A CONSTRUCT FOR PROJECT-BASED LEARNING: THE PROBOL MODEL

Theme: The Nature of Learning and Knowledge

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Abstract

Research entitled 'Organisational Learning and Business performance in Project-based Organisations' (PROBOL) is being undertaken by University College London and Cass Business School, London with seven organisations from diverse industries.

Its focus is on how strategic learning occurs within organisations as a consequence of project experience and how people actually learn. The developing theoretically grounded model reflects the interrelationship.

At the strategic level it centres on issues related to 'second order' learning (Argyris and Schon, 1974), regarding project-generated knowledge. Nonaka et al's model of knowledge creation (Nonaka et. al 1995, 2000, 2001) provides the starting point for investigating knowledge creation in projects.

Introduction

This paper reports on work in progress in an EPSRC funded research project, Project Based Organisational Learning ('PROBOL'), which is based around the development of a theoretically grounded model of organisational learning and knowledge creation in project-based organisations that addresses a core issue.

The core issue faced by organisations is, 'Why is it so hard for individuals to learn and create knowledge?' (Argyris, 1991, Von Krogh, Ichijo and Nonaka, 2000). In a recent interview with Edgar Schein (2002), Diane Coutu (2002) comments on the dilemma:

"Despite all the time, money and enthusiasm that executives pour into corporate change programs, the stark reality is that few companies ever succeed in genuinely reinventing themselves. That's because the people working at those companies more often than not fail at transformational learning – they rarely get to the point where they are eagerly challenging deeply held assumptions about a company's strategies and processes and, in response, thinking and acting in fundamentally altered ways. Rather most people just end up doing the same old things in superficially tweaked ways – practices that fall far short of the transformational learning, learning that most organisational experts agree is the key to competing in the twenty first century".

This issue is being investigated in this research project, within the context of project-based organisations, a category that is as under-researched as it is important. The focus of this research is the development of a model of project-based organisational learning for business performance. Central to the research is learning from projects, and why this is so difficult to operationalise. This paper enumerates the main construct of the research, which investigates the strategic learning interface.

Projects and organisational learning [1]

Projects are organisational vehicles for achieving a unique objective. Most authors begin with this as their core feature. Kerzner (1997), for example, characterises a project as having " a specific objective to be completed within certain specifications, with defined start and end dates, funding limits (if applicable), and which consume resources (i.e. money, people, equipment)" [Kerzner, 1997]. BS 6079, *A Guide to Project Management*, defines a project as "a unique set of coordinated activities, with definite starting and finishing points, undertaken by an individual or organisation to meet specific objectives within defined schedule, cost and performance parameters" [British Standards Institute, 1996]. *The Gower Handbook of Project Management* states that "a project is a cycle of activities with the purpose of supplying, within definite start and completion dates, a unique product, service or set of information to a specified quality and cost" [Locke, 2001]. PMI's *Guide to the Project Management Body of Knowledge* – PMBOK® – defines a project as "a temporary endeavour undertaken to create a unique product or service" [Project Management Institute, 2000].

Yet in reality the most fundamental characteristic of a project is something which is a direct result of this uniqueness and yet which is hardly mentioned in these definitions (pace Gower), namely *the project development life cycle. The one single thing which distinguishes projects from non-projects is that all projects, no matter how complex or trivial, go through a common life cycle development sequence.* It is the act of going from Concept through Definition, Development, Build, and Hand-over – or words to such effect: several different life cycle models exist [Project Management Institute, 2000; British Standards Institute, 1996; Dixon, 2000; Forsberg et al., 1996] – that truly distinguishes projects from non-projects. This sequence is invariant[2]. (See Figure 1) As such, they are important organisational vehicles for change. They are also the organisational form for achieving effective capital expenditure (facilities creation, new product development). As such they are responsible for a huge proportion of world GDP.
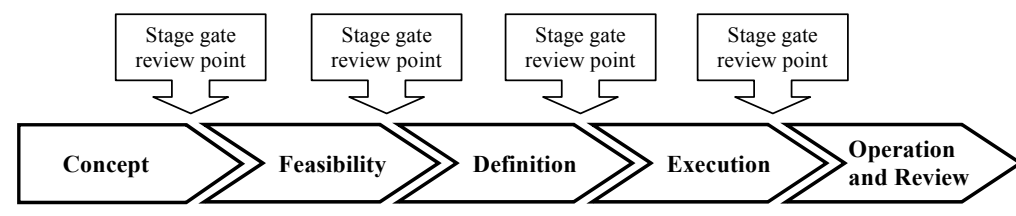

