SHARING LEARNING ACROSS PROJECTS: LIMITS TO CURRENT 'BEST PRACTICE' INITIATIVES

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Abstract

Many companies attempt to encourage cross-project knowledge transfer so that lessons learnt on one project are reused by other projects. The most common strategy for encouraging this cross-project knowledge transfer is to require project teams to capture what has happened on a project and to write down lessons learned, which are then stored on a database and so available through the intranet for others to learn from. Unfortunately, while this ICT-based strategy is widely adopted research has tended to find that such databases are not widely used. In this paper we draw upon data from 13 projects in 6 different organizations to consider why this stored knowledge is not deemed to be helpful in encouraging cross-project learning. In analyzing the cases, we explore the suggestion made by Cook and Brown (1999) that 'knowledge is a tool of knowing'. More specifically, in analyzing the case data we consider why knowledge captured from one project is typically not used as a 'tool of knowing' by other projects. The results suggest that this is because the knowledge that is captured is often not the useful knowledge and because project teams are often unaware that there is knowledge that could be a useful tool to help them improve their processes.

Keywords: cross-project learning, knowledge transfer, knowledge exploitation.

Sharing learning across projects: Limits to Current 'Best Practice' Initiatives

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Suggested track: D Knowledge Sharing

1 Introduction

Organizations are making increasing use of temporary project teams to accomplish specific tasks (Rubery et al., 2002) and increase adaptability and flexibility (Ayas and

Zeniuk, 2001; Sauer et al., 2001). Such project teams can be extremely productive (Clark and Wheelwright, 1993), but they can also fail to achieve their goals on time, fail to meet expectations, or exceed their budgets (e.g. Johnson, 1995). Moreover, while such project failures are of course a major concern for an organization, perhaps an even more widespread problem is that the learning achieved during a project is not available for use in other projects or other contexts. So that, as each new project is started, there is a tendency to 'reinvent the wheel', rather than learn from the experiences of previous projects, even though these previous experiences may be highly relevant in the new context (Prusak, 1997).

The purpose of this paper is to identify the problems of cross-project knowledge transfer, with a view to suggesting ways that organizations can make better use of the learning that is achieved by individual project teams.

2 Theory/Issues

It is common place now for organizations to have established practices that are aimed at retaining what has been learned on a project so that it can be leveraged by other projects (Raelin, 2000). Typically these practices involve maintaining project documentation and conducting project reviews, where project members are asked to capture the learning that has taken place on the project. Most often these reviews are done at the end of the project, but they are also often done when a project has met a series of predetermined milestones (Kotnour, 1999). Once the learning has been captured during these project reviews, the reviews are then stored on databases, alongside other project documentation. The idea is that other project teams can access these project documents by either the project title or keywords, assimilate the knowledge they contain and so learn from them. These databases are typically computer-based and can be accessed by the corporate intranet. In this way, so the theory goes, project reinvention will be avoided through using Information and Communication Technology (ICT) to capture, store and distribute the knowledge and learning from different projects (Sharp, 2002).

Such project document maintenance and learning review and capture practices could be considered to be 'best practice' since they are prescribed in most project management methodologies. However, evidence is accumulating that the practice is not very helpful (Von Zedtwitz, 2002). For example, Keegan and Turner (2001), studying 18 different companies that used project-based work, found that all had end-

of-project review practices in place, but also report that: ‘In no single company did respondents express satisfaction with the process’ (p. 90). These authors highlighted the main problem as a lack of time. Clearly if no ‘lessons learned’ are placed on the database because of pressure of time then the exploitation of the knowledge will not occur as anticipated. However, it is also apparent that even when databases exist, filled with the documents and reflective learning experiences from many projects, there are limits to the extent that they are actually used (Kotnour, 1999). This suggests that it is not simply a question of time that prevents such databases either being stocked or used. Instead, we need to consider problems with the actual practice. In particular, one issue that needs to be considered is the medium of transfer. Thus, there is accumulating evidence, that the medium of capture and transfer – through databases and corporate intranets - is limited in terms of how far such technology can actually facilitate knowledge transfer (e.g. Walsham, 2002). In order to understand the limitations of an ICT-led approach to cross-project knowledge transfer we need to explore the concept of knowledge.

The most common view of knowledge can be described as the knowledge as possession view, which assumes that knowledge is a possession (Blackler, 1995). From this perspective, knowledge is seen as an entity that can be made explicit and transferred from one person or group to another. Nonaka and Takeuchi’s (1995) knowledge creation cycle essentially assumes this view of knowledge, with the underpinning conversion processes essentially relating to how tacit knowledge can be converted to explicit so that it can be transferred. The ‘best practice’ cross-project knowledge transfer initiatives that have been widely adopted are premised on the knowledge as possession view. They involve the implementation of ICT to capture, store, search, retrieve and reuse knowledge (Alavi and Leidner, 1999; Ruggles, 1998). This dominant view of knowledge, then, sees knowledge as a resource that is possessed –by individuals, project teams, organizations or even societies.

Other writers criticize this knowledge as possession view (e.g. Blacker, 1995; Tsoukas, 1996), instead emphasizing that knowledge is situated in social and organizational practices and relationships (Tsoukas and Vladimirou, 2001; Lam, 2000). From this perspective, knowledge (or rather knowing) is not so much possessed as embedded in practice. As such, knowing is inherently social (Lave and Wenger, 1991). Importantly, since knowledge is embedded in practice, direct knowledge transfer between projects is not possible. This is particularly the case where the focus of the knowledge sharing

involves innovation and change – precisely the focus of most project-based learning. This is because knowledge, or at least what counts as knowledge, will be contested. Those with particular vested interests, will seek to sustain power and control within their own knowledge domains and over their own work practices (Abbott, 1988).

These two opposing views of knowledge are found in many of the typologies of knowledge and knowledge management that have been developed. For example, McElory (2000) develops a typology based on what he describes as traditional and new approaches to knowledge management - first and second generation knowledge management. First-generation KM, focuses on the supply of knowledge; that is the dissemination, imitation and exploitation of knowledge. Second-generation KM focuses on creating and maintaining the conditions required for the production of knowing. Second-generation KM recognizes that knowledge is context-dependent, since "meanings" are interpreted in reference to a particular paradigm (Marakas, Johnson and Palmer, 2000; Shariq, 1998).

