Establishing the Link Between Project Management Practices and Project Success

Terence J. Cooke-Davies PhD, BA, FAPM, FIMgt.

Human Systems International Limited

University of Technology, Sydney

There is substantial growth in the demand for both project managers and project management. Membership of professional associations is growing rapidly. Demand for certification of project managers is increasing significantly. An increasing proportion of the work undertaken by industry is project-based. (Lundin and Stablein 2000). However, project management is a pragmatic, practitioner-based discipline and is, by its very nature, an intensely difficult field to study.

This presents a challenge to the research community if it is ever to discover the basis to any underlying principles that may link project management practices to project success.

This paper will suggest one appropriate response to this challenge by describing:

- a flexible research methodology that is founded on a solid basis of philosophy, epistemology and research principles.
- a scope of study that is broad enough to discover such links between practices and results that may exist, while avoiding the study of "life, the universe and everything". And
- some results from applying the methodology that, while far from being the last word on the topic, do indeed provide some encouragement that valid results may, in time, be obtained.

1. A Flexible Research Methodology Based on Sound Principles

Underlying this paper is an actual programme of continuing research that was developed in embryonic form during 1993 and has been continually refined in practice since the beginning of 1994. It has been described in detail elsewhere (Cooke-Davies 2001) and it continues to evolve up to the present.

A Coherent Philosophy to Underpin the Approach.

It is necessary to look for a coherent grounding for the research into improved project management practices in part because "project management" lacks a "home" in the academy. Many of the techniques and practices are taught in engineering departments, and so some research originates there. Business schools and departments of management science also touch on project management, but project managers are not, as yet, recognised by many outside the global community of project management practitioners and the traditional areas of project management practice (such as engineering, construction, defence and aerospace) as being a "real" part of the organization structure at a senior level.

Projects don't have a home, but everybody does them. They are a bit like breathing – something everybody does at a sub-conscious level. Goals are created, decisions are taken to pursue the goals, and people are sent off to implement the resulting project or programme. Increasingly during the 1980s and 1990s (Kloppenborg and Opfer, 2000) practitioners of project management have sought to raise projects from the sub-conscious and intuitive to the conscious level as they have become more complex and more important, and as the social and economic consequences of failure have become more serious for business and for society.

Project management is a social construct involving a particular way of seeing a particular enterprise undertaken by a particular group of people. As such, it belongs firmly in the domain of social science rather than of science. On the other hand, many of the products produced by projects employ either the hard sciences (e.g. in the construction of a space probe) or technologies directly derived from the hard sciences (e.g. in the construction of a new building). This means that the realm of project management encompasses both social science and science, and the investigation of an appropriate research methodology must be broad enough to hold a debate with both of these domains.

Indeed, these are not the only two domains to be considered, and the "richness" of a project manager's real-world situation can be seen reflected in a diagram (Exhibit 1) adapted from John Mingers' adaptation of the views of the postmodern philosopher, Jürgen Habermas (Mingers 1997, p 10).

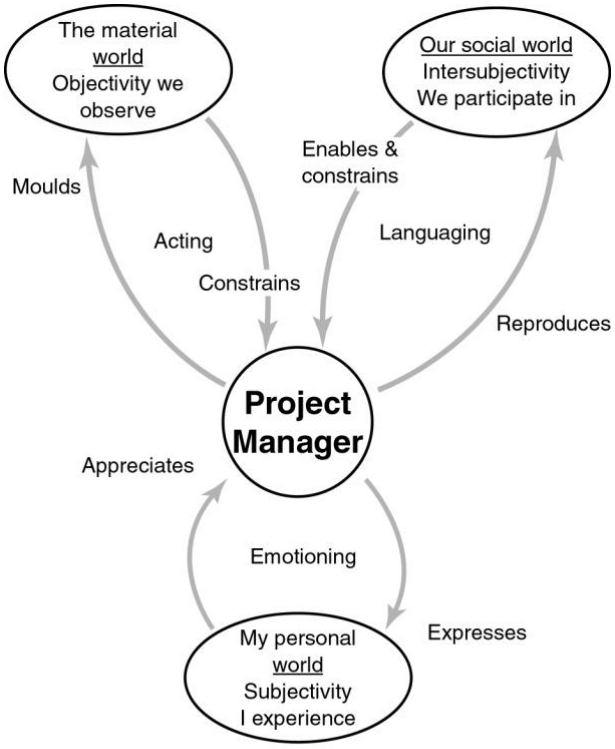

Exhibit 1: A framework based on Habermas' three worlds.

Philosophy predates Christianity by a half millennium or so, and although this isn't the time or place to become embroiled in a detailed analysis of the history of philosophy, the pendulum has frequently swung back and forth between the two extremes of the primacy of reason and the primacy of observed reality.

In the modern academy, the debate about where on its trajectory the pendulum rightly belongs is still experienced in the "paradigm wars" waged between those who are still heavily influenced by the enlightenment project and those who embrace the relativism of postmodernism. (Mingers 1997)

In popular language today, a sharp distinction is drawn between "subjective" opinions and "objective" knowledge. Phrases such as "just give me the facts" give voice to the prevalent idea that somehow "objective" knowledge is of a higher value than the mere "subjective". Ever since the Copernican revolution, science has been seeking to remove "subjectivity" from knowledge, and thus to remove any distortions from man's understanding of the true nature of physical reality.

