

2008

IS Project Success: Evaluating Beyond 'On Time and To Budget'

Jennie Carroll

RMIT University, jennie.carroll@rmit.edu.au

Justin Fidock

RMIT University, justin.fidock@dsto.defence.gov.au

Follow this and additional works at: <http://aisel.aisnet.org/irwitpm2008>

Recommended Citation

Carroll, Jennie and Fidock, Justin, "IS Project Success: Evaluating Beyond 'On Time and To Budget'" (2008). *International Research Workshop on IT Project Management 2008*. 9.
<http://aisel.aisnet.org/irwitpm2008/9>

This material is brought to you by the International Research Workshop on IT Project Management (IRWITPM) at AIS Electronic Library (AISeL). It has been accepted for inclusion in International Research Workshop on IT Project Management 2008 by an authorized administrator of AIS Electronic Library (AISeL). For more information, please contact elibrary@aisnet.org.

IS Project Success: Evaluating Beyond 'On Time and To Budget'

Jennie Carroll
RMIT University
Melbourne, Australia
jennie.carroll@rmit.edu.au

Justin Fidock
RMIT University
and
Defence Science and Technology Organisation
justin.fidock@dsto.defence.gov.au

ABSTRACT

There is considerable uncertainty about what to evaluate in IS projects and how this might be undertaken. Recent attention to the value that projects add to organisations indicates that evaluation at project closure needs to move beyond simplistic measures of 'on time and to budget'. This paper argues that formal evaluation is an important aspect of IS project management and describes the evaluation activities undertaken for a project to develop a prototype web-based portal. The paper contributes to IS project management in the following ways: it sets out key dimensions for evaluating IS projects, presents an evaluation framework constructed for the characteristics of the project, and provides details of the application of the evaluation framework.

Keywords

Project evaluation, IS project success, project management, knowledge systems.

INTRODUCTION

Evaluating an IS project builds on concepts from both project management and information systems (IS). In the project management literature, typical measures of project success rest on the three pillars of time, cost and scope and formal evaluation plays a minor role in determining success. In the Project Management Body of Knowledge (PMBOK) (PMI 2004), for example, the Closing Out process focuses on administration and contract closure rather than evaluation. However, as projects are increasingly used to manage organisational activities, evaluation of projects is becoming more important. This is evident for IS projects, whose contribution to organisational strategy and operation is receiving increased attention (Jones and Hughes 2001; Klecun and Cornford 2005). There remains considerable uncertainty about what to evaluate in IS projects and how this might be done, so that evaluation at project closure moves beyond simplistic measures of 'on time and to budget' to examine whether the project has added business value.

These issues are addressed through a rich case study of the evaluation undertaken at the end of a project to test the Proof of Concept of a web-based portal to support knowledge management in the Australian Army. The project was part of a major, organisation-wide initiative to shift the organisational culture to one appropriate for the modern information age and so was important not just for the deliverables produced but also in its contribution to this initiative. The project raised the issue of what should be evaluated in an IS project; the authors dealt with this problem by constructing an evaluation framework that addressed both usability and usefulness from potential users' point of view as well as the knowledge processes that underpin a knowledge management system.

The paper is structured as follows. Project success in the project management literature is discussed through comparison of traditional views evident in the PMBOK and broader views that reflect the role of projects in enacting organisational strategy. Next, an overview of evaluation in IS projects is presented. The context of the portal project is then outlined, including the organisational strategy of which this project is a part. The evaluation framework devised by the authors is explained and the evaluation process is described along with its outcomes. The implications of the project evaluation for the project and organization are discussed and the paper concludes with areas for future research.

BACKGROUND

Traditional indicators of project success are conformance to cost, time and scope constraints (Maylor 2001; Schwalbe 2004; Winter and Szczepanek 2008). The increasing 'projectification' of organisations—where work is

undertaken through multiple, often inter-related projects—has led to broadening of the type of projects undertaken (Soderlund 2004) and consequent re-evaluation of these indicators. Projects can be viewed as value creation processes (Winter and Szczepanek 2008), change management programs (Maylor 2001), and as ensuring excellence, continuous improvement and delight for the customer (Maylor 2001). Cooke-Davies (2008) argues that organisations undertake projects to achieve business strategy. Thus, corporate strategy and goals are translated into projects. Each individual project delivers products that are exploited in order to derive organisational benefits that, over multiple projects, achieve the organisational strategy, as shown in Figure 1.

