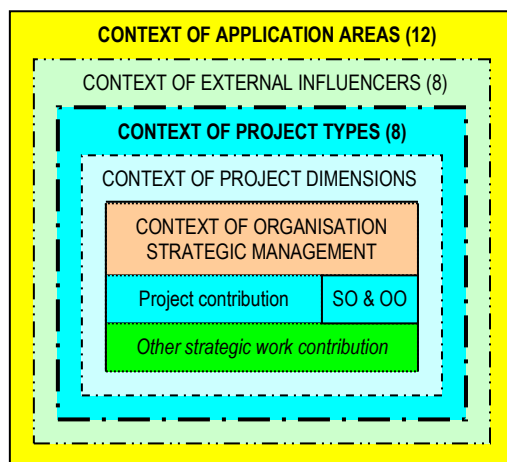


Series on project contexts

5. Contexts of project types ¹

By Alan Stretton

INTRODUCTION



This is the fifth of a series of seven articles which identify and discuss a variety of key contexts which impact on the management of projects. The basic reason for developing this series is that there is far too little attention given to the contexts of projects in the relevant literature – particularly when you consider that, in practice, effective management of projects' contexts is usually quite critical to achieving overall project management (PM) success.

The first article of this series (Stretton 2019e) identified six key types of project contexts. These were summarised pictorially into a combined model, depicted in skeleton format in

Figure 1: Outline project context model Figure 1 to the left.

The second article of this series (Stretton 2019f) was concerned with the context of organisational strategic management; the third (Stretton 2019g) with the contexts of projects being undertaken by supplier organisations (SOs) and owner organisations (OOs); and the fourth (Stretton 2019h) with the contexts of what Shenhar & Dvir 2007 describe as project dimensions. This article is concerned with project types in a more general context. Its position in Figure 1 is shown in heavier outlines.

RECAPPING DISCUSSIONS OF THE CONTEXT OF PROJECT TYPES IN THE FIRST ARTICLE

In Stretton 2019e I drew from some earlier articles I had written in this journal on categorising projects and programs (Stretton 2014f, 2014g). In the latter article I started with two listings from Japan's P2M (PMAJ 2008). These were mixtures of program/project types and application areas, which I separated into a listing of six types of projects, and ten application areas. I then made slight amendments and additions to the list of types of projects, which were added to previous contexts, to arrive at the Figure 2, as reproduced below.

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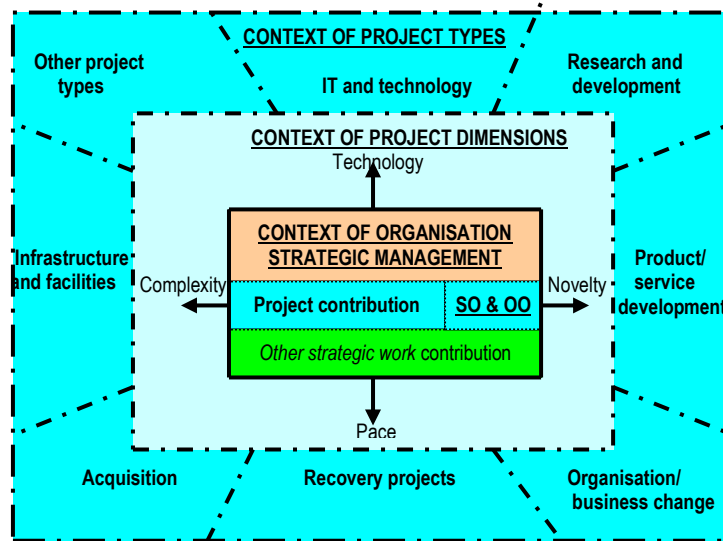


Figure 2: Adding the context of project types to the previous contexts

THE KEY IMPORTANCE OF FAMILIARITY WITH THE NATURE OF THE WORK INVOLVED IN THE PROJECT BEING MANAGED

Different PM approaches are needed for different types of project work

Archibald & Prado 2014 point to the importance of the project manager having specific familiarity about the nature of the work involved with the particular type of project, and to have PM approaches which are appropriate to its management:

....for a project to be successful, different types of project work associated with different types of project need to be managed differently. An experienced engineering-procurement-construction (EPC) project manager will often not be very successful managing a typical information technology (IT) software project. The project management methods and tools that are successful for an EPC facilities project are not very useful for an IT or new product development project.

