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Jill Owen

University of New South Wales, j.owen@adfa.edu.au

James Connor

University of New South Wales, james.connor@adfa.edu.au

Henry Linger

Monash University, Henry.Linger@monash.edu

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Innovation in ISD Projects: A KBV Approach

Jill Owen

James Connor

School of Business

University of New South Wales

Canberra Australia

Emails: j.owen@adfa.edu.au, james.connor@adfa.edu.au

Henry Linger

Faculty of Information Technology

Monash University

Melbourne Australia

Email: henry.linger@monash.edu

Abstract

The complexity of projects, and in particular emerging problems, cannot and are not able to be solved through traditional systems or process methodologies. The limitations of traditional tools and techniques that are deterministic and linear necessitate additional but complementary techniques to deal with the complex and dynamic evolutionary nature of ISD projects. Social processes, as distinct from formal structures, address complexity and drive innovation in ISD projects. Actors use knowledge based practices to create interleaved networks of expertise to clarify, brainstorm and innovate solutions. Drawing on an illustrative case study of an ISD project in an Australian Government Department we demonstrate how knowledge based practices were used to address emergent issues in the project and how the formal processes failed. However, the innovation was then re-incorporated into the formal systems to satisfy the rational, bureaucratic process requirements required in tightly governed projects. This clash of the formal versus informal represents a major theoretical and practical problem for knowledge, project management and ISD theory and praxis. We conclude by offering some suggestions on how to reconcile the irreconcilable.

Keywords

ISD Projects, Innovation, Knowledge Based Practices

INTRODUCTION

Traditional methods, tools and techniques that are used to manage and deliver Information Systems Development (ISD) projects are based on normative, deterministic principles that are derived from scientific management and hard and soft systems. These tools and methods are used to control the project and focus on achieving predefined ends, with the assumption that everything in an ISD project can be controlled (Morris 2002). We suggest that project management needs to be thought of more broadly in order to incorporate complex, and even chaotic, phenomena and extend the assumptions that underpin project management practices to include emergence, self-organization and adaptation.

This broader understanding of ISD projects, views projects as situated in an unstructured environment where requirements are dynamic and the technical solution is potentially unknown, resulting in the emergence of issues that need to be addressed. Such issues are intrinsic to ISD projects because of the sociotechnical nature of projects, the inherent complexity of such projects and the volatile environment in which they are conducted (Mathiassen 1998). The traditional toolset of project management is limited in its ability to deal appropriately with intrinsic issues and complexity.

In the context of complexity and emergent issues, project managers need to innovate as prescriptive rational methods cannot adequately address such phenomena. Such innovation is based on the knowledge and experience of the manager and their ability to apply this to the situation at hand. In this paper we draw on the Knowledge Based View (KBV) of the firm to address complexity and intrinsic issues. Our approach proposes using Knowledge Based Practices (KBPs) to facilitate innovation in the management of projects.

This paper is structured as follows: a background on the evolutionary nature of ISD, the KBV of managing projects, and of its role in innovations within the structured project environment. This is followed by an illustrative case study of a project to roll out an enterprise project management software tool in a large Australian Government Department. The case study is then analysed through the lens of KBV to show how innovation

occurs within the formal project structure and outside of the project structure and demonstrates the importance of KBPs as the process by which this innovation occurs.

THE EVOLUTIONARY NATURE OF ISD

The fragmented adhocracy of ISD, indicates that there is a need for frameworks to clarify socially organized human behavior in the complex and ambiguous activity of ISD (Hirschheim et al 1996). Each developer approaches the task of managing and delivering ISD projects based on their understanding of the task (Brooks 1995). Traditionally, methodologies focus on two aspects of project management; the process of managing the project and the design of the project (Hirschheim et al 1996). However, in practice requirements emerge and technical solutions evolve through the project lifespan. This means that rational approaches cannot necessarily deal with the inherent complexities of the intrinsic issues as they emerge in the project.

