

**New Product Development Project Manager Skill Sets  
in the Telecommunications Industry**

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## **ABSTRACT**

*New Product Development is a key strategy to cope with ever-increasing competition in the Telecommunications industry (called 'Telco' for short). The flexible project management processes to deliver newer technologies in challenging short time-to-market goals require skilful and strong project managers. In this paper, we present a theoretically based and empirically proven skill set framework, with clear definitions grounded in the recent management and leadership literature, to define successful Telco NPD project managers. It consists of technical, leadership, managerial and administrative skills: managerial skills are mandatory; technical and administrative skills are important to understand the technical work and business processes; and leadership skills are found to be limited at an operational level. We also examined which skills are important with respect to project phases.*

**Keywords:** Project management, New Product Development, Telecommunications

The telecommunications industry (called 'Telco' for short) has changed world-wide in the last decade with the de-regulations and consequent creation of hypercompetitive markets (Beardsley, Enriquez & Garcia 2004). The only way for Telco companies to survive and grow is to develop better products faster. The project manager is one of the key internal controllable variables for New Product Development (NPD) project management success (Cooper & Kleinschmidt, 1996). There is little literature on NPD project management in Telco, as service providing: the core business in the industry.

Our research aims at filling this gap and looks for an answer to the question 'what project managers should have to be successful in Telco NPD projects in Australia' (Kosaroglu, 2008); one of the first countries that de-regulated the industry more than a decade ago, and this study's outcomes may have implications for others following Australia's path. First, we made theoretical deductions for the Telco NPD case by considering industry and product characteristics (Hunt & Kosaroglu, 2006). In a pilot study, we pre-tested the skill set framework with a small number of project manager participants in an Australian Telco company (Kosaroglu & Hunt, 2007a). Then, we extended the net with a larger population that involves other key project management stakeholders and other Telco companies. It helped us to understand the major challenges in Telco NPD projects (Kosaroglu & Hunt, 2007b). In

this paper, we present the second part of our research, and report on the project manager skill sets to cope with them.

## **LITERATURE REVIEW**

We intend to distinguish skills and collect closely related ones under the most distinctive and mutually exclusive sets, as proposed by Berge et al. (2002). Some studies have investigated the skills of a project manager, and provided long lists without differentiating or examining inter-relations among them (Anderson 1992; Krahn 2005). Although this approach highlights important skills, it does not give a holistic view that provides an abstract and compact representation. In particular, the emphasis on leadership and the assumption that it incorporates the majority of management aspects presents a blurred picture (Hosking 1988). Grouping skills under separate management and leadership headings could overcome this deficiency (Thamhain 1989). However, those groupings were based on intuition rather than logic. Anderson (1992) considered a project manager as the CEO of a temporary organisation with four attributes: human relations and leadership skills, and technical and administrative experience. Planning appeared under both administrative experience and leadership skills. All four except technical experience had big overlaps, and the rationale for defining the attributes was not explained. Thamhain (1989) categorised the skills required in a project manager as technical, interpersonal and administrative. More recently, he expanded the classification to “sophisticated skills in leadership, administration, organisational and technical expertise” (Thamhain 2004:543), but without explaining why and how.

Our approach differs from others in that it is based on a clear rationale: how a skill set contributes to the success of NPD project management. The formation of the skill sets is grounded in the recent literature on management and leadership. It has converged to four categories: technical, leadership, managerial and administrative (Kosaroglu & Hunt 2006). The criteria for the skill sets and the associated skills are presented in Figure 1.

**[Insert Figure 1 here]**

NPD projects in Telco, *a service industry that uses capital intensive high technology systems*, can generally be described as systems integration. Telco companies cannot employ technologies and systems ad hoc; they must work without a glitch. Consequently, only proven technologies that have completed their development cycle are deployed. But, the companies cannot wait until they are perfected, because of the competitive pressures. Although products are not unpredictable radical innovations, they still require innovativeness to combine them with supporting systems and processes. Therefore a common project type involves implementing a new technology in practice, and ensuring that it doesn't fail (Benghozi 1999). All the features in a product may not be profitable, or there may be a demand to launch a new product earlier than the competitors and time may not suffice for a complete product. Once a basic functionality is delivered, new functions are added, as market opportunities are seized. Therefore, a second type of NPD project is incremental product modifications or product line extensions: the product is already in use and known to a greater degree (Robertson & Jones 1999).