Giammalvo 2019 points to the difference that the type of project work makes to the management of that project in even stronger terms:

....who in their right mind would believe that just because an individual was a great IT project manager that he/she could become the project manager to engineer, procure and construct a bridge?

These quotations emphasise the key point to be made about the relevance of the context of these broad different project types. In addition to project-specific differences, the nature of the work to be done within each project type is distinctive to that category. So, in addition to appropriate skills in project management per se, the project manager and project team members need to bring specific nature-of-work related knowledge, skills and experience to bear on their project to ensure that the totality of the work is effectively prosecuted.

The importance of the nature of the project work is often not acknowledged

The focus of most of the project management literature is on what one might call “generic” project management tools and techniques – i.e. those that are deemed to apply irrespective of the particular nature of the project. However, it is evident from the above that the nature of the project work is also extremely relevant, and should be given more prominence than it currently receives. As indicated in the above quotations, this factor is highly relevant in choosing the most appropriately qualified and experienced project managers to undertake particular types of projects. But it is also relevant to educating and credentialing project managers.

On a personal note, I have often conjectured that most of the project managers I have worked with, including some world-class ones, would probably not pass most “generic” project management certification or accreditation tests “cold turkey”. I have further conjectured that one reason would most likely be that their work-type-specific skills were probably a good deal more relevant to their successful performance than their “generic” project management skills.

SOME PERSONAL REFLECTIONS ON MANAGING DIFFERENT TYPES OF PROJECTS

Many of my comments on elements of the project contexts being discussed in this series have derived from my own experience, particularly in Civil & Civic (C&C), and I will continue with this reflective, but hopefully useful, indulgence in the following discussions of managing two of the types of projects identified in Figure 2, namely *Organisation/Business Change* and *Research and Development*.

Organisation/business change project types

By an accident of history, I happen to have had substantial direct experience in several of these “project type” groups. A taste of this diverse experience is reflected in the following quotation from Murphy 1986:73.

Alan Stretton, afterwards a Director of Civil & Civic, came to Lend Lease from the Snowy Mountains in late 1961. His first job was to reconstitute the costing and financial control system for construction jobs – ‘Roy and I had done it before on the Snowy’ – and also to work on construction planning. ‘Network analysis’, a new planning aid from the United States, came into Lend Lease with Alan Stretton. He then worked on improving design cost control and, with the expansion of the organisation, has been involved in many fields, including (as well as management training), research and development, and corporate planning.

I can personally affirm that different project types, and indeed sub-types within a broader type, necessitated different styles of management. We start with three sub-types within the broader *Organisation/business change* project type:

- Developing and deploying a new C&C financial and cost control system
- Introducing network techniques (CPM) into C&C construction planning
- Managing the Lend Lease group management education program

Developing and deploying a new C&C financial and cost control system

The most important thing about this project was that you had to already know a great deal about both company and project financial and cost control systems to be able to undertake this type of project with any chance of success. My boss (Roy Robinson) and I had already developed and deployed a construction project cost control system for day labour work in the Snowy Mountains Authority (in spite of opposition from the chief finance officer). We had learnt many lessons the hard way, and were therefore reasonably well prepared to undertake the larger task of developing an integrated cost and financial control system for an entire organisation. As the designated project manager, I had enough relevant knowledge and experience to be able to effectively monitor the inputs of specialists, and integrate these inputs into an effective whole.

I was also responsible for effective deployment and de-bugging of these systems. The use of these types of systems was, of course, mandatory, so that my mode of interaction with users tended to be combination of coaching and trouble-shooting, but with authoritarian overtones where needed.

Introducing network techniques (CPM) into C&C construction planning

This had some strong similarities with the financial and cost control system project. First, I had to master the technique of CPM – the Critical Path Method (also known as Arrow Diagramming) – which I did with the invaluable help of Eric Watson, who had joined us from Bechtel, where he had had a thorough grounding in the use of CPM. I then mounted a construction planning education program based on CPM, and followed this up with visits to every construction site, with appropriate coaching. These processes were repeated when we switched to Fondahl's activity-on-node method – which later came to be known as the Precedence Diagramming Method (PDM).

The main difference between the deployment of these construction planning techniques and the financial and cost control system was that, whereas strict adherence to the latter was mandatory, I did not make adherence to either of the two network planning techniques mandatory. This was because planning was only one of the many management functions involved in construction project management, and the way they went about it was up to the individual project team.

This changed the emphasis of my role as effectively program director to much more of an advisory one. My real concern was that project managers did actually think through what had to be done, and organise for its effective execution. I was less concerned with what particular planning technique they used. In fact, most of them found that PDM suited their planning needs best, but I left the decision to them, as they were the people who were finally accountable for their project.