Explicitly framing ISD in sociotechnical terms has shifted the focus from being a purely technological endeavour to one that highlights the complexity of the project; including technical complexity, rate of technological change, importance of security, business change, use of virtual project teams, organizational instability and interdependence with other organizations (Sauer et al 2009). Tools and techniques to manage and deliver ISD projects need to address this complexity by broadening the responsibilities of project management from merely the production of a tangible output to creating value for the organization through that output.

A sociotechnical framing of the ISD field balances technology, organization, management and a social orientation (Baskerville & Myers 2002). Thus ISD projects are seen as the means to implement change. These projects operate in an unstructured environment and are, by necessity, more complex because of interrelationships with stakeholders, emerging scope and organizational expectations. It is a paradoxical environment, both highly constrained and restricted (the process and systems of the organisation and of project management) but unstructured in terms of the complexity and emergence of tasks/issues that need to be addressed.

THE KBV OF MANAGING ISD PROJECTS

The limitations of traditional tools and techniques that are deterministic and linear necessitate additional but complementary tools and techniques to deal with the complex and dynamic evolutionary nature of ISD projects. These add to, rather than replace, the existing tool (Reich et al 2008, Young et al 2011). We adopt a Knowledge Based View of the firm to underpin this expanded toolset of project management in order to support the innovation that is necessary in the project management process to dynamically address emergent issues. KBV views knowledge, and the ability to apply it, as the most strategic asset of an organization. Knowledge resides with the individuals while the firm is an integrator and enabler of the creation of knowledge (Grant 1996, Spender 2003, Kogut & Zander 1992). This view assumes that organizations operate in an evolutionary dynamic and complex environment (Santos & Eisenhardt 2005).

As issues emerge within the dynamic environment of ISD projects innovation is required where resources can be recombined or used in different ways to address the complexity and/or resolve the issue (Schumpeter 1934, Penrose 1959, Galunic & Rodan 1998). The primary resource to resolve issues is knowledge (Grant 1996) and innovation occurs where knowledge is acquired, negotiated and integrated (Grant 1996, Santos & Eisenhardt 2005, Swan et al 1999).

We take the process view, rather than the structuralist view of innovation where it is seen as 'a complex, time phased, politically charged design and decision process often involving multiple social groups within the organization' (Swan et al 1999 p 263]. However to deal with multiple organizations or stakeholders within projects these processes involve networking simultaneously across multiple perspectives (Swan et al 1999). It is also crucial to allow for the role of wider networks that actors may use to resolve issues, utilizing weak ties professional networks and personal contacts that fall outside the traditional barriers of organizations and processes.

KBPs are the processes by which this innovation is conducted. KBPs capture activities that are directed to exploring, understanding and making sense of specific situations, sharing that understanding and using the understanding to inform actions that will impact on the situation (Owen 2010). Addressing complexity and resolving intrinsic issues requires the experience and knowledge of actors who can apply that knowledge in the resolution of the specific issue (March 1991). KBPs are utilised to make sense of a situation so that appropriate action can be taken, rather than following the traditional prescriptive approach. Understanding the issue is a necessary precondition to manage the complexity of ISD projects.

Addressing complexity requires experimentation, innovation, flexibility, collaboration, negotiation (March 1991) and an understanding of existing and changing power structures. Such practices draw on the experiential knowledge of the participant, their domain knowledge and emergent knowledge of the situation (Brown & Duguid 1998, Tsoukas 1996, Orlikowski 2002) rather than relying on rational decision-making processes (Weick 1995, March 1999). Participants need to exploit their existing knowledge and skills to create new knowledge to respond adequately to complexity (Mintzberg 1989, Burns & Stalker 1961). In the KBV approach complexity and the resolution of intrinsic issues are made explicit as part of the approach to managing and delivering projects.