Hansen, Nohria and Tierney (1999) developed another typology, this time of KM strategies used by different companies: codification and personalization. Companies using the codification strategy focus on making all knowledge explicit, so that it can be stored on a database. Others can search this database and so acquire this knowledge rather than having to develop it for themselves. Clearly, this assumes that knowledge is something that is possessed. The alternative is to use a personalization strategy, encouraging employees to participate in networks where they can discuss and learn through dialogue. This strategy accepts that knowledge is closely tied to the activities of individuals as they go about their daily work and needs to be shared mainly through face-to-face contacts. Personalization assumes that knowing is embedded in practice.

Another typology of knowledge management was articulated by Swan, et al., (1999). These authors distinguish between a cognitive and community view. The cognitive view equates knowledge to objectively defined concepts and facts that can be transferred through text, using ICT. The community view, on the other hand, sees knowledge as socially constructed and based on experience. From this view, much knowledge will always remain largely tacit and as such can only be shared through joint experiences in social networks and groups.

Finally, Alavi (2000) focusing explicitly on KM systems – IT-based systems developed to enhance the use of knowledge in organizations – distinguishes between repository and network approaches. The repository approach involves building and implementing knowledge repositories and retrieval technologies, so that data, both internal and external, can be stored and searched. The network model uses technology to connect people, for example through having a corporate "yellow pages" directory. Essentially, the network model provides information on the sources of knowledge while the repository model supplies the knowledge itself.

Each of these typologies, then, develops some aspect of the distinction between knowledge as possession and the situated view of knowing. Yet, in reality knowledge is always a combination of tacit and explicit knowledge (Polanyi, 1958). Thus, Tsoukas (1996) argues that tacit and explicit knowledge are 'mutually constituted'. The recognition of the mutual interaction between tacit and explicit knowledge, led Cook and Brown (1999) to argue that the two views of knowledge – knowledge as possession and knowing as situated in practice - are mutually compatible rather than mutually exclusive. They suggest that they represent two different, albeit related, epistemologies - the epistemology of possession (knowledge) and the epistemology of practice (knowing). Thus, knowledge as something possessed must be practiced in a specific context to be meaningful. They refer to this as a "generative dance", with knowledge being a "tool of knowing" (Cook & Brown, 1999), making knowledgeable action possible. This suggests that knowledge, packaged as an entity, may be useful to someone – a tool - helping them to improve their practice. We return to this idea in the discussion.

The ICT-led approach to cross-project knowledge transfer is, as already discussed, firmly rooted in the knowledge as possession epistemology. Given what has been discussed above, the purpose of the empirical case investigation was to explore under what conditions this approach to knowledge transfer can be effective, but, more importantly, under what conditions it is likely to be ineffective. More specifically, in this paper we use empirical case material (Yin, 1989) from project experiences in six different organizations to consider why the ICT-based approach to the sharing of cross-project knowledge is not the tool of knowing that is anticipated and so does not typically achieve the significant exploitation of learning expected, even though this approach is now ubiquitous in terms of practice.

3 Methodology

This investigation was an exploratory qualitative study of thirteen unrelated projects, for the purpose of understanding the processes by which project-based learning and knowledge is created and transferred. The unit of analysis was the project. What the case studies give us that other research designs cannot is an intensive investigation of processes, which reveals the common patterns among projects. The limits of qualitative research involving a small set of cases are well documented: we do not know if the findings from this inquiry can be generalized to a larger population. The value of the research instead lies in its ability to provide insights through rich detail, and to provide directions for future inquiries.

The focus of our investigation was to use interviewing techniques to better understand the ways in which projects take their learning and transfer this knowledge to others. Interviewing was chosen as the method of investigation because there is a strong indication in the organizational learning and knowledge transfer literatures that the context in which transfer occurs is extremely important (Argote, 1999; Szulanski, 1996).

Companies were chosen based on industrial sector. Six diverse industrial sectors were represented in the data, telecommunications, pharmaceuticals, health-care, construction, social services, and automotives. These particular industrial sectors represent a substantial portion of the UK economy, and hence were identified as critical for inclusion in a UK-based cross-sector inquiry. In this paper we do not provide detailed descriptions of each case, given the limitations of space, but instead select case vignettes that provide us with the clearest example of the particular issue or the most contrast. This approach to case selection has been used by others (e.g., Wastell, 1999; Orlikowski, 1993). All organizations are located in the United Kingdom. Each of the organizations is a large, well-established company, in that they each have been operating for at least 30 years and on average employ over 50,000 people.

In each company, two specific projects were chosen as the focus of our investigation (in one of the cases we actually collected data from three projects). Projects were chosen by the organization, based on a set of guidelines set by the research team. Since we were interested in generic project-based learning issues, we asked each organization to provide us with a typical project. We also recognized the difficulties in comparing projects at different phases of their life cycle (Leonard-Barton, 1990), and so we requested a mature project that was well established in the organization.

We conducted interviews with a range of project team members, thereby providing us with a holistic perspective on project-based learning and cross-project knowledge transfer. In total, we interviewed 130 individuals, in 13 different projects, in six organizations over a two-year period (see table1 below). We also collected documentation from the different project teams.

Table 1. Projects included across sectors.

	Industry			**Services**		
Sector	Automotive 2 sites	Biosciences 2 sites	Construction 4 sites	Health 1 site	Mail 6 sites	Water 8 sites
Project 1	Product development (post-launch)	Product development (original)	Product development (repeat)	Service delivery development (reeng)	Outsourcing review (original)	Facilities Development (original)
Project 2	Product Development (early stage)	System development (original)	Product development (repeat)	Service delivery development (original)	Internal process development (original)	Process development (original)
Project 3			Product development (original)			

While the interviews varied in length from one-half hour to over two hours, on average each interview lasted for approximately one hour and fifteen minutes. At each interview, the researcher gave a brief example of knowledge transfer to help the respondent understand the general phenomenon of interest. The interviews then followed a pre-designed interview protocol. Questions in the interview protocol were developed based on an extensive review of the knowledge management literature, a workshop in which senior managers from each of the six companies discussed project-based learning issues, as well as from the backgrounds in knowledge management research of the various research team members. At each interview, numerous open-ended questions were asked to encourage respondents to relate stories of how knowledge was created and transferred within and across projects.