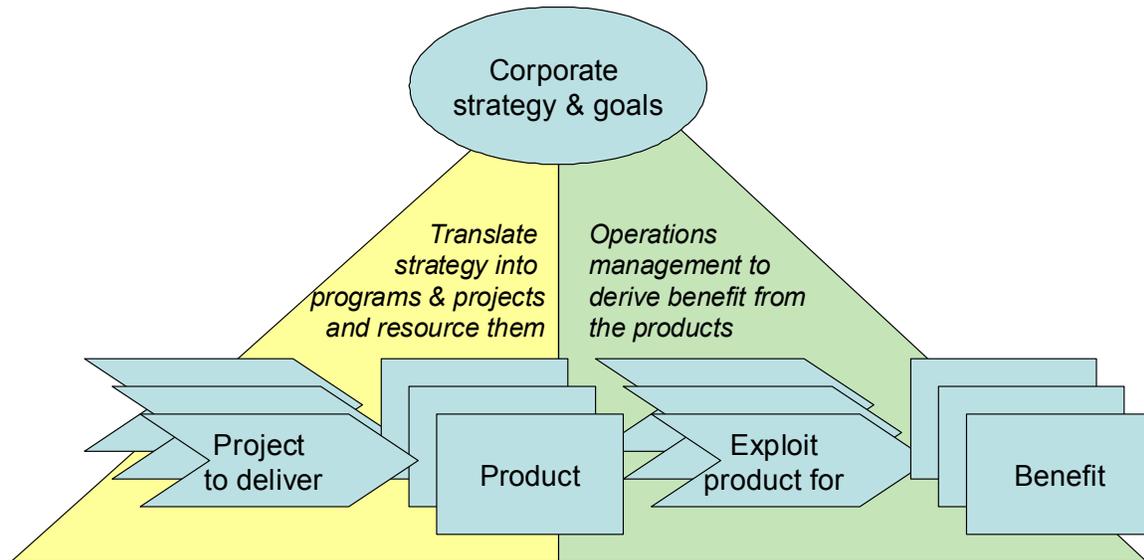


Figure 1 Relationship of projects to overall organisational strategy (Cooke-Davies 2008:248)

Despite the importance of projects in adding value to organisations, this view has not yet become a part of orthodox project management. The PMBOK (PMI 2004) still reflects the old view that projects aim to deliver “on time, in budget, to scope”. At present, detailed specification of evaluation of the project outcomes is a significant omission from the PMBOK. Indeed, the term ‘project evaluation’ is not in the index of the PMBOK. The PMBOK pays little attention to the early, initiation phases of projects and so contains few references to organisational or project strategy, project definition and value management (Morris 2008). This separation of project definition, where linkages with business performance are established, from other project management activities can be catastrophic if one views the focus of project management as “delivering business benefits through projects” (Morris 2007: 194).

In contrast, organisational strategy and benefits management do receive attention in other project management approaches such as PRINCE2 and the APM PMBOK that includes a ‘post-project evaluation’ process (Morris 2007). Evaluation takes place throughout a project as well as at its end. Post-project evaluation provides a ‘big-picture’ overview that assesses the extent to which project aims have been achieved, from the viewpoint of certain stakeholders (Morris 2007); it also encourages organizations to learn from their experiences (Frame 2007) In such circumstances, evaluation is crucial to the concept of ‘project success’.

These tensions are evident in evaluation of IS projects. Currently in IS there is “little agreement on the essential role of evaluation, a ‘best way’ to evaluate, on what and how to evaluate, whom to involve and within what paradigm to proceed” (Klecun and Cornford 2005: 229). Evaluation of IS projects to demonstrate effects and benefits are rarely undertaken (Jones and Hughes 2001; Klecun and Cornford 2005). When undertaken, evaluation tends to focus on technical aspects such as reliability, performance, usability and cost-benefits. Typically, the broader aspects of organisational value arising from IS projects are ignored. This may be because of practical difficulties such as identifying the breadth of costs and benefits beyond simplistic financial terms. Consequently, there has been interest in qualitative and interpretative evaluation approaches to examine the softer aspects of IS projects (Farbey, Land and Targett. 1999) as well as acknowledging temporal issues arising from users’ appropriation of technology (Fidock, Carroll and Rynne 2008). Key dimensions of evaluation of project success can be derived from the five ‘W’s and H’: who, what, when, where, why and how (Couger 1996:35). Thus evaluation may include:

- who evaluates and is involved in the evaluation process?;
- what is evaluated? If an information system is an ensemble of technology, people, processes and other resources (Kling and Scacchi 1982), then what aspects of this ensemble are evaluated?;
- when does evaluation occur: during, immediately at the end, or some time after the completion of the project? (Morris 2007);
- where does evaluation occur e.g. in a laboratory or in everyday use context?;
- why are we evaluating? What is the point of the evaluation and what will be done with the findings?; and
- how will the evaluation be undertaken, for example using what tools to produce quantitative, qualitative or both kinds of data?