A number of project characteristics have been examined and triangulated for Telco in different types of classifications, as shaded pictorially below in Figure 2 for theoretical deductions about skill sets. As stated previously, new technologies are used in Telco NPD, only after they are enhanced and tested to be proven reliable. The functional groups that are formed around technologies can be impacted, and the number of interfaces and interactions grow proportionally with their number (Mihm et. al. 2003). Effective business processes are required to handle this complexity. Therefore, there is an increased emphasis on formality, procedures, control, reporting and detailed planning, which correspond to administrative and managerial skills (Shenhar and Dvir 1996, Shenhar 2001). Project managers should understand the dependencies among the project tasks. This requires good technical skills, to produce effective plans. At the high extreme, close to R&D projects, there is a reverse trend, communications are more informal, management style is flexible towards less control (McDonough 1990, Jassawal and Sashittal 2000). Then, leadership skills become more important to motivate the team. The effective project manager then, is a technical expert and a leader. NPD project managers in Telco should have all the skill sets: technical, leadership, managerial and administrative. For new products that involve

high technologies, they dominantly need technical and leadership skills (Thomke 2003). Large projects also require good managerial and administrative skills. For product line extensions, technical and leadership skills are not as essential as others (McDonough 1993).

**[Insert Figure 2 here]**

## **RESEARCH METHODOLOGY**

In the same tradition with the majority of the NPD literature, we aimed to produce generalisable results, but also to gain a better and deeper understanding of Telco NPD projects. To facilitate both, we selected the case study methodology, which relies on multiple data sources with data converging in a triangulated fashion, and followed the guidelines in Yin (2003). A Telco company or a business unit, where the phenomenon under consideration – NPD projects – occurs, constitutes a case. Five cases were developed to cover the majority of the firms in the Australian Telco industry. One of the cases is a professional services supplier, rather than a Telco company. They also participate in Telco NPD projects, and they are included to test the results at boundary conditions. Two cases only have one project and one participant, however, they are extremely useful for cross case comparisons, and to check the consistency of the results.

Semi-structured individual one-on-one interviews were used to collect data. The university ethics approval was obtained, and its guidelines have been followed through the data collection, analysis, and presentation of the results. Each participant had at least five years of experience in NPD related roles. The participants (i.e. units of data collection) provided rich data during 1 to 1.5 hour interviews. Project managers, managers of project managers, program managers, senior managers, and project sponsors were chosen in order to triangulate data both within and across the cases. About half of the participants have worked in more than one company, and therefore they can make direct comparisons between cases. There were standard, and then open ended follow up questions about a number (three to five) specific projects (i.e. units of data analysis). The key questions were: “Describe the particular challenges that arose in each project.”, “In which phases of the project did they happen?”, “How did

you (or the project manager) overcome them?”, “What would you (if project manager) do differently?” to understand how they benefited from the skill sets. The interview protocol was designed to collect data starting from the sample projects that reveal the most information about project challenges and the skills that project managers benefited to overcome them, and moving to broader examination across the cases. This strategy had a positive effect; the participants recalled past events more strongly and made better generalisations and cross case comparisons. The interview transcripts and the researcher’s notes were analysed, and conclusions were drawn systematically with traceability back to the original data for construct validity. A number of second short interviews were arranged on areas that needed clarification. A number of knowledgeable and experienced project managers were also referred to in order to check the validity of the findings. The overall research design is presented in Figure 3.

**[Insert Figure 3 here]**

A noticeable data saturation was observed by the seventeenth interview, then a further six participants, who have experience in more than once case, were specifically chosen for cross case examinations. Griffin and Hauser (1993) observed the same behaviour in their research that compared different data collection methods to understand the customer needs. They compared different data collection methods and found that one-on-one interviews with 20 – 30 customers reveal 90% or more of the information. In the last six interviews, the researcher deliberately proposed and hinted opposing or different arguments to check if the results are consistent for all cases. Totally, 23 participants cited 84 projects, of which 12 were cited more than once. A summary comparative information among the five cases is provided in Table 1. Case 1 has most of the projects, nevertheless the results are consistent for all cases.

