient interviewer (Sharp, 2002).

The advantages of questionnaires are they provide the opportunity to access a large sample, the data is relatively accessible, easy to capture, record, cheap and efficient to extract. The disadvantages are that they are time consuming to design, have a low response rate, require a pilot and the results require careful statistical analysis (Sharp, 2002). Although questionnaires are predominantly effective at capturing quantitative data, they can capture rich qualitative data through open ended questions (Wellington, 2000).

3.4 RESEARCH METHOD AND VENDOR SELECTION

A carefully constructed questionnaire should capture sufficient quantitative and qualitative data about the subject matter. There is little difference between a highly structured interview and a questionnaire. If data captured from questionnaires was found to be insufficient then it could have been supplemented with qualitative structured interviews. This would have allowed further exploration of the questionnaire results. Several studies highlighted in the literature review combined questionnaires with interviews (Henry et al., 2007; Jewels, 2006; Lee, 2001).
Web based questionnaires were thought to be the obvious survey method when compared to telephone and paper based methods due to ease of data collection, ability to access a large sample, speed to distribute and receive responses, cheapness to administer and ability to automatically verify respondents. The claim that internet surveys do not capture representative sample as they exclude non-technically proficient people should be of low significance as the participants are PMs of ‘software’ projects. It is unknown how many people choose not to respond to web based surveys via URLs and therefore bias of non response needs to be considered. It would be acceptable for the sample size to be relatively small due to the heterogeneous population and relatively low importance of accuracy (Andrews et al., 2003; de Vaus, 2002).

In selecting a web based survey, three free websites were reviewed including Questionpro, Surveymonkey and Freeonlinesurveys (FreeOnlineSurveys.com, 2009; QuestionPro, 2009; SurveyMonkey.com 2009). They were assessed against a set of quality criteria (Andrews et al., 2003). Freeonlinesurveys was discredited because it had a time limit of ten days. Questionpro and Surveymonkey both met the majority of quality criteria. Paid survey options were also considered in case the free surveys were not adequate. Despite Questionpro offering unlimited complementary responses and Surveymonkey only offering one hundred complementary responses, Surveymonkey was selected due to its ability to provide a URL, it was aesthetically more pleasing and the question types were more appropriate. There was an option of upgrading to the paid version of Surveymonkey at any stage if such functionality was deemed necessary.

Considering the constraints of ten complementary questions with the free versions, an advantage of Surveymonkey was that it offered a question style of a matrix of drop down menus which allowed copious data to be captured within one question. The other question types that were appealing were the multiple choice questions and a comment field within each of the ten free questions. Surveymonkey offered three methods of collecting responses, creating a web link, creating a pop up and email list management. The number of responses could be tracked with each collector, which enabled calculation of a response rate for email invitations.
To analyse the results collated by the free version of Surveymonkey, the data would need to be re-keyed into a spreadsheet. The raw data provided includes, the total number of people who started the survey, the number of people who completed the survey, the percentage of respondents who selected a certain answer, the count of people who completed each question and the count of people who skipped a question. The paid version allows the data to be automatically downloaded, filtered according to requirements and provides graphs and charts.

### 3.5 Designing the Questions

Designing the questionnaire was a complex process. It was important to ensure that the survey was reliable and valid, that is, the results could be trusted and that the survey measured what it intended to measure. In ensuring that the survey was reliable, particular attention was paid to the wording of each question and some questions were asked in different ways to check answers for consistency. The questionnaire was deemed valid as it measured the overall research question (de Vaus, 2002, p.52-55). There were questions measuring the dependent variable ‘project success’ as well as the independent variables ‘components’. To help ensure that the participants clearly understood the questions, the phrase ‘components’ was interchanged with ‘tools and templates’.

A published study about how software professionals view project success was used as inspiration in the design of survey questions (Agarwal and Rathod, 2006). The study’s research question “Which characteristics of software projects dominate the notion of project success in the minds of software professionals?”, aimed to capture respondent’s opinions and beliefs about project success, through multiple choice and ranking answer options. Similar to the intention of this dissertation their survey data was analysed for correlations amongst variables.

Thomas and Fernández’s, (2008) list of project success criteria was incorporated into the questions of the dissertation’s survey in order to qualify how respondents viewed project success. Using a five point Likert scale respondents were asked how relevant project success criteria were to project success. This dissertation’s survey aimed to capture the
beliefs of PMs whereas Thomas and Fernadez’s study assessed respondent’s behaviour through interviews about their experiences.

It was acknowledged that different characteristics of PMs may influence survey responses. Research about what influences project success suggested that project success is also affected by management methods, size, complexity, technology and experience of PMs (Hidding and Nicholas, 2009). The characteristics captured by other similar surveys included age, tenure, experience (Henry et al., 2007). This dissertation’s survey captured data about the PM’s industry sector, size of projects PMs manage, experience as a PM and whether PMs had been educated in project methodologies. The primary reason for capturing such data was to describe the sample. These characteristics are known as uncontrolled variables as they are difficult to disentangle (Oppenheim, 1972, p.10). Standard demographic information was deemed not important to the analysis.

The research was not concerned with comparing differences in opinions between various groups. To ensure only the target group responded to the survey, only software PMs were asked directly to participate. Non software PMs were classified as ‘controlled variables’ which the research aimed to eliminate. One question in the survey was allocated to verifying that the respondents were software PMs.

There was an obligation to ensure that the survey was ethically sound. This required participation to be voluntary and based on informed consent. Further, the researcher had to ensure that confidentially, anonymity and privacy standards were adhered to (Andrews et al., 2003). The survey was voluntary by default of completion and a statement to the fact was highlighted in the introduction. The introduction and introductory email also highlighted the purpose of study, outlined the expected duration, described the benefits and how respondents were selected, identified the researcher and stated that results can be obtained on request. Further, a question was allocated towards obtaining consent for respondent’s answers to be used as part of academic research. In respect to privacy, permission was gained before links to URLs were posted on websites (Andrews et al., 2003; de Vaus, 2002).
The survey questions were designed to capture qualitative data about behaviour, beliefs, knowledge and attitudes. Both open and closed questions were considered. As closed questions can force respondents to select an answer which does not represent their opinion, the answers incorporated a sufficient range of non biased alternatives as well as options of 'neutral' for some questions. The advantages of closed questions are that they are quick to complete and easy to extract results. Several open questions were included to capture in-depth answers. The disadvantages of open questions are they are difficult to code results due to coder bias, answers can be misinterpreted and they rely on articulate responders (de Vaus, 2002, p.96-102).

Of the closed questions two questions used the Likert scale. Several papers included in the literature review made use of a five point Likert scale style of questions in their questionnaires (Henry et al., 2007; Hidding and Nicholas, 2009; Lee, 2001; Thomas and Fernández, 2008), although one research paper used a seven point scale (Keith et al., 2009). Checklists and multiple choice formats were also used. Whether to include a middle alternative was debated, however it was thought appropriate not to force people to select a certain opinion. It was also thought that the issue of acquiescence would not be problematic in this survey as such an issue is more prevalent in surveys with lowly educated respondents. Survey responses may be slightly affected by respondents selecting socially desirable answers, however the assurance of confidentiality should mitigate this (de Vaus, 2002, p.102-105). Careful attention was paid to avoid questions that were leading, embarrassing, too long, negative, ambiguous, over precise, prestige biased or had obvious answers, used complex language or used double barrelled words (de Vaus, 2002, p.59-64; Oppenheim, 1972, p.96).

In formatting the questionnaire, recommendations by de Vaus (2002) were followed. The instructions, purpose and confidentiality statement were included on the first page. The order of the questions started with some easy and obviously relevant questions. Towards the end of the questionnaire, there were some abstract and open questions (de Vaus, 2002, p.105-108). Time was spent ensuring that the survey was designed well and that respondent would interpret the survey correctly (Oppenheim, 1972, p.20-21).
After the questionnaire was designed it was pilot tested by two people to check how respondents would understand each individual question and to check the questionnaire in its entirety, including the flow, timing and respondent’s interest in completing it. Very minor changes were made after the survey had been piloted. Refer to appendix B for a copy of the survey.

3.6 DISTRIBUTING THE SURVEY

Availability non-probability sampling was thought to be the most appropriate sampling technique. This technique supports the aim of capturing opinions from a relatively heterogeneous population. As it was not the main intention of the research to generalise from the sample and because web based surveys are not highly supportive of random sampling, probability sampling was not considered (Andrews et al., 2003). The survey sample depended upon people who responded to an invitation to voluntarily participate in the questionnaire. The method of sampling could have also been referred to as ‘positive sampling’, because only PMs were able to respond (Andrews et al., 2003; de Vaus, 2002, p.69). There were two modes of questionnaire distribution. An email invitation was sent to seventy personal contacts and a web link was posted on some university chat sites and project management sites.