In sharp contrast to the confidence of science and positivism, the second half of the twentieth century has seen the pendulum swinging back towards a view that is in total contrast to it – a view that is often characterised as constructivism, but that leads to the outlook known as "postmodern". In this view, all confidence in man's ability to know anything about reality is replaced by a deep-seated suspicion that anything that is spoken says more about the speaker than it says about the object that is spoken about. For example, "Roland Barthes (1915 – 1980) exposes the manipulative power-interests which often underlie the 'mythologies' of the second half of the twentieth century. In his *Mythologies* (French, 1957; English, 1972) he unmasks what we too often perceive as 'natural' or 'given' as socially contrived. Many manipulative devices appear to be natural 'truths'." (Thiselton, 1995, p. 14.) This view has much to contribute to this research, but both the recursive nature of Barthes' warning about the hidden motives behind "truth-claims" and also the roots of project management in engineering and technology (both derivative from the natural sciences) each in their own way suggest that constructivism on its own cannot provide the entire context for project management research.

A radical alternative both to positivism and to constructivism is proposed by Michael Polanyi who saw great danger in the separation of personal judgement and involvement from scientific method, and who asserted that the devaluing of personal judgement is a self-fulfilling principle, since any faculty that is unused tends to decay. As he saw it, many people have less opportunity for using their personal judgement than was true in the past, and when people are consistently told that their personal judgement is unreliable and irrelevant, they use it even less, so that it does indeed become unreliable and irrelevant. Instead of judging for ourselves, we wait for 'science' to pronounce.

From the point of view of the general public (including, presumably, many project management practitioners), therefore, the prevailing research paradigm is positivist/realist. But this fails to take account of the actual act of faith that creates the initial worldview that "science" proceeds to investigate. Similarly when project management practitioners refer to their occupation as a "profession", they typically overlook that the word can mean either "a vocation requiring higher learning" or "an avowal (of faith)" (Turner 2000).

If a research method is to be developed for the investigation of project management, therefore, it is legitimate to reject both the extremes of positivism and of constructivism, and to search for a route that lies somewhere in between. What is required is a route that recognises the role of both subjective commitment and of tacit knowledge, while acknowledging that there is an external reality that can legitimately be investigated.

The realm of management science has, in recent years, begun to grapple with methods that reflect paradigms broad enough to embrace all three of Habermas' worlds, and this paper will propose that different research methods are appropriate to different philosophical positions and to different epistemic procedures, as shown in Exhibit 2.

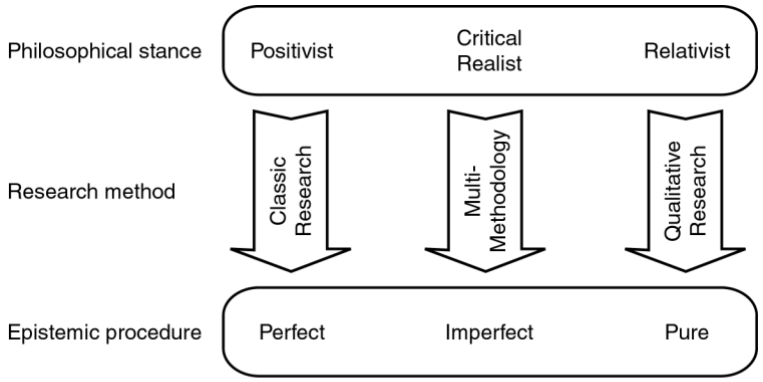

Exhibit 2: Research methods and underlying paradigms.

The hypothesis that has guided this research programme can be restated in the form of the following six propositions, which together set out the epistemological challenge to be faced.

1. Project management is a coherent worldview about the way people work together to accomplish complex tasks.
2. As such, it embraces a whole set of propositions that people who adopt it are willing to entertain.
3. Project management attracts adherents and practitioners who make assertions from within the worldview to people who may or may not embrace the worldview as a whole.
4. To create, develop and promote a conceptual basis to this worldview, academic research must be built on solid epistemological foundations.
5. Assumptions can only be questioned by accepting others unquestioningly ("a door turns on fixed hinges")
6. To examine the whole world view, it will be necessary to use different parts of the basis as "hinges" for different pieces of research, that nevertheless cohere with each other.

There are additional worries in the field of project management, where project teams (consisting of unique groups of people) are struggling in circumstances that will always contain some unique elements to tackle some unique piece of work. The way a personal subject (say an engineer) knows an impersonal object (say a bridge) is fundamentally different from the way that the same subject knows another person (say her supervisor).

So project management, along with fields such as educational theory and practice, psychology, sociology, anthropology, law, some aspects of medicine and philosophy, politics, history and economics depends for its credibility on knowing people.

This means, in effect, that whatever epistemology is adopted, knowing people is at least as worthy a contender for an underlying epistemological paradigm as a knowledge of everyday objects.

And yet, in the field of positivist/empiricist scientific method, subjects become objects of observation and reliance upon the simple observational paradigms has the consequence of assimilating those subjects to physical objects, reducing their subjectivity and specificity to interchangeable, observable features.

So how is this dilemma to be resolved? That is where the second aspect of the approach comes in – the research methodology itself.

An effective research methodology that is appropriate to project management.

It is becoming widely recognised in the field of management science in general, and systems thinking in particular, that the application of multiple methodologies is appropriate even within a single research programme. Instead of the classic shape of research (shown in Exhibit 3), there is a growing recognition that different types of intervention are appropriate at different stages in the process of research.