Combinations of these dimensions can be applied to particular projects; for example, an important aspect of IS project success is user satisfaction (who) that relates to the usability of a system interface and the usefulness of the functionality provided by the system (what) (Davis 1989).

Thus, building on Figure 1, an IS project may be undertaken to provide business value ('benefit') as part of implementing corporate strategy and goals. The 'Project to deliver' arrow can be renamed as 'IS project to deliver' that requires effective project management including robust and targeted evaluation activities. This leads to IS Project Success that encompasses both developing the required product (system) and/or process change along with organizational learning (about the project, its outputs and impacts on organizational strategy). IS Project Success is a necessary part of achieving organizational benefit (from this project) and implementing corporate strategy and goals (from multiple projects), as shown in Figure 2. This paper argues that it is appropriate evaluation activities that link the IS project to the wider organizational environment and so ensures that the value or benefit to the organization is identified.

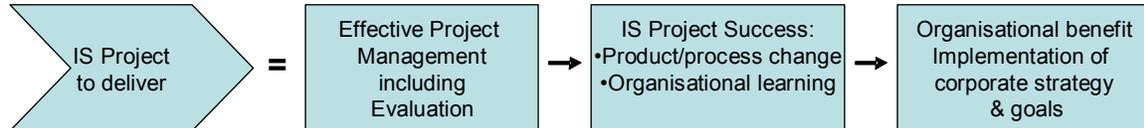


Figure 2 'Projects to deliver' decomposed for IS projects

CONTEXT OF THE PROJECT

Cooke-Davies (2008) indicates that multiple projects may work together to implement strategy. The case described in this paper is such a project: it is one part of an overall organisational strategy to update the organisation through, among other initiatives, a focus on knowledge management. The organisation involved is the Australian Army. The context of the army's core business, warfare, has changed from state-on-state warfare to new strategic contexts and priorities, driven in part by enemies such as terrorists and militia who are not readily identifiable and employ unconventional weapons and tactics (Fidock et al. 2008). Change is therefore necessary but can be difficult to implement in highly hierarchical organisations such as armies (Macredie and Sandom 1999).

The Australian Army is responding to these challenges by investing in new technologies, introducing substantial structural and cultural reforms and further developing its people (The Australian Army 2005). A series of initiatives is underway to identify more effective ways of managing knowledge as part of shifting the Army to a learning organisation. Such a shift involves changes in culture as well as processes, technical infrastructure and tools. The development of a technology-based knowledge domain was proposed as a way of providing improved access to and sharing of knowledge within the army (The Australian Army 2007).

The ultimate aim is to bring distributed knowledge sources into a central domain, to be known as the Army Knowledge Domain portal. The vision is for a configurable portal that can be tailored for individual users' needs and preferences; the portal will provide access to the internet, internal defence networks and overseas knowledge sources (such as from defence forces of allies). It is acknowledged that this is a long-term vision. A Proof of Concept trial

was proposed that focused on one area of army knowledge called Doctrine that is the Army's explicit, more-enduring and higher-level knowledge that has been formally evaluated and is currently provided in hard-copy form (The Army Learning Model 1 August 2006). A project for the Future of Doctrine (FOD) trial commenced in June 2006 to support modernisation of Doctrine (its development, production and dissemination). The trial aimed to refine requirements, systems and concepts relating to knowledge management in the army and so reduce the risk of a full-scale implementation of the Army Knowledge Domain (AKD). The project to develop an AKD prototype portal – also known as the FOD trial – specified major tasks were creating a classification or ontology of knowledge elements, resolving any technical issues, production of multimedia and simulation content and change management initiatives. Technical risks were believed to be low (because portals are well-proven in commercial contexts and existing technologies (including COTS) can be used). In contrast, non-technical risks were high because the project entailed significant culture change. The FOD trial would be Phase 1 of the implementation of the Army Knowledge Domain, ongoing until the end of 2012.