Several steps were put in place to encourage a high response rate. SurveyMonkey’s software worked on different platforms which should have limited technical problems, confidentiality was assured, participants could review the entire survey before committing, participants were informed upfront of the likely duration for completing the survey, reminders were used, for email invitations, the subject title was relevant, the researcher’s email address and name was incorporated in the email, there were several methods of inviting participants, the survey was customised for PMs using PM jargon and a follow up process was used (Andrews et al., 2003). Acquaintances were directly asked to complete the survey as response rates are higher with people who have a prior relationship with the interview (Davies, 2007). There is conflict amongst the literature regarding the most desirable length of a survey, it is agreed that the perception of effort required would influence the response rate. Sometimes a lengthy surveys are seen as too much effort, other times people perceive short surveys as insignificant (Andrews et al., 2003; de Vaus,
Due to the restriction of ten questions for free web based surveys, a short survey with an expected duration of twenty minutes was implemented.

### 3.7 SUMMARY

Criteria for selecting the research method involved considering how qualitative ordinal data was to be collected and then analysed in a quantitative manner. Various research methods were evaluated against the criteria and the questionnaire research method was selected. Three on-line questionnaire providers were evaluated and the vendor Surveymonkey was chosen. The questionnaire was designed and tested before finally being distributed via email and weblinks.
CHAPTER 4 DATA COLLECTION

4.1 INTRODUCTION
Data collection involved identifying who, from where and how survey participants could be sought. Once the data was collected, it was filtered, manipulated and analysed. Finally the data was checked for answer consistency.

4.2 PROCESS AND DATA SOURCES
The data sources were selected by compiling a list of all personal acquaintances with experience managing software/IT projects. They were personally requested to participate in the survey and additionally to forward the survey link to their personal contacts. The other data source was a web link posted to the Open University course chat sites including M865 Project Management and M80. The links were left open for three weeks and then closed. There was a sixty percent response rate to the personal email invitations which contributed to thirty percent of the overall responses. Approximately sixty percent of the responses were a result of ‘friends of friends’ completing the survey. Approximately ten percent of responses were from links posted on websites.

4.3 PRELIMINARY ANALYSIS
All completed surveys were reviewed. Five responses were deleted as no core answers had been completed. Data from the remaining seventy-nine responses was extracted. Numerical data was re-entered into spreadsheets for quantitative analysis and worded answers were copied and pasted into a word document for qualitative analysis. (Refer to appendix C for extracts of the raw data.)

Qualitative analysis involved summarising over ten thousand words extracted from the open ended questions. For each answer set, key themes were identified and all answers were coded under these themes and clustered into lower level ideas.
Quantitative analysis involved turning the count of answers into percentages based on the number of people who answered that particular question and double checked against data displayed by SurveyMonkey. For the question about industry sector, any classifications where the population was less than three percent, were incorporated under the ‘other’ classification. Most data was used to create frequency distribution charts.

Likert scaling was used to calculate the relative necessity of components for different elements of project success according to the collective responses from the survey sample. (Refer to appendix D for details of Likert scale calculations.) There is much debate as to whether Likert scaling can be used in such circumstances. Likert scaling was thought to be an appropriate method based on the following assumptions. The ordinal data collected from the Likert scores were considered to be interval and continuous in nature. Multivariate statistical analysis techniques can be applied to the ordinal data (Carifio et al., 2008; Clason and Dormody, 1994; Lubke et al., 2004; Pell and Pell, 2005; Wu, 2009). The group can be compared in a meaningful way because the data is from a single homogenous population and the questionnaire is resistant to variation across groups (Lubke et al., 2004). The assumptions about the data have been clearly stated (Pell and Pell, 2005). The inferred conclusions were carefully considered (Clason and Dormody, 1994). The advantage of the Likert scores is that it allowed a single number to describe the overall opinion of the population (Trochim, 2006).

To pictorially demonstrate the perceived necessity of components for individual elements of success, the components were ordered according to their Likert scores and plotted onto charts.
4.4 CONSISTENCY OF ANSWERS

The results were checked for consistency for two reasons, to check that respondents answered consistently to similar questions and secondly to check for consistency against answers that did not involve scaling. Figures 4.1 - 4.8 show the perceived relative necessity of components using the Likert scaling method and the top three most essential components viewed by respondents.

In regards to achieving budget, three of the top four components with the highest Likert scores were also the top three components viewed as most essential (budget tracking tools, business case/brief/mandate and change control documents) as shown in figure 4.1 and 4.2. The discrepancy in the consistency was that project initiation documents had the second highest Likert score however only nineteen percent found them to be essential.

![Figure 4.1 Perceived necessity of components for meeting budget](image1)

![Figure 4.2 Most essential components for meeting budget](image2)

In regards to achieving time scales, the three components that scored the highest Likert score on the scale of necessity were consistent with the most essential components, including project plans, risk and issues logs and change control documents as shown in figure 4.3 and 4.4.
The answers from both questions were also consistent for achievement of scope. Figure 4.5 and Figure 4.6 show that specification, business case/brief/mandate and change control documents as very important.
There was consistency amongst answers for achievement of customer satisfaction figure 4.7 and 4.8 show than status reports, communication plans and business case/brief/mandate to be very important.

Components deemed by the respondents to add little or no value to the project were compared against components that scored relatively low Likert scores. As shown by figure 4.9 and table 4.10, components that had the top three highest percentage of the sample indicating that they contributed little value to project success were also amongst the four components to receive the lowest average Likert scores. These included benefit realisation plans, lessons learned reports and communication plans. The slight inconsistency was in regard to meeting minutes which had the second lowest average Likert score however was only nominated by five percent of the sample to add little or no value to project success.
4.5 SUMMARY

Potential survey participants were approached via email and websites and the majority of them were acquaintances of the researcher. The raw survey qualitative data was reduced to a tangible form and the numerical data underwent some Likert scaling and percentage calculations. Answers from Likert scaling were checked for consistency against answers that did not involve scaling and completed surveys were checked for consistent responses.
CHAPTER 5 RESULTS

5.1 INTRODUCTION
A profile of the respondents who participated in the survey and a summary of their results are presented in this chapter. The validity of the results and an analysis of the research process are discussed.

5.2 PRESENTING RESULTS

5.2.1 DESCRIPTION OF SURVEY SAMPLE
Seventy-nine software/IT PMs responded to the questionnaire during August 2009. Sixty-three responses were fully completed and sixteen were partially completed. Most partially completed surveys were halted after the third question. The majority of respondents, eighty-nine percent, worked in the private sector as shown in figure 5.1. Figure 5.2 shows sixty-eight percent of respondents worked in the financial services and banking sector and seventeen percent in IT & Technology. Figure 5.3 shows more than two thirds of the respondents had at least five years and four percent has less than one year PM experience. Figure 5.4 shows sixty-two percent of respondents had formal PM qualifications. Figure 5.5 shows the typical budget size managed by the respondents. Thirty-six, nineteen, seventeen, thirty-eight and twenty-six percent of PMs managed respective budgets of million plus, over five million, between one and five million pounds, between three hundred thousand and one million pounds and below three hundred thousand pounds.
5.2.2 THE MEANING OF PROJECT SUCCESS

One survey objective was to clarify the meaning of project success. The survey sample defined project success differently to the most frequently published definitions. Results in figure 5.6 show that less than half of the sample thought scope, budget and time to be highly relevant to project success whereas ninety percent of respondents found achievement of business objectives and sixty-nine percent found delivery of benefits to be highly relevant. Meeting customer expectations was perceived by seventy-one percent of people as highly relevant, which was more in line with the literature. Scope in terms of system quality and functionality was perceived as equally relevant which supported the assumption to combine them into one category. In addition to the IT project success criteria shown in figure 5.6 other elements of project success identified by the respondents included, fit with organisation/business unit/IT strategy.

![Figure 5.6 How respondents defined project success](image_url)
5.2.3 CONTRIBUTION OF COMPENDIUM COMPONENTS TO PROJECT SUCCESS

The components perceived to contribute most towards project success are highlighted in figure 5.7. The data in this figure is a summary of what was discussed in the section 4.3.

![Figure 5.7 Most essential & necessary components for achievement of budget, schedule scope and customer satisfaction](image)

Such information may be valuable in circumstances whereby one factor of project success is considered more important over others. For example, if the budget was fixed and timescales and scope were constrained, then budget tracking tools could be prioritised as they were rated the most necessary of all the components on the Likert scale when aiming to achieve budget, however the least necessary when aiming to meet time scales, scope and customer satisfaction (refer to table 5.1). These conclusions are limited subject to the Likert use assumptions and the fact that Likert scores were based on perceptions.