Managing the Lend Lease group management education program

I inherited the task of managing the entire Lend Lease group internal management education program when a key employee left. This came about because I had been running the internal management education program within the largest of the group companies at the time – Civil & Civic – and it seemed a natural move, particularly because I was so fully informed about the contents, and the accompanying educational processes. My role was essentially as program manager for the entire program, mainly concerned with maintaining high quality levels. Fortunately we had very good people managing these programs in the group subsidiary companies, so that my management task was more like a consultancy than anything else.

Research and Development (R&D)

I was in charge of Civil & Civic's R&D work for some two decades from 1962. This was a very productive and successful unit, and an unusual one in the building and construction industry at the time. As Clark 2002:41 records,

In 1959 Dusseldorp [then CEO of Civil & Civic] created an R&D department with a straightforward charter: 'to identify better things to do and better ways of doing things', so as to keep the company 'at least one jump ahead of the competition'. A totally new concept for the Australian building and construction industry at the time, the R&D group....searched for those 'better things and better ways'.... While some of the resulting innovations were fizzers others proved successful. The invention of a safer and more efficient formwork hoist, a range of new concrete formwork systems, and the 'Progressive Strength' system of high-rise concrete construction, for example, all 'simultaneously improved the rate of construction and worker safety, were adopted throughout the industry, and remained the standard for many years'.

As manager of this effort over such a long period, I was a kind of cross between a department manager and a program manager. We had some very good people. You can't have a successful R&D group without such people, and this helped make my management task relatively easy. My recollection of my job was that, more than anything else, I acted as a kind of sounding board – a some-time counsellor, prompter, encourager, and ultimately a decision maker. Whatever appropriate personal attributes I brought to this task (and I don't really know what they were), this particular job seemed to me to come as naturally as breathing.

I want to finish this section with a note about knowledge aspects of our R&D people which appear to be contrary to some conventional wisdoms. With only a couple of exceptions, we deliberately recruited people who had had no prior experience in the construction industry. Why did we do this? Because this industry is a very traditional one, with strongly entrenched ways of doing things, most of them unexamined with regard to their effectiveness. So, people with enquiring minds from outside the industry rather naturally ask the question, "Why are you doing it this way?" Many of our most significant breakthroughs had their genesis with asking this question, and then looking for, and finding, more innovative and/or effective ways of doing things, and in some cases, new things to do.

A MORE GENERALISED CLASSIFICATION OF PROJECT TYPES/SUB-TYPES

In the above discussion of *Organisation/business change project types*, we looked at three sub-types in this group. There are, of course, many more sub-types within this particular category of project types, and indeed within all the other project types.

At this more detailed level, the classification of project types and sub-types can become quite complicated. As Archibald & Prado 2014 observe,

There is usually a wide range in the size, risk and complexity of projects within each project category or sub-category.....

These authors discuss a variety of ways of further classifying projects, including the following, described as *Classifying projects within categories and sub-categories*.

- Project complexity and risk
- Strategic transformational programs
- Major or minor projects
- Mega projects and programs

Project complexity and risk

Archibald & Prado subtitled this classification as follows.

Number of different skills or techniques needed, geography/cultures/languages; risks can be financial, technological, political, time pressure, or others,

Earlier in their article, Archibald & Prado discuss the project diamond model of Shenhar & Dvir's 2007 (as well as an earlier scope-and-technology categorisation by Shenhar and colleagues). I also discussed Shenhar & Dvir's diamond model (which I described as the NTCP model) in the first and fourth articles of this series, under the heading "Context of project dimensions".

Now, Shenhar & Dvir 2007 have a good deal to say about both project complexity and risk. Project complexity is one of the four major dimensions of the NTCP model, and implications for the management of various levels of project complexity are discussed in some detail in Chapter 6 of their book. They also have substantial discussion on "Managing your project risk" (from p. 171), as well as management implications for risk management of the various levels of their four dimensions in tables in their appendices. This category of project complexity and risk has therefore already been at least partially accommodated, albeit a little indirectly, in this series.

Strategic transformation projects and programs

Archibald & Prado have only a short commentary on this category, as follows.

These innovative projects and programs will obviously be major, complex, and usually high risk endeavours to which the above considerations [on project complexity and risk] will apply.