To aid in data consistency, the interview data was initially coded based on a coding scheme developed by the research team using NVivo. As is typical in inductive studies, writing the case studies was an iterative process in which the data was constantly revisited (Eisenhardt, 1989; Yin, 1989), searching for regularities and patterns. This enabled us to identify topics or themes which became the categories for further study (Bogdan & Biklen, 1992). Within each category if inconsistencies occurred among the data that was collected, third party sources were consulted for clarification. Triangulation across the different sources of primary and archival data revealed a high level of data consistency.

After each case study was complete, the data was re-analyzed to develop the conceptual insights presented in this paper. While there were no preconceived hypotheses at the outset of the inquiry, patterns emerged from the data reflecting the barriers and facilitators to the transfer of project-based knowledge using ICT.

4 Results

In this section we draw upon examples from the different projects, presenting them as vignettes, to illustrate the main issues that emerged from the analysis of the data. Two key issues appeared to be important in relation to understanding the limitations of ICT-based cross-project knowledge transfer: first the focus of learning and second the type of learning. In terms of the focus of learning, what emerged from the cases was that the learning on a project could be either at the individual, the group or the organizational level.

Individual learning:

Many of the interviewees in all the projects commented on how they are had personally learnt a lot from being involved in the project, for example describing their involvement as – “an incredible personal learning experience”. Many also commented on how the knowledge they had gained from the project would be retained by them and reapplied if they were involved in a project where this experience would be useful. In this paper, however, we are not interested in this individual level learning and transfer but the extent to which project-level knowledge is created and transferred.

Group/project learning:

The various projects that we studied certainly had a group level output – they each developed a product, a service or an organizational system - that was the outcome of drawing upon the knowledge of the various participants. However, there were

differences between the projects in terms of how far this group output was the result of simply adding together the knowledge of the individual participants to arrive at the output versus actually generating a group level of learning that was a product of interaction and debate between the different team members.

At one extreme of this continuum was the project in a hospital where the individuals who were supposed to constitute the project team – related to improving the transfer of care of patients once their hospital treatment had been completed - did not even know that they were on a project! For example, one person who was supposedly a team member commented - “to be fair I have not been involved in anything around delayed transfers of care.” (Matron). The Duty Manager had the same comment: “Interestingly enough when I got the e-mail from Mary I did say I was not aware I was part of the team. To me it is not there really. As far as I can see it is not a project and there is not a team doing it. […] She [Project Manager] did not set up a team or anything like that she just cracked on”. In this case, the team leader had discussed informally with the supposed team members ideas about improving the transfer of care of patients and had then written a report with recommendations based on the ideas and information gleaned from these discussions - “I was aware of Angie being around but not really understanding exactly what she was doing. But she dipped into a couple of our meetings relating to the predicted discharge date […]. And you would go and she would be there and you would think well how come she is here but I never formally sat down and discussed or had any conversation about transfer of care with her. I never really fully understood what Angie’s role was. Was she not working very much on her own then?” (Assistant General Manager, Medicine).

In one of the mail projects there was also limited evidence of learning and knowledge creation at the level of the project team. The project was concerned with the creation of a new international mail centre. It was a major capital investment project for the organization in terms of scope (one of the biggest things they had done) and focus (they had previously concentrated on the domestic operation) and involved project members from a range of different functional backgrounds, referred to as the project strands. However, Integration of the different strands had been issue, especially because the inter-dependencies between the different parts of the project were not well understood. In fact, the project was regarded as an automation project by the automation strand, a buildings project by the buildings strand, an operations project by the operations strand, an HR project by the HR strand, a commercial project by the commercial strand and each have had a different approach to managing projects and a

different experience of such big multidisciplinary projects. Not all the elements of the project had been ongoing from the start and all tended to have gone through different stages. There was a structure in place for inter-strand meetings. However, personal interests and task domains limited interaction: “we have no reason to speak to one another at all which I think is a good thing in so much as it would be very easy to get bogged down in everything that is going on in the project and then you have got too many fingers in too many pies. So it is quite good that we keep ourselves to ourselves.”

One of the construction projects in the water company, occupied a middle ground in terms of team level learning. The project involved three main internal stakeholders - the process development team, the works operation team and the engineering team. The process team involved the engineering team from early on because they knew they needed to understand the engineering constraints. The works operation team only really got involved when building on their area was discussed and there was very little interaction between the different sites. This prevented systematic cross-fertilization: “I think that is where we have missed out on this project. We have missed out this opportunity if you like to discuss it” (Area Works Manager) and “I think we tend to work more in our own specialized field we are very process driven these days. Very – and there is not so much cross fertilization I don’t think” (Area Works Manager). The lack of more systematic interaction was motivated by time pressure. In order to limit possible disturbance or noise, the implementation team (process and contractor) did not create an integrative forum to discuss inter-site issues: “And every time you put another forum in there which can throw a few more hand grenades in there you slow everything down. And I guess at the end of the day they still have to hit that due by date. So I can see why it has happened.” (Works Area Manager).

A higher level of team knowledge creation was achieved by the hospital project team that was reengineering the process for diagnosing and treating babies with a high risk of having a congenital dislocation of the hip. The project is known as the one-stop pediatric hip clinic (OSPHC). In this project, basically everybody who could have a say in the reengineering of the process was involved. This proved useful to address all relevant issues in a timely fashion: “Everybody right from me to Dr. W. were involved so therefore things that perhaps would have gone wrong at the running stage were already discussed and ironed out. So we did not really have that many problems” (Ward Clerk). The project was a great success. The maternity unit believed the project to be one of the best things brought to their practices in the last few years: “It is a bit

too successful in a way; we have got really big clinics and they are way ahead – it has achieved what it wanted to" (Ward Clerk). As for the patients, a satisfaction survey was conducted - the response rate and feedback were exceptionally good (100% response rate and all but one positive feedback out of 95 questionnaires handed in).