This is where it is appropriate to move the discussion away from the general nature of the epistemic problems of knowledge to the particular origins of project management as a discipline. As has been seen, project management is a discipline that has been codified as a tradition through the combined experience of project management practitioners – a group that could be considered as a global "community of practice".

During the 1990s, a corpus of writing has been developed under the general title of "Communities of Practice". A community of practice is a group that shares knowledge, learns together, and creates common practices**.** Communities of practice share information, insight, experience, and tools about an area of common interest (Wenger, 1998).

The informal network of project management practitioners constitutes just such a "community of practice". This community is both the "custodian" of the project management worldview, and also the group of people who, by the nature of their employment, are charged with delivering the practical results of employing the "worldview" to deliver economic and social benefits through the effective management of individual projects.

An essential strand in the development of the new research methodology, therefore, is the creation of an explicit "community of practice" from among those practitioners who have most to gain by the development of "reliable knowledge" about project management, and most to lose by the perpetuation of traditions that are based in misperceptions and misunderstandings about what is truly the case.

Normally in a research programme a particular problem is identified, and then a given sample of knowledge chosen, and the appropriate medium for it decided – what sample, what questionnaire, what interviews are needed? The choice of sample will be determined by the paradigm being adopted, which in turn will have been shaped by the conscious or sub-conscious hypothesis about where the cause of the problem may lie. Once the data has been collected, it is analysed, conclusions drawn, and a report written that may or may not be published and if it is, may or may not be read and/or acted upon.

Exhibit 3: The classic shape of single-paradigm research.

There is a need to move away from this research methodology towards one that takes more account of the different "worlds" in which a project manager operates, and which makes effective use of the tacit knowledge possessed by the global project management "community of practice". The principles of such a methodology are shown in Exhibit 4.

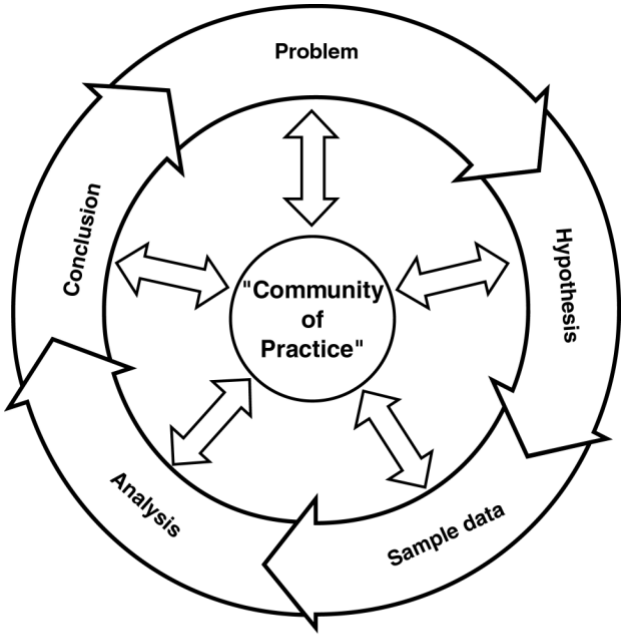

Exhibit 4: The concept of a continuous research methodology.

A methodology of this type represents a considerable development from the single-paradigm, single-research model of Exhibit 3. What doesn't happen in the model pictured there is the feedback to change the ongoing data collection process.

The model shown in Exhibit 4 is actually a form of "continuous learning action research". Within the loop, there are reflection and people workshops, so that there is a community sharing aspect built into the method. Most research doesn't embrace learning on the part of anyone but the researcher. Dissemination is left to the chance of the library browser – that's where the literature search piece comes from. In the method developed in this programme, learning on the part of the community providing the data is built in. People come together for the purpose of sharing and discussing, which in turn changes the way the data is collected.

The novelty in this methodology stems from the combination of a genuine "community of practice" that is a community in more than name alone and that shares both a wealth of tacit knowledge and also the commercial motivation to implement changes based on what they learn. The individual techniques such as case studies, reflection workshops, qualitative analysis, and quantitative analysis are not in themselves novel. Neither is the "action research" focus.

It should be emphasised that what has been developed is a methodology, rather than a technique. "The difference between a technique and a methodology is that the former insists of a set of prescribed procedures which lead to an end point without need for reflective intervention; whereas the latter embeds a set of techniques and tools within a larger process involving judgement and, commonly, social interaction among participants in the process. One consequence of this is that no two enactments of a given methodology are likely to follow the same analytic path." (Rosenhead, 1997)

But if such a methodology is to produce valuable knowledge about which practices lead to project success under which circumstances, what topics will need to fall within its scope?

2 – A Scope that is Appropriate to the Topic Being Studied.

One outcome of the work that has been reported elsewhere (Cooke-Davies 2001a) has been to identify three discrete levels at which project success can be measured: managing a single project successfully (doing things right); ensuring that a single project is successful (doing the right things); and assuring the consistent delivery of successful projects (doing the right combinations of the right things in the right sequence).

This has been possible only by defining the scope of the research sufficiently broadly to enable each of these levels in turn to come under the microscope. In effect the scope includes those practices that could influence project success at each of these three levels, and also those issues that need to be resolved in order to permit different pieces of research to complement and build on each other.

Practices that could influence project success.

Practices involved in managing a single project successfully.

A logical starting point for the definition of the scope of practices to be included in the first of these three questions is those practices that have been described in detail in the PMBOK® Guide (PMI 2000), or that have been included in other project management bodies of knowledge (Dixon 2000; Caupin et al. 1999).