This commentary indicates that the authors had very substantial strategic transformations in mind with this category. However, I am taking the liberty of including these in the broader context of organisational strategic initiatives of any kind. The latter has already been included as a specific context in this series, under the heading of “The context of organisational strategic management”.

Major and minor projects

Archibald & Prado 2014 say that it is useful to identify at least two classes of projects within each category, although some organisations use three or even four classes within a specific category. In particular, they distinguish between what they describe as major projects and minor projects, on the bases of factors such as size, complexity, risk, requirement for sponsorship, type of project manager, and degree of application of full project management processes. I am not sure how important a contextual issue the above is, but have included it for the sake of completeness.

However, one end of the major projects classification can be extended out to the fourth classification nominated by Archibald & Prado, namely “*Mega*” projects and programs, which has not been discussed to date in this series, and will now be addressed as a new major project type.

“MEGA” PROJECTS AND PROGRAMS

Archibald & Prado note that “mega” projects and programs (“major projects on steroids”) present unique governance and management challenges, but they do not elaborate on these. Indeed, the mainstream project management literature has relatively little to say about mega projects. As I have not covered these elsewhere, I will now attempt a partial coverage of the most relevant materials I am aware of.

Some of the most quoted analyses of what they describe as “A calamitous history of cost overrun” (Ch. 2) on mega projects that I am aware of come from Flyvbjerg et al 2003. Their classic book on “Megaprojects and Risk” was particularly concerned with transport infrastructure projects. However, they record (on p. 18) that they also

.... examined cost data for several hundred other projects, including power plants, dams, water projects, oil and gas extraction projects, information technology systems, aerospace projects and weapons systems. The data show that other types of major project are at least as, if not more, prone to cost overruns as are major transport infrastructure projects.

Flyvbjerg et al emphasise that mega projects are complicated (p. 9). Bob Prieto uses the terminology “Large complex projects” to describe what others call mega projects. These descriptors appear to be virtually synonymous in the way they are discussed by these authors, so I will use their descriptors interchangeably in the following.

Prieto's "Theory of management of large complex projects"

Prieto has discussed problems with the management of large complex projects for many years, with many articles in this journal, including a major article on "Project management theory and the management of large complex projects" (Prieto 2015a). Many of these materials have also been amalgamated into a book with the above title (Prieto 2015b). His work is by far the most detailed on the subject that I know of. I could not possibly do his work anything like justice in the few selective extracts which follow, but hope to give at least a flavour of what he has had to say.

Prieto's discussions of aspects of large complex projects ("It's complicated")

Under the heading "It's complicated!", Section 8 of Prieto 2015a discusses the following twelve aspects of large complex projects in substantial detail. It is simply not possible to adequately summarise over 20 pages of discussion in less than one page, but I have put brief notes against each heading to try and give some sense of at least parts of his discussions on these aspects in Figure 5 below.

- **Project time scale:** There are many consequences of typically extended timeframes for large complex projects. These often include having project organizations that range from semi-permanent endeavours to life cycle provision of services.
- **Outcomes:** A strong outcomes focus is needed on large complex projects. Strategic Business Outcomes (SBOs) become more important than requirements. In some instances large complex projects may be faced with emergent SBOs.
- **Stakeholder role:** Large complex projects require the design and outcomes to satisfy not just the owner but also many of the outcomes desired by a network of enabling and blocking stakeholders. Stakeholder engagement is a core activity.
- **Boundary:** Large complex projects are not well bounded. Influences acting to create a semi-permeable boundary include the emergence of new outcomes and stakeholders, and large numbers of ex-project inputs and assumption drivers.
- **Flow across boundary:** Influencing flows shape transformative flows and may arise from flows crossing semi-permeable boundaries, as well as the interaction between two or more transformative flows present within the project context.
- **Flows:** Flows acting on large complex projects include transformative flows inside a task, and between tasks; Influencing flows from external stakeholders or changed project environment; and Induced flows from interactions of one or more influencing flows.
- **Requirements:** An owner's project requirements (OPR) often prove to be optimistic (the "planning fallacy") or incomplete (often too narrowly defined). Also emergence of new requirements during execution is characteristic of long duration complex projects.
- **Scope:** Scope must go beyond just the project's technical requirements and explicitly include a broader set of owner's requirements, including owner's strategic outcomes, and mandatory/quasi-mandatory requirements from external stakeholders.
- **Tasks:** Tasks are increasingly interdependent, coupled by constraints and "white space" risks. Tasks may become coupled and entangled and task limits may change and at times become open ended.
- **Project organization:** Organizations must be adaptive, flexible, self-renewing, resilient, learning, and capable of responding intelligently to change. The rules of connection within the organization must be simple to facilitate flexible responses to complexity.
- **Knowledge management:** Knowledge sharing is a central execution principle:
 - Everyone has access to all information needed to do their job
 - New information is continuously created and shared.
- **Execution Focus:** Simplification and flexibility become core features of execution. These include increased emphasis on fabrication, modularization, and standardisation of systems, structures, components and work processes – plus many more.