Organization learning:

In most of the cases the transfer of knowledge from the individual projects to the rest of the organization, relied very heavily on social rather than ICT-based networks, even though in virtually all cases all project documents and reviews were stored on a database that was accessible and searchable by others. Firstly, transfer occurred through individual project members moving to other projects. Secondly, transfer occurred through project managers talking to each other about their project issues. While these two mechanisms were important, the most widely cited mechanism facilitating cross-project knowledge transfer was through senior managers, who were responsible for larger programs, serving as the conduit -"the people that review the project frequently review many other projects and they can pass that information on to other teams" (interviewee in biosciences project). For example, in the construction company the sharing of knowledge across projects was left to the regional management team to come on site and try to extract information on what the lessons really were to be learned from the progression of a project: "it is not really our role at the end of the day it is the guys that go round the site taking ideas from other sites. Yes that is probably the only way it is shared" (Senior QS).

While cross-project knowledge transfer did therefore occur within each of the organizations, it should also be noted that many of the interviewees in each of the projects commented that this was not done as well as it might be. For example, in relation to the construction project in the water company, an interviewee commented that the assumption was that the lessons learned from sites would be passed on as each works were built through the local teams: "So you would hope that the lessons learnt would have been passed through these teams, the contractors and the engineers. I am not convinced that has worked very well." (Area Works Manager). In this case, despite the fact that the implementation was done in sequence rather than in parallel, cross-fertilization was limited and some sites experienced the same problems that other sites had experienced before them. This happened because issues were discussed locally and local teams were not aware of the issues faced by other sites: "The trouble is we have our local meeting where we discuss our local sites, not

knowing that all these problems are quite manifest and consistent across other ones as well" (Area Works Manager). As a consequence local teams were struggling with local issues in complete isolation from the rest of the company.

Moreover, not only was there not much evidence of knowledge transfer from the project teams studied to the rest of the organization, it was also the case that none of the projects that we looked at had really made use of the knowledge from other projects, which was stored in the organizational databases and available through the intranet. As one interviewee in the water company said - "Well I want to get this job sorted out, so while I am looking at other jobs or looking at what other people are doing I am not doing this one. Probably waste more time to be honest. In my opinion I should be doing this one, get this one done and then move on to the next job." (M&E Design Engineer). The result was that there was a lot of relearning that occurred. The comments from one of the hospital project interviews summarized this "We seem to perpetually be doing the same work over and over again identifying the same problems over and over again but nobody is actually doing anything about it." (Matron). Even where a project team had been very successful there was very little attempt to try and capture why this had been the case and to share this knowledge across the organization. For example, in the successful hospital hip project, the project was reviewed in terms of the performance of the new process (e.g. waiting time, number of referrals) as opposed to the way the project was developed and managed as a team. This relates to the issue of the type of learning that is described next.

Type of Learning

In terms of the type of learning, there was a very clear distinction that emerged from the data between product learning – what had actually been achieved in relation to the stated goals or objectives; and process learning – how the team had worked to achieve these goals or objectives and why certain processes seemed to have worked while others seemed to have been less successful. In particular, what was captured at the level of the project was much more often 'product' knowledge rather 'process' knowledge. For example, one of the biosciences cases involved the design and implementation of a new IT system to track project progress. Interviewees noted that much had been learnt by the project team, but that it was not in the mindset of the project team to envisage the deployment of learning points elsewhere because it had not been an objective of the project.

This lack of consideration for process learning and knowledge capture was explained by the concentration on delivering the project objectives. In other words, the focus was on the deliverables and the output rather than the methodology. The one exception to this focus on product learning was in one of the automotive projects. The project involved a major facelift of an existing vehicle. More importantly, the vehicle design and the project also spanned a change of ownership, so that the vehicle was designed under one parent company and then redesigned under another. Because of the change of ownership developing process knowledge became a priority. The newly acquiring parent wanted to find out as much as possible about the processes of the parent that was selling the company. This was done by pairing someone from the automotive company with someone from the departing parent company. More generally, however, this focus on capturing process knowledge did not occur. A number of reasons emerged from the data that help us to understand the focus on project-level product rather than process learning and knowledge capture. These are described next.

Belief in uniqueness of context:

Projects are set up individually and people do not necessarily see the connection between projects. Worst, it is not unusual to find several projects that are of a very similar nature going on in different parts of the organization. Given this perceived uniqueness, there was a common view that learning in the projects was too specific to be shared with the rest of the organization: “Probably 20% of what we do is general to everything 80% is specific to this project” (Interviewee in water company project). This perceived uniqueness meant that there was little attempt to try and capture process lessons that might be applicable elsewhere, even though many interviewees acknowledged that in reality this uniqueness was probably exaggerated.

Ability to capture and access the softer lessons:

Interviewees noted that systems are appropriate to capture product knowledge but not the process or “softer learning”. An example was provided by an interviewee: if a project involves a third party contract it would be very easy to actually get hold of the contract to look at. If the project was delayed because the team did not conduct negotiations with this third party early enough then: “I doubt whether I would find out that happened and I certainly would find it difficult to see the impact”. As one of the interviewees from a biosciences project commented: “Even if you did conduct that

review and it was valuable, I don't think we have the structure or language to learn from it. It is very easy to have a technical report but if there is an issue about the way work was conducted, I am not sure we have a framework to hang that on in order to know where to look to access it". This manager went on to provide an example from his own project, which had experienced problems with an external consultant they were working with. The consultant was preparing reports for the team, which they did not feel were very good, and the team put the blame on the consultant. However, when they finally got around to discussing it with him what became clear to them was that the problem was theirs – they had not made it clear to him what exactly they were looking for. The point was made that, even though no one on the project team had any experience of working with external consultants, within the larger organization they did have this previous experience and had faced this problem. However, the organization had not learnt from this and there was no specified procedure for making sure that this did not happen again. While recognizing this lack of inward learning transfer, this individual also admitted: "I don't really know how I can put that learning out into the organization so that others benefit from it… I and any member of the team that goes into another project and has to do some specification work for a consultant will be very much wiser than we were before. But another project, starting in a few months time that does not have one of us in it, they will have to learn that lesson (for themselves)".