<table>
<thead>
<tr>
<th>Components</th>
<th>Budget</th>
<th>Schedule</th>
<th>Scope</th>
<th>Customer Satisfaction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specifications</td>
<td>4.13</td>
<td>4.20</td>
<td>4.80</td>
<td>4.13</td>
</tr>
<tr>
<td>Business case/ brief/ mandate doc.</td>
<td>4.30</td>
<td>3.97</td>
<td>4.55</td>
<td>4.20</td>
</tr>
<tr>
<td>Project initiation docs./ CCRA</td>
<td>4.42</td>
<td>4.17</td>
<td>4.30</td>
<td>4.00</td>
</tr>
<tr>
<td>Change control documents</td>
<td>4.22</td>
<td>4.31</td>
<td>4.42</td>
<td>3.59</td>
</tr>
<tr>
<td>Risk and issues logs</td>
<td>3.92</td>
<td>4.31</td>
<td>4.36</td>
<td>3.81</td>
</tr>
<tr>
<td>Status reports/ presentations</td>
<td>3.78</td>
<td>4.03</td>
<td>3.80</td>
<td>4.34</td>
</tr>
<tr>
<td>Project plans/ Gantt charts</td>
<td>3.92</td>
<td>4.66</td>
<td>3.72</td>
<td>3.61</td>
</tr>
<tr>
<td>Budget tracking tools</td>
<td>4.72</td>
<td>3.64</td>
<td>3.28</td>
<td>3.50</td>
</tr>
<tr>
<td>Lessons learned from prior projects</td>
<td>3.67</td>
<td>3.92</td>
<td>3.67</td>
<td>3.67</td>
</tr>
<tr>
<td>Communication plans</td>
<td>3.23</td>
<td>3.80</td>
<td>3.58</td>
<td>4.25</td>
</tr>
<tr>
<td>Meeting minutes/ actions</td>
<td>3.38</td>
<td>3.78</td>
<td>3.88</td>
<td>3.73</td>
</tr>
<tr>
<td>Benefit realisation plans</td>
<td>3.34</td>
<td>3.34</td>
<td>3.92</td>
<td>4.05</td>
</tr>
</tbody>
</table>

Table 5.1 Average group Likert scales for budget, schedule, scope and customer satisfaction

Scatter diagrams were used to analyse Likert scores of one component when two elements of success are of concern. The components highlighted in the top right corner are
perceived as relatively most necessary. Figures 5.8 – 5.13 show that project initiation documents, specifications and business case/briefs are thought to be necessary in all scenarios. As shown by figure 5.8, 5.9 and 5.11, change control documents are necessary amongst any combination of budget, schedule and scope. Risk and issues documents are perceived as necessary for meeting budget and scope as shown in figure 5.11. Status reports were perceived as highly necessary if customer satisfaction and schedule are of most concern as shown by figure 5.12.
The Venn diagram in figure 5.14 shows the components perceived as necessary, based on their Likert scores for various combinations of budget, schedule, scope and customer satisfaction.

![Venn Diagram](image)

Figure 5.14 Venn diagram showing most necessary components

Figure 5.15 shows the percentage of respondents who identified the components as the top three most essential components required when trying to meet budget, schedule, scope and customer satisfaction expectations. Change control document, was the second most frequently nominated component for three of the scenarios including budget, timescales and scope. Business case/brief/mandate was the third most frequently nominated component in three of the scenarios including budget, scope and customer satisfaction.

<table>
<thead>
<tr>
<th>Most essential tools &amp; templates</th>
<th>Budget</th>
<th>Schedule</th>
<th>Scope</th>
<th>Customer Satisfaction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Change control docs</td>
<td>54%</td>
<td>48%</td>
<td>52%</td>
<td>8%</td>
</tr>
<tr>
<td>Business case/ brief docs.</td>
<td>41%</td>
<td>24%</td>
<td>51%</td>
<td>37%</td>
</tr>
<tr>
<td>Project plans/ Gantt charts</td>
<td>14%</td>
<td>14%</td>
<td>16%</td>
<td>8%</td>
</tr>
<tr>
<td>Specifications</td>
<td>32%</td>
<td>9%</td>
<td>8%</td>
<td>16%</td>
</tr>
<tr>
<td>Risk and issues logs</td>
<td>19%</td>
<td>41%</td>
<td>29%</td>
<td>14%</td>
</tr>
<tr>
<td>Budget tracking tools</td>
<td>14%</td>
<td>14%</td>
<td>16%</td>
<td>8%</td>
</tr>
<tr>
<td>Status reports/ presentations</td>
<td>17%</td>
<td>5%</td>
<td>65%</td>
<td>32%</td>
</tr>
<tr>
<td>Project initiation docs</td>
<td>19%</td>
<td>19%</td>
<td>32%</td>
<td>14%</td>
</tr>
<tr>
<td>Communication plans</td>
<td>5%</td>
<td>57%</td>
<td>5%</td>
<td>6%</td>
</tr>
<tr>
<td>Benefit realisation plans</td>
<td>14%</td>
<td>5%</td>
<td>32%</td>
<td>14%</td>
</tr>
<tr>
<td>Meeting minutes/ actions</td>
<td>14%</td>
<td>6%</td>
<td>19%</td>
<td>6%</td>
</tr>
<tr>
<td>Lessons learned</td>
<td>14%</td>
<td>6%</td>
<td>19%</td>
<td>6%</td>
</tr>
</tbody>
</table>

Figure 5.15 Top three most essential components for different factors of project success voted by PMs
Many respondents noted that the most essential components are the ones that help to baseline and subsequently ones that help to track against the baseline. “What gets measured gets done” claimed one PM. The rationale according to some, is that baseline components provide opportunity to clearly outline objectives, milestones and overall goals of the project as well as expectations about schedule, cost and scope. Tracking components provide a structured and formal approach to measuring progress and budget and give an early indication of potential problems. Specifically change control documents were noted to help ensure awareness about the inevitable impacts of scope changes to schedule and budget. It was recorded that status reports can keep stakeholders well informed of progress, risks, issues and changes, which helps to manage expectations. They can be used as an aid to build a sponsor’s confidence in the PM’s ability to deliver.

In response to being asked about which components add little value to project success, twenty-nine percent of people stated that they all add value. Such statements were accompanied by conditions, components are valuable providing they are used appropriately at the right times and for the right purpose, ‘fit for purpose’, have an overhead that is appropriate to size of the project, tailored to the needs of the recipients, designed and written well and accessible. Statements such as “all tools add value if used correctly, any tool can also be a waste of time if it is simply a tick the box exercise” were consistent with the results from the Likert scores for necessity as no components received a score equating to unnecessary.

As shown in figure 5.16 twenty-nine percent of people indicated that benefit realisation plans added little or no value to the project. The reasons highlighted were lack of appetite for PM involvement beyond the tenure of the project, lack of buy in from business managers, difficulty in identifying and measuring intangible benefits (particularly for legislative or technical upgrade projects) and that they are redundant as a project should not be initiated if there are no benefits. “Most people just want to get on and deliver, benefit realisation plans and lessons learned require additional effort at the start and end of the project” commented one respondent.
Seventeen percent of people indicated that lessons learned contributed little to projects. Some reasons noted were lack of responsibility for taking lessons forward, inability to control or improve upon issues identified in a previous project, output from an ineffective lessons learnt exercise or a poorly written report is unconstructive and “Lessons are often discussed but not learnt”. Several people advocated if lessons learned exercises were carried out properly, the output would be highly valuable. Thirteen percent indicated that communication plans added little value to project success for reasons such as standardised communication is not always necessary, small projects do not warrant them and communication plans can be contained within other deliverables. Status reports were thought to add little value by eight percent of respondents because they are often not read or out of date by time they are, verbal updates are sometimes preferred or there is an expectation for PMs to solve the issues rather than highlight them.

Elements of project success that were rated highly relevant by most respondents were achievement of business objectives, customer/user satisfaction and delivery of benefits, whereas benefit realisation plans was the most frequently nominated component thought to add little or no value to the project.

Other components identified by the respondents however not incorporated in the survey include risk management plans, quality assurance approaches, various testing documents, governance model documents, seller/contact performance documents, defect tracking tools, business continuity tools and plans, use case diagrams, network diagrams, earned value tools, estimating tools, stakeholder analysis documents and calendars.
5.2.4 RESISTANCE TO USING COMPENDIUM COMPONENTS

The key reasons identified as to why there is resistance to using some components are:

- Perceived as an inefficient use of time
- Perceived as an expensive bureaucratic overhead
- Past experience of poorly designed/applied components
- Disproportionate focus on the component relative to the task at hand
- Fear of transparency/responsibility
- Not fit for purpose
- Neglect to use or review a completed component
- Lack of understanding about the purpose of components

According to the responses, one major reason for resisting components is that “they are seen as time consuming, unnecessary administration work which takes away from actually doing the job”. Components are often viewed as an expensive bureaucratic overhead, or seen as ‘nice to have’ administration tasks or efforts and cost allocated towards them are seen as wasteful. Opinions about why negative impressions are held about components are that they have resulted from exposure to poorly designed, or poorly applied components. For example people have been exposed to components that have been cumbersome, inefficient to use, out of date by time they get read or a results of effort duplication.