Practices to ensure that a single project is successful.

The second question, however, is considerably more complicated. Before the "success" of any individual project can be measured, the benefits that it is intended to deliver must be considered, and these can vary considerably as the following partial list of project types indicates.

- Successful Business Process Reengineering projects (which have a notoriously low rate of achievement of their objectives) can lead directly to improved competitiveness.
- If the organization is essentially project-based (as is the case in many of the traditional project management environments such as Engineering, Defence, Petrochemical exploration, Construction or IT/IS Systems Integration) then successful project performance translates directly into an improved bottom-line.
- If the organization is operations-based, then successful projects to support or to improve operations (such as marketing projects, plant shutdowns, or production engineering projects) lead indirectly to improved bottom-line performance.
- Successful research projects and (in the case of some industries such as Pharmaceuticals) development projects lead to a maximised return on R&D spend, leading directly to the creation of new streams of operating revenue.
- Successful development projects improve time to market, and can enhance competitive position, product sales or product margins.
- Successful IT/IS projects deliver improved financial benefits (either directly or indirectly), and/or reduced wastage from aborted projects (Standish, 1995).
- Successful projects to design, procure and construct new capital assets can enhance time to market, return on investment, reduced operating costs or some combination of all three.

The variety of this list suggests that other practices, such as benefits realization, play their part, and need to be included in the scope of the research. Other relevant practices include stakeholder management and project strategy.

Practices to ensure the consistent delivery of successful projects.

The answer to the third question involves an even wider group of practices.

Every business organization is faced with resource constraints, and has to make choices about how to apply its resources to best implement its chosen business strategy. Some share of the resources will be applied to the current mainstream operations of the organization ("business as usual") and some different share to initiatives that are designed to create new capacity or new capabilities to meet future challenges ("business change"). These choices typically become enshrined in approved budgets, which are then used as the basis for day-to-day operational control, with oversight being exercised by means of some form of governance structure.

For "business as usual", there are tried and tested methods of establishing annual budgets, and reviewing performance against these. The problem occurs when business strategy is implemented through change initiatives – either projects or programmes. It is a challenge that lies at the heart of multi-project management, which itself embraces two related areas of knowledge.

The APM Body of Knowledge (Dixon, 2000) defines portfolio management as "the management of a number of projects that do not share a common objective" and programme management as "the effective management of several individual but related projects or functional activities in order to produce an overall system that works effectively".

Each of these has received a certain amount of attention in recent years. Portfolio management has been touched upon in most recent books that relate to projects as a means of implementing corporate strategy, for example (Cleland and King, 1988: Turner, 1993: Dinsmore, 1999: and Knutson, 2001). Programme management has been the subject of a number of journal articles (e.g. Pellegrinelli, 1997) and "how to do it" books (Reiss, 1996: CCTA, 1999).

Although each of these approaches makes either explicit or implicit allowance for dynamic interactions between projects (programme management, perhaps, better than portfolio management), neither of them does justice to the challenges faced across the totality of projects that make up an organization's attempts to implement strategy through business change. Portfolio management assumes that the challenge is to manage the tensions within the project-functional management matrix, and to establish relative priorities between projects. Programme management, while recognizing the interdependence of projects within a programme, confines its focus to a single programme.

A third dimension is what has been called the "multiproject matrix" (Engwall and Källqvist, 2000). From an interesting case study of a Swedish project-based engineering company, they conclude that, "when projects constitute the primary operations of the organization . . .the established model is too superficial. Thus, it is time go beyond the present conceptual framework of the matrix organizational form. . . . . Until now, the multiproject matrix has been a neglected phenomenon. This is an unknown field of research, but it is the current reality for most project managers in practice." Experience with organizations in which projects do not constitute the primary operations (such as Banks) suggests that this reality is even more extensive.

Other practices that impinge upon project success.

As if the scope of this research were not overwhelming enough in and of itself, at least three other groups of practices have a demonstrable link to the three groups of practices listed above:

- Technical delivery practices – for example Software design, Systems engineering, Engineering design, Drug development. The interfaces between these and the classic project management practices are described in the PMBOK® Guide (PMI 2000, 9-17).
- Support practices related to developing the capability, motivation and effectiveness of the people who manage projects, or who work on projects. These and the following group are described in PMBOK® Guide as "General Management Practices."
- Organizational readiness – those processes, along with the culture that surrounds them, that govern the extent to which an organization is capable of making root and branch changes to its business processes.

Some challenges that need to be overcome as a pre-requisite to successful research.

The scope of the research programme needs to address a number of definitional distinctions for which, as yet, no generally agreed understanding exists throughout the community of project management researchers or practitioners.

Projects and processes

One distinction to be made is the difference between "projects" and "processes". A confusion between the two surfaces most sharply when the topic of "maturity" is being discussed since "maturity" is a concept that applies to processes. But surely "projects" are somewhat different, aren't they?

How the two relate is still a topic on which the community of project management practitioners does not speak with a single voice. There is general agreement that projects are different from processes. Projects are unique "chunky" things that have a clear start and finish, that are defined by a unique scope of work and so on. Processes, on the other hand, are usually considered as repetitive sets of activities, carried out again and again with little variation.