Figure 1: the project life cycle.

Despite their importance, their management is too often trivialised as a form of planning and monitoring, with perhaps the deployment of some soft skills such as teamwork and leadership. In reality project management is much more than merely as an execution discipline for completing a set of tasks 'on time, in budget, to scope'. It involves 'front end' work in deciding the strategic approach, addressing funding and compliance issues (safety, health, environment, quality, etc.), and managing the development of the project design

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[1] PROBOL Paper: Morris and Loch, 2003
[2] It is useful to note that the same life cycle sequence can be nested within each stage of the overall life cycle, just as subprojects nest within projects which can nest within programs

before moving to 'build'. Planning, optimising, monitoring, dealing with changes and risks are on going throughout. Managing projects effectively is in reality as much about 'doing the right projects' as 'doing the projects right' (Collison and Parcell, 2001). The term 'the management of projects' has been used to capture this broader intellectual framework of defining and delivering the project, within its changing context (Morris, 1992, 1997).

In fact, as current research being carried out at UCL (Morris and Jamieson, 2003) confirms, the management of projects is a fundamental means of translating corporate strategy into effective results. There is a clear sequence of moving from enterprise strategic management, through portfolio management, to program and project management (Figure 2).
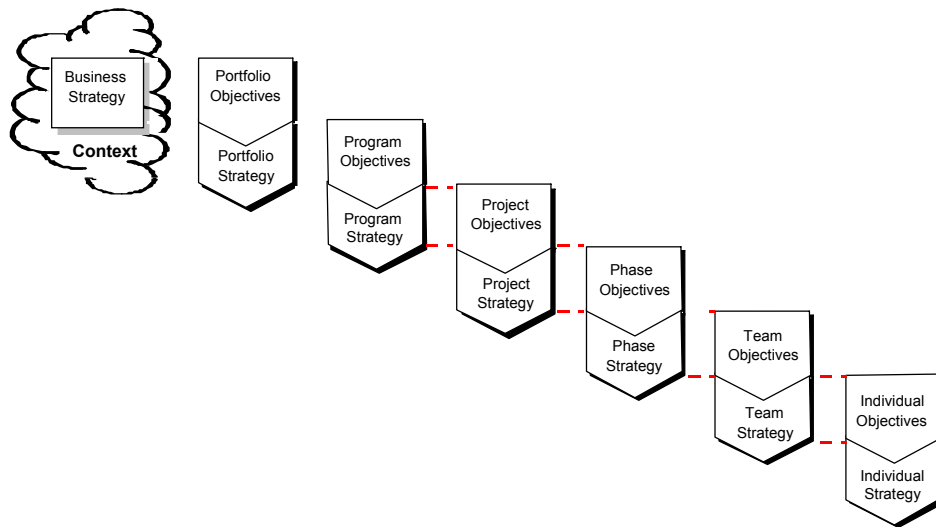