Poor PM practices have appeared to fuel some resistance. Reported were instances about PMs focussing disproportionate efforts towards using tools relative to understanding and managing the project or to the contrary neglecting to use tools when busy, being apprehensive about the transparency associated with using components such as exposing their weaknesses, highlighting bad news or making themselves more accountable and PMs trying to escape responsibility by hiding “behind words in a poorly phrased requirement”. Further, PMs are “often guilty of creating documents for themselves which have no meaning to others”, lacking confidence to adapt, customise and omit components or on the other hand PMs using their own variants which do not always fit with an organisation’s internal systems and functions.
Many respondents advocated that resistance was often due to components not being fit for purpose. It was highlighted that components can be too heavy, prescriptive, pre-defined, ridged or inflexible. “If templates are very rigid, people can get fed up with what they see as a waste of time filling in seemingly useless information”. Components may not be appropriate for the audience (the recipient’s learning style), size of project, development methodology and the changing needs of projects.

People may resist components as they do not understand their purpose or benefits or even project practices in general. “There is a general lack of awareness of the importance of documentation in projects which sometimes makes it hard for PMs to get the intended audience to read the documents, this in turn is a disincentive for PMs”. One respondent noted that tools and templates are not always necessary, as some talented PMs are successful without them.

5.2.5 COMPENDIUM COMPONENTS & KNOWLEDGE MANAGEMENT

The survey captured opinions about effective ways of managing knowledge within and between projects. The key opinions were:

- **Implement collaborative software tools**
- **Ensure transparency, availability and accessibility of information**
- **Facilitate knowledge transfer by establishing regular meetings between various stakeholder groups**
- **Encourage personal, tailored, frequent and proactive communication practices**
- **Publish high quality documentation**
- **Harvest a culture of knowledge sharing within the organisation**
- **Centralise project knowledge and delegate its management and maintenance to a specialist team**

Fifty-five percent of respondents suggested implementing various types of collaborative software tools to aid project knowledge management. Ninety-three percent agreed that collaborative software tools are helpful for managing components. One person believed that “the production of project artefacts made available through a knowledge management system, is the only reliable way of managing knowledge consistently across an organisation.”
Other reasons identified as to why components are helpful are that they facilitate knowledge sharing, collaboration and communication (particularly for dispersed or large teams), version control, storing and retrieval of knowledge, effective use and reuse of resources, controlled distribution, an audit trail, accessibility and availability of information and a common, consistent, centralised and standardised source of information.

Some comments about collaborative software were consistent with the literature about the need for a knowledge sharing culture to be present, if the technology is to be of value. “Having a central store of information helps but it will not be effective on its own”, the organisation needs to have adopted a collaboration knowledge sharing approach. Other caveats noted were that the collaborative style, fits with the organisation, is supported, implemented and used properly, users are trained, the project is sufficiently large to warrant it, and knowledge stored on the software is managed and maintained.

Another common suggestion was to ensure transparency, availability and accessibility of information and documentation. Some views captured were that information should be available to all, password protected mapped or restrictive drives should be avoided, information should be available but not pushed on people or the conflicting view that information should be pushed on people as they will not necessarily seek it on their own.

Many respondents indicated that PMs can facilitate knowledge transfer by establishing regular meetings between various stakeholder groups. It was proposed that meetings can be supported by technology and that PMs should ensure that the relevant people attend the meeting. It was suggested that meetings can be used to confirm the knowledge requirements, ensure the relevant owners are completing their tasks as required, capture ongoing lesson learned and identify interdependencies between projects or to walkthrough/review documents. Identified in the answers were that both formal and informal meetings should be used.

Encouraging personal, tailored, frequent and proactive communication practices was also viewed to be an effective means of managing project knowledge. One respondent suggested to “make continual communication a way of working”. Communication practices
such as using personal and face to face communication where possible, supporting email and directory access with personal contact, tailoring communication to the audience and instilling regular communication habits between project stakeholders were advocated. It was remarked that PMs can foster good communication practices by promoting relationship building and teamwork, managing the appropriate volume, quality and relevance of communication and giving stakeholders advanced notification about what tools and process they should expect as well as explaining the rational for their use. Other advice included co-locate project teams, using development managers and PMs who are effective communicators, actively promoting project news and retaining project staff post project completion. The suggestions about engaging in personal communication and establishing regular team meetings for effective knowledge transfer is in line with the literature about personal exchange of knowledge being important, particularly for the vast amount of implicit knowledge which may not be able to be codified into a component.

Many respondents stressed that published documentation must be of high quality, well written, peer reviewed, consistent, up to date, relevant, understandable, tailored and fit for purpose. Advice about how organisations promote high quality documentation include “define and mandate a minimum set of documents that must be produced”, implement a formal process of presentation and review of project documents, encourage consistent format of documentation by implementing standard templates, perform document audits, ensure documentation is available and up to date, archive project documentation for use by subsequent projects, allocate time in the project plan towards document production, use resources who are skilled at producing formal records, acknowledge the life time of a document, be aware that forcing people to produce documentation against their will may lead to weak documentation and ensure documentation is relevant and understandable to stakeholders. From the discussions about sense-making highlighted in the literature review, it could be implied that high quality documentation is required for sense-making to be effective.

According to many respondents it is important to harvest a culture of knowledge sharing. The survey captured many tips as to how organisations can create such a culture. Some formal knowledge sharing practices proposed include publish knowledge management
policies and standards, assign ownership of knowledge management objectives, set expectations as to how knowledge will be transferred throughout the project and capture and refer to past risk logs, issues logs, lessons learned logs and post project reviews. Further, communication barriers should be prevented, continuity of staff should be promoted in order to retain knowledge within the organisation and avoid dependencies on one key resource as a knowledge source. It was thought that informal knowledge sharing would help to mitigate any gaps in the formal knowledge sharing process. Ideas about informal knowledge sharing were that it can be supported if relationship building and frequent team interaction is fostered. Examples captured about how knowledge sharing can be encouraged include “public recognition and reward strategies”, leading by example, actively sharing knowledge and “showcasing good projects in the organisation”. As noted in the literature review, knowledge sharing is dependent on peoples’ propensity to share. Harvesting a culture of knowledge sharing was a recommended means of boosting people’s propensity to share.

A few respondents suggested that organisations should centralise project knowledge and delegate its management and maintenance to a specialist team such as a dedicated project department or PM office. The advantage of maintaining a holistic view of projects within the organisation is that it provides opportunities to identify where knowledge can be shared.

In summary, some ideas advocated were in direct support of components aiding knowledge management such as ‘publish high quality documentation’, ‘ensure transparency, availability and accessibility of information and documentation’. Others were in regards to personal exchange or socialisation of knowledge such as ‘facilitate knowledge transfer by establishing regular meetings between various stakeholder groups’ and ‘encourage personal, tailored, frequent and proactive communication practices’. The specific circumstances as to when documentation or personal exchange of knowledge is thought to be most effective is shown in the table 5.2.
<table>
<thead>
<tr>
<th>Scenario</th>
<th>Documentation (%)</th>
<th>Personal exchange (%)</th>
<th>Both equally effective (%)</th>
<th>Neither are effective (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Across different time zones</td>
<td>48</td>
<td>3</td>
<td>48</td>
<td>1</td>
</tr>
<tr>
<td>In a small project where project resources are co located</td>
<td>6</td>
<td>67</td>
<td>27</td>
<td></td>
</tr>
<tr>
<td>When there is a risk that a project resource could leave unexpectedly</td>
<td>44</td>
<td>27</td>
<td>29</td>
<td>0</td>
</tr>
<tr>
<td>When the maintenance and support team are not involved in the project</td>
<td>48</td>
<td>13</td>
<td>35</td>
<td>5</td>
</tr>
<tr>
<td>When there is a need to learn about things known in another context</td>
<td>17</td>
<td>48</td>
<td>33</td>
<td>2</td>
</tr>
</tbody>
</table>

Table 5.2 Percentage of respondents who viewed documentation or personal exchange as the best mode for knowledge management for particular scenarios

Contrary to what was hypothesised in the literature, the respondents did not vote for the use of documentation to be a more effective method for knowledge sharing across a global project team or across dispersed team in same country. Further there was very little difference in opinion about whether personal exchange or documentation was thought to be the most effective means of knowledge management in the following scenarios - amongst a team of mixed cultures, from one phase of the project to the next, in an organisation where there are many similar projects, when there is a need to gain knowledge about a previous project, when project resources do not know each other and there is limited social interaction and when there is a resistance to share knowledge.