So far so good – it is when we probe a little more deeply that the difficulties start to emerge. For example project management, defined as the set of activities that is carried out to manage any given project, is increasingly described as a set of interdependent processes. That is how both the world's leading project management standard (PMI's PMBOK® Guide) and the world's most widely adopted project management methodology (Prince2) describe project management. From the opposite end, a recent book on process improvement (Eckes 2001) defines a process as " a series of steps and activities that take inputs, add value, and produce an output." Isn't that what a project is?

How repetitive these management processes are in any organization is likely to depend on two other considerations: what type of project is typically undertaken, and the extent to which the organization supplies internal or external customers using internal or external resources. For example processes are likely to be much more repetitive in projects such as the rollout of multiple implementations of a telephone switch than in such projects as the development of a new product with high technical innovation.

Processes and personal competence

A second distinction involves the precise relationship between individual competence or expertise and the maturity of organizational project management processes. Every aspect of project management has two dimensions – a technical dimension and a human dimension. In this case, the technical dimension encompasses those groups of practices or processes that have been described above, while the human dimension includes not only the people who are operating these processes, but their expertise.

The concept of process maturity was born in the Total Quality Management movement, where the application of Statistical Process Control (SPC) techniques showed that improving the maturity of any technical process leads to two things: a reduction in the variability inherent in the process, and an improvement in the mean performance of the process. (Cooke-Davies et al. 2000)

This has been further refined and has led for example to techniques such as "Six Sigma", which use "fact-based data-driven process improvement" as the basis of improved corporate performance (Eckes 2001).

The process of planning a large project, on the other hand, is very different in nature as well as in scope from processes such as issuing customer invoices. One of the differences is the extent to which individual expertise, knowledge and judgment are brought into play. As research has corroborated (Lechler 1998), where projects are concerned it is people who get things done.

The continuous gradual performance improvement as processes mature is in sharp contrast with the way individuals acquire skill. In one of the most authoritative accounts (Dreyfus 1986) of this process, Hubert and Stuart Dreyfus identify five stages in skill acquisition: novice, advanced beginner, competence, proficiency and expert. What distinguishes the final two stages is that although experts and proficient performers are familiar with the rules of good practice, they no longer select and follow rules. Rather they perform smoothly, effortlessly and subconsciously.

What this means in terms of project-related management processes, of course, is that there is a tension between the degree of "mechanistic" prescription that needs to be built into a mature process to minimize its variability, and the degree of flexibility that an expert project manager will bring to bear on any given project, to optimise the project performance.

Taxonomies and definitions

The third class of distinctions is one that recognizes the socially constructed nature of the field of project management. If research into the topic is to generate reliable knowledge that can itself act as a platform for further research, then it is important to establish agreement on a broad front to a set of definitions and "types".

Each of these is important, and it could be argued that one of the most important contributions that PMI has made to the profession is the provision of a widely accepted standard, containing clearly defined terms for the common processes involved in managing a single project.

The importance of clearly defined and generally accepted "types" is less well appreciated, but there are two strong arguments for its importance. Firstly, a study of the impact of categories on perceptions (Bowker and Leigh Starr 1999) shows how pervasive categorization is on any field of study. And secondly, if the newly emerging information science based on situation theory (Devlin 1999) is correct, then the recognition of "types" is an essential ingredient to the acquisition of expertise, quite apart from allowing the results of different pieces of research to be related to each other.

So, what can be accomplished using a soundly based practitioner-centred research programme on such a broad investigative scope?

3. Results that Provide Some Encouragement.

The research programme that lies behind the method and scope described in the first two parts of this paper has been in progress since 1994, and already has a considerable number of results to show. The specific format of the community that is operating the programme is a Network of large national or international organizations on three continents each of which makes an explicit commitment and pays an annual subscription in return for the right to draw knowledge from a centrally-held and maintained knowledge pool. The agreement also stipulates the expectations of individual members that the Network has in terms of contributing knowledge.

There is a need both to protect the commercial sensitivity of information provided by individual member organizations, and to restrict the general publication of conclusions that are being paid for by the subscriptions of member organizations. Nevertheless, the structure of the knowledge pool can be described and a number of encouraging results can be published without compromising the interests of the members.

Elements of the knowledge pool.

The knowledge pool contains five elements that have been drawn upon in writing this paper.

1. The Corporate Practices Questionnaire (CPQ). A database of answers to questions about the project management practices of member organizations covering business processes, multi-project management processes, project processes and support processes. Textual descriptions of practices are included, as are numerical ratings against defined scales for both the organizational approach (what the organization recommends or mandates should be done) and deployment (what actually happens).
2. The Project Healthcheck Tool (PHT). A database of answers to questions about the adequacy and maturity of practices that are employed on individual projects along with the results (or latest forecasts of the results) of the projects in terms of time, cost and scope delivered. Time and cost are recorded in both absolute terms and relative to plan at a fixed point in the project life cycle. Scope is recorded only relatively against the agreed plan.
3. Case study presentations on specific project management practices and the results they obtain, made by individual member organizations to their fellow members at one- or two-day workshops.
4. Facilitated group dialogue among members' representatives to develop knowledge and understanding in the light of input from items 1, 2 and 3 above.
5. Research reports prepared by working parties comprising employees of member organizations. Each report investigates a particular topic that may arise from any of items 1, 2, 3 or 4 and that provides further information at greater depth, drawing on existing knowledge in the knowledge pool, information provided by members of the working party and/or fresh research data gathered by the working party itself.