Figure 2: the sequence of progressing from business strategy to project strategy

Many organisational theorists present projects as a form of 'adhocracy' (Mintzberg, 1979, 1985), failing to bring out the importance of the life cycle discipline to the effective management of projects. In the same vein, projects, in this guise as non-bureaucratic, agile organisational forms, have been promoted as particularly useful forms for effecting organisational learning and knowledge creation (Nonaka et al., 2001). While it is certainly true that the task nature of projects ought to lend itself to greater organisational flexibility and innovativeness, it is important to recognise that the gated process development character of the project life cycle offers a particularly good framework for learning opportunities to be organised in a disciplined manner (as is being demonstrated in the research being reported here).
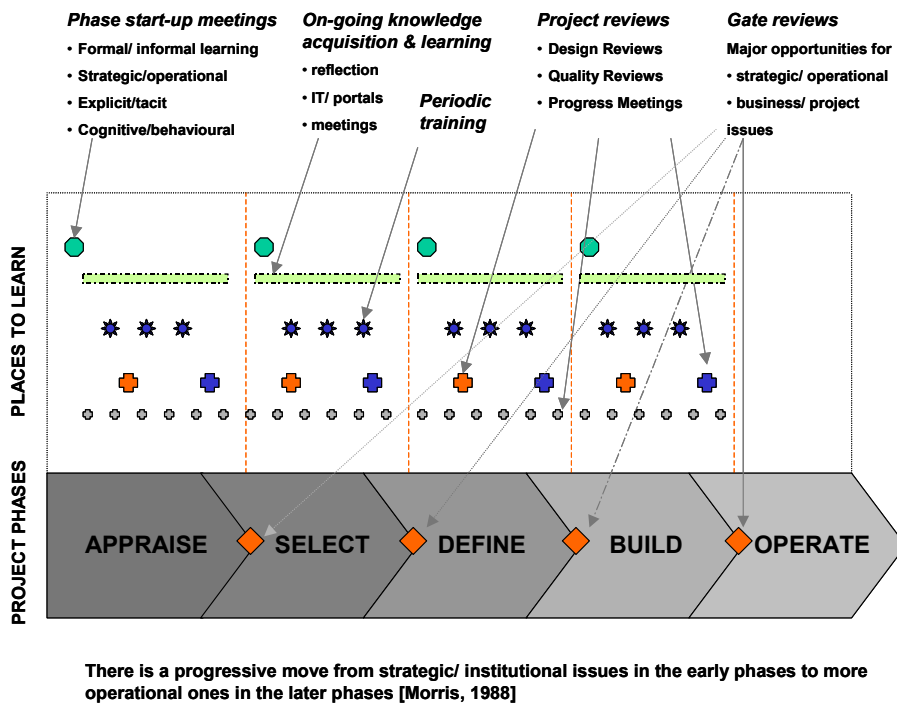
Figure 3: Learning opportunities organised by the project life cycle

On the other hand, projects pose their own quite particular challenges of organisational learning (Lundin & Midler, 1999; Dixon, 2000; Brander-Löf, Hilger, & André, 2000; Turner, Keegan & Crawford, 2000). Project-based organisations work on life cycles that are often long, developmental, non-repetitive, and typically organized around teams assembled specifically for the project that are often disbanded, sometimes quite rapidly, upon the project's completion. Typically, companies – and people and teams – come together for the first time in 'the organization' (i.e. the project): this means there is often a scramble to create the right Knowledge Management /Organisational Learning culture, locate knowledge 'assets', and access and internalise previous learnings. Supply chain patterns and procurement practices militate against effective learning practices.

Hence, for example, Scarbrough et al (2002) found that "many features of project-based practices and learning pose specific challenges to current knowledge management and project management approaches". Rehearsing the lack of "institutionalised mechanisms for knowledge capture, learning and improvement, which are built into more steady-state activities (Edelman, 2000)", they consider the multidisciplinary and cross-functional character of projects prevent knowledge sharing, both across and within projects (Knights and Willmott, 1997; Newell et al., 2001).

Knowledge Management and Organisational Learning are particularly important in projects because too often their performance is often not good (Baker, Green & Bean, 1986; Baker, Murphy & Fisher, 1974; Cooper, 1993; Crawford, 2000; Lim & Mohammed, 1998; Morris & Hough, 1987; Pinto & Slevin, 1988; Standish, 2000). With the growing recognition therefore of the need to learn and improve our project management capability, there has recently been several studies of learning in project-based organisations resulting in the identification of the

following as being 'good practices' (Brander-Löf, Hilger, & André, 2000; Leroy, D. 2002, Turner, Keegan & Crawford, 2000) resulting in the following as being 'good practices (Figure 4).

