Post Implementation Reviews – A Means of Applying Knowledge: Lessons from a failed project

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Abstract

One of the defining properties of a project is that it has a definite start and a definite end, yet perceiving IT projects autonomously may actually contribute to their suggested low rates of success. A post implementation review (PIR) empowers us to make better decisions in future projects by using the lessons learnt from another. The process by which these lessons are captured might be described as a practical application of knowledge management (KM) principles. Using the experiences gained from a failed multi-national IT project, we will discuss how project knowledge can be captured and incorporated for use within a post implementation review, in order to increase the likelihood of success in future projects.

Keywords

IT Project Management, Knowledge Management, Post Implementation Review

INTRODUCTION

There is, according to Thorp & DMR's Center for Strategic Leadership, (1999), a growing body of evidence that new and improved technology has not consistently produced business results over a period of several decades. According to Schwalbe, (2002), today's corporations recognise that to be successful, they need to understand modern project management techniques, with Thorp & DMR's Center for Strategic Leadership, (1999) suggesting that the reliability of IT project delivery is one of four levels at which the reality of IT has not lived up to its promise.

Projects, even though one of their defining qualities is that they have both definite beginnings and definite ends, (Olson, 2001), making them of definite temporary durations, may still be viewed as but steps that exist within a broader framework of organisational objectives and given contexts and environments. Project success has been traditionally considered by project teams as delivering expected functionality within a predetermined budget and within a specified timeframe. The temporary nature of the project delivery method does not however imply that the deliverable itself is necessarily of a temporary nature (PMI, 2000, p5). Paradoxically, projects that are successfully managed strictly to comply with a project's contractual obligations, might ultimately be of less overall benefit to the organisation than if the project was managed with concomitant consideration of an organisation's long term requirements.

Evidence of poor IT project success has been provided by many researchers, (Dhillon & Backhouse, 1996; Hochstrasser, 1993; Lin & Pervan, 2001; McGunnagle, 1995). Too often, according to Clark, (2001), the knowledge assets created during IT projects are lost, ignored, or not leveraged to their fullest potential and having made costly errors by disregarding the importance of knowledge, many firms are now struggling to gain a better understanding of what they know, what they need to know and what to do about it, (Davenport & Prusak, 1998). The most practical application of knowledge management for project-based organisations is in the passing on of lessons learned, as both intra-project knowledge and inter-project knowledge. According to Kotnour, (2000), project performance is positively associated with project knowledge, the greater the amount of knowledge that can be created and shared throughout and after a project, the greater the likelihood of project success.

Considered a vital component of modern project management by the Australian Computer Society Inc, (2000), PIRs provide a vehicle for learning and are a way to review and document the successes and failures of a project, including as key deliverables for administrative closure, a list of lessons learned, (Thomsett & Thomsett, 2001).

Recognising the potential of their innovative and technically advanced design for automated warehouses, an Australian company, which we will call Dag-Brücken (DB), was awarded the Queensland State Premiers Export Award in the late nineties and was a finalist in that years National Export Awards. Yet just two years after being honoured with this prestigious award, DB was wound up by its administrators, leaving its unhappy clients with partially completed projects and with a design concept that was (as yet) never to be attempted again in a project of the same type.

Although none of DB's projects ever reached the stage where a PIR could be undertaken, one of the project team members, as part of his postgraduate studies, had documented actual events over a 20 month period, providing an example of the special mode of evidence collection that Yin, (1994), calls 'participant-observation'. By examining this evidence we will discuss how a PIR could have been used to identify how future projects might have learned from the failure.

BACKGROUND

IT Projects

Projects are distinguished from other organizational operations by their temporary and unique nature. Temporary, in terms of having a definite commencement date and an equally distinct completion date, and unique, in that they create a product or service that is different from all other products or services (PMI, 2000).

The triple constraints of time, scope and cost describe the restrictions in which individuals, teams and organizations are expected to operate within projects (Schwalbe, 2002). This is expanded on by the PMI, (2000) to explicitly include a requirement that the project deliverables meet a predefined standard or quality. A project might therefore be summarised as a sequence of unique, complex, and connected activities having one goal or purpose that must be completed by a specific time, within budget, and according to specification, (Wysocki, Beck Jr, & Crane, 2000).