‘Pattern matching’ (Eisenhardt 1989; Collis and Hussey 2003, Yin 2003) method was used to analyse the research data: interview transcripts and the researcher’s notes during the interviewees. In a case study, several pieces of information from cases need to be logically related to a theoretical or a predicted proposition, and then compared and revised with empirical findings to form a qualitative

representation (Yin 2003). The pattern appearing from the empirical evidence is compared with the proposition (Trochim 1989); if the patterns coincide, the validity of the theory is strengthened. To generate empirical evidence from interview transcripts and notes, the data were displayed in a matrix, called a mapping matrix, similar to the effects matrix of Collis and Hussey (2003), and consistently evaluated and compared with the new data until convergence occurred iteratively as presented in Figure 3. The emergent patterns, which form the research findings, are consistent across all cases.

**[Insert Table 1 here]**

### **PROJECT MANAGER SKILL SETS IN TELCO NPD PROJECTS**

Although there were variations in matrix organisational structures and NPD processes – case 1 and case 2 were the most contrasting examples – they had similar project structures and processes without any significant impact on the way Telco NPD projects are managed. They both had similar project team structures with functional group representatives in them. We have noted strong empirical evidence to support the theoretical skill set framework in Figure 2. Managerial and administrative skills were not distinguishable in the literature, but participants made clear arguments differentiating them: managerial skills employ project management concepts (effectiveness), and administrative skills use the organisational settings (tools, culture, structure, etc.) to make it happen (efficiency). Set out below from the empirical evidence, is a summary of how the skill sets contributed to project management success.

**Technical skills:** These skills help project managers basically in two ways: to understand project tasks and how they relate to form the product; and to communicate and relate to different stakeholders, i.e. technical engineers, senior managers and external parties, in their professional languages. However, the technical knowledge does not need to be detailed. Some participants called these skills ‘technical acumen’ to describe the adaptability to different technologies in a project; project managers are generalists, not specialists. As project managers have the overall visibility, they acted as a quality insurance mechanism by asking the ‘right’ questions to ensure that the overall solution does not have

any gaps. Project sponsors and other stakeholders did not usually have sufficient knowledge to describe a product, and they relied on project managers to define and to produce the project plans that deliver the intended product. If there were gaps, they expected project managers to inform them, so they could help to address the gaps pro-actively. More importantly, too much technical orientation was counted as one of the detriments to project management success. Project managers may have strong technical background in an area, and of course they may state their opinions, but they are better off not getting involved in a technical project task. In some projects, they lost their attention on the project, in favour of that task. They are there to get the work done, not to do the work. Interestingly, almost all the cases selected NPD project managers with some technical background, showing how technical skills are valued. Having both managerial and technical perspectives, allowed quick resolution of conflicts, which is critical to attain fast time-to-market goals.

***Leadership skills:*** The leader role in a conventional sense is more relevant to help individuals excel personally and professionally. However, project managers had a dedicated focus on the NPD project. Therefore, a relation similar to that between a functional manager and employee did not hold for them. They were interested in team member's concerns and motives, but only in order to get the job done. During the interviews, project manager participants gave examples of leadership: how they communicated with the project stakeholders, negotiated a solution and obtained their buy-in. They listened to the team members and encouraged effective business solutions, which have lower costs and are more convenient to integrate with business processes. At the cross point of all project activities, they faced conflicting demands from different stakeholders. They had to be strong and persistent not to be beaten by these pressures, and to communicate the project goals constantly to keep them aligned. This was indeed a marketing effort especially to the senior managers to maintain their ongoing support, and to the project team creating the impression that they are in the spot light. They also had to be aware of organisational politics not only to avoid harm, but if possible, to use it in favour of the project management success. They tried to run a coherent team, and owned project and personal issues, but only to a certain extent. If problems were not resolved quickly, they engaged functional or senior managers, whichever was suitable. They always had urgent items on their agenda under time-



to-market pressure, and did not have much time for individual or team building activities. Practically, this was also not possible, since projects are short term endeavours requiring intensive attention to the project work, and the matrix organisational structure limits them; they do not have any direct authority over anyone and cannot cross the boundaries with functional managers. One project manager intentionally ignored leadership, and stated that his role as a leader is very limited.