KBV facilitates a problem-solving perspective where structures or boundaries change depending on the nature of the issue. In ISD projects problem solving occurs within the established structures, using the existing toolset. Complexity and emergent issues are addressed within these boundaries but through the implicit, and often invisible, use of KBPs that allow creative and innovative application of the toolset within the constraint imposed by the project structure (Owen 2010, Owen & Linger Forthcoming). Such “solutions” usually address the immediate and practical aspects of the problem that allow the project to proceed.

Addressing issues in this limited and constrained fashion often ignores the broader ramifications of the problem on the project, stakeholders and its value proposition. In terms of the KBV, such issues need to be removed from the performance of the project to another more strategic venue that has the knowledge, experience and authority to address and resolve the issue (Nickerson & Zenger 2004). Such a venue represents an extension to the project boundary and is a structure established to address the issue. The structure is outside the normal project performance but within the broader conceptualization of the project. These venues can be informal and often ad-hoc to resolve the issue on a just-in-time basis (Denning 2006, Snowden 2002). The group is viewed from a sociotechnical perspective, including the project or issue and the tools and techniques, technology and the organizational and social context (Mahring et al 2004, Latour 1996, Callon 1986).

INNOVATION WITHIN THE PROJECT MANAGEMENT LITERATURE

Project management literature is relatively young as it emerged iteratively to address problems in the space and military environment since WWII. It owes part of its genealogy to the ideas of Taylor (1947) inspired, scientific management as a way of controlling for the actions of people in a productive capacity. This is fraught with difficulty and it is testament to our collective, practitioner and academic, failure that we continue to turn to structure to address the problem of agency in work (Morris 2002, Winter & Checkland 2003). Telling is the analysis of Shenhar & Dvir (2007) which shows that the application of formal processes to projects does not result in a greater likelihood of success. At its core, the problem is a very old theoretical one – the conflict of structure and agency on individual action. While the field discussing the problem of work, innovation and structuration is large and ever growing. We have chosen to draw some of our discussion from a little known (outside the discipline) economic sociologist, Thorstein Veblen (1857-1929). Writing in 1898, Veblen argued that ‘A habitual line of action constitutes a habitual line of thought, and gives the point of view from which facts and events are apprehended and reduced to a body of knowledge ... a process or method of life, once understood, assimilated in thought works into the scheme of life and becomes a norm of conduct, simply because the thinking, knowing agent is also the acting agent’ (Veblen 1898 p 195). The conditions of innovation, entrepreneurship, and what we now call knowledge work were key concerns of early economic sociologists, such as Veblen and Schumpeter who focused on knowledge as determining innovation (Gilding 2005). What is of note here is the long, complex and detailed theoretical and empirical debate within the literature as to how to balance the needs for structure (formal control systems in a project/organization) and actor agency to step out of those bounds and innovate. The warning that Veblen offers is that increasing structuration can only lead to the increasingly habitual response of the knowledge worker. In effect, as the complexity of the task and processes around it become more complex the human actor is increasingly forced to rely on the system and processes to deal with it. They are habituated into a structural response to any problem, irrespective of the problem. Of course, in such a circumstance the ability to innovate is severely curtailed as the complexity of the organizational project structure increases. We have emerging evidence that the better project managers eschew formal systems, except when required for compliance, and utilize what is traditionally called ‘soft’ management and innovation skills. For example, Leybourne and Sadler-Smith (2006) found a positive relationship between the use of intuitive judgment and improvisation for project outcomes. Further, they also argue strongly for an experiential basis to good intuition which from our perspective is the effective use of knowledge by the actors to address emergent issues.