Several ways in which organisations can balance the reliance on project documentation and socialisation of information identified were:

- **Mandate a minimum set of documentation that must be produced**
- **Encourage plentiful personal exchange of knowledge**
- **Prevent superfluous documentation**
- **Harbour a combination of both documentation and personal exchange**
- **Engage proficient resources to tailor the mix of documentation and socialisation according to the unique characteristics of the project and organisation**
- **Clearly define knowledge transfer responsibilities and requirements**
- **Implement and enforce project processes/methodologies**
- **Educate stakeholders about project methodology and the pros and cons of knowledge transfer methods**
According to the results captured, organisations should mandate a minimum set of documentation that must be produced in order to minimise risks associated with key-person dependencies, ensure common understanding, fulfil legal and audit requirements, support an audit trail, aid communication and decision-making, allow stakeholders to pull information as required and ensure procedure, support and specialist information is captured. However, it was also remarked that organisations should be careful not to over produce documentation. “Documentation is imperative, but the personal touch is also vital to get a team to work together”. Plentiful personal exchange of knowledge should be encouraged in order to confirm the message has been delivered and received, ensure the most up to date knowledge is being transferred, mitigate effort lost associated with out of date documentation, develop good relationships between stakeholders, alleviate any cultural differences, facilitate team work, reduce unnecessary effort expended on excessive documentation, motivate people and win them over and resolve communication problems.

Many respondents indicated that organisations should harbour a combination of both documentation and personal exchange. Some suggestions captured about how organisations can do this include document the outcome of verbal knowledge transfer to prevent the loss of information, provide opportunity for dialogue/questions about a document to verify understanding and use templates as a prompt, then carry out steps using the most effective medium. One respondent advocated that “Good projects are built on good processes and relationships. You can’t get good relationships by just sending documents to people”. The recommendation to use both codification and socialisation methods are consistent with many publications referred to in the literature review which concluded that socialisation is required for effective sharing of explicit knowledge as well as implicit knowledge.

It was recommended in several answers that organisations should engage proficient resources to tailor the mix of documentation and socialisation according to the unique characteristics of the project and organisation. This recommendation is in line with

Compendium Components

Socialisation

Mandate minimum set
Prevent superflous
Plenty of personal exchange
Papadimitriou and Pellegrin’s (2007) findings which concluded that components should be aligned with the lifecycle and dynamics of the project. According to one respondent, “A key skill of PMs is judging what level of documentation versus verbal communication is required.” When determining the mix, it was suggested that organisations should consider the culture, environment, goals, nature, size, location, project phase, team dynamics and stakeholder characteristics. Other suggestions include allowing proficient PMs to judge the most effective mix, involving the project team in order to increase user buy in and referring to lessons learnt to gauge what may or may not work. Further, it was noted that organisations should clearly define knowledge transfer responsibilities and requirements, implement and enforce project processes/methodologies, educate stakeholders about project methodology and the pros and cons of knowledge transfer methods.

5.3 VALIDATION

The survey results can be considered valid and reliable because the research question was answered based on a carefully collected large sample of data. Reliable data was due to careful wording and piloting of questions and the analysis of answer consistency. Reliability of data for generalisation purposes is hindered by the data’s weaknesses. The data is based on opinions and subject to discrepancies between what is perceived and what actually happens, it is unknown whether the data reflects views from a representative sample and the necessity scores are subject to Likert scaling assumptions. As there is no unified view as to the uses of Likert scaling, the results can only be considered valid to those where the assumptions for Likert scaling hold true.

Consistent with the literature about supporting knowledge management via codification of explicit knowledge and personal exchange of implicit knowledge, the respondents viewed components and their management via collaborative software tools as an aid to project knowledge management and that personal exchange is highly important for knowledge transfer. Opinions about collaborative software were in line with the literature review in that collaborative software would facilitate sharing of knowledge in distributed teams, documentation would help to prevent the loss of knowledge when team members leave and that a knowledge sharing culture needs to be fostered to encourage people’s willingness to share knowledge.
In conflict to the literature, meeting budget, scope, timescales and customer satisfaction were not identified as being highly relevant to project success by the majority of respondents. Further, the sample did not indicate that components are more important as a means of knowledge management relative to socialisation for knowledge transfer where social interaction was limited, in global and virtual teams, when there is a need to learn about things known in another contexts and to mitigate some knowledge risks such as failure to learn from past projects and loss of knowledge between phases.

The results provide PM academics with an insight to the perceptions about why there is a resistance to using components, in which circumstances components are perceived as less appropriate compared to personal methods of knowledge transfer, what other modes of transferring project knowledge are effective and why collaborative software is seen to be valuable.

The results answer the research question in terms of identifying which components are perceived to contribute towards a project meeting, budget, schedule, scope and customer satisfaction, however the results do not indentify which components are valuable when aiming to achieve what most of the sample viewed as highly relevant to project success, including achievement of business objectives and delivery of business benefits.

5.3.1 ANALYSIS

Upon reflecting on the chosen research method, how the research was executed and the data collected from the research, it was thought that the web based questionnaire was sufficiently adequate for the time, budget and expertise constraints of an MSc student. Slight modifications to the method may have improved the research marginally. To address the major limitations of the research such as the data being based on perceptions rather than actualities an alternative research method would have been required. Post research completion, such alternatives were still considered less appropriate given their individual limitations and the MSc constraints.
The questionnaire research method was found to be most appropriate however to mitigate issues associated with opinions and perceptions, a case study about what components have led to successful projects in the past would enable collection of less biased data. Interviews would have allowed qualification of answers for instances where answers were less articulate or uncertain. If a professional was involved in administering the survey, their expertise could be used to conduct interviews, gain in-depth insights and interpret the data. Ten thousand words from open ended questions were coded and allocated into themes which were subject to coding errors. Respondents may have been forced to answer closed questions in a way that did not reflect their views.

A higher survey completion rate may have been gained if it was compulsory to complete all questions or questions were designed using the functionality in the paid version of SurveyMonkey. Nevertheless, the response rate was more than anticipated and all the data was still supported by the free version of SurveyMonkey.

Execution of the questionnaire may have been at a higher standard if produced by an industry professional. The quality of the questionnaire was restricted to the inexperience of the MSc student and the free version of the web based software. To improve the content of the questionnaire, questions in the survey could have been included to clarify that the respondent reflected the required profile. Self verification that respondents were IT PMs could be subject to inconsistencies due to the differences in job titles and role responsibilities across organisations. Capturing information about the respondent’s country of residence could have enabled analysis on the influence of culture between the answers of UK and non UK residents. Further the questionnaire could have been fine tuned by being piloted on a larger sample.

More than sufficient good quality data was captured from a large sample. All data was collected within a three week time frame and no financial outlay was required. The data was easy to extract, manipulate, analyse and was low in administrative intensity. Reams of rich data were collected from the open ended questions. All data was limited to subjectivity, it was based on respondents’ perceptions and beliefs and may not reflect reality. Results may have been distorted from the bias of non response, partially completed
responses or because many of the respondents were personally connected to the researcher. It is unknown how many people did not respond to the weblink or why a large number of people ceased the survey mid way through. It is speculated that people may have stopped because one of the questions appeared too cumbersome. Analysis could have been undertaken to ascertain how project success was perceived by the sixty-four people who answered the question about tool necessity perceived as opposed to the seventy-eight people who completed question project success. Further analysis of respondent’s characteristics against answers could have been undertaken.

5.4 SUMMARY

The majority of the IT PMs who participated in the survey had at least five years PM experience, held formal PM qualifications and worked in the private sector in the banking and finance industry. The results showed that the respondent’s view of project success varied from what was advocated in the literature. Achievement of business objectives and delivery of business benefits were thought to be highly relevant. The research identified a list of components perceived to contribute most towards different elements of project success, reasons as to why there is resistance to using the project compendium and thoughts as to how project knowledge can be manage. The results collected were considered valid and the manner in which the research was carried out was appropriate despite there being opportunities for some improvement.
CHAPTER 6 CONCLUSIONS

Based on assumptions that project success equates to a project meeting budget, timescale, scope and customer expectations, then PMs should focus their efforts toward using specifications, business brief/case/mandate documents and project initiation documents as such components are perceived as highly necessary in contributing towards project success. However, PMs should also consider identifying and then subsequently using components to support the achievement of business objectives as more than twice the number of survey respondents thought achievement of business objectives was highly relevant to project success compared with a project being on-budget, on-time and to scope. Benefit realisation plans were thought to be the least valuable component for projects, despite sixty-nine percent of the survey group indicating that delivery of business benefits are highly relevant for project success. All project components were thought to add value to project success providing they are used appropriately.