**Managerial skills:** These were the mandatory skills for project managers, since the ultimate responsibility relied on them to develop and execute project plans. Producing plans was not always easy for large and complex projects. However once completed and then updated with the project progress, they helped in many ways: they provide visibility into project details; allow close tracking and control; form a means of communication with the team members; and give a high level summary of critical tasks and milestones for reporting to senior managers. The plans were also binding agreements with vendors. There were tools that help project managers to produce project plans in a short time, but with a precaution: perfection and knowledge in these tools is not the aim, but their utilisation to produce meaningful and useful plans is. Planning was an important step to view the whole project end-to-end. It also gave opportunity to evaluate the impacts of the risks and unknowns. The project stakeholders were aware that anything may happen and prevent a project from achieving its goals. Having a risk aware mindset that tracks project progress and questions what may go wrong, let project managers produce alternative contingency plans in a very short time. This increased confidence in project managers, and helped them to enlarge their influence. However, a good project plan alone did not suffice. Project managers sometimes needed to exercise positional powers to implement the changes or to obtain company resources. Escalations in the organisational hierarchy were the only formal mechanism. Although they did not intend to use it due to its possible consequences, the empirical evidence showed that the project managers use escalations often. They are considered as a natural extension of their actions, and senior managers address them as part of their daily regular duties. They needed to be justified with facts and quantified data. With the arguments as to how the company was impacted with late delivery of projects, project managers could affect senior managers' decisions, and therefore influence company strategy in a limited way. Before any formal

escalation procedure, they informally disclosed an issue, then escalated formally if it could not be prevented, so it did not come as a surprise. Interestingly, several project managers stated that they do escalate early to avoid the blame game. In reality, working with many uncertainties, they used escalations to cope with them.

***Administrative skills:*** Telco companies are formed of specialised groups around technologies and functions. Project managers relied on administrative roles and policies to cross these boundaries to implement process changes. They needed to know who does what, and the decision makers. Project governance described roles and responsibilities, and also what was expected of them. As part of their administrative role, project managers used the escalation paths that were defined in this governance, to resolve project issues quickly. Time-to-market pressure has made exercising escalations a part of project management culture. The project management tools were the other helpers in managing projects. There was not a standard way in their use; they were tailored locally depending on a project manager's personal preferences as to how they recognised and processed data. The efficient use of these tools made a remarkable difference in exhibiting managerial skills, and enhanced their performance. The procedures and processes that integrate a project with the rest of the company provided feedback on how a project was progressing and contributing to the overall strategy at a high aggregate level. Project managers also used other well known tools, like e-mails for communication and, MS Word for documentation. They are not considered special tools for project management. However, due to their central and critical role in projects, project managers need to convey precise and concise messages, and to be more sensitive to comply with relevant company policies on electronic communication and documentation. The participants performed their administrative tasks at a minimum level, avoided those that do not contribute to project management goals, and spent time in the order of urgency. In none of the cases, was there any evident systematic effort to improve project management processes. After they were set, there was not much effort to revise or amend them. There was a recognition of the need for stronger processes to eliminate heavy dependency on individuals, to gain best practices in Telco and other industries, and to retain more knowledge. However, this is contradictory to achieving maximum flexibility to deliver new products in the shortest possible time.

Balancing speed and time-taking processes is quite challenging. Project managers at least had to satisfy the key processes and basic quality checking in order to avoid hitting a road block.

### **PROJECT MANAGER SKILL SETS vs PROJECT PHASES**

All the cases use a stage (or phase)-gate NPD process (Cooper 1994), which is also applied by many other Telco companies (Engwall 2001), with usually four phases. Only case 2 had seven phases, and it was necessary to map them to four phases for comparison purposes. The phases consist of closely related consecutive NPD steps with gates separating them. The gate keepers, who are usually senior managers, control a project's progress at a gate and approve advance to the next phase. In the Initial Investigation (II) phase, project requirements are gathered, clarified and documented. The alternative solutions are developed, tested and an optimum one is selected in the Feasibility and Definition (F&D) phase. In the Development Implementation and Validation (DIV) phase, the selected solution is deployed in practice, and product ownership is passed to operational groups. At the end of the DIV phase, the acceptance from the operational groups signifies that the project has been completed to satisfy the required conditions; theoretically, this is when a project manager's duty ends. Closure phase is for closing a project financially and administratively. In the following, which and why the skill sets are important in each phase are reviewed more closely