- Systematic collection of learning [on projects]
- Periodic project review points
- Distinguishing between tacit and explicit knowledge
- Identification of key persons as repositories of tacit knowledge and as 'owners' of subject matter areas:
- Information Management tools to capture, store, process, archive, retrieve and present explicit knowledge
- A discipline of accessing knowledge (using checklists or other 'look up' guides etc) by the project teams before beginning a new project task
- A definition, in some way, of the knowledge in a particular area: the 'Body of Knowledge'
- Establishment of an integrated KM program in place [informally even if not formally]
- Formal management of this KM program
- A formal program of learning defined, using this knowledge
- The distinction made between individual, team and organizational learning
- A mechanism for updating the knowledge.
- A program or programs developed to use the knowledge/ learning that is 'identified'
- Metrics/ benchmarking,of knowledge effectiveness
- Continuous improvement/upgrading
- A competency development program related to organizational learning
- Training (as part of the above): face-to-face and IT/e enabled

Figure 4: Project based 'best learning practices'

If these then are best practice, is this enough? Should project-based organisational learning now work satisfactorily. The research being reported here suggests not: for these recommendations still skirt one of the hardest issues of all – not just in projects but in fact in all organisations: why is it so hard to get people really to learn?

PROBOL: research into project-based learning [3]

It was within this context that an Engineering and Physical Sciences Research Council funded research project was launched on learning in project-based organisations (PROBOL), the aim being to compare best practices of organisational learning in project-based organisations across several different industry sectors[4].

A review of the literature showed that whilst the organisational learning field was well populated, the vital issue of knowledge creation had received less attention. Most organisational learning theories were deficient in viewing "that knowledge development constitutes learning" (Senge, 1990). Nonaka and Takeuchi (1995) outline the limitations of this perspective commenting that even after twenty years of work in this field, "a comprehensive view of what constitutes "organizational" learning has not been developed".

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[3] PROBOL Paper: Morris and Loch, 2003
[4] Six global companies (in banking, computer systems, construction, energy, pharmaceuticals, and turbines) and one government department.

In the initial stage of the PROBOL research an exploratory stance was taken through adopting a 'grounded theory' approach to establish key variables/factors across each of the seven organisations being studied. This enabled the identification of emergent variables, while providing a framework that allowed comparisons to be made across them. The model that is emerging is embedded in the literature on organisational learning and knowledge on the one hand and project management and the management of projects on the other. The initial findings have also informed the development of the model. The findings from this phase of the research have informed the development of a theoretical model of project-based organisational learning and knowledge creation. The dimensions of 'process', 'content' and 'context' were evident from the findings. The 'content' aspect has been acknowledged through benchmarking at the project level, whilst in the 'external context' environmental turbulence has been identified as an influence in the learning 'push' and 'pull' of the 'internal context'.

The emerging model being developed in PROBOL draws on the work of Nonaka et al. (1995, 2000, 2001). At the core of the model is the knowledge conversion process that converts tacit knowledge into explicit knowledge, and back again to tacit knowledge, through a continuous spiral of the knowledge conversion modes of 'Socialisation', Externalisation, Combination and Internalisation'. Nonaka et al. acknowledge both the 'content', the knowledge assets and the 'context', the 'Ba', considering them as moderating the knowledge conversion process. (Requisite variety is cited as one of the key enablers of 'Ba'. Drawing on the work of Ashby (1956) on the 'law of requisite variety', Nonaka et al. include this enabler in recognition of the fact that 'in order to deal with challenges posed by the environment, the internal diversity of an organization has to match the variety and complexity of the environment' (Nonaka et al. 2001).)