The consensus was that process lessons are better shared informally and directly with the people who were involved: "I think you learn so much from looking at the system but there is more to be learnt by talking to somebody that has done it." Moreover, It is was noted that it was difficult and too time consuming to write lessons learned down: "I think you can't write it all down anyway. You could probably tell them in five minutes and can answer the question for them rather than spending half a day or a day trying to write it and put it down on paper." (Interviewee in water company project). And, even if process lessons are captured and stored many of the interviewees commented that they were very difficult to find. For example, an interviewee in the automobile company said: "the intranet within (X) - there is so much information there that you can't tell what is worth having and what is not" (Quality Engineer).

Overall then, the data indicated that these softer issues did not get captured, even when things had gone wrong. For example, on the mail project, despite the problems encountered in progressing the programme, there was no formal documentation of lessons learned or learning points for other projects. There was no ongoing log of

learning points of what would be done differently: “It is all within the head of individuals on the project” (manager in water company).

Standardization:

The accumulation of process knowledge was also limited by attitudes to innovation and change, especially in organizations that relied heavily on standard processes. In the construction company most of the projects they undertake are repeat projects or projects of a very similar nature, such as warehouses where design concepts and solutions are well established. In this context, they have a very standardized procedure that must be followed. The standardized procedure is essentially the accumulation of learning and knowledge from past projects. This works well when a project fits the normal template. However, where a project is different in some ways then this standard procedure becomes an inhibitor rather than a facilitator, because the project team finds it difficult to learn, not having been used to doing other than follow the set procedures. One of the projects included in this study, was indeed a project that was very different and involved the redevelopment of Birmingham International railway station. This was very different from the core of this company’s business which consists of much simpler, repeat and “bread and butter” jobs, usually referred to as “logistic tin sheds” in the company: “it is totally different from anything we have done normally” (Senior QS). Many problems were experienced in this project because project team members attempted to follow standard procedures which did not work in this new context.

More importantly, in this standardized context, as technical improvements need validation and may cost money to develop, stakeholders were often resistant to support more innovative technical solutions: “So the contractor’s argument is leave it the same as it is don’t refine it. Don’t improve it and we will get it to you cheaper. We want to continually improve it. But we have got a battle on then because it may cost us a bit more money” (Design Engineer). So in this context, there is a reluctance to share process knowledge because this is seen to be disruptive.

Project Reviews and Milestones:

The biosciences organization was typical of the project review practices identified among the cases. At the very end of the project the project manager is supposed to write up a project report with learning points and recommendations for future projects. The only thing required is to write the report and upload it. There is no real evaluation

of whether this has generated learning points or encouraged the sharing of insights. Interviewees commented that these reviews were often not done systematically or with any real emphasis because it felt like ‘an exercise of writing a document and putting it in a database where it would never be accessed’. One reason why these end-of-project reviews were not seen to be very effective was because of the time lag between the completion of the project and the meeting. Interviewees stated that it was not only very difficult to motivate and get a team together to conduct the review once the individuals had started to work on other projects but it was also often too late to have ready live memories. On the other hand, there was also a comment in this biosciences case that the end-of-project reviews are done before it is known how successful the product that has been developed actually is in the market place. This makes it difficult to evaluate the success of the project team.

In the automobile company also interviewees made similar comments about the limitations of the milestone and review processes: “technically it is part of our processes (to conduct lessons-learned reviews) but the important parts are always delivery of the vehicle out of the gate at the end of the day and the things which are not directly attributed to that are going to fall to secondary importance. And that is certainly going to include things like lessons learnt.” (Quality Engineer). Another problem related to learning around reviews was that the pre-determined time-bands as dictated by milestones did not necessarily correspond with learning needs. Thus, as an interviewee explained in the automobile company, learning and cross-fertilization between programmes largely happened as and when it was needed - “personally I think that is the best time to learn - when you have to” (Power Train Manager) as opposed to through formal review because the timing of that review was seen as inappropriate and its practicalities were limited for effective cross-fertilization: “It is informal but that is how things happen. Because to do it formally you would take a long time and you would probably get wrapped up in all sorts of bureaucracy. So if you can do it informally all the better.” (Vehicle Engineering Manager).

The construction company was similarly very focused on the successful delivery of the project, which distracted from any reflection on process: “on site you have only got one job to think about” (D&B Coordinator) so unsurprisingly, “there is very much a mentality of get this one done then on to the next one.” (Senior QS). For this reason project members did not see the direct benefit of documenting and sharing lessons learned on a systematic basis: “Sometimes you don’t have enough time on your hands to kick it

[the problem] round the table" (Senior QS). Another manager identified how the construction industry tended to have a "doing" culture: "the industry I think is too focused on actually building rather than sitting back and saying well let us take these people out for a week and do something that might benefit the company in the long run. It is all short term management." (Coordinator). A comment from a construction project interviewee described the end of project review process - "They do do a formal handover but it is not given enough credence in my opinion. It is very low priority. It is all about getting the job done and going on to the next one and not really learning lessons from where they have gone wrong in the past." (Senior QS). So, even if there was supposed to be a formal hand over meeting at the end of the project amongst all the site managers, contracts managers etc., due to normal pressures of work it tended not to happen until six months after completion and by that time everybody had moved on to other assignments and had their own different agendas. The result was a lack of systems and tools for reporting experiences: "There is no formal reporting system. And it is not really good to be honest." (Senior QS). In this company they did have a quality alert system that was supposed to be used where a major problem had occurred. However, this alert system largely went unused because project teams preferred to simply fix the problems as they happened and move on, leaving no record of the problem or how it had been solved.