***Initial investigation phase:*** A clear project scope from the II phase increases the project management success significantly. Intense communications happened until an agreement was reached between project stakeholders, and this required leadership skills. Project managers needed to listen and understand what is really wanted, state it correctly in both engineering and marketing terms, negotiate and resolve conflicts between project stakeholders, obtain their buy-ins, and then record clearly to prevent any confusion in future. Good project managers dug deeper to disclose un-written requirements, to be sure that there is no missing piece, and they deliver the right product. Consequently, technical and leadership skills were the most critical skill sets in the II phase.

***Feasibility and definition phase:*** The focus in this phase shifted to finding an optimum solution, and there was more interaction and communication with functional engineering groups. Project managers promoted business sensitivity in the project team for a cost effective and simple solution. They also allowed feasible changes in the project in order to have a successful product at the end, but it required a selling exercise to the project team to expand the project scope. Project plans with more accurate estimates were needed, since the company really begins using its resources starting with this phase. Plans had to contain sufficient details and interim milestones to track project progress, and to keep expenses under control. Project management tools were big helpers to produce, update and store information efficiently. Good documentation was needed to record designs, process changes, and to explain a new product. Good leadership, managerial and administrative skills were required to handle this complex project phase. The technical skills were needed only to understand project team members' work, and to check their technical decisions. There were technical experts in the project team having the needed detailed technical knowledge. Even if project managers have that knowledge, they were better not to get involved and lose focus from the project. Therefore, in contrast to the II phase technical skills were not essential.

***Development, implementation and validation phase:*** Whatever is done in a project is to secure the operational groups' buy-in and their approval. Process changes particularly needed special attention. Project managers had to listen to every signal, and understand and address concerns in order to eliminate the risk of last minute problems. Deviations from project plans had to be carefully examined. Anything that might impact the dates had to be handled immediately by engaging the right people in the company. Project managers used their positional powers via escalations the most in this phase. It was impossible to predict everything. Project management tools helped identify delivery date risks earlier, and to update the plans quickly. Similar to the F&D phase, good leadership, managerial and administrative skills were required in this phase. A moderate level of technical skills sufficed to understand what is happening during deployment in the field.

***Closure phase:*** Operational acceptance indicates that a new product development is completed and it can be supported after its market launch. This phase had more marketing activities, and project

managers helped to answer initial queries coming from operations, sales and customers, as they had the overall understanding and connections with the people who could answer detailed questions. It required some informative communications and technical knowledge only.

The above comparison among the phases resulted in skill sets versus the project phases pictorially presented in Figure 4. However in reality, there may not be clear cut boundaries between the project phases, since time-to-market pressure forces shortened project durations. An easy solution was to eliminate or short-cut project tasks or a whole project phase, but with the likelihood of issues popping up in the DIV phase. Quick fixes and rushing to the market might have serious quality problems in the customers' hands, and Closure could then become a long fault clean-up phase. What usually happened: some requirements were not identified during the II phase, or tests were incompletely done in the F&D phase. Project managers had to resist cutting corners, and perform critical tasks. With tight delivery dates, all the II, F&D and DIV phases needed to be considered at a high level. They could adjust the phase durations or overlap them and plan for multiple releases. But, they should set project stakeholders' expectations up-front. A strong empowered and skilful project manager, who has excelled in all technical, leadership, managerial and administrative skill sets, was needed in accelerated projects.

**[Insert Figure 4 here]**

## **CONCLUSIONS**

In this paper, we have presented our final report on the skill sets of Telco NPD project managers to successfully manage their projects. We first proposed a theoretical skill set framework based on the rationale of how the skills contribute to project management success, using clear definitions from an extended literature review with recent publications on NPD, project management and leadership. The skill set consists of technical, leadership, managerial and administrative skills. Then, we proved its validity with empirical evidence for Telco NPD projects in the Australian Telco industry (Kosaroglu 2008). The applicability of the results across all the cases and the consistent triangulation of them with

different stakeholders implies that one of the Telco companies can be selected as a representative case to investigate NPD projects and their project managers.