A new structural form is advocated by Nonaka (2001), that of the 'hypertext' organisation, on the basis that conventional structures are unable to support the development of "organizational capability to acquire, accumulate, exploit and create new knowledge continuously and dynamically and to re-categorize and re-contextualize it strategically for use by others in the organization or by future generations". The 'hypertext' organisational structure is where the three layers of, "business-system (utilization of knowledge), knowledge-base (accumulation and sharing of knowledge), and project-team layer (creation of knowledge) engage in a dynamic knowledge cycle". This view of organisational structure resonates with the perspective adopted for this research of how projects feed into the strategy of organisations (Morris and Jamieson, 2003), the management of projects (Morris, 1994) and project management (Morris and Hough, 1987).

The Emerging Learning Model for Project-Based Learning
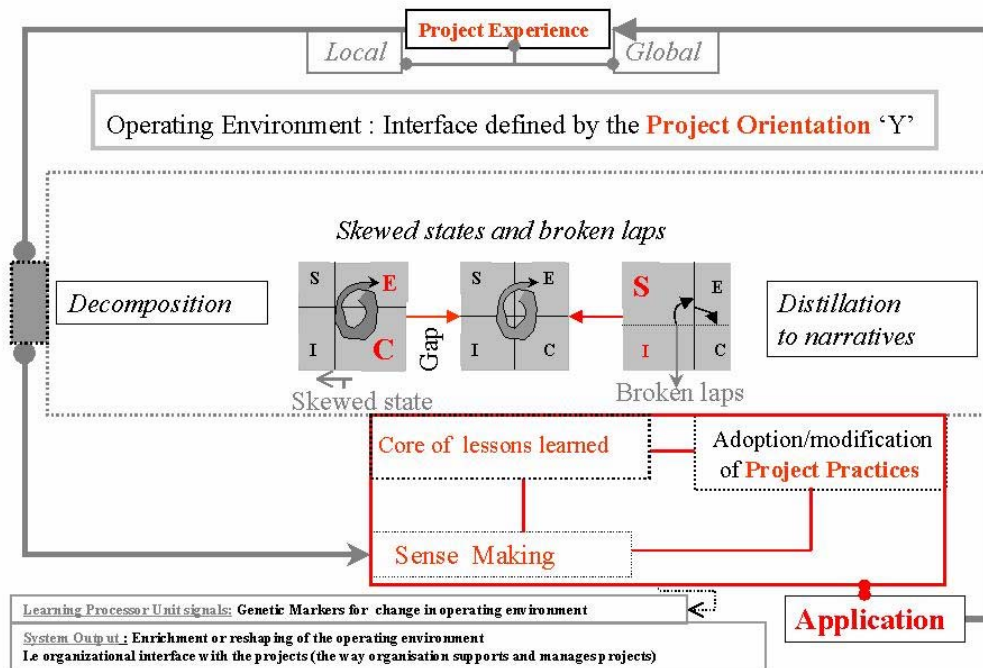
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Figure 4: Project based Learning Model[5]

Strategic Level Project based learning [6]

PROBOL's theoretical empirical model has two main components. The first, at a strategic level, investigates issues related to what is termed second order learning (Argyris and Schon, 1974), and can be understood as project generated knowledge that has an impact on the way organisations plan and manage projects. The second one examines knowledge creation and learning at the operational level.

The strategic construct of the PROBOL model has been configured under several relationships, combining a wealth of alternate yet connected perspectives from literature and adding insights from the first exploratory phase.

One of the key perspectives relates to 'project orientation'. Project orientation in literature has been used to imply the extent to which an organisation is project led or project based. The higher project orientation is, under this conceptualization, the higher is the project performance, as suggested in some case research (Morris and Hough, 1987; Might and Fisher, 1985). The term is also seen at the individual and team level as in being shaped by work experience. It has been used as a defining characteristic of variables like project leadership (Wheelwright, Clark, 1992) and team competence (Gareis & Hueman, 2000),

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[5] PROBOL Paper: Lampel, Morris, Jha and Loch 2003
[6] PROBOL Paper: Lampel, Morris, Jha and Loch 2003

among others. The concept of project orientation under these perspectives has contributed to management design for resourcing, control and co-ordination (Gareis, 1992).