The strength of any project-based organisation is its ability to repeatedly achieve successful results in projects (Greer, 1999). A factor that Cooke-Davies, (2000), suggests leads to consistently successful projects is "An effective means of ''learning from experience'' on projects, that combines explicit knowledge with tacit knowledge in a way that encourages people to learn and to embed that learning into continuous improvement of project management processes and practices", (p189), citing Kerzner, (2000), who suggests that continuous improvement represents the fifth and highest stage of project management maturity in an organization.

Knowledge Management (KM)

While the term *knowledge management* still struggles for consensus in meaning, there is widespread agreement that the principles inherent within it are important factors in managing the modern organization. Knowledge management is defined by Peteraf, (1993)as managing the processes of creation, development and diffusion of knowledge in order to achieve organizational capability. In supporting this definition, Bair, (1998), describing KM as a "discipline" that promotes an integrated and collaborative approach to the process of information asset creation, capture, organization, access and use, conflicts with the view ofMurch, (2001), who suggests that although corporations are positioning KM as a discipline, to succeed, KM must be oriented to practical applications of knowledge, e.g. in project management, (p206).

Knowledge strategies may be thought of as a method of ensuring that an organization achieves continual improvement, through its ability to react with its environment, in order to make better decisions about how it manages its resources and how it can improve business processes.

Knowledge workers, described by Turban, McLean, & Wetherbe, (2002), as "people who create information and knowledge as part of their work and integrate it into the business … responsible for finding and developing new knowledge for the organisation and integrating it with existing knowledge", populate modern project-based, information-based organizations. Several essential characteristics of information-based organizations populated with knowledge workers are identified byDrucker, (1988), which include clearly stated and communicated goals for the performance of individuals and the organisation; and greater responsibility of the knowledge worker for their own information needs and contribution. Added to this new dynamic, Drucker suggests, are issues relating to: employee incentives; creating a unified vision; accommodating task force orientation of the workforce; and appointing executives with the necessary skills set.

A number of challenges exist for knowledge management. Organizational culture has been identified as the single factor that holds most influence over the abilities of individuals to share knowledge (Earl, 2001; Frame, 1999; Santosus & Surmac, 2001). Another challenge for knowledge management is to focus knowledge management initiatives on the people, knowledge and business objectives first, rather, than on the technology (Santosus & Surmac, 2001). Another factor that effects the use of knowledge management strategies and techniques is the fluidity of knowledge and its openness to value decisions. Thus *knowledge evaluation* is required for justifying and measuring the business value of knowledge on an ongoing basis(Abou-Zeid, 2002).

Post Implementation Review (PIR)

Even though a PIR provides a great opportunity to formalise recommendations to the system, Wysocki et al., (2000), suggest that they are seldom carried out by organisations, providing reasons why this stage is left out of the project lifecycle,

Managers don't want to know. They fail to see the link between completed and future projects.

Managers don't want to pay the cost. A PIR can cost up to 10 percent of the system's price tag, (Butler, 2001) so it is more likely that the project manager will elect to spend the scarce commodities of time and money on future projects rather than on one that has already been completed.

It's not a high priority. They believe that there is nothing to gain from wasting time picking over the bones of previous projects when others are on the horizon.

There's too much other billable work to do. Managers may not possess the foresight to see the financial imperative of analysing project performance.

The PIR, which should be performed once the project has achieved stabilisation after the implementation of a project or project phase, is suggested by Thomsett & Thomsett, (2001) as a way to review and document the successes and failures of a project with its key deliverables including a list of lessons learned for administrative closure. They identify one of the purposes for performing a post-implementation review as providing a vehicle for learning which can only be achieved if the project team is able to explicate their experiences so that others can avoid making the same mistakes and gain from their successes.

The PIR, according to the Australian Computer Society Inc, (2000), is a team-driven process that reviews

- The key project deliverables
- The development process
- How well the business case was delivered

One of the key elements of organizational competence in project-based organizations relates to the importance of incorporating lessons learned in future projects. According to Frame, (1999) "… they must deal with project management consciously and systematically, that is, they must institutionalize it". The importance of this is underlined by the observation of Wiegers & Rothman, (2001), that failing to learn from the past practically guarantees that it will be repeated and further undermines the effectiveness and usefulness of recommendations when they are not implemented.