In the mail organization interviewees commented on how documents (e.g. progress reports, issues logs, weekly steering group minutes or programme board meeting minutes) that had been generated regularly in the course of the programme were not that easy to draw from because one would need to have an understanding of the project to appreciate them. It was also noted in this organization that the organizational structure changes regularly (practically every eighteen months), so that formal knowledge capture mechanisms do not always work. There is no guarantee for example that the relevant database would still exist when required at a later stage as databases were cleared down on a regular basis. And even if the relevant database was still available, chances are that the information archived might not be that relevant to the new management systems and the organizational structure: "one of the best projects that I worked on was the track and trace project - very successful on the tracking of things and I kind of call on that whenever I can. But I have looked recently at the files and the things that are on line and they are completely out of date, just not relevant to the way we work today and the way the organization is structured."

Even documents kept for the project team itself were not all systematically used. For example, interviewees recounted how there were occasions when the project team had to go round the arguments on specific issues all over again because nobody could quite remember what they had decided in previous meetings. This was not because the meeting minutes were not kept but rather because people would rather rely on their memory than the minutes themselves.

Overall, it can be said that was documented at these milestones and reviews was not learning but actions and outputs because it was the much more specific issues about project progress that were important for the progression of the project and the satisfaction of the steering committees.

Lack of awareness that learning has occurred or needed:

Many of the interviewees in each of the projects described how they sought out knowledge only when they had a problem. For example, interviewees in the automobile case pointed out that organizational incentives did not encourage the search for 'best practices' because It emphasized expedience in getting the product to market. Learning was therefore described as more trial and error than it needed to be because time was not devoted to searching for best practice solutions. Best practice solutions were described as 'a luxury'! Similarly, in the mail company, cross-project learning was described as being essentially problem-driven as it happened informally mainly as and when deemed necessary in a situation where local understanding was not enough: "I would say it is at a fairly informal level. If there is a problem I have got and I can't see any way round of it then fairly soon I would make contact with other project managers that I know to see if they have had that problem and if so how did they get round it. Only if there is a specific problem I will try and pick somebody's brains on" (Programme Control Manager). An example was provided in the Biosciences IT implementation project where the team had failed to test the system adequately with some disastrous results when the system actually went live. But as one of the interviewees commented, given the inexperience of the project team, members had simply been unaware that they needed to do more testing. They had not been given adequate training and so while they did very little testing they assumed this was normal because nobody had told them how much testing you need to do, even though this knowledge was available in other parts of the organization.

A very common recognition among interviewees on all the various projects was that learning points were more naturally derived from problems in progressing the project, rather than from project successes: “They plan it and it goes according to plan and everything is fine and they don’t see it as a learning experience because that is what we planned to do anyway. The things that stick out in their minds are the exceptions and the exceptions are always the nasty surprises. I think that is why they are always focusing on these things.” (biosciences interviewee).

Similarly, in the construction company it was noted that lessons learned and learning points were typically biased toward what went wrong because of the nature of the work on these projects: “The mistakes are the ones you remember because they generally cost you money so it is generally the failures that you remember” (Senior QS), but the benefit of success stories, although recognized, were not capitalized on: “They are always very quick to tell you off for making mistakes but not quite so quick to praise.”

Interviewees also commented that learning from these mistakes typically remains personal: “the people that have made them (mistakes) will learn from them but the company should learn from them as well. There is not really a procedure in place where it happens at the moment.” (Senior QS). This means that even when there are problems they are not always shared beyond the project team. As described by an interviewee in one of the mail projects, there is a lot of sensitivity around some aspects of the project that makes it hard to discuss some of the issues: “you can't actually discuss some of the problems you are facing because by implication you are signaling there are issues with the project which you generally want to communicate through a structured process rather than let those things leak out”. Similarly, in the biosciences company the IT director commented: “(there) were people at that time who did not feel that they could be honest about problems within a project” and another interviewee stated: “I think sometimes there is a stigma associated with saying ‘we made a mistake’”.

5 Analysis and Conclusions

As a general finding, on all of the projects studied, projects were required to document what they were doing and conduct and capture a review of learning. This documentation was catalogued and then placed on an organizational database and so was available for others to search and learn from. However, interviewees in all companies stated that the documents thus produced were typically not helpful. Those

examples where transfer of learning was effective were much more heavily dependent on social networks than on ICT. In other words, learning from other projects occurred through a process of dialogue, and was only rarely mediated through ICT. The finding that social networks are more important than databases has been similarly found by others (e.g. Keegan & Turner, 2001). This suggests that, in relation to the sharing of project-based learning, the community model (Swan et al., 1999) or personalization strategy (Hansen et al., 1999) of knowledge management is more useful than the ICT approach.

An important reason why the databases were not used was because this data contained knowledge about what was done but not how and why, i.e., product rather than process knowledge. The data indicates a variety of reasons why this process knowledge was not captured and codified. Firstly, because it was more difficult to capture this 'softer' knowledge – interviewees discussed how there was no language for helping them to capture this type of learning – unlike more technical knowledge it could not be bundled into an equation. Secondly, project teams typically came together to reflect on progress around the pre-defined project milestones. However, given the need to show that progress was 'on-target' at these points in the project there was much more focus on what had been achieved and much less on how and why progress was either on or off target. Thirdly, learning was ignored when things went well and learning points were only really recognized when the project had hit a problem. Yet, there was a reluctance to share problem experiences because this could suggest that the project team had made some kind of mistake. Finally, the end-of-project reviews, which were supposed to be the major junctions at which teams reflected and captured lessons for the future were not very effective. In particular, participants pointed out that they were sometimes too late – so that the team had disbanded and each member moved on to another project so that they had either forgotten about or were less motivated to think about what they had learnt. On the other hand, some pointed out that these reviews were sometimes too early – after the project team had finished its work but before the product or service they had been developing had actually been evaluated by the customer, whether internal or external, so that the team could not really determine what the project had achieved.