Project teams tend to have a ‘closed shop’ mentality (Van Donk & Molloy 2008) that arises through a number of processes. First is the belief that the team is ‘special’ or separate from business as usual activities and standard work flows. Second, they tend to develop an in-group out-group bias based on their identity and loyalties as a

team driving change in an organisation (Connor 2007). Last, project processes tend to value the input of those within more than those outside the project – partly for the obvious reason of insider knowledge, but also because of the tendency for some teams to hold knowledge as a form of organizational power, especially in high conflict or change project environs. The tendency towards insularity is problematic for innovation, which despite common sense mis-conceptions of the ‘lone’ entrepreneur/hero, is achieved in a social context. Obstfeld (2005), drawing on a long history of research, notes the importance of networks and weak social ties that allow actors to draw upon a diverse range of knowledges and expertise to solve emergent issues (Obstfeld 2005). This innovation process is about ‘creating new social connections between people, and the ideas and resources they carry, so as to produce novel combinations’ (Obstfeld 2005 p 100). The drive to control and structure within projects is a barrier to innovation that requires open networks that can incorporate and use ideas from a range of actors.

In a review of the substantive literature on innovation, Hage (1999) identified three key variables as central to the process; the organic structure, organizational strategy and the complexity of the division of labour. KBPs are particularly connected to the division of labour, as a diversity of skills, knowledge, experience *and* the ability to apply them are needed in innovation. KBPs represent processes that are inherently social as a range of actors negotiate to make sense of the emergent issue and resolve it (Owen 2010, Owen & Linger Forthcoming). The greater the diversity the greater the likelihood of knowledge creation to address the issue. However, formal structures tend toward the reproduction of self, thus ISD teams are more likely to all be experienced ISD practitioners and share similar as opposed to diverse experiences and knowledge. Keeping this in mind, the ad-hoc structures established outside the performance of the project, deliberately involve actors who have the broader organizational knowledge and experience to make sense of the issue. Moreover all actors participating within this venue are not bound by the project structure and may be free to innovate in order to resolve the issue.

RESEARCH METHOD

The case presented in this paper is a study of the nature of an ISD project involving outsourcing the implementation of an enterprise project management software application at an Australian Government Department. The project was explicitly constructed to drive organizational change and provides an ideal venue in which to study project complexity and the sociotechnical nature of ISD. In outsourced projects, complexity that is inherent in ISD projects is compounded by the fact that there are two parties (actors) involved in the implementation process; the commissioning authority and the outsource provider. Both manage their respective responsibilities for the project and need to negotiate acceptable resolution of emergent issues. In this organizational change project, our focus was to study the project from each actor’s perspective and the interaction between the actors during the implementation process. This approach allowed us to gain insight into how each actor approached emergent issues and the resolution of these issues during implementation.

This empirical research was conducted using an exploratory case study methodology to focus on an ISD projects used to deliver organizational change (Marshall & Rossman 1995). This study is interpretive focusing on the socially situated nature of the project (Walsham 1995), in order to allow the phenomena to be studied in detail using a variety of approaches (Myers 1997). This emphasis on the social and organizational phenomena allows these elements to be studied in a particular context where ‘the experience of the actors are important and the context of the action is critical’ (Kaplan & Maxwell 1994 p 369). Moreover, the case study methodology allows us to focus on emergent phenomena situated in an actual organisational context (Benbasat et al 1987).

The study used a number of different data sources to view the phenomena in different ways (Yin 1994) in order to crosscheck findings (Stake 2000). The study was conducted by observations, background discussions, analysis of internal and publicly available documents, analysis of secondary sources covering internal and external business processes and in-depth interviews. A framework was developed for recording and analysing the relevant project documentation and business processes. In addition an interview guide was developed for conducting in-depth interviews, and key themes were covered in the background discussion.

Observations and background discussions allowed the framework and in-depth interview guide to be constructed and further interviews were conducted as necessary to consolidate the data collection. Nine in-depth interviews, each taking approximately ninety minutes, were conducted with the outsource provider employees at all levels, including the Managing Director, a member of the Senior Management Team and a sample of Consultants including the two consultants from the case study project team. This provided a background as to how the provider conducted projects. Interviews with the Government Department staff responsible for the project were done informally due to imposed restrictions. Detailed analysis of business processes and documentation were conducted for the outsource provider and the Government Department. For the Government Department publicly available documentation was used in the analysis as it provided an overall profile of how project management

occurred within the Department. Secondary data was also available in the form of audit reports about the Department's project management capability.