THE DAG-BRÜCKEN PROJECT

Background

In the late 90s, an agreement was made between a well-known beverage manufacturer, Super-Cola Taiwan, (SCT) and a small Australian electrical engineering company, Dag-Brücken ASRS Pty Ltd, (DB), to provide an automated storage and retrieval system (ASRS) facility as part of SCT's production facilities in Asia. Essentially, the system was designed to automatically move pallets of beverages from the end of multiple production lines, for storage into a high rise warehouse; and when required for sale, to automatically move them to locations where they would be accessed for despatch to clients. One key advantage of this type of system is that it provided a high density storage facility that required absolutely no operational warehouse personnel. Using a variety of different types of robotic devices, controlled by programmable logic controllers (PLC) via a Microsoft Windows based personal computer, the DB system differed from other types of ASRS in that its robotic cranes were able to manoeuvre around corners. This feature made it theoretically possible for a single robotic crane to service a whole multi-aisled warehouse, providing a cost efficient alternative to more traditional types of ASRS.

Research

As a long-term IT practitioner with extensive inventory management experience, the principal author designed a part of the ASRS control software. His experience with the vendor organisation over a 20 month period was documented in an original case study written as part of his own IT postgraduate studies, describing how the absence of appropriate quality assurance processes may have contributed to the ultimate demise of the organisation. The case was subsequently totally rewritten in early 2003 broadening its focus to show how a number of other factors within a project management environment may have contributed to the ultimate demise of the organisation. The case itself has been accepted for publication in the Journal of IS Education (Special Issue: Case Studies for IS Education).

In his preparation of the case, which is the foundation for the evidence in this paper, the principal author has had access to an extensive amount of archival documents produced over his 20 month period of involvement and provides a current perspective with recent personal interviews of key players both in Australia and in Taiwan.

OBSERVATIONS

The observations will concentrate on factors relating to the IT/IS component of the DB project and the environment in which the processes were conducted. It is not intended to discuss business administration issues that might have contributed to the ultimate demise of the organisation except where they may have specifically impacted on the IS/IT environment.

There is clear evidence from the case that there was an absence of any formal software development or project development methodology. It places DB at the first (initial) level of the capability maturity model described by Paulk, Curtis, Chrissis, & Weber, (1993) as having software development processes that are ad hoc and occasionally even chaotic, few processes defined and success dependant on individual effort. It also places DB at the first (ad-hoc) level of the project management maturity model (Enterprise Planning Associates, 1998) cited by Schwalbe, (2002, p219) and described as disorganised, no defined systems and processes and resulting in chronic cost and schedule problems.

Leadership

There was somewhat surprisingly, nobody on the management team with any experience of the type of IT development being attempted. Multi million dollar contracts had been negotiated with no involvement of specialised IS/IT professionals from either party. The entrepreneurial DB managing director (MD) was an electrical engineer who had developed advanced knowledge of PLC control software and believed that the development of the PC control software would held few technical challenges. There was a general belief by management that software engineering was just programming. They had failed to recognise as Ho-Stuart, Moraji, & Thomas, (2000), suggest, “Software engineering is a disciplined approach to software development that considers all aspects of the system development process”.

There was at this point of the project a level of understanding that reflected whatDubin, (1962), describes as *unconscious incompetence,* i.e. not being aware of a specific cause of a problem or being unaware of a problem at all.

A misunderstanding of the software engineering role was clearly demonstrated by there being no specialist IT project manager.

Development Methodology

AlthoughThomsett, (1989), suggests that “Project Planning is a team-driven process; all team members should be active in planning their project”, certain strategic directions and tactical decisions had already been taken by DB management with no involvement of specialist IT personnel. Twelve months delivery dates had already been agreed upon prior to employing any IT/IS staff and before any software design specification or requirements had been discussed with clients.