These issues help us to make sense of why so little use was made of the project documentation and reviews that were stored on the ICT databases. If we return to the idea introduced earlier that 'knowledge is a tool of knowing' (Cook and Brown, 1999)

our data suggests that we should rephrase this to ‘knowledge can be a tool of knowing’ but only if a number of criteria are met. More specifically, our analysis of the interview data suggests three important criteria in relation to cross-project knowledge transfer. First, there must be some team knowledge that goes beyond the individual learning level; second, there must be an awareness that there is some knowledge that exists that could be a useful tool to help to improve the progress of a particular project; and finally, the knowledge that exists in the documents must actually be useful to others as a tool of knowing. Importantly, our data illustrate that in the context of cross-project knowledge transfer these criteria are often not satisfied – there is limited project-level learning, there is a lack of awareness that there is knowledge available that could be helpful and the knowledge that is captured is often not the most useful for other projects to learn from. We will consider each of these in the next paragraphs.

First, for cross-project knowledge transfer to be useful for organizational exploitation there must actually be some project-level learning that is worth sharing. While in all the projects there was evidence of some individual level learning – some project team members had learnt something as a result of being involved in the project – there was not necessarily any project-level learning. The starkest example of this was on the transfer of care hospital project but on some of the other projects there was limited evidence of project-level learning because interactions between the various groups represented on the project team were kept to a minimum in order to avoid conflict (Abbott, 1988), so that there was nothing learnt at the project level. In essence, where project teams approach the tasks mechanistically (Knights & Wilmott, 1997), each project member working independently on a set of clearly defined tasks or processes with which he/she is familiar using his/her existing knowledge, there is no real project-level learning. Individuals may learn through this process but there is no collective level of learning and so there can be no cross-project knowledge transfer.

Second, evidence from the cases clearly indicated that project team members typically only sought out external knowledge when they were experiencing a problem that they could not solve with their existing knowledge. As long as things ‘went to plan’ there was no attempt to learn or improve upon how things could have been done better. In other words, even if some knowledge existed in an organization that would be very pertinent in relation to the work of a particular project team this would typically go unutilized because teams would not make an effort to find a tool which could improve their operation if the tools they were currently using were ‘good enough’ (Simon, 1979). The

supply of knowledge on organizational intranets therefore often goes unused because the corresponding demand for this knowledge does not exist. This is why the role of intermediaries was so important in the case organizations – individuals who were over-seeing several projects and so could identify how knowledge acquired on one project might be useful to another team. These intermediaries acted as the bridge for this knowledge transfer. Without these bridges each project team is likely to remain blissfully unaware of knowledge that might be a useful tool in their own context, however, well-stocked the databases. This lack of demand for knowledge that could potentially improve the project process was particularly acute at certain points in the project life-cycle. For example, when deadlines were approaching the focus was very much internal, to ensure that milestones were achieved, and there was little consideration of how knowledge from others could be helpful, unless there was a problem that could not be solved. So while the milestones and review points were potentially opportunities for reflection on what had been learnt, in reality they were actually only rarely focused on this because of the demand to deliver output.

The intermediaries did then ensure some cross-project knowledge transfer based on their personal understanding of what knowledge might be useful to a particular project. These individuals could have pointed project team members to the documents that existed from other projects that they thought would be useful. The evidence suggested however, that they were more likely to connect people personally rather than connect people to the documents. In understanding why this happened we need to consider the final criteria that seemed to make the knowledge that existed in databases not very helpful to other teams as a tool of knowing – the content of this knowledge. Earlier we discussed how explicit and tacit knowledge were mutually constituted (Tsoukas, 1996). Here, however, it was not that the project team members lacked the tacit knowledge or the absorptive capacity (Cohen and Levinthal, 1990) to make use of the explicit knowledge, but rather that the explicit knowledge was simply of the wrong type to be useful. The documents that existed on these databases tended to focus very much on what had been achieved by a project team rather than how this had been achieved and/or why what had been done either worked or did not work. In other words, what was stored was typically product knowledge rather than process knowledge. Yet, the product knowledge was less useful because this referred to the specific objectives of the project which was unlikely to be helpful in other contexts given that project objectives per se are typically unique. What would have been more useful was the process knowledge since this has a much wider relevance across projects. There were

examples of where this process knowledge was captured and in these instances it was found to be useful. For example in one of the automobile projects there was a focus on process knowledge because the change of ownership motivated the acquiring parent to learn as much as possible about the processes of the departing owner. In most of the other projects, however, this process knowledge was largely ignored.

Understanding why the project knowledge captured on ICT databases and potentially available through intranets does not typically provide a useful 'tool for knowing' for other projects also helps us to think about how this knowledge might be made more effective. First, it suggests that there is likely to always be a useful role for intermediaries, given our natural tendency to 'satisfice', especially when deadlines are tight as they often are on projects. These intermediaries can connect teams to knowledge that might help them to improve the ways they are working, even when there are no immediate problems. The role of these intermediaries is to encourage teams to see how, despite their uniqueness, there is room for them to learn from the experiences of others since others may have learnt about procedures that will be useful to them. In other words, it is important for managers to encourage project teams to think about what procedural type problems they are likely to face and to recognize that other teams may have developed some useful ways of overcoming these problems that the team can learn from. So, while the particular focus of the project may be unique, the processes are likely to share much in common with the processes used by past projects. Second, it suggests that teams could usefully be encouraged to capture process rather than product knowledge since it is this process knowledge that is likely to be more widely useful to other project teams. This would require a specific emphasis on the capture of process knowledge, as in the automobile project, as without this emphasis our data illustrate that the deadlines and milestones naturally divert attention to the product knowledge – what has been achieved. In particular, this suggests a need to change the typical focus of project reviews which generally ask project teams to capture only what they have achieved and do not encourage reflection on how. Interestingly, one of the interviewees in the biosciences case commented how being involved in this research had itself been a stimulus to this organization's focus on process type learning issues - "I would say that it is only since talking to you and your colleagues about the concept of learning, about the way we conduct projects one to another, has really come to the fore in my mind. I don't think there is a consciousness that you have got two types of learning from a project - you learn what the project achieves but you also learn from going through the process and running it". And finally,

there is the more general suggestion from the analysis that effort placed on developing personal networks (a community approach - Brown and Duguid, 2001 - to facilitate cross-project learning) may be more effective than, or at least a necessary compliment to, setting up a database to capture project documents and codified lessons learnt (an ICT approach).