In both organizations an initial analysis of the interviews, business processes, methodologies and documentation were carried out. Then, further data was obtained via background discussions with project team members. An additional two in-depth interviews were conducted with the lead consultant from the outsource provider and the project manager from the client site. The interviews with the two project participants involved two iterations so that issues raised in the first interview could be clarified or further information obtained. This approach allowed for leading questions to be asked facilitating reinforcement and open ended, semi structured questions to identify emerging themes (Dawson 2008).

CASE STUDY SETTING

The study was conducted in a large Australian Federal Government Department (the Department), comprising a number of Divisions, that outsourced the rollout of a software application to a consulting company PMC Australia (PMC), the outsource provider. PMC implemented their system for the Department, based on the Department's requirements. The project was their common ground where the interaction between the Department and PMC took place. PMC's focus was on implementing a software application. The Department wanted a system to manage their projects at an enterprise level. This requirement represented a fundamental change in the way the Department organized and delivered its projects.

The Department

The Department was a statutory authority established under the *Commonwealth Services Delivery Agency Act 1977* and was charged with the delivery of social services support to the Australian community and other government departments. To do this the Department had branches located throughout Australia. The Department's business was derived from partnerships with a number of government agencies that set social service policy direction. Policy initiatives implemented on behalf of other agencies are largely delivered by projects. Its budget was estimated at just under AUD\$3 billion, including revenue from agencies and policy departments of just over AUD\$2.5 billion. Services and products were continually refined by the Department based on government legislation and budgetary initiatives introduced by the government. Divisions within the Department were structured to support the strategic themes for the Department of strengthening customer focus, building a networked organization and building capability for government.

The Department identified the need for an enterprise project management tool. An enterprise view of projects aimed to provide a transparent link between the original project scope and the government/client's expectations, while providing clear timeframes, schedules and interdependencies. This tool facilitated project scheduling, project tracking, and project financial and human resource management. For this type of reporting to occur it was recognized that an enterprise-level tool was required. In addition this technology allowed a top-down approach to managing resources (financial, human and material).

The Department decided to outsource the application and delivery of an enterprise project management tool to a third party who specialized in such tools. It was a direct source contract to select an enterprise project management tool. PMC was contracted to deliver this software, PEPMS. Under Commonwealth procurement guidelines a direct source contract was allowed as an earlier version of the project management software was already used. If the Department had decided to change to another provider it would have resulted in a change of IT architecture, organizational and business processes and a change in the knowledge of people, which would have resulted in additional training.

PMC

PM International was a global company based in the USA, where they researched, developed and provided software for enterprise project management. The software was sold internationally in 128 countries by authorized resellers and PMC had been the Australian and New Zealand reseller for nineteen years.

In Australia PMC was a privately owned, locally run organization, with a professional service culture and informal but developing business processes. The background of the principals was predominantly engineering, thus facilitating rational decision-making processes. The management structure of PMC was a matrix structure reflecting the regional and functional business lines. A board of management, consisting of executive and non-executive members, governed the strategic direction and finances of the organization. PMC's employees had skills in managing and delivering ISD projects, implementation of enterprise project management tools and integration with other IT systems. The company employed approximately twenty consultants (implementation and technical) throughout Australia and sourced contract staff from their professional networks, as required.

PMC was structured on a state basis with consultants being allocated to a project by the Regional Manager. Management, functional areas and specialist software development and integration areas sat at the Head Office level. The Project Enterprise Project Management Software (PEPMS) allows scheduling, project management processes and resource management to be viewed at the enterprise level.

The PEPMS Project

To enable the Department to have an enterprise view of projects rather than at the single project level, Department management recognized that there was a need for a software tool to facilitate this. A project to enable visibility of resource commitment and demand, and to enable projects to be viewed at the portfolio, program and project level was instigated within the IT Division.

The primary objective of the PEPMS project was to upgrade and replace the Department's existing project management tool, which could not effectively manage resources. Another project objective of the implementation was to enable the Department to manage their portfolio project and implement an enterprise portfolio management approach within the Department.