Figure 5: Prieto's twelve aspects of large complex projects, and brief notes on his discussions

Some attributes of large complex projects vs. traditional projects

In Prieto 2015a:24, he very specifically says (his emphasis):

Large complex projects differ from those that comprise the traditional domain of projects as defined and served by the Project Management Institute and its Project Management Body of Knowledge (PMBOK). Remember its admonishment that PMBOK provides a management framework for **most projects, most of the time**. Large complex project appear to live outside these boundary conditions.

Importantly for this article, Prieto discusses many attributes of large complex projects, and compares them with what he calls the prevailing *traditional or classical theory of projects*. I am going to draw on three of his tables outlining certain distinctive aspects related to the management of large complex projects, which are also compared with “traditional” projects. We start with some precepts/ assumptions.

Some precepts/ assumptions re large complex project mgt. vs. “traditional”

The following is derived Prieto 2015a, Table 7. Whilst covering only some aspects of his table, it has some very substantial materials on precepts and assumptions which are directly relevant to the management of large complex projects (my numbering).

THEORY OF LARGE COMPLEX PROJECTS [Prieto]	PREVAILING THEORY OF PROJECTS
<p>PRECEPTS</p> <ol style="list-style-type: none"> 1. Large complex projects range from semi-permanent endeavours to life cycle provision of services 2. Influencing flows shape transformative flows and may arise from flows crossing semi-permeable boundaries as well as the interaction between two or more transformative flows present within the project context 3. Influencing flows may change the nature of tasks to be undertaken as well as how the various process flows define, interact with and drive forward the transformation process <p>ASSUMPTIONS</p> <ol style="list-style-type: none"> 4. Tasks increasingly interdependent, coupled by constraints and “white space” risks. “Influencing vectors” arise from process flows, influencing flows, and new flows created from the interaction of two or more “influencing vectors” 5. Tasks may become coupled and entangled and task limits may change and at times become open ended 6. Requirements may emerge in the process of project execution; susceptibility to the “planning fallacy” 7. Tasks may arise as the result of emergent requirements, “influencing vectors” and flow-to-flow interactions 8. Totality of work is influenced by semi-permeable project boundaries, emergent requirements, and “influencing vectors”. Initial decomposition of the initial transformation effort may not define the ultimate totality of transformation 9. Strategic Business Objectives (SBO) become more important than requirements, and in some instances projects may be faced with emergent SBOs. 10. Requirements must not only address emergent factors but also uncertainty over time as large complex projects often have extended project delivery times and significant considerations of life cycle factors and needs 	<p>PRECEPTS</p> <ol style="list-style-type: none"> 1. Project is a temporary endeavour 2. Total transformation can be decomposed into manageable tasks 3. Executing each task in optimal manner & sequence optimises overall project execution <p>ASSUMPTIONS</p> <ol style="list-style-type: none"> 4. Tasks are independent, except for sequential relationships 5. Tasks are discrete & bounded 6. Uncertainty of requirements low 7. Uncertainty of tasks to be performed is low 8. The totality of works to be performed can be described by top down decomposition of total transformation effort 9. Requirements exist at outset of project 10. Requirements can be decomposed together with the work to be executed

Figure 6: Some precepts/ assumptions re management of large complex projects, plus comparison with prevailing traditional projects – derived from Prieto 2015a, Table 7

In addition to these materials on precepts and assumptions underlying Prieto’s theory of management of large complex projects, he has made direct comparisons with equivalent materials relating to prevailing “traditional” project management, which are shown on the right of Figure 6.

This is the most detailed of the three figures I will be presenting based on Prieto’s tables. It gives a very good indication indeed of how the combination of size and complexity can complicate so many key management-related issues, sometimes quite dramatically. It also illustrates rather starkly how much more complicated these issues are than their equivalents in more traditional project contexts.

It will also be seen that some of the materials from the earlier notes on Prieto’s discussions of aspects of large complex projects in Figure 5 also appear in Figure 6 above. There are substantially more of these types of connections in the full texts of Prieto’s theory of management of large complex projects.