A project team was created. The project manager was an officer with 10 years background in instructional systems design/training development. Due to the posting cycle of the Australian Army, the project manager and project sponsor were due for new postings towards the end of 2007, so the project had a hard end-date that was not negotiable. The budget was set. The project manager was supported by a project assistant and an IT team comprising civilian technology specialists. The head of the IT team had 25 years experience in IT and was supported by two long-term IT workers, an ex-librarian who is a 'content custodian' of knowledge sources and a young technical assistant. All except the project manager worked part-time on this project. Initially much work was undertaken on the ontology of knowledge elements that was later abandoned. A range of issues arising from the breadth of project scope, diversity of systems that are knowledge sources as well as political issues presented by the IT workers meant that the scope of the project was progressively reduced.

The AKD prototype portal was developed using a combination of open source software (AJAX) and commercial off-the-shelf technology. The in-house IT team used AJAX to develop a web portal that would accept feeds from various repositories. The search technology was provided via a commercial search interface called Retina, developed by Autonomy who specialise in 'meaning based computing'. Such an approach is valuable for knowledge management, particularly searching unstructured data. Thus the AKD prototype was composed of two distinct components accessed via a web browser: the prototype portal (developed in-house, that provides access to stored data) and Retina (for search and information retrieval). Two separate knowledge sources, the Army Doctrine Electronic Library (ADEL) and Army Knowledge Online (AKO), were accessed by these two prototype components. ADEL provides access to Doctrine and the AKO to less formalised content.

EVALUATION

Conceptual model

This paper reports on the evaluation undertaken at the end of the project; the evaluation report produced by the authors was one of the final project activities, submitted in November 2007. The project was completed on time and to budget. The FOD trial aimed to develop a prototype web-based portal and changes to the Doctrine knowledge processes to support learning in the Army. Given the significant culture change involved in the organisational strategy, gaining user acceptance of the AKD prototype in terms of usability and usefulness (Davis 1989) was especially important. The authors constructed an evaluation framework composed of four main elements as shown in Figure 3:

- Interface. A user interacts firstly with the graphical user interface (GUI) that represents the functionality provided by the system to the user. It is traditionally evaluated through the concept of usability (Preece, Rogers and Sharp 2002). The GUI of the AKD prototype should enable users to "access, search and retrieve data in a simple and logical manner" (Preliminary use case specification March 2007). For some users, access to the portal was likely to be sporadic, while undertaking a course or updating knowledge, and so usability is important; others, such as instructors and doctrine staff are likely to access it on an ongoing basis. However, the GUI is only the gateway to the required data: the user looks through the GIU to the other prototype components.

- Search. The key functionality provided by the prototype relates to the facility of the search engine that is reflected in the speed, relevance and completeness of the data retrieved and the way it is presented in the GUI. Together, the Search functionality and data constitute the main elements of usefulness for users.
- Data. The prototype portal was required to bring together some of Army's disparate range of knowledge sources into one place. The requirements were developed in the context of existing systems that provide stove-piped access to Army's knowledge. That knowledge is primarily drawn on to support training and education. Thus, both access to these data and the quality of the data retrieved are important (e.g. the most up-to-date Doctrine).
- Knowledge processes. The data are the outcome of a complex series of knowledge processes where lessons are collected (e.g. from sites of warfare), analysed and added to Doctrine. Changes to knowledge processes are part of the overall organisational change strategy. However, initial aims to deliver new technology and cultural change were adapted given limited time and resources allocated to the project so that, in the end, only the success of the technological change was evaluated, although participants in evaluation activities provided valuable input to possible avenues for process and ultimately cultural change.