Reasons as to why there is resistance to using components are they are perceived as an inefficient use of time and an expensive bureaucratic overhead, people have had experience of poorly designed/applied components, PMs neglecting PM tasks to focus on using the component itself, fear that the component will bring about unwanted transparency/responsibility, components are not fit for purpose, people not incentivised to use components if others neglect to review them and people lack understanding about the purpose of components. There may be potential for organisations and PMs to take proactive steps to avoid such resistance.

The respondents viewed that components can be used to effectively manage project knowledge which should ultimately contribute to project success. Providing components are of high quality, they help to ensure transparency, availability and accessibility of information. Components can be a centralised source of knowledge and could be managed by a specialised team. Collaborative software tools are thought to be important in managing project knowledge. The effectiveness of components are thought to be improved if a culture of knowledge sharing is harvested within the organisation. According to the respondents, organisations need to harbour a combination of both components and personal exchange for effective knowledge management. A minimum set of documentation...
that must be produced should be mandated, however superfluous documentation should be 
prevented and project stakeholders should be encouraged to engage in plentiful personal 
exchange of knowledge. Socialisation techniques that are believed to be effective for 
knowledge transfer include establishing regular meetings between various stakeholder 
groups and engaging in personal, tailored, frequent and proactive communication practices. 
It is also suggested that organisations should engage skilled resources to tailor the use of 
components versus socialisation of knowledge according to the unique characteristics of the 
project and organisation. Other recommendations include clearly defining knowledge 
transfer responsibilities and requirements, implementing and enforcing project 
processes/methodologies and educating stakeholders about project methodology and the 
pros and cons of knowledge transfer methods.

6.1 PROJECT REVIEW
This dissertation achieved its aim. It identified the perceived relative value of each 
component within the project compendium in respect to how necessary they are in helping 
a project achieve budget, schedule, scope and customer satisfaction. Achievement of 
business objectives was voted by more people as being highly relevant to project success 
compared to budget, schedule, scope and customer satisfaction. However, this dissertation 
did not capture data about which components are perceived to add value to the 
achievement of business objectives. The definition of project success is still unclear as 
results of the primary research appear to be at odds with the frequently cited definitions of 
project success published in the literature.

A review of literature concluded that components would contribute to project success 
because they provide opportunities for codification of knowledge which is important for 
knowledge management particularly for global and dispersed teams. Components aid sense-
making activities, which help to progress projects from one stage to the next and enable 
information capture for traceability.

Good quality and quantity of data was captured. The data gave an insight to PMs’ 
perceptions about which components contribute most or least towards project success and 
why. The perceived reasons for resisting to use components and methods by which
components can be used as a means for knowledge management were identified and the value of technology for managing components was confirmed.

6.2 FUTURE RESEARCH

Future research could involve verifying results by approaching the research from different angles or by building upon the results found. Similar research could be conducted with different groups of people such as project customers, sponsors, suppliers and workers, to gain a broader project community view as opposed to PMs’ view about how components lead to project success. Collecting raw data about past project success scenarios and the components used in such circumstances would help to validate the opinions and perceptions gained via the survey method. Research that involved analysing data without using the Likert scaling method may create possibilities for authenticating the results for audiences that do not subscribe to the manner in which Likert scaling was applied.

Further investigation into which components contribute towards a project achieving business objectives and delivery of business benefits could be carried out as these factors were seen as highly relevant to project success. It may be interesting to clarify why benefit realisations plans are not considered valuable by many PMs, despite the purpose of such documents being strongly associated with benefit delivery. As there is no consistent view within the literature and with this survey about the definition of project success there are opportunities to conduct research to clarify the definition. Research on the current use of change control documents could be conducted. Change control documents were perceived as essential for achievement of budget, schedule and scope by a large percentage of survey respondents however the literature highlighted that although traceability is viewed as important it is rarely used in practice. Research could be undertaken to access the necessity of those additional components identified by the respondents as contributing to project success.

The research sample was made up of a large portion of private sector banking and finance PMs. Comparing results against a dominant public sector sample would be interesting as the public sector is known more bureaucratic in nature and to embrace methodologies such as
PRINCE2. Investigation into the necessity of components for different budget sizes as well as for teams that co-locate versus teams that are dispersed could be undertaken.

Further research could look at other factors influencing project success by moderating variables such as organisational culture and variances in PMs’ effectiveness. How much difference would components make to skilful PMs who communicate well? If the same project manager managed two identical projects in the one organisation, one using components and one not using components, what would be the outcome? What is it that makes some PMs more successful than others? There has been much research into project failure relative to research about project success, there are opportunities for factors influencing project success to be further explored.
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INTRODUCTION

Research has shown that projects generally have a reputation of failure with many not meeting budgets, timelines and requirements. Project success is generally measured by a project’s performance against budget, timeline, scope and customer satisfactions. Project methodologies have been introduced and refined to assist with project success. These methodologies are accompanied by tools, templates and instruments or what this dissertation refers to as project compendium components. The absence of components is rarely highlighted as a contributing factor to project failure. However, the use of components as a contributing factor towards project success is implied because they are aligned with project management methodologies and their components can facilitate the transfer of relevant knowledge to project stakeholders. Due to the growing number of global and virtual project teams, knowledge management has become increasingly important.

The predicament faced by PMs in regards to relying on components for project knowledge transfer is that much important knowledge is based on feelings and insights which is difficult to extract and capture with components. Further, face to face or personal exchange is often cited as the best means of knowledge transfer which is not always viable for the growing number of global and virtual teams, due to costs, time differences and distances. This dissertation attempts to look at this dichotomy, it aims to understand how valuable individual components are in their contribution to project success.

RESULTS

Seventy-nine PMs responded to a web based questionnaire which captured data about PMs’ beliefs and ideas about project success, the value of individual components, why there is resistance to using components, knowledge management and collaborative software.
The following chart shows how the respondents define project success.

The components that were viewed to be relatively more necessary for different elements of project success are shown in the Venn diagram.
The perceived relative necessity of individual components for different elements of project success and shown in the charts below.

Reasons identified by the respondents as to why there is a resistance to using components include they are perceived as an inefficient and an expensive bureaucratic overhead, previous experience of poorly designed/applied components, PMs neglect PM tasks to focus on using the component itself, fear that the component will bring about unwanted transparency/responsibility, they are not fit for purpose, sometimes they are not reviewed
which is a disincentive to use them and lack of understanding about the purpose of components.

The chart to the right shows which components were viewed as having limited value.

Many interviewees thought that high quality components can be used to effectively manage project knowledge as they help to ensure transparency, availability and accessibility of information. For components to be most effective, it was viewed that they need to be used in conjunction with personal exchange of knowledge and used in an environment where knowledge sharing is fostered. Collaborative software tools were thought to further aid management of components.

**ANALYSIS**

The initial assumption that project success equated to meeting budget, schedule, scope and customer satisfaction was not found to be consistent with the results of the survey. Many more respondents indicated that achievement of business objectives and delivery of business benefits were highly relevant to project success compared with the number of respondents who identified a project being on-budget, on-time and to scope. Benefit realisation plans were thought to be the least valuable component for projects even though delivery of benefits was thought to be highly relevant to project success. The results indicated that all components add value to project success providing they are used appropriately.

**DISCUSSION**

The value of this research is that it has given PMs and academics insight into PMs’ perceptions about the value of components. By having a better understanding about why components are not used, which components are thought to be most useful and which are considered least beneficial, PMs can target use of components where they will be most
effectively and efficiently used. PMs can also try to mitigate inappropriate use and address specific resistance to component use. The unexpected result regarding the core meaning of project success prompts the need for further investigation into what project success means to the project community. Which components contribute most towards core project success factors such as achievement of business objectives and delivery of business benefits is another question for further research particularly since the respondents thought benefit realisation plans were the least valuable component. The conclusions of the research are considered valid primarily due to the large survey sample size, however they are limited in respect to the limitations associated with the scaling calculations and because they are based on perceptions and opinions.
This survey aims to capture opinions about project management tools and templates. Results will be published as part of a student’s dissertation for their MSc at The Open University. Participation is voluntary. Answers are confidential.

* Who should respond: Project managers of software projects.
* Expected duration: 20 minutes.

1. To participate in this survey you must be able to answer YES to the following 3 questions. Once you have ticked YES, please proceed by selecting the next button at the bottom of your screen.

A) Are you presently or have you been a project manager?
B) Are you managing or have you managed IT/software projects?
C) Do you give your consent for your answers to be used for the purpose of academic research?

If you would like to receive the results of this survey please include your email address here.

2. Please describe yourself

- Are the projects you manage in the Private or Public Sector?
- Which industry sector do you work in?
- What are the typical size project budgets you manage?
- How much PM experience do you have?
- Do you have any PM qualifications?