We explained how project manager skill sets contribute to project management success. Managerial skills are mandatory, but more is needed to be successful in Telco NPD projects. Although leadership skills are usually emphasised more than others, their usage is limited, and different from functional line management in terms of its focus on projects. (Keegan & Hartog 2004). Administrative skills increase project managers' efficiency to develop and modify plans, and to use organisational factors to resolve project issues quickly. We noted clear differences between managerial and administrative skills, similar to indicated by Pettersen (1991). Technical skills are more important in the initial stages of the projects. F&D and DIV phases need good managerial and administrative skills, and have less demand for technical skills.

Telco industry requires all four skill sets with varying degrees depending on the project phases. Although, desirable to run a project with the same project manager from beginning to end, occasionally resources need to be re-allocated in the most effective way. Project managers with the associated skills can be assigned depending on the phase of a project. For example, a project manager with good technical skills will perform better in a project in II phase, and one with managerial and administrative skills in F&D and DIV phases. Since Closure phase does not require any managerial and administrative skills, a less experienced project manager can be assigned.

Australia is an example of de-regulated Telco markets, and this study may give some insights for other Telco companies new to such markets. A future research study in another developed country could provide indications, if the results are universal in any de-regulated Telco market. Using the skill set framework presented here and the knowledge of their requirements, Telcos in particular and possibly other industries can more efficiently recruit, train and develop NPD project managers and achieve successful project outcomes.

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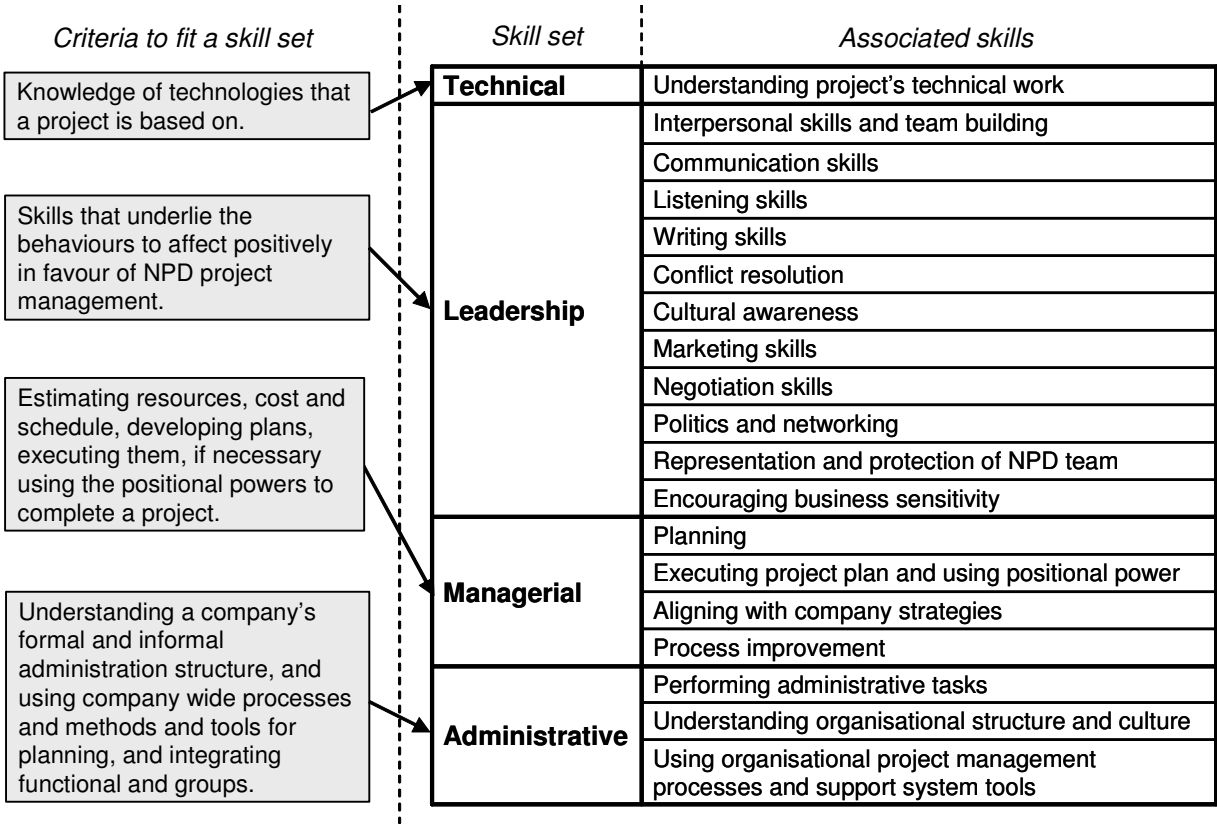