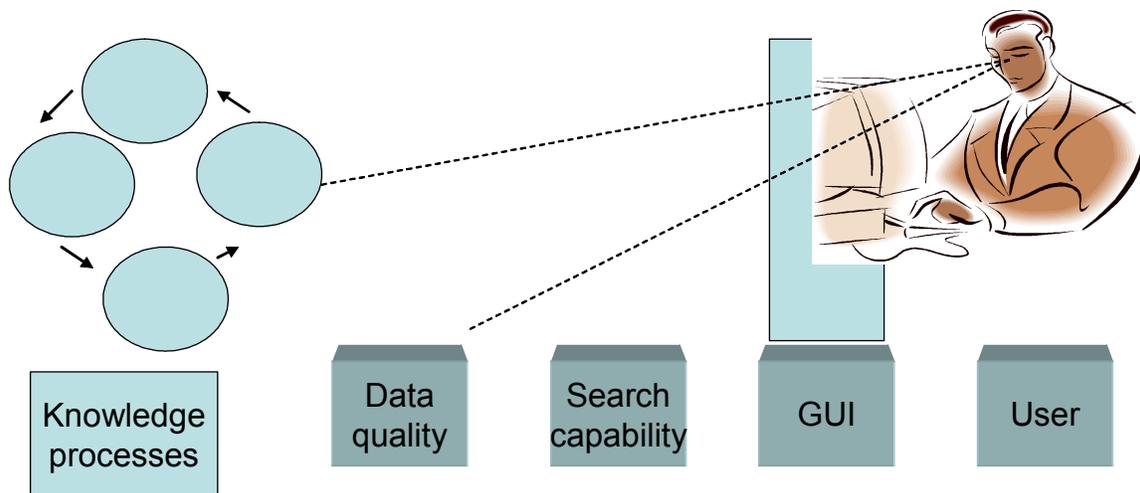


Figure 3 The evaluation framework

Evaluation process

A multi-method approach was employed that included contextual interviews, group discussions, questionnaires, workshops, laboratory experiments, observations, video screen capture of system usage, notes from discussions and documentary evidence (Fidock et al. 2008). This paper reports on the three evaluation activities.

Two evaluation workshops were held in 2007, each lasting for two days and involving a total of 15 participants. These workshops were designed to give participants an opportunity to explore the prototype and to compare this to existing systems. Participants used the AKD prototype to complete a series of tasks typical of those undertaken as part of learning and work-related activities. ADEL, an existing system, was the main point of comparison since it is used extensively by Army personnel to support their learning needs, and because the initial requirements for the AKD prototype had been influenced by this system.

GUI

The prototype interface provided access to Doctrine via a series of tabs along the top of the interface, as well as via a tree structure in the left frame (Figure 4). In addition, an XML viewer to support user access to selected content was included in the centre frame. The prototype also allowed users to click on words highlighted in italics to see the definition, presented in the right frame. The bottom frame was reserved for listing the 10 most related information sources as identified by enterprise search technology developed by Autonomy. However, this functionality was not enabled. Access to this search technology was provided via a dialogue box at the top of the page.