References

Abbott, A. (1988). The System of Professions. Chicago: University of Chicago Press.

Alavi, M. (2000). Managing knowledge. In: R. Zmud (Ed.), Framing the Domain of IT Management. Cincinnati, Ohio: Pinnoflex Educational Resources Ltd. Chapter 2, 15-28.

Alavi, M. and Leidner, D. (1999) Knowledge management systems: issues, challenge and benefits. Communications of the Association for Information Systems, 1, Article 7.

Argote, L. (1999). Organizational learning: Creating, retaining and transferring knowledge, Boston: Kluwer Academic Publishers

Ayas K, Zeniuk N. (2001). Project-based learning: Building communities of reflective practitioners. Management Learning, 32, 1, 61-76

Blackler, F. (1995). Knowledge, Knowledge Work and Organisations: An Overview and Interpretation. Organisation Studies, 16, 6, 1201-1041.

Bogdan, R.C. and Biklen, S.K. (1992). Qualitative Research for Education, Boston: Allyn and Bacon

Brown, J. S. and Duguid, P. (2001). Knowledge and organization: A social-practice perspective. Organization Science, 12, 2, 198-213.

Clark, K.B and Wheelwright, S.C. (1993). Managing New Product and Process Development, New York, The Free Press.

Cohen, W. M. and Levinthal, D. A. (1990). Absorptive-Capacity - a New Perspective on Learning and Innovation. Administrative Science Quarterly, 35, 1, 128-152.

Cook S D.N. and Brown J.S. (1999) Bridging Epistemologies: The generative dance between organizational knowledge and organizational knowing. Organization Science, 190, 381-400.

Eisenhardt, K. (1989). Building theories from case study research. Academy of Management Review, 14, 532-550

Johnson, J. (1995). Chaos: The dollar drain of IT project failures. Application Development Trends, Jan., 41-47.

Hansen, M., Nohira, N. and Tierney, T. (1999). What's your strategy for managing knowledge? Harvard Business Review, March-April: 106-16.

Keegan, A. and Turner, R. (2001). Quantity versus quality in project-based learning practices. Management Learning, 32, 1, 77-98.

Kotnour, T, (1999). A learning framework for project management," Project Management Journal, 30, 2, 32-38.

Knights, D. and Wilmott, H. (1997). The hype and hope of interdisciplinary management studies. British Journal of Management, 8, 9-22.

Lam, A. (2000) Tacit knowledge, organizational learning and societal institutions: An integrated framework. Organization Studies, 21, 3, 487-513.

Lave, J. and E. Wagner (1991). Situated Learning: Legitimate Peripheral Participation. Cambridge University Press, Cambridge.

Leonard-Barton, D. (1990). The intraorganizational environment: Point-to-point versus diffusion. In Williams, F. & Gibson, D.V. (Eds.) Technology Transfer: A Communication Perspective, Thousand Oaks: Sage Publications

Marakas, G.M., Johnson, R.D., and Palmer, J.W. (2000). A theoretical model of differential social attributions toward computing technology: when the metaphor becomes the model, International Journal of Human Computer Science, 4, 719-750.
McElroy, M. (2000). Integrating complexity theory, knowledge management and organizational learning. Journal of Knowledge Management, 4, 3, 195-203.
Nonaka, I. (1994). A dynamic theory of organizational knowledge creation. Organization Science, 5, 1, 14-37.
Nonaka, I and Takeuchi, H. (1995). The knowledge-creating company: How Japanese companies create the dynamics of innovation. New York: Oxford University Press.
Orlikowski, W. (1993). CASE tools as organizational change: Investigating incremental and radical changes in systems development. MIS Quarterly, 17, 3, 309-324.
Polanyi, M. (1958). Personal knowledge. Chicago, Ill.: University of Chicago Press.
Prusak, L. (1997). Knowledge in organizations. Oxford: Butterworth-Heinemann.
Raelin JA. (2001). Public reflection as the basis of learning. Management Learning, 32, 1, 11-30
Rubery, J., Earnshaw, J., Marchington, M., Cooke, F,L. and Vincent, S. (2002). Changing organizational forms and the employment relationship," The Journal of Management Studies, 39, 5, 645-672.
Ruggles, R. (1998). The state of the notion: Knowledge management in practice. California Management Review, 40, 3, 80-9.
Sauer, C., Liu, L. and Johnston, K. (2001). Where project managers are kings. Project Management Journal, 32, 4, 39-49.
Shariq, S.Z. (1998). Sense making and artifacts: an exploration into the role of tools in knowledge management. Journal of Knowledge Management, 2, 2, 10-19.
Sharp, D. (2003). Knowledge management today: Challenges and opportunities. Information Systems Management, 20, 2, 32-37.
Simon, H. (1979). Rational decision making in business organizations. The American Economic Review, p. 510.
Swan, J., Newell, S., Scarbrough, H. & Hislop, D. (1999). Knowledge management and innovation: Networks and networking. Journal of Knowledge Management, 3, 4, 262-275.
Szulanski, G. (1996). Exploring internal stickiness: Impediments to the transfer of best practice within the firm. Strategic Management Journal, 17, 27-43.
Tsoukas, H. (1996) The Firm as a Distributed Knowledge System: A Constructionist Approach. Strategic Management Journal, 17, Winter Special Issue, 11-25.
Tsoukas, H. and E. Vladimirou (2001). What is organizational knowledge? Journal of Management Studies, 38, 973-993.
Von Zedtwitz, M. (2002). Organizational learning through post-project reviews in R & D. R & D Management, 32, 3, 255-268.
Walsham, G. (2002). What can knowledge management systems deliver? Management Communication Quarterly, 16, 2, 267-273.
Wastell, D. (1999). Learning dysfunctions in information systems development: Overcoming the social defences with transitional objects. MIS Quarterly, 23, 4, 581-600.
R. Yin. (1989). Case Study Research: Design and Methods (Rev.ed). Sage, Beverly Hills, CA.