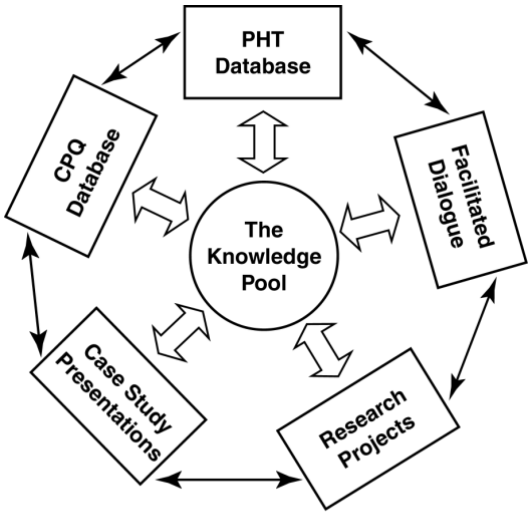

Exhibit 5: Research elements of the knowledge pool.

In accordance with the principles described in Part 1 of this paper, these elements are not independent "stovepipes" but are interdependent in many ways. For example, low scoring practices in the CPQ give rise to research reports. Insights to emerge from the PHT are used to provide in-depth back up for the organizational answers to the CPQ provided by the same members, as well as to modify the questions in the CPQ over time. Research reports combine with case study presentations on specific topics to support facilitated group dialogue, from which the principles of good project management practice are extracted.

In addition to these elements of the knowledge pool, others exist to promote organizational learning between members. Since these have less importance for project management research, they are not described here.

Results from the CPQ – general results.

The primary use of the CPQ is to allow individual members to compare their conduct of project management with other members, using charts and tables produced from the numbers to provide a visual comparison, and the words of the evidence to identify qualitative differences. Members who demonstrate superior practices according to these two scales are then invited to give case-study presentations at workshops.

In a more general sense, however, the CPQ is useful in providing an overview of the "state of play" of project management practices in specific sectors of the global network. The following extract from a CPQ report illustrates this:

"Project management communities believed that their organizations were generally dissatisfied with the results obtained by their projects, due to over-optimism at the outset, late completion, overspends, failure to deliver benefits and lower-than-expected return on profit.

Much excellent project management practice was incorporated into the approach of these same organizations, and in certain critical areas, such as risk management, it was improving. Project planning and risk management scored highly for both approach and deployment, and virtually all companies in the data set were adopting ways of integrating project working into the organization and developing "muscle memory" through the use of standard corporate approaches or a corporate methodology.

Any delivery system, however, is only as good as its weakest point, and the report pointed to such weak points in general practice within the network. Deployment was generally less good than approach in all areas, but particularly so among the top-scoring companies for "monitoring and controlling progress" and for "closing projects". Among the majority of companies, "risk identification and management" revealed the largest gap between approach and deployment.

A theme that threaded its way through the individual topics was the challenge faced by even the best organizations in transferring lessons learned from one project to another. This was the worst scoring sub-topic in the report. The challenge showed up most acutely in "closing projects", a topic that was not only the lowest scoring one in the questionnaire, but was one that had become noticeably worse in the two years or so since the questionnaire had last been answered by the network.

The second-lowest scoring topic was project control. Costs were controlled better than schedule, with resources being controlled even less well. When the lack of control was considered together with the difficulties in learning lessons, the weakest point in the delivery systems began to reveal itself.

In-house project organizations who lacked both the disciplines of contracts (which procurers had) and the incentive of commercial survival (which suppliers have) scored less well than the others in four areas: "closing projects", "project planning", "monitoring and controlling progress" and "managing quality". (Extract from CPQ Report, Europe, 1999)

First results from the PHT – Analysis of 136 projects undertaken in 2000

The PHT itself contains approximately 100 questions about project management practices, as well as information about the nature of the project, the experience of the project team, the objectives of the project and the results achieved. The analysis, which is described in detail elsewhere (Cooke-Davies 2001) used CHAID analysis, and bivariate correlation confirmed through one-way ANOVA and Kruskal-Wallis tests.

The question being asked in this analysis was, "What project management practices, if any, can be shown to have a measurable and predictable impact on project performance across a wide range of types of projects?"

A number of conclusions can be reached in answer to this question.

- Although there is a loose but significant relationship between time predictability and cost predictability, and a somewhat stronger one between scope predictability and time predictability, the traditional project manager's iron triangle of time, cost and scope are each influenced by different project management practices.

- Project management practices do not appear to have different effects when employed on different types of projects, in different industries or across the varying perspectives of in-house, supplier, procurer or prime contractor.
- Projects that cost more than £100 million do not seem to be either more or less predictable as far as cost is concerned than projects that cost less than £1 million, or anywhere in between. Projects lasting longer than 3 years, however, seem to be significantly less predictable in terms of both time and scope than projects of a shorter duration.
- Project duration is less predictable than either project scope or cost, and it's predictability is significantly affected by a number of practices, including the: -
    - Adequacy of company-wide education on the concepts of risk management.
    - Maturity of an organization's processes for assigning ownership of risks.
    - Adequacy with which a visible risk register is maintained.
    - Adequacy of an up-to-date risk management plan.
    - Adequacy of documentation of organizational responsibilities on the project.
- There is also some evidence, at least for the set of projects in this analysis, that time predictability is probably affected by the: -
    - Adequacy and maturity of processes for identifying and quantifying risks.
    - Adequacy of communication about risk status throughout the project's life.
    - Maturity of the process for maintaining effective baseline control and change control.
- There is also some evidence, at least for the set of projects in this analysis, that cost predictability is influenced by the maturity of the scope change control process.
- For projects undertaken by organizations with a mature scope change control process, the adequacy of providing the right level of information to the right level of authority (thereby enabling effective governance) makes a significant difference.
- The differences in time predictability between those projects employing these practices adequately, and those not doing so can be as much as 40% (from being on schedule to being 40% late).
- The differences in cost predictability between those projects employing these practices adequately, and those not doing so, can be as much as 23% (from 4.5% under budget, to 18% over budget).