When, after a few months it became evident that the project was not proceeding normally, the organisation passed to what Dubin, (1962), describes as conscious incompetence, i.e. being aware of a problem but still not understanding its cause. Still not understanding the essential differences between IT project management and other types of project management, which are discussed by Oskarsson & Glass, (1996) and Sommerville, (1995), the organisation employed a part time external consultant to oversee the work of the software developers. The consultant chosen was however not a professional software engineer but a university lecturer in electrical engineering who had little commercial experience in software development projects, although he had worked for the organisation on a previous electrical engineering project. Kapur, (1999), identifies seven major ways that IT projects differ from “traditional” engineering projects, of which two clearly relate to the DB example.

1. A clearly defined end state is difficult to achieve in IT projects, even after they are finished. It is widely acknowledged that well-defined deliverables represent a critical success factor for projects, (Frame,

1999; Schwalbe, 2002; Wysocki et al., 2000). This omission by DB was reflected in a situation where there was no contractual obligation to design and develop the software in any particular way.

2. Engineering project phases follow a linear path whereas IT projects overlap and even spiral, thus increasing the complexity of the project management required. In DB's case individual software modules were developed from start to finish without any iteration or integration in what could be described as a series of stand alone waterfall approaches, (Sommerville, 1995).

Although an expensive scaled down test rig was constructed it was used predominantly to test mechanical, electrical and PLC software features associated with the robotic cranes. DB management appeared more at ease with the type of testing where something physical could be seen to be happening, e.g. cranes moved, forks extended and retracted, and cradles lifted rather than the virtual testing that is familiar to the IT developer.

Selection of Personnel

As the organisation's management team did not understand the specialised nature of IT development practices, the process used for the selection of development staff was consequently flawed. The principal requirement for all development staff was predominantly, if not totally, their programming abilities in whatever language that had been selected by management. As a consequence of selecting many IT graduates direct from university, there were few project team members that had enough experience to question the wisdom of decisions that had already been taken.

Group Dynamics

In spite of the attempts to segregate the various development teams by providing separate offices, encouraging separate lunch breaks and in one instance referring to one particular group as the "A Team", some individuals eventually reached the level of learning thatDubin, (1962), refers to as *conscious competence*, in that they developed competent performance by focussing on specific problems.

The types and structures of the project teams however, provided little opportunity for team knowledge exchanges, reinforcing the stand-alone nature of the individual development processes. Although it was evident that the teams were not cooperating and that the relationships and conditions within the teams themselves were not contributing to workplace harmony or effectiveness, many individuals remained highly focussed and motivated and were prepared to work extraordinarily long hours under seemingly impossible conditions even when they must have known that they were on a *death march,* (Yourdon, 1997).

Contract

The contract had provided for a situation where staged payments were to be made based on physical deliveries of parts of the system which ultimately had little to do with the clients' final operational requirements. The absence of any genuine performance requirements throughout the project life cycle resulted in not only the client being unable to evaluate progress but DB themselves having no real indication of how advanced they really were. There were for the client, no clear exit points, and no places within the contract where a lack of progress would signal that the project should be modified or terminated without being subject to substantial penalty payments. The absence of any formal process for specification alteration or conflict management resolution procedures in the contract created an ambiguous relationship between vendor and client. The obvious vagueness in the contract terms created a plethora of potential conflicts needing resolution throughout the project. The absence of formal processes for enabling specification changes and handling conflict resolutions made the tasks of individuals on the project arduous to say the least.

The generally held Western belief that a contract was legally binding contrasted sharply with the more usual Asian interpretation that contracts were more of a *starting point for negotiation*. The intransigence of DB on some issues thus appeared to the client simply as uncooperative and recalcitrant behaviour. This interpretation was reinforced on-site by the project manager adopting, what was described by both client representatives and sub-contractors, as *a dictatorial attitude exhibiting an abrupt and uncompromising communication and negotiating style*. His relationships in the earlier construction phases had been predominantly with local manual labourers and tradesmen and the autocratic style he had adopted was, he believed, the most appropriate for that situation. Yet when he was joined on-site by professionally qualified, self-motivated and technically aware DB staff, he failed to modify his leadership style.

ANALYSIS

The case highlighted a number of issues that would have provided an opportunity for incorporating learning in DB to enhance success in future projects.