Please select answers from the drop down menus.

[Dropdown options for Private, Public, Other, etc.]
[Dropdown options for Education, Engineering, Science, etc.]
[Dropdown options for budgets: 0 - £50K, £50K - £1M, £1M - £5M, £5M plus, etc.]
[Dropdown options for experience: 0-1 year, 1-5 years, 5+ years, etc.]
[Dropdown options for qualifications: Yes, No, etc.]
3. In your opinion, how relevant are the following in determining a software project as a success?

<table>
<thead>
<tr>
<th></th>
<th>Highly relevant</th>
<th>Relevant</th>
<th>Somewhat relevant</th>
<th>Neutral</th>
<th>Irrelevant</th>
</tr>
</thead>
<tbody>
<tr>
<td>Achievement of business objectives</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Business continuity</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Customer/ user satisfaction</td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td>Delivery of benefits</td>
<td></td>
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<tr>
<td>On-budget</td>
<td></td>
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<tr>
<td>On-time</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Project team satisfaction</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Scope (met functional requirements)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Scope (system quality)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sponsor satisfaction</td>
<td></td>
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</tr>
<tr>
<td>Stakeholder satisfaction</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Steering group/ project board satisfaction</td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>System implementation</td>
<td></td>
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<tr>
<td>System use</td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Other (please specify)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

4. Please rate how necessary the following tools and templates are to helping the project achieve budget, schedule, scope and customer satisfaction.

<table>
<thead>
<tr>
<th></th>
<th>Budget</th>
<th>Schedule</th>
<th>Scope - quality &amp; functionality</th>
<th>Customer Satisfaction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Benefit realisation plans</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Budget tracking tools</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Business case/ brief/ mandate documents</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Change control documents</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Communication plans</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lessons learned from prior projects</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Meeting minutes/ actions</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Project initiation docs./ Cost Benefit Risk Assessments</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Project plans/ Gantt charts</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Risk and issues logs</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Specifications (business, technical &amp; functional)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Status reports/ presentations</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Are there any other tools which you believe are important and have not been mentioned in the above list?

---

71
5. Please prioritise the most essential tools and templates to use when trying to meet budget, schedule, scope and customer satisfaction.

<table>
<thead>
<tr>
<th>Priority 1</th>
<th>Priority 2</th>
<th>Priority 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Meet budget</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Meet time scales</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Meet scope - functionality &amp; quality</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Customer Satisfaction</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Why do you believe the above tools are important to project success?

- Don't know
- None
- Other
- Benefit realisation plans
- Budget tracking tools
- Business case/ brief/ mandate
- Change control documents
- Communication plans
- Lessons learned
- Meeting minutes/ actions
- Project initiation doc/ OGRA
- Project plans/ Gantt charts
- Risk and issues logs
- Specifications
- Status reports/ presentations

---

6. Why do you think there is resistance to using some project tools and templates?
7. In your opinion, do any of the following tools and templates add little or no value to the project? Please mark which ones.

- Benefit realisation plans
- Budget tracking tools
- Business case/ brief/ mandate documents
- Change control documents
- Communication plans
- Lessons learned from prior projects
- Meeting minutes/ actions
- Project initiation doc./ Cost Benefit Risk Assessments
- Project plans/ Gantt charts
- Risk and issues logs
- Specifications (business, technical & functional)
- Status reports and presentations

Why do you believe the above selected tools add little value to the project?

8. In which of the following circumstances would you find project documentation to be the most effective means of transferring knowledge as opposed to personal exchange?

Some examples of personal exchange include: face to face communication, team meetings, phone and email.

<table>
<thead>
<tr>
<th>Circumstances</th>
<th>Documentation</th>
<th>Personal exchange</th>
<th>Both are equally effective</th>
<th>Neither</th>
</tr>
</thead>
<tbody>
<tr>
<td>Across a global project team</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Across dispersed team in same country</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Amongst a team of mixed cultures</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Across different time zones</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>From one phase of the project to the next</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>In a small project where project resources are co-located</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>In an organisation where there are many similar projects</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>When there is a risk that a project resource could leave unexpectedly</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>When there is a need to gain knowledge about a previous project</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>When the maintenance and support team are not involved in the project</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>When project resources don't know each other and there is limited social interaction</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>When there is a need to learn about things known in another context</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>When there is a resistance to share knowledge</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

How can organisations ensure that there is an appropriate balance between the reliance of project documentation as opposed to socialisation of information?
9. Knowledge management involves capturing, storing, retrieving and sharing of knowledge. Ensuring the relevant knowledge is available to the project team is said to be a core function of project management. In your opinion, what are the most effective ways of managing knowledge within and between projects?


10. Do you believe that collaborative software tools are helpful in managing project tools and templates? (eg. repositories, Sharepoint, Lotus Notes)

   - Yes
   - No

   Why?


APPENDIX C PRIMARY DATA EXTRACTS

3. In your opinion, how important are the following in determining a software project as a success?

<table>
<thead>
<tr>
<th></th>
<th>Highly relevant</th>
<th>Relevant</th>
<th>Somewhat relevant</th>
<th>Neutral</th>
<th>Irrelevant</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project team satisfaction</td>
<td>13%</td>
<td>42%</td>
<td>32%</td>
<td>9%</td>
<td>4%</td>
</tr>
<tr>
<td>Business continuity</td>
<td>29%</td>
<td>46%</td>
<td>15%</td>
<td>9%</td>
<td>0%</td>
</tr>
<tr>
<td>On-time</td>
<td>32%</td>
<td>56%</td>
<td>9%</td>
<td>1%</td>
<td>1%</td>
</tr>
<tr>
<td>On-budget</td>
<td>33%</td>
<td>51%</td>
<td>13%</td>
<td>3%</td>
<td>0%</td>
</tr>
<tr>
<td>Scope (functional requirements)</td>
<td>42%</td>
<td>53%</td>
<td>4%</td>
<td>1%</td>
<td>0%</td>
</tr>
<tr>
<td>Scope (system quality)</td>
<td>42%</td>
<td>53%</td>
<td>4%</td>
<td>0%</td>
<td>1%</td>
</tr>
<tr>
<td>System implementation</td>
<td>46%</td>
<td>44%</td>
<td>8%</td>
<td>3%</td>
<td>0%</td>
</tr>
<tr>
<td>Steering group/ board satisfaction</td>
<td>47%</td>
<td>42%</td>
<td>10%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>System use</td>
<td>47%</td>
<td>42%</td>
<td>9%</td>
<td>1%</td>
<td>0%</td>
</tr>
<tr>
<td>Stakeholder satisfaction</td>
<td>64%</td>
<td>31%</td>
<td>4%</td>
<td>1%</td>
<td>0%</td>
</tr>
<tr>
<td>Sponsor satisfaction</td>
<td>67%</td>
<td>27%</td>
<td>5%</td>
<td>1%</td>
<td>0%</td>
</tr>
<tr>
<td>Delivery of benefits</td>
<td>69%</td>
<td>21%</td>
<td>6%</td>
<td>4%</td>
<td>0%</td>
</tr>
<tr>
<td>Customer/ user satisfaction</td>
<td>71%</td>
<td>27%</td>
<td>3%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>Achievement of business objectives</td>
<td>90%</td>
<td>8%</td>
<td>3%</td>
<td>0%</td>
<td>0%</td>
</tr>
</tbody>
</table>

5. Please prioritise the most essential tools and templates to use when trying to meet budget, schedule, scope and customer satisfaction.

<table>
<thead>
<tr>
<th>Tools and Templates</th>
<th>Budget</th>
<th>Time Scales</th>
<th>Scope</th>
<th>Customer Satisfaction</th>
<th>7. Do any of following tools and templates add little or no value to the project?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Benefit realisation plans</td>
<td>14%</td>
<td>3%</td>
<td>5%</td>
<td>32%</td>
<td>29%</td>
</tr>
<tr>
<td>Budget tracking tools</td>
<td>94%</td>
<td>2%</td>
<td>2%</td>
<td>3%</td>
<td>5%</td>
</tr>
<tr>
<td>Business case/ brief/ mandate docs.</td>
<td>41%</td>
<td>24%</td>
<td>51%</td>
<td>37%</td>
<td>2%</td>
</tr>
<tr>
<td>Change control documents</td>
<td>54%</td>
<td>48%</td>
<td>52%</td>
<td>8%</td>
<td>3%</td>
</tr>
<tr>
<td>Communication plans</td>
<td>0%</td>
<td>0%</td>
<td>5%</td>
<td>57%</td>
<td>13%</td>
</tr>
<tr>
<td>Lessons learned from prior projects</td>
<td>0%</td>
<td>3%</td>
<td>3%</td>
<td>6%</td>
<td>17%</td>
</tr>
<tr>
<td>Meeting minutes/ actions</td>
<td>0%</td>
<td>16%</td>
<td>6%</td>
<td>19%</td>
<td>5%</td>
</tr>
<tr>
<td>Project initiation docs./ CBRA</td>
<td>19%</td>
<td>19%</td>
<td>32%</td>
<td>14%</td>
<td>3%</td>
</tr>
<tr>
<td>Project plans/ Gantt charts</td>
<td>29%</td>
<td>92%</td>
<td>8%</td>
<td>3%</td>
<td>5%</td>
</tr>
<tr>
<td>Risk and issues logs</td>
<td>19%</td>
<td>41%</td>
<td>29%</td>
<td>14%</td>
<td>2%</td>
</tr>
<tr>
<td>Specifications</td>
<td>14%</td>
<td>14%</td>
<td>79%</td>
<td>16%</td>
<td>5%</td>
</tr>
<tr>
<td>Status reports/ presentations</td>
<td>3%</td>
<td>17%</td>
<td>5%</td>
<td>65%</td>
<td>8%</td>
</tr>
</tbody>
</table>
4. Please rate how necessary the following tools and templates are to helping the project achieve budget, schedule, scope and customer satisfaction.