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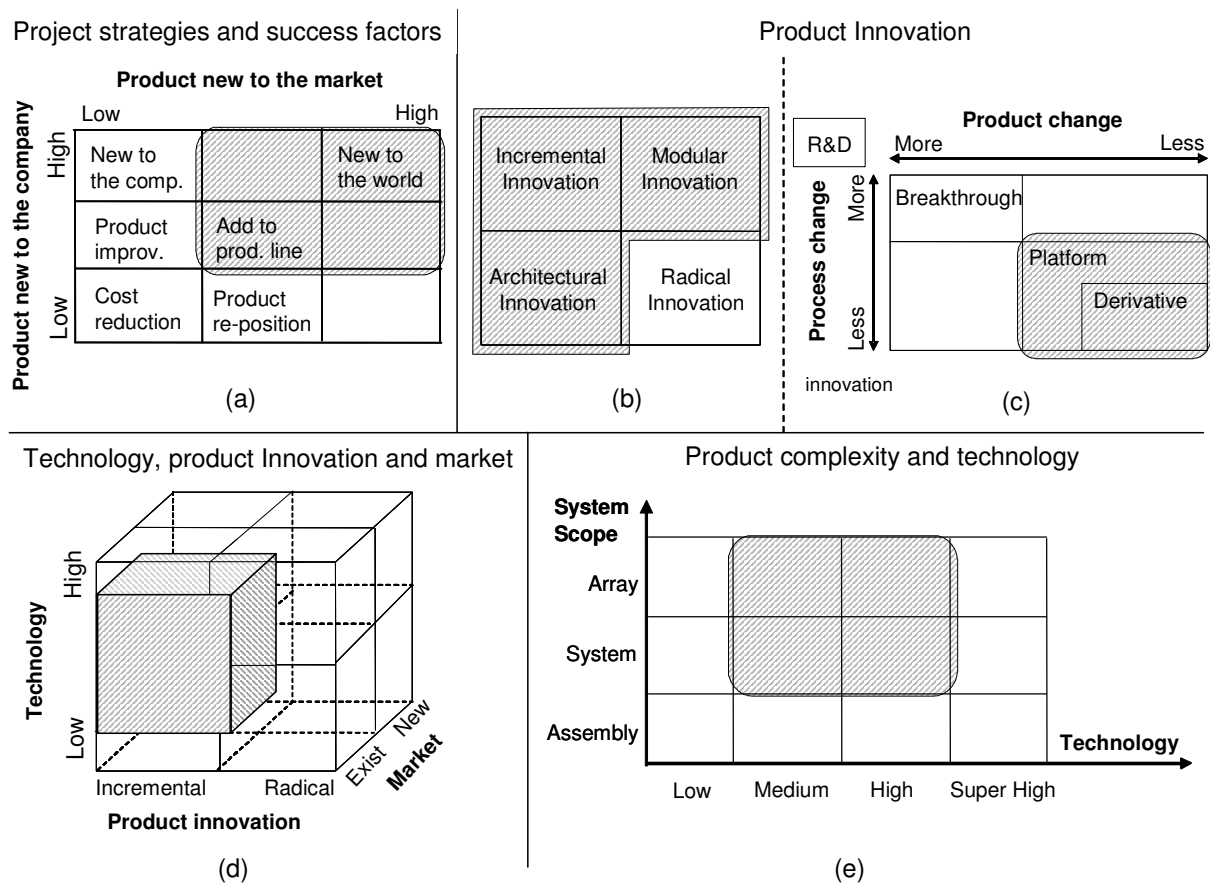
**Table 1: Cases, Number of Participants and Projects**