Prevention of failure

It is necessary to emphasis the fact that the project itself was based on an unproven technology viz., use of aisle changing robotic cranes for automatic storage and retrieval. An investigation into the complexity of one of the components was recently undertaken by seeking the opinion of two senior software engineers, both with PhDs in computer science and one with a specialisation in robotics. Although both believed it *might be possible, given enough time* they agreed that a fully optimised version of this component would almost certainly be outside the capabilities of undergraduates or graduates with limited experience. As this particular component was critical to the system operating at an acceptable performance level it is still uncertain whether this particular design would ever have worked successfully. In contributing towards success in future projects it is therefore acknowledged that some knowledge collected might contribute to a future project not proceeding beyond an early evaluation stage. Although this may not strictly be considered as contributing to project success it must still be considered as contributing towards *prevention of failure*.

Lessons from the case

Attempting to identify the major factors contributing towards cancellation of IS development projects and proposing and testing a model of relationships among those factors, Oz & Sosik, (2000), proposed the following variables,

- Poorly communicated goals/deliverables
- Lack of corporate leadership
- Inadequate skills and means
- Poor project management
- Deviation from timetable/budget

The DB case provides clear evidence of examples of each of these variables confirming the suggestion by Oz & Sosik, (2000), “Thus, the focus of decision-makers in IS development should be on sound leadership and clear communication rather than technology”.

Specifically, the DB case highlighted the following areas that would have needed to have been addressed in any PIR for the purpose of increasing the likelihood of success in future projects.

- Absence of a formal software development methodology
- Absence of a project development methodology
- Absence of project planning occasioned by the “unconscious incompetence” of the MD
- Exclusion of specialised IT personnel in any planning
- Setting of unrealistic delivery deadlines
- Undefined project deliverables/dates
- Lack of recognition of the need for a systems approach leading to isolated development of software subsystems and excluding any integrative system testing
- Inability to identify specialised IT personnel skill needs
- Conscious efforts to segregate development teams
- An emphasis on testing of the physical system to the exclusion of the logical system
- Major omissions in the contract
- Culture differences
- Project manager’s intransigence in his management style

Though the company itself was so mortally wounded from its experience that a PIR would not have helped it, many lessons can be learned from the DB experience that might contribute to the likelihood of success in other projects.

CONCLUSION

In suggesting a framework in which project knowledge can be captured it should be apparent that if operating at the level of learning referred to as unconscious competence it will be practically impossible to know what types of knowledge are relevant. It is impossible of course to, as Davenport & Prusak, (1998)state, *know what we don’t know*. Nevertheless, although DB never reached the stage of conducting a PIR it is proposed that the facilitation of KM in IT projects demand that a PIR be conducted.

Traditional types of evaluation items for PIRs, such as those described by Mantel Jr, Meredith, Shafer, & Sutton, (2001), provide opportunities to address and rectify specific problems that have been identified throughout the project in a reactive manner and include,

- Communication with client / senior management
- Opportunities for technical advances
- Reduction of indirect & direct costs
- Improvement of the PM process
- Identification of risks discovered within project
- Utilization of project members skills
- General management experience gained by PM's
- Improving organizations use of projects
- Increasing speed of obtaining results in projects

However these types of evaluation items cannot generally be applied properly where there may be a level of *unconscious incompetence* or even *conscious incompetence* within the organisation. Each item relies on having at least an understanding of the principles involved in the evaluation of results. If, as in the DB case the organisation did not undertake a risk management strategy at all, because they did not understand the real reason for undertaking risk assessments, then they are unlikely to gain anything by including it in the PIR.

The key characteristics of a project methodology is that it is a "repeatable process that is measurable, manageable and able to be mapped", (Weiss & Wysocki, 1992). It is this repeatability that allows incremental improvements to be passed on to projects through the lessons learned from preceding projects. Even though each project may still be considered unique, failure to appreciate that the project methodology itself spans projects will ultimately limit the effectiveness of any PIR.

The value of a PIR might therefore be enhanced by its explicit incorporation within the project methodology itself, rather than adding it to the project once the project has been implemented.

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