These multiple perspectives aim at capturing aspects of the understanding about the 'mutual' fit and the pattern which typifies how organizations relate to the projects they undertake. Most of the literature, however, continues to have the dominating premise of the 'fit of the organisation to the project' (Wheelwright & Clark, 1992). This term we have used in the research as implying how the organisation supports and controls projects, essentially, how the projects relate to the core operations of the organisation. This sets our investigation's environment at a strategic level by looking into the project organisation interface that is unique to every organisation and also changes overtime in response to learning. The 'practices' part examines the modification and adoption of the project practices, which for our purpose are defined as strategic rules or phenomena that guide the project execution. These in our research act as 'genetic markers' for learning that is manifested in the ways in which the organisation supports and controls projects, thus the project orientation of the organisation.

The changes induced by learning can be either minor or major; depending upon how lessons are made sense of; sense making being the relationship between strategic experiences and strategic frameworks, (Kuwada, 1998). This core of lessons learned, and the strategic framework in which they are set, the research suggests, undergoes a process of enrichment and reshaping (Lant and Mezias 1992; Tushman and Romanelli 1985) to form the dynamic process of project-based learning

The construct of project orientation and practices forms the main part of our empirical investigation. In conjunction with case study work it is expected to throw light not only on how organisations are learning from projects, but also on the nature of enablers in the project and the organisational interface that impact on this learning from project experience. The perspective about where the experiences originate and how they are perceived is under the construct of direct (local) or indirect (more global) experiences. These form key moderating variables for the PROBOL construct.

The treatment of experiences for organisational learning has been addressed in the literature either as explicitly 'decomposed' experiences or, at the other end of the spectrum, narratives that shape organisational perception (Snyder and Cummings 1998; Schulz 2001). We have used such frames in combination to create a continuum that connects the strategic level approach such treatment of project experience to the more micro level thoughts on knowledge creation (Nonaka et al., 2001). This continuum between decomposition and distillation of project experiences defines stages or states of the skew in the modes of knowledge conversion in the knowledge creation spiral. This unification of the model not only for the first time operationalises the four modes of knowledge conversion, but also provides a device that allows the investigation of strategic intent about channelling learning. It is anticipated that the findings from this part of the research will enable the detection of possible levers and measures of learning and knowledge creation, at the operational level. The unification is further discussed in the following section thus delineating the evolution of the PROBOL model.

Operational Level Learning from Projects

As briefly mentioned in the preceding section the second part being integrated into the PROBOL framework is taken from the robust construct of Nonaka et al's model (Nonaka et. al 1995, 2000, 2001). This relates to tacit and explicit components of the knowledge creation process. It is essentially investigating knowledge creation at the operational level of the project. It incorporates the view that 'content' and 'context' play mediating/moderating (Nonaka, et al., 2001, Ferlie and Loch 2001) role in the process of knowledge creation. The literature demonstrates the embeddedness of the processes of learning in social contexts (Lave and Wenger, 1990. Wenger, 1998; Brown and Duguid, 1991). Dierkes, Antal, Child, and Nonaka (2001) consider that the "key challenge to models of organisational learning is to recognise how its processes are embedded in social contexts".

Several authors support this notion adding that the contexts can be explored "in terms of those participating and their cultures, as well as task systems, organisational structures and environmental forces". A similar argument related to organisational learning has been put forward by Loch (2000) and Ferlie and Loch (2001). This contends that the process of learning is mediated by the learning 'content' and 'context'. Pettigrew and Whipp (1991) and Pettigrew, Ferlie and McKee (1992) embedded their research in the work on organisational change. This model has now been extended to 'knowledge creation'. The work of Nonaka et al., has also been explored in the context of project life cycle (Leroy, 2002). An integrated conceptualisation with the strategic part of the model and associated operationalisation has been proposed under PROBOL. This is a significant addition to the theory presented in previous work in the area of organisational learning and to the relatively newer area of project-based learning.