Results from a working party investigating the project management maturity of different industries.

One of the sectors of the Network is exclusively concerned with Pharmaceutical R&D projects, and contains the majority of the world's leading companies in this field. An interesting example of how additional research supplements the main databases was shown in a piece of work that was designed to indicate whether or not specific industries demonstrated different patterns of maturity in their project-related management practices. (Arzymanow and Cooke-Davies 2002).

A series of normative group techniques was used industry over a period of a year by a group of project management practitioners with extensive experience of more than one to identify those "domains" that differentiate the approaches of organizations in these different industries.

Ten domains were identified as follows:

1. Project culture
    - Pervasiveness of culture
      What is the extent of a project-based culture within the organization?
    - Team member identification
      Do members of project teams identify themselves mainly with the project they are working on, or with the functional discipline they possess?
    - Depth of project identification
      What is the lowest level at which people working on a project identify themselves primarily with a project?
2. Organizational leadership

- Commitment of Upper Management
  How committed is upper management to the importance of developing an organizational project management capability?
- Understanding of Upper Management
  How extensively does upper management reveal its understanding of what is necessary to develop and improve a project delivery capability?

3. Business culture
   - Business Focus
     To what extent are all governance decisions taken by the project team based on the business case for the project?
   - Business Awareness
     To what depth in the project team is there knowledge of the specific business case and project strategy?
4. Multi-project management
   - Prioritising projects strategically
     Are all project prioritised according to their strategic importance?
   - Resourcing projects fully
     Do the resources allocated to projects reflect their strategic priority?
   - Reacting to changing circumstances
     Do resources allocated to projects change as strategic priorities change?
   - Reflecting changed resources in expectations.
     When resources are changed because of changing strategic priorities, are project expectations changed accordingly?
5. PM structure, methods and systems
   - Extent of PM systems, methods and processes
     How widely across the organization are common systems, methods and processes used for the management of projects?
   - Integration of PM systems, methods and processes
     How well are PM systems, methods and processes Integrated with mainstream business systems?
6. Degree of authorization
   - Project authorization.
     Does the project team have the authorization necessary to deliver the agreed project strategy? Is governance role to ensure project is being managed or is role to review and approve decisions?
7. Location of information
   - Centralization of information in each project.
     To what extent are all project plans and functional plans and documentation integrated and held in one location under the control of the project (project or project manager ?) ?
8. Matching team to project
   - Matching the team to the project stage or type.
     To what extent is the organization capable of characterizing the development type and stage of a project, identify different types of teams (e.g. lightweight, heavyweight, autonomous), and adopt an appropriate governance structure that reflects the difference?
9. Capability of PM staff
   - Competency of PM staff.
     Do you have the capability to deliver the projects that you need? Do you have a sufficient pool of competent project managers to deliver the project portfolio?

10. Strength of project vs. functional management
    - Strength of matrix.
      To what extent are people and dollars allocated to and managed by the project?

Interviews were obtained with 31 organizations, as follows:

- 9 "big Pharma" R&D organizations (spending more than $1billion per annum on R&D)
- 6 "medium Pharma" R&D organizations (spending between $250million and $1billion per annum)
- 5 Telecommunication companies.
- 4 Defence organizations.
- 3 Financial services companies.
- 2 major UK-based construction companies.
- 2 Petrochemical organizations: One of the world's largest 3 integrated operators, and one of the world's largest 3 engineering contractors.

Numerical scores were obtained for each question, using pre-determined ranges of scores (to produce a radar chart comparison), and the descriptive answers to each question were also kept (to perform a qualitative analysis of the different mental models underlying each organization's score.) In order to improve the consistency of scoring, each set of data was obtained from a senior member of the project management community, in an hour-long telephone interview. Only two interviewers were used, and the first two interviews were conducted jointly, scored independently, and the results calibrated.

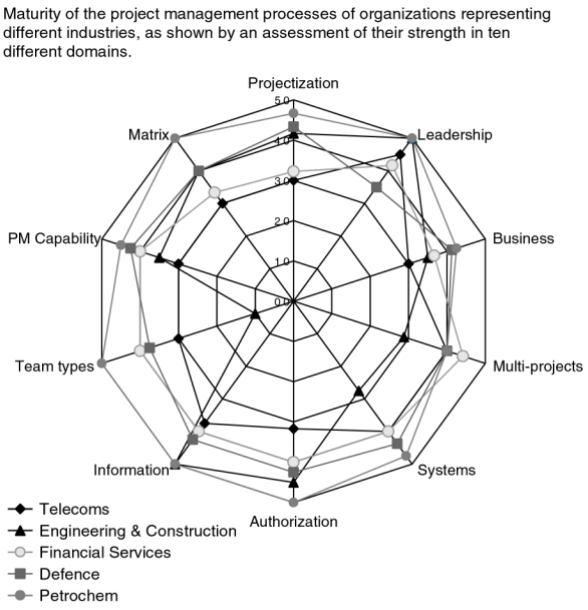

Exhibit 6: Profile of project management maturity in different industries.