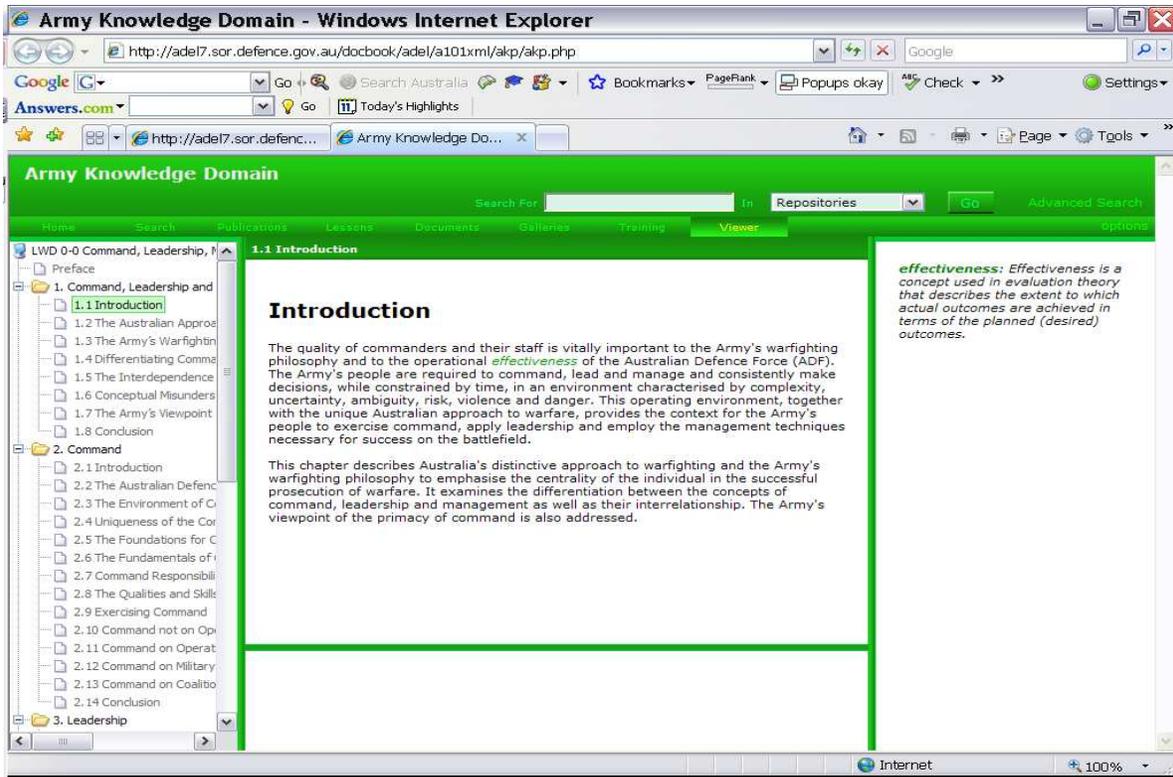


Figure 4 The prototype portal

Participants' impressions of the prototype's GUI were captured. The project manager demonstrated the prototype as well as five similar system so that participants could compare the AKD prototype GUI with other knowledge management systems. The other interfaces were Retina, an alternative screen design for the prototype portal that was mocked up by a professional designer, an American army portal, ADEL and the AKO. Participants were asked to rank order the different interfaces and provide comments relating to use of colour, layout, use of space, and so on. Table 1 shows that Retina was the highest ranked interface and ADEL the lowest ranked.

Interface	A sample of participants' comments	Average rank	Overall order
Retina	Simple interface; Good design and colour; Like the folder hierarchy; Nice layout; Front page boring	2.29	1
AKD prototype portal	Simple layout; Easy to use; More cluttered; Text too small; Colour poor; Different colour options; No borders on buttons	3.27	3
Mock-up for AKD prototype portal	Looks professional; Uncluttered; Better colours; Good layout; Don't like colour scheme, font [too] small	3.54	4
ADEL	Very busy; Cluttered, slow; Simple layout, easy to use; Good use of tabs at top; No abstracts with search results	4.11	6
AKO	Too busy, Info hard to read; Cluttered; Logical grouping; Hard to search; Good colour	4.10	5
US system	Access to email and other info sources; One central portal; Cluttered; Nice, crisp; Good colour	3.18	2

Table 1. Interface comparison

Most participants commented favourably on Retina's search capability and the way the search results were presented and grouped into thematic folders (see left frame of Figure 5, below the search query box). For the prototype portal,

there were minimal concerns raised, other than comments about the colour scheme, and difficulties in differentiating tab buttons.



Figure 5 The Retina interface

Search Capability and Data

Participants' used the AKD prototype to complete a range of set tasks. This enabled evaluation of the search capability and data (i.e. usefulness of the prototype). This activity aimed to actively engage participants in using the prototype for typical tasks that would be undertaken by future users of the AKD, such as preparation prior to attending a formal training course.

Participants completed two sets of 22 questions that required access to Doctrine. They were divided into two groups. One group used existing systems (primarily ADEL) to answer the first question set, then used the AKD prototype to answer the second question set. The second group used the AKD prototype on question set one, and existing systems on question set two. Both the prototype portal and Retina provided access to different knowledge sources via a single point of entry, via presentation in a structured form (the prototype portal), or via search returns (Retina).

The results suggest that the AKD prototype (primarily Retina) was more effective than existing systems, with an average of 7.79 questions completed correctly compared with 4.71 ($F=4.02$, $p=0.066$). Additional feedback was collected through observation during the tasks. Many negative comments were made by participants who started with the AKD then switched to the existing system (ADEL). Several participants expressed very high levels of frustration when using ADEL. They found it difficult moving from the fast, multi-functional and sophisticated search facility provided by the prototype back to the inefficient and ineffective search and cluttered interface of ADEL. Retina was preferred not just because it was much faster in returning search results, but also because it was perceived to provide superior search results that provided greater support in completing the tasks correctly. One of the commissioned participants said: "Even though it is still under development, I'll get the URL address for Retina, because you can get the information [you need], even if it's in an area I don't know anything about." Participants' choices and associated comments showed a strong preference for Retina over the prototype portal.