<table>
<thead>
<tr>
<th>Tool/Document</th>
<th>Budget</th>
<th>Schedule</th>
<th>Scope</th>
<th>Customer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Benefit realization plans</td>
<td>Highly necessary</td>
<td>Highly necessary</td>
<td>Highly necessary</td>
<td>Highly necessary</td>
</tr>
<tr>
<td>Budget tracking tools</td>
<td>Highly necessary</td>
<td>Highly necessary</td>
<td>Highly necessary</td>
<td>Highly necessary</td>
</tr>
<tr>
<td>Business case/ brief/ mandate docs</td>
<td>Highly necessary</td>
<td>Highly necessary</td>
<td>Highly necessary</td>
<td>Highly necessary</td>
</tr>
<tr>
<td>Change control documents</td>
<td>Highly necessary</td>
<td>Highly necessary</td>
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<td>Highly necessary</td>
</tr>
<tr>
<td>Communication plans</td>
<td>Highly necessary</td>
<td>Highly necessary</td>
<td>Highly necessary</td>
<td>Highly necessary</td>
</tr>
<tr>
<td>Lessons learned from prior projects</td>
<td>Highly necessary</td>
<td>Highly necessary</td>
<td>Highly necessary</td>
<td>Highly necessary</td>
</tr>
<tr>
<td>Meeting minutes/ actions</td>
<td>Highly necessary</td>
<td>Highly necessary</td>
<td>Highly necessary</td>
<td>Highly necessary</td>
</tr>
<tr>
<td>Project initiation docs/ CCRA</td>
<td>Highly necessary</td>
<td>Highly necessary</td>
<td>Highly necessary</td>
<td>Highly necessary</td>
</tr>
<tr>
<td>Project plans/ Gantt charts</td>
<td>Highly necessary</td>
<td>Highly necessary</td>
<td>Highly necessary</td>
<td>Highly necessary</td>
</tr>
<tr>
<td>Risk and issues logs</td>
<td>Highly necessary</td>
<td>Highly necessary</td>
<td>Highly necessary</td>
<td>Highly necessary</td>
</tr>
<tr>
<td>Specifications</td>
<td>Highly necessary</td>
<td>Highly necessary</td>
<td>Highly necessary</td>
<td>Highly necessary</td>
</tr>
<tr>
<td>Status reports/ presentations</td>
<td>Highly necessary</td>
<td>Highly necessary</td>
<td>Highly necessary</td>
<td>Highly necessary</td>
</tr>
</tbody>
</table>
8. In which of the following circumstances would you find project documentation to be the most effective means of transferring knowledge as opposed to personal exchange?

<table>
<thead>
<tr>
<th>Circumstances</th>
<th>Documentation</th>
<th>Personal exchange</th>
<th>Both are equally effective</th>
<th>Neither</th>
</tr>
</thead>
<tbody>
<tr>
<td>Across a global project team</td>
<td>27%</td>
<td>13%</td>
<td>60%</td>
<td>0%</td>
</tr>
<tr>
<td>Across dispersed team in same country</td>
<td>27%</td>
<td>25%</td>
<td>48%</td>
<td>0%</td>
</tr>
<tr>
<td>Amongst a team of mixed cultures</td>
<td>48%</td>
<td>3%</td>
<td>48%</td>
<td>2%</td>
</tr>
<tr>
<td>Across different time zones</td>
<td>33%</td>
<td>21%</td>
<td>46%</td>
<td>0%</td>
</tr>
<tr>
<td>Across different time zones</td>
<td>33%</td>
<td>21%</td>
<td>46%</td>
<td>0%</td>
</tr>
<tr>
<td>From one phase of the project to the next</td>
<td>6%</td>
<td>67%</td>
<td>27%</td>
<td>0%</td>
</tr>
<tr>
<td>In a small project where project resources are co-located</td>
<td>33%</td>
<td>24%</td>
<td>43%</td>
<td>0%</td>
</tr>
<tr>
<td>In an organisation where there are many similar projects</td>
<td>44%</td>
<td>27%</td>
<td>29%</td>
<td>0%</td>
</tr>
<tr>
<td>When there is a risk that a project resource could leave unexpectedly</td>
<td>32%</td>
<td>24%</td>
<td>43%</td>
<td>2%</td>
</tr>
<tr>
<td>When there is a need to gain knowledge about a previous project</td>
<td>48%</td>
<td>13%</td>
<td>35%</td>
<td>5%</td>
</tr>
<tr>
<td>When the maintenance and support team are not involved in the project</td>
<td>38%</td>
<td>27%</td>
<td>35%</td>
<td>0%</td>
</tr>
<tr>
<td>When project resources don’t know each other and there is limited social interaction</td>
<td>17%</td>
<td>48%</td>
<td>33%</td>
<td>2%</td>
</tr>
<tr>
<td>When there is a need to learn about things known in another context</td>
<td>32%</td>
<td>37%</td>
<td>30%</td>
<td>2%</td>
</tr>
</tbody>
</table>
APPENDIX D LIKERT SCALING

The Likert items were assigned the following values:
5 = highly necessary,
4 = necessary,
3 = neutral,
2 = unnecessary and
1 = highly unnecessary.

For each element of project success the Likert scores were calculated as follows:
\[ a = \text{number of people who identified component as highly necessary}, \]
\[ b = \text{number of people who identified component as necessary}, \]
\[ c = \text{number of people who identified component as neutral}, \]
\[ d = \text{number of people who identified component as unnecessary and} \]
\[ e = \text{number of people who identified component as highly unnecessary} \]
\[ n = \text{total number of people who answered question} \]

\[ \text{Likert score} = \frac{a5 + b4 + c3 + d2 + e}{n} \]

<table>
<thead>
<tr>
<th>Benefit realisation plans</th>
<th>Budget</th>
<th>Schedule</th>
<th>Scope</th>
<th>Customer Satisfaction</th>
<th>Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.34</td>
<td>3.34</td>
<td>3.92</td>
<td>4.05</td>
<td>3.66</td>
<td></td>
</tr>
<tr>
<td>Meeting minutes/ actions</td>
<td>3.38</td>
<td>3.78</td>
<td>3.88</td>
<td>3.73</td>
<td>3.69</td>
</tr>
<tr>
<td>Communication plans</td>
<td>3.23</td>
<td>3.80</td>
<td>3.58</td>
<td>4.25</td>
<td>3.71</td>
</tr>
<tr>
<td>Lessons learned from prior projects</td>
<td>3.67</td>
<td>3.92</td>
<td>3.67</td>
<td>3.67</td>
<td>3.73</td>
</tr>
<tr>
<td>Budget tracking tools</td>
<td>4.72</td>
<td>3.64</td>
<td>3.28</td>
<td>3.50</td>
<td>3.79</td>
</tr>
<tr>
<td>Project plans/ Gantt charts</td>
<td>3.92</td>
<td>4.66</td>
<td>3.72</td>
<td>3.61</td>
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The average necessity value for each component was calculated by summing all individual values and then dividing the total by the number of respondents. To gain an overall view of project success, the average Likert scores for budget, schedule, scope and customer satisfaction were calculated.

**Scatter diagrams**

Scatter diagrams were used to analyse Likert scores of one component when two elements of success are of concern. Each component was plotted on the chart, one Likert score on the Y axis and one Likert score on the X axis. Both axis were set to three equals neutral. There were no Likert scales that registered less than 3. The components that scored greater than four (where four equals necessary) on both axis were highlighted in the top right corner as components which were perceived as relatively most necessary. For schedule, business case/briefs had a Likert score of 3.97, as this score was close to 4 it was also highlighted.