While the initial scope was to implement PEPMS in the IT Division, there was no formal scope management and the scope and project requirements were broadened in the first few months of the project to include both the internal and customer-facing divisions. This change of scope was due to the range of projects the Department had and to support good strategic project management. There was also a requirement for more efficient data sharing between systems by integrating PEPMS with the Department's ERP systems. This was facilitated by allowing financial and resource data to be imported from PEPMS to the ERP system.

As other Divisions were included in the project requirements changed in terms of configuration requirements and additional functionality that was outside the initial requirements and scope of the project. The initial duration of the project was eight months but was extended to two years to cover the extended scope.

While the PEPMS project did not appear to be a complex task, it became complex as it was used, in a political sense, to drive organizational change. The impact of standardization of procedures and reporting, as well as the centralization of control over projects, was facilitated by the implementation of the new application.

Divisions within the Department resisted the rollout as users did not understand why they had to use a new system; they assumed that the existing project management systems were sufficient and allowed them to manage projects effectively and efficiently. Project managers and users in Divisions were only concerned with the project they were working on and did not understand the imperative behind viewing projects at an enterprise level. Champions in each division were identified to assist with the rollout and improve usage of the tool. These champions were not part of the project team but were identified as key stakeholders and subject matter experts within the Divisions who could influence the usage of PEPMS.

In one service delivery Division the Senior Manager did not see the benefit in changing. Even though the project managers and schedulers in his Division wanted to use PEPMS, its implementation in that Division was abandoned.

'The system was foisted upon them whether they wanted to do it or not. They had to do it as the configuration on the earlier system was prone to breaking down, preventing the Department from performing internal cost recovery.' (PMC Lead Consultant)

The integration of PEPMS with other technology was not in itself complex. Rather it became complex with the interaction of the Integration Consultant with stakeholders and users from the Department. PMC recognized that their understanding of the requirements was based on assumptions about what the customer wanted. This recognition led PMC's Lead Consultant to remove the issue from the confines of the project to resolve the requirements. Complexity increased in the project as the PMC Integration Consultant did not understand the customer requirements. The consultant developed what he thought the Department required, rather than what it required, which exacerbated the complexity for the Lead Consultant. In an effort to resolve the confusion and reduce the complexity, the PMC Lead Consultant organized an initial meeting between Department representatives and PMC to make sense of the requirements and agree on a set of requirements. This was instituted as a regular forum to deal with all emergent issues with the meeting assuming explicit responsibility to develop a comprehensive understanding of the issues, assign an owner to each issue and ensure that the issues were resolved.

Issues emerged in the project as there was a discrepancy between the stated aim and implied agenda of the Department. This contributed to the changing of requirements throughout the project. The discrepancy became evident to all parties as a gap in the scope emerged, making the project unbounded. From the Department's perspective, the resolution of this discrepancy was to renegotiate the contract terms. However, we could only guess at the underlying political and perhaps economic bases for this discrepancy as these factors were not on the public record, and our informants were reluctant to express their opinions on this matter. PMC only became aware of the discrepancy after the contract was awarded. One consequence was that PMC lacked an understanding of what was required, which Divisions were involved, and the timing of the implementation in each Division. To resolve the different perspectives, between the contracted project and what the Department expected, the Project Steering Group and PMC's management team met and negotiated a revised contract.

'Sometimes the scope is not clearly defined so we believe we are meant to be there to do something and the customer thinks that we are actually doing something completely different. Or they are expecting us to do more than we have actually signed up for.' (PMC Professional Services Director)

The PEPMS project involved twenty people: an executive sponsor, seven project board members, a business owner, a project owner and the project team. The project team consisted of ten members: the project manager, a project administrator technical staff and consultants from PMC. The Department's project team members provided IT coordination, business analysis, project administration and scheduling activities.