Socialisation, externalisation, combination, and internalisation, as delineated the model (Nonaka et al.), is being seen in PROBOL to relate to the second element of strategic project-based learning: the continuum between decomposition and narratives. A basic illustration of the skew that was introduced in the preceding section is that socialisation appears more dominant when distillation (stories/narratives/word-of-mouth) is the dominant strategic mode, while combination appears more dominant with discovery (explicit capture of knowledge). Both ends of this continuum are shaped by how the organisation has made sense of its experiences in relating project experiences to improve business performance. In most cases this is seen as more emergent and less deliberate, indicating a scope for strategic action and thus further validating the PROBOL model.

The integration has several dimensions, besides this basic illustration. One that is of importance is the recognition of the 'state of the skew' (from the traditional balanced quadrants of the modes of knowledge conversion i.e. SECI). It establishes the current position of the organisation and compares it with the desired state, thus bringing into play the issue of 'levers and measures'. The purpose of these is to relate measures of learning outcomes to the effectiveness of learning processes. This issue is being investigated both at the micro level of the knowledge creation process and at the more macro or strategic level.

In recent discussions with partners at data collection sessions, some interesting insights have emerged concerning connecting the modes of knowledge conversion (socialization, externalization, combination and internalization) to the project life cycle. The ensuing

discussions indicated that breaks in the modes of knowledge conversion spiral[7] provide strong grounds for exploring further corridors that connect strategic intent to operational level impacts on project based learning. The project life cycle linked to modes of knowledge conversion have been addressed in the recent past, albeit with a view to map the modes of knowledge conversion within different life cycle components (Leroy, 2002). The perspective that is being adopted in PROBOL is to map the project life cycle on to the knowledge creation process. Breaks in the knowledge creation spiral, when the project life cycle is mapped on to it, are breaks in the 'learning gates' from one life cycle component to another. Such breaks can be related to treading back on the project life cycle (e.g. revisiting the early design-development phase) owing to phenomena, such as scope creep, which in turn are related to aspects such as length of project lifecycle and/or extent of business environment turbulence and/or nature to sanction from sponsor, amongst others. These strategic elements or ways that the organisation manages its projects are embedded in the practices that are the focus of the data collection activities. A further connection with the strategic frame defined by project orientation, other than the skew in the modes of knowledge conversion, has thus been established.

Research Design and ongoing data collection

The PROBOL research design in the second phase is split into two stages. The first exploratory phase established the relevance of the 'content' and 'context' to the process of organisational learning and knowledge creation. The first jstage of this second phase involves a) undertaking a 'Gap Analysis' to establish 'what' is happening within each partner organisation in terms of knowledge creation and dissemination and b) an investigation into project orientation and project practices/phenomena. The second stage addresses the 'how' and the 'why' of the knowledge creation and dissemination in the organisations.

The purpose of the 'Gap Analysis' is twofold. Firstly it enables the establishment of a baseline for each organisation against a theoretical model derived from the work of Nonaka et al. Secondly it informs the development of the PROBOL model through the links with 'decomposition' and 'distillation to narratives'.

A descriptive statistical survey methodology is being used for the 'Gap Analysis'. Data is being collected by first conducting a customization of a generic questionnaire. This is being achieved at each of the partner organisations, initially, through face-to-face discussion with researchers and then via an iterative process using electronic media such as e-mail. Subsequently it is administered to a number of respondents who are not participants in the customization process. Face-to face interviews are conducted at each partner organisation, with selected respondents that are representative of both organisational roles and levels. Each question on the questionnaire refers to two types of projects, ongoing current projects and past projects.