Case	Short Description	No of participants	No of projects
Case 1	Large Telco company, subsidiary of a global Telco group	21	57
Case 2	Large Australian Telco company	9	8
Case 3	A Telco business group	2	5
Case 4	Large Telco company, subsidiary of a global Telco group	1	1
Case 5	Australian branch of global Telco professional services supplier	1	1

**Figure 1: Project Manager Skill Set Framework**

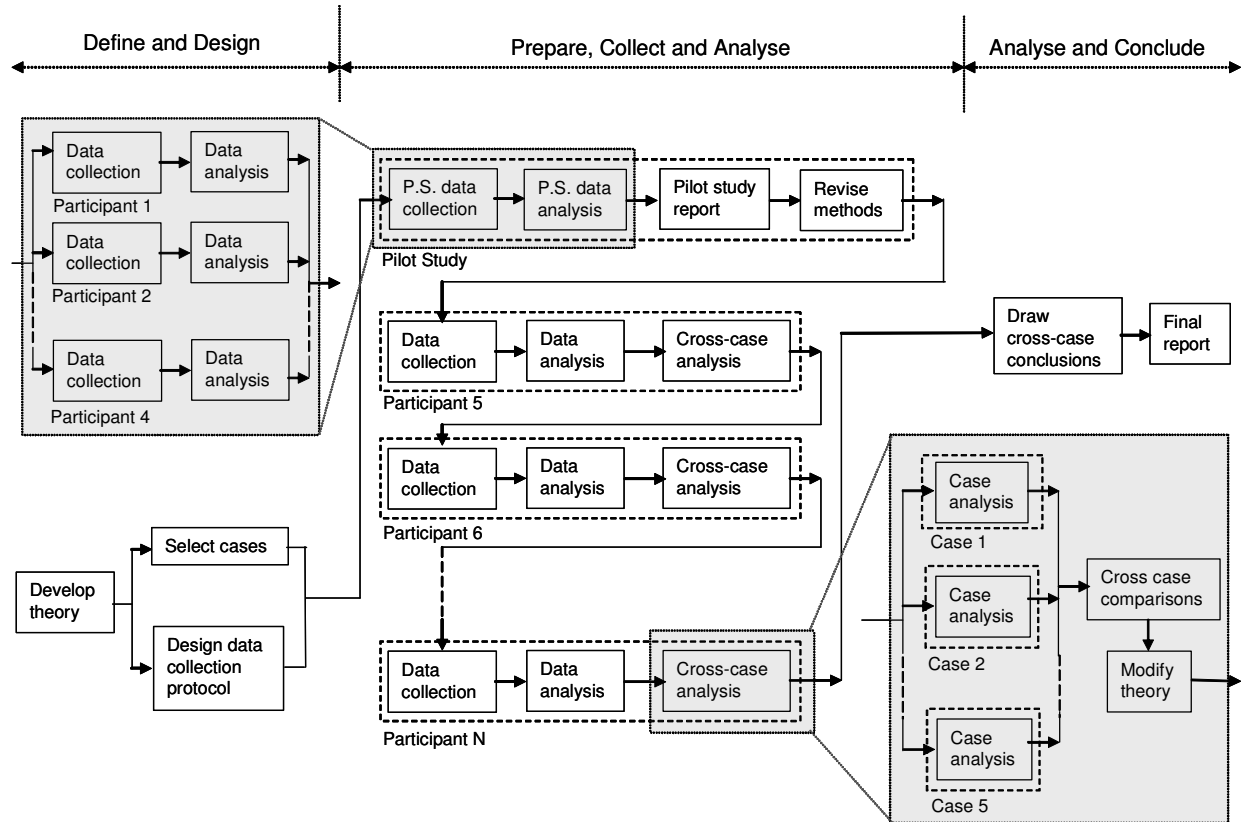


**Figure 2: Telco NPD (Shaded) in Different Project Classifications**



**(a) Project success measures versus project strategies (Griffin & Page 1996, p. 481), (b) A framework for product innovation (Henderson & Clark, 1988, p. 12), (c) Development project types (Wheelright & Clark, 1992, p. 74), (d) The contingency cube for NPD and R&D projects (Balachandra & Friar, 1997, p. 284), (e) A two dimensional topology of engineering projects (Shenhar 2001, p. 401)**

**Figure 3: Overall View of the Case study Research Design**



**Figure 4: Skill Sets versus Project Phases**