The results of this research were used by the Network sector both for each member to identify a desired profile of project management that was consistent with the organization's strategic goals and also for the Network sector to define its scope of work for the next few years. As a practical example, a leading petrochemical alliance project manager has been invited to address a forthcoming network on the subject of inter-company project alliances.

Concluding observations

This is far from being the last word on the subject – indeed, the whole field of project management research is in its infancy.

However, the research methodology described in Section 1 of this paper, when used for continuous action research covering the scope described in Section 2, is producing the kind of results described in Section 3 that provide encouragement to the community of project management practitioners that constitute the Network.

References

Arzymanow, Andrew and Cooke-Davies, Terence J. 2002. A Profile of Project Management Maturity in Different Industries. *IRNOP V: Fifth International Conference of the International Research Network on Organizing by Projects*: Renesse, Zeeland 2002.

Bowker, Geoffrey C. and Leigh Star, Susan. 1999. *Sorting things out. Classification and its consequences.* Cambridge, Mass and London, England: The MIT Press.

CCTA. 1999. Managing Successful Programmes. London, UK: The Stationery Office Books.

Caupin, G., et al. 1999. *ICB. IPMA Competence Baseline*. Monmouth: IPMA

Cleland, David I. & King, William R. 1988. *Project Management Handbook (2nd. Ed.).* New York, NY: Wiley.

Cooke-Davies, Terence J. 2001. *Towards Improved Project Management Practice.* U.S.A., www.dissertation.com

Cooke-Davies, Terence J. 2001a. The real success factors on projects. *PMI Europe 200:1 Fourth European Project Management Conference,* London, U.K.

Cooke-Davies, Terence J., Schlichter, F. John and Bredillet, Christophe. 2001. Beyond the PMBOK® Guide. *PMI Annual Seminars and Symposium 2001*. Nashville TS.

Devlin, Keith. 1999. *Infosense – Turning Information into Knowledge*. Freeman, New York, NY.

Dinsmore, Paul. 1999. *Winning in Business with Enterprise Project Management*. New York, NY: Amacom.

Dixon, Miles (2000) Project *Management Body of Knowledge*. Fourth Edition edn, High Wycombe: APM

Dreyfus, Hubert and Stuart. 1986. *Mind over Machine*. New York NY, Macmillan, The Free Press

Eckes, George. 2001. *The Six Sigma Revolution: How General Electric and others turned process into profits*. New York NY, Wiley

Engwall, Matts and Källqvist, Anna Sjörgren. 2000. The Multiproject Matrix: A Neglected Phenomenon. *IRNOP IV: Fourth International Conference of the International Research Network on Organizing by Projects.* Sydney.

Kloppenborg, Timothy J. and Opfer, Warren A. 2000. Forty Years of Project Management Research: Trends, Interpretations and Predictions. *Proceedings of PMI Research Conference* Paris. Project Management Institute, Inc.

Lechler, Thomas. 1998. When It Comes To Project Management, It's The People That Matter: An Empirical Analysis of Project Management in Germany IN Hartman, Jergeas and Thomas, (Eds.) *IRNOP III. The Nature and Role of Projects in the Next 20 Years: Research Issues and Problems*. Calgary. University of Calgary

Lundin, Rolf A. and Stablein, Ralph. 2000. Projectization of Global Firms - Problems, Expectations and Meta-project Management. *IRNOP IV: Fourth International Conference of the International Research Network on Organizing by Projects.* Sydney.

Mingers, John. 1997. Multi-paradigm Multimethodology. In: Mingers, John and Gill, Anthony, (Eds.) *Multimethodology. The theory and practice of combining management science methodologies.* Chichester: John Wiley.

PMI. 2000. *A Guide to the Project Management Body of Knowledge (PMBOK® Guide) 2000 Edition CD-ROM*. Philadelphia. PMI.

Pellegrinelli, Sergio. 1997. Programme management: organising project-based change. *International Journal of Project Management.* Vol. **15**, No. 3

Reiss, Geoff. 1996. *Programme Management Demystified*. London, UK: Spon Press.

Rosenhead, Jonathan. 1997. Foreword. In: Mingers, John and Gill, Anthony, (Eds.) *Multimethodology. The theory and practice of combining management science methodologies.* Chichester: John Wiley and Sons.

Thiselton, Anthony C. 1995. *Interpreting God and the Postmodern Self*. Edinburgh: T&T Clark.

Turner, J. Rodney. 1993. *The handbook of project-based management*. England: McGraw-Hill.

Turner, J. Rodney. 2000. The profession of project management? The role of professional institutions and a map of the body of knowledge. . *IRNOP IV: Fourth International Conference of the International Research Network on Organizing by Projects.* Sydney.

Wenger, Etienne. 1998. *Communities of Practice. Learning, Meaning and Identity*. Cambridge, U.K.: Cambridge University Press.

Contact Details

Establishing the Link Between Project Management Practices and Project Success

Terence J. Cooke-Davies PhD, BA, FAPM, FIMgt.

Managing Director: Human Systems International Limited

Adjunct Professor: University of Technology at Sydney

Mailing address:
Dr. Terry Cooke-Davies
Human Systems International Limited
4 West Cliff Gardens
Folkestone
Kent CT20 1SP
UK
Telephone +44 (0)1303 226071
Fax +44 (0)1303 226072
Email: cooke-daviest@humansystems.co.uk