We now move on to look at various extents of different types of management focus.

Types/extent of management focus on large complex projects vs. “traditional”

The following figure on the extended focus of the theory of large complex projects, and comparisons with “traditional” classical projects, is derived from Table 15 in Prieto 2015a (my numbering).

Extended focus of the theory of large complex projects	
Extended Focus	Classical Focus
1. Owner readiness	1. Project readiness
2. Emergent outcomes (multi-finality)	2. Output focus
3. Flows including emergent influencing induced flows	3. Tasks and transformative flows
4. Stakeholder engagement (partners in success)	4. Stakeholder management
5. <ul style="list-style-type: none"> • Confirm <i>continued validity of assumptions</i> • Monitor <i>environment for emergence or changes in influencing flows</i> • Influence <i>flows across semi-permeable boundary</i> • Evolve <i>modified project to anticipate/ respond to emerging externalities</i> 	5. <ul style="list-style-type: none"> • Organize • Direct • Coordinate • Control

Figure 7: Extended management focus on large complex projects plus comparison with classical (“traditional”) focus – derived from Prieto 2015a, Table 15

In the bullet pointed headings for type 5 in the “Extended focus” section in the above figure I have added descriptors from the text to the original heading word in each case, to give a better idea of what Prieto intended by these headings.

Managerial leadership behaviours for large complex projects vs. “traditional”

Finally, we move on to look at Prieto’s recommendations on appropriate management leadership behaviours for large complex projects – and also how he sees these as comparing with leadership behaviours on traditional projects. The following is derived from Prieto 2015a, Table 14 (my numbering).

Management of large complex projects require changed leadership behaviours	
<i>New Leadership Behaviours</i>	<i>Traditional Leadership Behaviours</i>
1. Group leadership	1. Individual leadership
2. Motivation and movement	2. Control and order
3. Transformative leadership	3. Scientific management
4. Shared outcomes focus	4. Outputs focus
5. Agreement and acceptance of goals	5. Assignment and directive
6. Flat communication and information structures	6. Hierarchical and siloed
7. Questioning (assumption, process, outputs)	7. Acceptance of normative
8. Collaboration and information sharing with stakeholders	8. Adversarial or transactional approach
9. Management of flows	9. Management of tasks

Figure 8: (New) managerial leadership behaviours for large complex projects plus comparison with “traditional” – derived from Prieto 2015a, Table 14

I share the opinion of many writers that the key role of leadership in managing projects does not get the attention in the literature that its importance deserves. It would appear from Figure 8 that leadership in the context of managing large complex project is an even more onerous responsibility.

Concluding this context of mega-projects/ large complex projects

I have been somewhat more expansive here on the context of mega-projects/ large complex projects because it is so important, and I have not covered it elsewhere. I have quoted Prieto extensively simply because he appears to have identified more specifically appropriate management approaches for these types of projects than anyone else that I know of.

And I comment (again) that many of these summarised materials from Prieto only scratch the surface of the more detailed expositions in his articles and book.

SUMMARY

We started by re-presenting the materials and diagram from the first article of this series, which comprise eight types of projects.

In relation to the management of different project types, I first discussed the key importance of the project manager being familiar with the specific nature of the work involved in the project, because different types of project work need different project management approaches. A project manager who is skilled in the domain of one type of project may be well out of his/her depth in a different domain. I also noted that the importance of this is often not acknowledged in the project management literature.

I then offered some personal reflections on managing different types of projects to illustrate the above, citing my experience managing three different sub-types within the broader category of organisation/ business change projects, and also in managing research and development projects.

I then listed more generalised four-type classification of projects within categories and sub-categories proposed by Archibald & Prado to focus on an important group of project types which is not widely discussed in the regular project management literature, namely *Mega projects and programs*. These are also called *large complex projects* by Prieto, and I have quoted extensively from his theory of managing such projects. This is mainly due to the fact that he has much more extensive detailed material than any other author I know of on these very important, often highly visible and sometimes problematic, types of projects.

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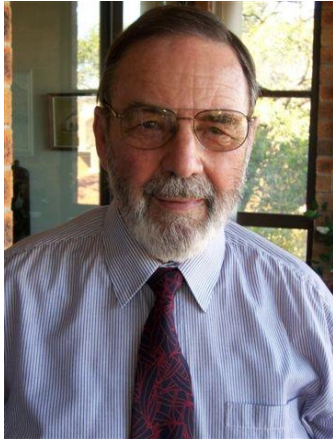
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