Knowledge Processes

The knowledge processes that underpin Doctrine and other Army knowledge sources were examined through group discussions. The portal prototype has acted as a catalyst for consideration of a range of computer-based tools to enhance knowledge processes, and also surfaced issues that need attention for achieving longer-term Army strategy, such as archiving, version control, ownership of content and responsibility for its currency and the technology infrastructure. One participant noted that: "Learning is not in a vacuum. [It is affected by] structures, culture, access to appropriate technologies." Participants stated that access to computers varies depending on location, rank and tasking, and some do not have regular access. Also, there are variable degrees of computer literacy (across all age groups). They are aware that the knowledge processes that underpin Doctrine itself need to be updated. Participants believed that this trial offered possibilities, including provision of information in digital form as input to (not just output from) the knowledge processes. Thus Doctrine would become an on-line resource, up-to-date and accessible. Finally, participants suggested that a discussion forum—open to all but facilitated for content and accuracy—could be added to the AKD to encourage sharing of information.

DISCUSSION

Figure 2 suggests that an 'IS project to deliver' requires effective project management including appropriate evaluation activities in order to provide IS project success, comprising products and/or process change along with organizational learning in order to gain organizational benefit and ultimately enact corporate strategy and goals. The FOD trial project was delivered on time and to cost but with limited scope. Did it provide organizational benefit and contribute to corporate strategy?

This project was one in a series of projects designed to improve Army's knowledge processes. Although evaluation was undertaken at the individual level, the findings had various organisational impacts. Firstly, the intention was to develop an in-house web-based client for the AKD prototype (the portal, see Figure 4), including the provision of search results via this interface rather than via Retina. This was partly driven by a strong preference for open-source solutions amongst the IT team, an approach they had also employed previously in developing and supporting ADEL.

The outcomes from evaluating the GUI and the task performances with the two systems (search capability and data) changed this. The project manager decided to continue to evaluate Retina and to include other commercial applications (e.g. comparing the portal's XML viewer with PDF viewers). This decision shifted the focus from developing a bespoke prototype. By presenting participants with an opportunity to explore a range of interfaces and functionality from a variety of different systems, the project led to a shift in requirements for the next stage in developing the AKD.

Secondly, the findings in relation to ADEL, the existing system, were important. They provided evidence of shortcomings of ADEL that had hitherto been ignored. For the participants, use of the prototype surfaced shortcomings of the functionality and performance of ADEL. ADEL is the corporately-sanctioned source for an important class of Army's codified knowledge and much-used by participants to support training and work. The workshops encouraged people to re-evaluate it. If given a choice, the participants would now reject ADEL in favour of the prototype. ADEL's lack of responsiveness and poor search functionality meant that as soon as a viable alternative was presented, participants were eager to explore and use the alternative. This has political implications related to the power of the IT team who had directed the technology agenda towards developing bespoke systems such as ADEL.

Thirdly, a crucial aspect of the evaluation involved the knowledge processes; changing these processes is an integral part of the organisational strategy to provide timely access to accurate and relevant information. However, limited resources (time, money and full-time staff) meant that this aspect of the project was removed from the scope of the project and shifted to future projects that will take the refined requirements for a knowledge portal from prototype to a full-blown system. However, the group discussion raised several suggestions for improving knowledge processes in the army. The project manager is aware that the technology is a small part of the knowledge process and that, for the AKD to work, it needs to be effectively positioned in its environment (in relation to the overall Army learning and knowledge processes, its people and the existing technologies). She sees that the AKD will be an 'eco-system' where technology provides the front end of the larger knowledge concept, the people and the knowledge context; the task at present is shifting people to be more receptive to the concept of knowledge management.

The trial was judged a success on the grounds that access to knowledge sources was enhanced, with efficiency gains for users when engaged in learning and other work-related activities. The 'evaluation model' devised for the

evaluation (Figure 3) was valuable for assessing the usability and usefulness of the prototype from an individual viewpoint. However, while the technical aspects of the AKD concept was judged to be 'proved', the portal does not provide the full functionality expected of a portal—it is not yet a 'window of choice' for users—and no multimedia or simulation was available in time for the evaluation. More importantly, the changes in culture and processes (of collecting, analysing and sanctioning Doctrine) were not addressed by the trial and so the contribution of the FOD trial to the overall organisational strategy is only partial. The more difficult cultural and process changes must still be tackled by future projects.