Initially, representation from PMC involved one Implementation Consultant to lead the consulting side and advise the Project Manager on technical and functional issues. As requirements broadened, two Technical Consultants from PMC joined the team to develop the integration of PEPMS and the ERP. As requirements emerged in the Business Divisions additional PMC consultants were deployed for short-term assignments to meet the timeline.

PMC's approach to implementing PEPMS was to use a methodology focusing on software implementation and systems integration. The management and delivery methodology was based on the Project Management Institute's (2008) Project Management Body of Knowledge (PMBOK) and software development and integration methodologies. Its methodology allowed PMC to identify business needs, and facilitated collaboration with the customer, by having the customer input into the project by assessing their needs. The Department's project management methodology was also based on PMI (2008) PMBOK. In addition they used PRINCE2 to manage the IT components of projects.

The PEPMS's Project Management Plan stated that the departmental project management methodology would be followed. It also stated that as the project was changing business processes, and integrating with IT infrastructure. However, while the project management plan stated that this would occur, it didn't. The project team combined and adapted methodologies based on PMBOK and PRINCE2. However, the Department's project manager thought that he was following the Department's methodology but he only used it for reporting purposes. Once the initial project management plan was completed, and approved, it became a static document and was not updated. From a project control and monitoring perspective within the Department, PRINCE2 governance principles were applied to the project. Regular reporting occurred to the Project Board. PMC's Lead Consultant blended the Department's and PMC's methodologies. This methodology was used for project delivery in terms of requirements gathering, configuration and project reporting.

'Methodologies were adapted to ... I did what I thought was appropriate for the situation as most people do ... [PMC's methodology] was not prescriptively followed. I did not use the templates but I applied the principles in terms of documenting user needs and translating them into a configuration document.' (PMC Lead Consultant)

Technical issues arose during the project relating to system testing, implementation and functionality. PEPMS did not do everything that was covered in the initial requirements, nor with the requirements that emerged during the project. As technical issues arose they were recorded in an issues log. However, where possible technical and functional issues were addressed within the confines of the project using existing tools and techniques that were adapted to the situations. These issues were process related rather than technology related although some were seen as major technical issues by the Department.

'There was nothing unusual or circumstantially unique about the occurrence of these issues. They arose for the same reason that issues arise in any project – that is, as projects enter the delivery stage, the forces of change

(as is the nature of projects) reveal and cause differences between the current environment and the new.' (The Department Project Manager)

Functional or technical issues that could not be resolved within the confines of the project, were informally resolved by the creation of temporary solutions. The informal group, comprising the PMC lead consultant and technical consultants from PMC, collaborated to develop an informal workaround. This occurred where resources such as people working on the project could not be removed from a timesheet in PEPMS software. The issue was raised four times within the project. When it could not be resolved in the project a temporary solution was created. The issue was then formally documented and sent to the USA to be included in the next formal updated release of PEPMS.

DISCUSSION

The fundamental problem is resolving issues within a project framework that has proved to be incapable of predicting and resolving the issue itself. Actors must therefore use their knowledge and experience to innovate a solution outside the formal project framework. But, the formal framework is how a project is measured, it also forms the legal basis of action within a project that allows actors to act. The problem is how to allow innovation outside formal control then re-integrate the innovation within the formal system in a way that does not cataclysmically disrupt the formal to such an extent as to make it no longer legitimate.

Within the Project Boundary

The division of labour in the case study incorporated project team resource specialization where the project team was formally structured so that each person had a specialized role to perform specific tasks. Tools and techniques, in the form of specific methodologies, were also prescribed to manage the project.

The PEPMS project became complex as requirements emerged and a change in scope was recognized. The methodology followed by the Department could not deal with the complexity of the project as it assumed that a defined solution existed. Their methodology could not be applied directly to the intrinsic issues and another process was undertaken to normalize the situation. However, a rational approach to managing an ISD project does not always suit the needs of a project. Rather an emergent methodology is utilized that is adjusted to the needs of the situation. As Kautz et al (2004) point out such emergent methodologies are in fact normal practices in project management and ISD (Mathiassen & Stage 1992). Flexible methodologies enable actors to address effectively project complexity in the deployment and implementation process. Such methodologies are tailored to deal with the contingencies of emergent intrinsic issues. Tailored methodologies are based on the actors' experiential knowledge and role in the project and are applied dependent on the experience of the actor and the contextual nature of the project.