The data is analysed according to a common core of categories related to the knowledge creation and dissemination facets in the model proposed by Nonaka et.al (2001). The design of a coding framework for analysing the collected data is proceeding in parallel with the design of the 'Gap Analysis' questionnaire. The coding framework for the questionnaire is also being developed and linked to the model (Nonaka et al.). A profile of knowledge

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[7] leading to the drop or rise in knowledge creation efficacy from one quadrant to the other

creation/dissemination is being produced for each partner organisation using this method. These findings are informing the conduct of the second phase of the research.

With regards to the investigation of project orientation and practices, the strategic construct of the model is derived from multiple relationships. These have been hypothesised in the literature and investigated in the exploratory phase. (Lampel et al.2003)

The support and control systems for projects are reference frames within which project-based-learning can be augmented. This premise guided the formation of the survey tool of project orientation, which is investigating perceptions about how the organisations support and control projects. The indicators used include resourcing projects, networking of knowledge resources for projects, boundary spanning in roles, and involvement of top and project leadership, among others. (Lampel et al.2003)

The practices-adoption/modification part of the research is investigating a key list of practices and phenomena derived from literature. The data from this, coupled with the data on project orientation, is expected to provide information about how project practices and project orientation reflect on the translation of project experience to sense making (and thus learning) by the organisation. Statistical analysis is being deployed to analyse the data; the reliability-validity quotients for the data received so far are satisfactory. (Lampel et al. 2003)

Following these surveys the qualitative case studies are providing insights into the issue of 'why is it so hard to learn and create knowledge to do the right project and do the project right' (Collison and Parcell, 2001) and 'Why is it so hard for individuals to learn and create knowledge?' (Nonaka et al., 2001). This case study approach is informing ongoing development of the conceptual model. The modes of knowledge conversion will be further investigated through the concepts provided by Von Krogh et al. (2000) on knowledge enablers. A further review of the literature and taking account of findings from the surveys are integral to informing the emerging PROBOL model.

Preliminary Findings[8]

Generic instruments have been designed for organisations albeit with minor customisation without altering the frame of the questionnaire. Phenomena that practitioners for respective organisation recognise as manifesting their project environments validate the instruments. Some of the elements of project orientation were readily recognised by the practitioners as describing their project environment thus validating the instrument. Other areas provided points for reflection for example the departure of the project from the organisation's core product technology increased the likelihood of the involvement of top leadership in setting guide lines for project planning. Results were in many cases specific to the organisations, in light of the fact that project orientation or the interface environment of the organisation with the projects it undertakes is unique. The results also provided grounding to issues such as a strong community of project managers reduced the tendency to bury project failures. This was evident in the results across partner organisations. Results such as these have provided the environment for exploring additional relationships by undertaking further analysis through incorporating the results from the adoption and modification of practices.

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[8] PROBOL Paper: Lampel, Morris, Jha and Loch. 2003

The robustness of the connection between the adoption and modification of practices, with the project interface environment, that is described by the organisations' project orientation has also been established. The project orientation system, defined by the data collected for organisations, becomes more predictable in terms of dominant components, when the data arrays of adoption and modification are made to act upon it. Though this is rudimentary there are strong indications that the adoption and modification in practices are genetic markers for 'changes' in how the organisation supports and controls project (project orientation) and a very vital element of the project based learning diagnostic.

On the knowledge creation front data has shown that there is a skew in how the modes of knowledge conversion operate in organisations. Also evident are organisation specific elements in the project life cycle that contribute to breaks in the knowledge creation spiral.

More analysis is in progress and most of it will be made public only with the consent of the partner organisations. Detailed generic findings will be made public over the next six month

Conclusions

The PROBOL model recognizes the interrelationship between the strategic and operational levels and the dual nature of projects (project management and the management of projects). This duality has been incorporated into the model of project-based learning and knowledge. The model provides a framework for connecting strategic intent with learning at the operational level from projects, whilst also addressing how organizations learn. This perspective will enable the emergence of further insights to inform the identification of possible 'levers' at both the strategic and the operational levels.

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