CONCLUSION

This paper has argued that evaluation is an important aspect of IS project management, both in influencing project success and in contributing to overall organizational strategy and learning. This paper provides an overview of dimensions of evaluation (based on the '5Ws and H' of Couger 1996) that may be useful for IS projects. Selected dimensions were employed in the case study reported in this paper—'what' to evaluate and 'how' this might be done—that go beyond the traditional project management indicators of success. They are represented in an evaluation framework used to assess individual's perceptions of the usability and usefulness of a prototype portal as well as the knowledge processes that feed into the portal. This illustrates one approach to evaluating an IS project. The key dimensions forced us to examine 'who' would be involved in the evaluation, 'what' was to be evaluated and 'why' we were evaluating, particularly the ways that our evaluation report might be used within the organization. Constructing and applying the framework helped focus our evaluation efforts on all the key aspects of the portal prototype, not just the interface, as well as the overarching organisational strategy of changing knowledge processes.

The results of the evaluation had effects beyond assessing the success of the FOD trial project: they had implications for future projects that will work to enact the organizational strategy of implementing the AKD (with associated process change) by 2012.

The project was delivered on time and to budget, although its scope was reduced to include technological but not process change. The FOD trial project surfaced difficulties in achieving culture change along with technological change. Some of the project sponsors believed that a technological innovation could lead to desired changes in organisational culture. The project manager was more realistic about the significant time and energy needed to achieve such change. The project supported proof of the AKD portal concept, it highlighted shortcomings in existing knowledge systems such as ADEL and it provided a way forward for developing a fully-blown AKD portal. It did not address the long-term, complex and difficult task of achieving change in the army's knowledge processes. This is an area for further research that could fruitfully build on existing IS and project management knowledge.

REFERENCES

- Cooke-Davies, T. (2008). Managing benefits, in J.R. Turner (ed.) *Gower Handbook of Project Management* 4th edition, Aldershot UK, Gower, 245-259.
- Couger, J. D. (1996). *Creativity & Innovation in Information Systems Organizations*. Danvers, Mass., Boyd & Fraser.
- Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology, *MIS Quarterly* 13(3), 319-340.
- Farbey, B., Land, F. and Targett, D. (1999). Moving IS evaluation forward: Learning themes and best practice, *Journal of Strategic Information Systems*, 8, 89-207.
- Fidock, J., Carroll, J. and Rynne, A. (2008), *Evaluating information systems: An appropriation perspective, IS Foundations: Answering the unanswered questions about Design Research*, Canberra, Australian National University.
- Frame, J.D. (2007). Lessons Learned: Project evaluation, in P.W.G. Morris and J.K. Pinto (eds), *Project Organization & Project Management Competencies*, New Jersey, Wiley, 253-269.
- Jones, S. and Hughes, J. (2001). Understanding IS evaluation as a complex social process: A case study of a UK local authority, *European Journal of Information Systems*, 10, 189-203.
- Klecun, E. & Cornford, T. (2005), A critical approach to evaluation, *European Journal of Information Systems*, 14: 3, 229-243.
- Kling, R. and Scacchi, W. (1982). The Web of Computing, *Advances in Computing*, 21, 1-90.

- Macredie, R.D. and Sandom, C. (1999), "IT-enabled change: evaluating an improvisational perspective", *European Journal of Information Systems*, 8:4, 247-259.
- Maylor, H. (2001). Beyond the Gantt chart: Project management moving on, *European Management Journal*, 19:1, 92-100.
- Morris, P.W.G. (2007). The validity of knowledge in project management and the challenge of learning and competency development, in P.W.G. Morris and J.K. Pinto (eds), *Project Organization & Project Management Competencies*, New Jersey, Wiley, 193-205.
- Preece, J., Rogers, Y. and Sharp, H. (2002). *Interaction design: Beyond human-computer interaction*, John Wiley & Sons, Danvers MA.
- Project Management Institute (2004). *A Guide to the Project Management Body of Knowledge (PMBOK Guide)*, 3rd edition, PMI, Newtown Square, PA.
- Schwalbe, K. (2004). *Information Technology Project Management*, Boston, Thomson Course Technology.
- Soderlund, J. (2004), On the broadening scope of the research on projects: A review and a model for analysis, *International Journal of Project Management*, 22, 655-667.
- The Australian Army (2005), "The Hardened and Networked Army ", <http://www.defence.gov.au/update2005/defence_update_factsheet.pdf>.
- The Australian Army (2007), "Centre for Army Lessons enhancing war fighting capability ", Defence: the official magazine of the Australian Department of Defence, no 2, <http://www.defence.gov.au/defencemagazine/editions/200708_02/groups/army01.htm#top>.
- Winter, M. and T. Szczepanek (2008). Projects and programmes as value creation processes: A new perspective and some practical implications. *International Journal of Project Management* 26: 95-103.