These techniques utilized Schön's (1991) concept of reflection in action, in that they are constructed from an understanding of how the methodology should be applied in the current situation. This understanding is based on learning, sensemaking and exploitation of organizational memory and personal experience (Schön 1991). These flexible approaches overcome the limitations of standard methodologies. This approach allows the actor to innovate using KBPs to adapt the methodology to the situation.

Outside the Project Boundary

When issues emerged in the project, the initial response was to apply the standard rational toolset in order to solve the problem. Often this approach requires KBPs in order to create the flexibility required to resolve the issue, as discussed above. However such actions often impact on broader organizational concerns that also need to be addressed. On the other hand some issues that emerge cannot be managed appropriately within the project. In the case study such issues included too many stakeholder interpretations, the project team was unsure of what the problem was or potential solution was unknown. In both these situations these issues were referred to another level where a structure was constructed to address the issue outside the normal project performance. Within this structure KBPs were used to resolve the issue and incorporate the resolution into the existing project structure. In this context KBPs represent an innovative and flexible means to address the intrinsic complexity of ISD projects.

Within the structure that was created outside the boundary of the project, an informal group, collaborated to make sense of the issue and negotiated a resolution and implementation action for the issue. The lack of understanding of the Department's requirements, and the broadening scope within the PEPMS project caused PMC to establish a formal meeting to create a space to facilitate these issues to be considered at a meta-level. Within this space the issue was reframed after considerable reflection and the opportunity to make sense of the issue in a broader context of the Department's emerging agenda. The creation of this space assisted the

participants to reflect by allowing them to utilize their experiential knowledge to make sense of the ambiguity (Weick 1995). It also enabled intervention and the formulation of an action plan the issues that this group had to solve including dealing with and prioritizing emerging requirements, and renegotiating the contract to reflect a revised project scope as the output. Experiential knowledge was used to finalize the revised scope and agree and prioritize the requirements.

The significance of this structure was that the actors were able to use KBPs that drew on a broader knowledge base, they brought a meta-level understanding of the issues and their experiences of past projects and the organizational imperatives of the Department. Moreover the actors had power and authority to resolve the issue and were able to exercise their power to implement their resolution of the issue (Schön 1991).

Resolving these issues required innovation, flexibility (March 1999) and experimentation since the actors did not have recourse to any existing methodologies or standard processes. KBPs were used to make sense and structure the intrinsic issues, understand and resolve them as 'it reflects the need to adopt different intervention devices and different forms of measurement depending on the ontological state' (Snowden 2005 p 11). This recognized that the potential solutions that emerged were based on collective knowledge with a number of alternative opinions, and solutions and approaches could be applied (Snowden 2002). Within this context KBPs were the process which allowed innovation to occur. The paradox is to create systems and structures that allow the informal to thrive in the formal.

CONCLUSION

Project management can be conceptualised as a complex socially situated activity. Traditional project management practice is normative and deterministic and resolves emergent issues by applying the manager's knowledge and experience to adapt these existing tools, techniques and methodologies to the current situation. However, as intrinsic issues emerge they require a deeper, more strategic organisational and professional knowledge to be brought to bear on the emergent issue and on the project. Both adaptation and strategic rethinking of the project represent venues where KBPs form the core of activities. These practices allow the complexity, uncertainty and ambiguity of the project to be explored, understood and resolved using tools and techniques that are appropriate to the issues. It also provides opportunities for participants to reflect and learn from their experience. Significantly, KBPs operationalize the KBV of the firm within the project context. KBPs also enable the innovation that is necessary within projects to respond to complexity and emergent issues.

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