Modeling Project Management
By R. Max Wideman

The following research paper has been prepared with a view to
advancing the body of project management body of knowledge

Introduction

Professor Pinto once observed that

> "Project management is a philosophy and technique that enables its practitioners to perform to their maximum potential within the constraints of limited resources, thereby increasing profitability . . . With the future bright for expanding the role of project management on a worldwide basis, the only potential clouds on the horizon concern the ability of governments and businesses to use these techniques well. The lack of formal training for many future project managers is worrisome and must be corrected. We must continue our efforts to develop a common skill set and body of knowledge so that these techniques can be used to their maximum potential."[1]

Indeed, to improve the education and training of project management practitioners we need to be sure we understand what project management is, what it does and how it works. While there is significant unanimity on its various parts, the following definitions show that there is by no means unanimity on these issues.

> "The art of directing and coordinating human and material resources to achieve stated objectives within the limits of time, budget, and client satisfaction."[2]

> "The art of making things happen."[3]

> "The planning, monitoring and control of all aspects of a project and the motivation of all those involved in it to achieve the project objectives on time and to specified cost, quality and performance."[4]

> "The discipline of managing projects successfully."[5]

> "The application of knowledge, skills, tools, and techniques to project activities to meet the project requirements."[6]

Judging by the number of different thoughts represented here, project management is clearly a complex subject and equally clearly, there are varying opinions as to how project management should be characterized. We might take Peter Senge's advice:

> There is something in all of us that loves to put together a puzzle, that loves to see the image of the whole emerge . . . Systems thinking is a discipline for seeing wholes. It is a framework for seeing interrelationships, rather than things, for seeing patterns of change rather than static 'snapshots'[7] . . . Ultimately, the payoff from integrating systems thinking and mental models will be not only improving our mental models (what we think) but altering our ways of thinking[8] . . . [However,] . . . in some ways,

[organizations] are especially vulnerable because all the individual members look to each other for standards of best practice. It may take someone from 'outside the system', such as foreign competitors, with different mental models, to finally break the spell.[9]"

True to form over the last couple of decades, there have been a number of attempts to clarify this complex subject of project management by means of modeling. By "modeling" I mean here some sort of graphical portrayal, and because this continues to be one of the great-unresolved issues, it is instructive to trace through some of these efforts over the years.

Why model?

A model is some form of representation designed to aid in visualizing a thing that cannot be observed directly, either because it has not yet been constructed or because it is abstract. There are various kinds of modeling so we must first be clear on what we mean in this instance. First and foremost is the mental model – the image that forms in people's minds when a subject is discussed. Often we assume that a word or label means the same thing to all people, but as the Wideman Comparative Glossary of Project Management Terms demonstrates, this is far from the case. These tacit mental models about how we see the world tend to be so deeply ingrained that they influence how we take action and even inhibit acceptance of new ideas, or new models, however well presented!

Then there is the physical kind, three-dimensional models that may or may not be working mechanically but do demonstrate shape and physical relationships, such as in structural and architectural models. Or there are the mathematical kind expressed as formulae, such as financial or research models that explain how certain input variables relate to an outcome variable.

But probably the most common models are diagrammatic, including charts and figures that present information by visual impression that satisfy the old saying "A picture is worth a thousand words." No doubt these are the most common because the media, paper, is so readily available. However, they do suffer from the major drawback of being two-dimensional and various devices are often used to try to overcome this limitation.

Nevertheless, the benefits are clear. Diagrammatic models can
> Enable each part to be identified, and labeled
> Allow relationships between the parts to be identified, described and analyzed
> Simplify the complexity of real systems and enable analysis and new insights at lower cost
> Provide a common conceptual framework and thereby facilitate discussion, understanding and consensus building
> Clarify relationships, pinpoint key elements and consciously block confused thinking
> Test the assumptions behind the model being created
> Test the impacts of different options without disrupting the real system
> Express rules and relationships more simply and so assist in appropriate selection
> Broaden our perspective allowing people to see a larger picture, if not the whole picture
> Be flexible, permitting expansion as new information comes to light
> Allow everyone to see their part without getting at cross-purposes, or getting bogged down on

one small part of the puzzle

Indeed, perhaps the most important aspect is the identification of relationships between the parts that might otherwise by hard to talk about. Relationships tend to be subtle and more difficult to think about and discuss and therefore tend to be the pieces that are most valuable to understand and influence. This is particularly true of "project management" as a comprehensive discipline. If we could establish a robust model of project management that would better enable practitioners and educators alike to hold a shared vision, then we would be better positioned to establish and improve our practice, research, education and training efforts.

Back in 1987, Professor Linn Stuckenbruck made a strong case for a model of project management, firstly to "glue it all together" and secondly to make sure it is complete. He suggested that the model must do these things:

1. "Clarify the overall scope and extent of the comprehensive project management body of knowledge
2. Break up the body of knowledge into logical and understandable categories or divisions
3. Utilize and build on the work accomplished by the PMI ESA Project
4. Indicate the interrelationships between the various categories into which the project management body of knowledge can be subdivided
5. Take into account the complexities of project management and the integrating nature of the project manager's job and of his or her supporting team
6. Provide a breakdown of the project management body of knowledge can readily be utilized for storage and retrieval of all elements of project management, i.e. functions, processes, activities, tools and techniques
7. Be sufficiently simple and understandable to be useful (i.e. saleable) to present and potential project management practitioners
8. Be consistent with the course content of project management educational programs (particularly with the PMI sponsored program at Western Carolina University)."[10]

Project management models in the early eighties

Prior to the eighties most of the focus was on project team behavior, with only limited attention given to the organizational environment. One of the earliest models that we could find illustrated the project management construction environment as shown in Figure 1.[11]

This diagram illustrates the complexity of stakeholders involved or impacted by a building construction project of significant size, such as an office complex or tower. Note the central position of the project manager and his/her team. However, the project sponsor is not as well connected as the role now suggests it should be.

There have been several early attempts to illustrate the connection between cost, schedule and work, but one of the earliest attempts to diagram the relationship between the management processes of project
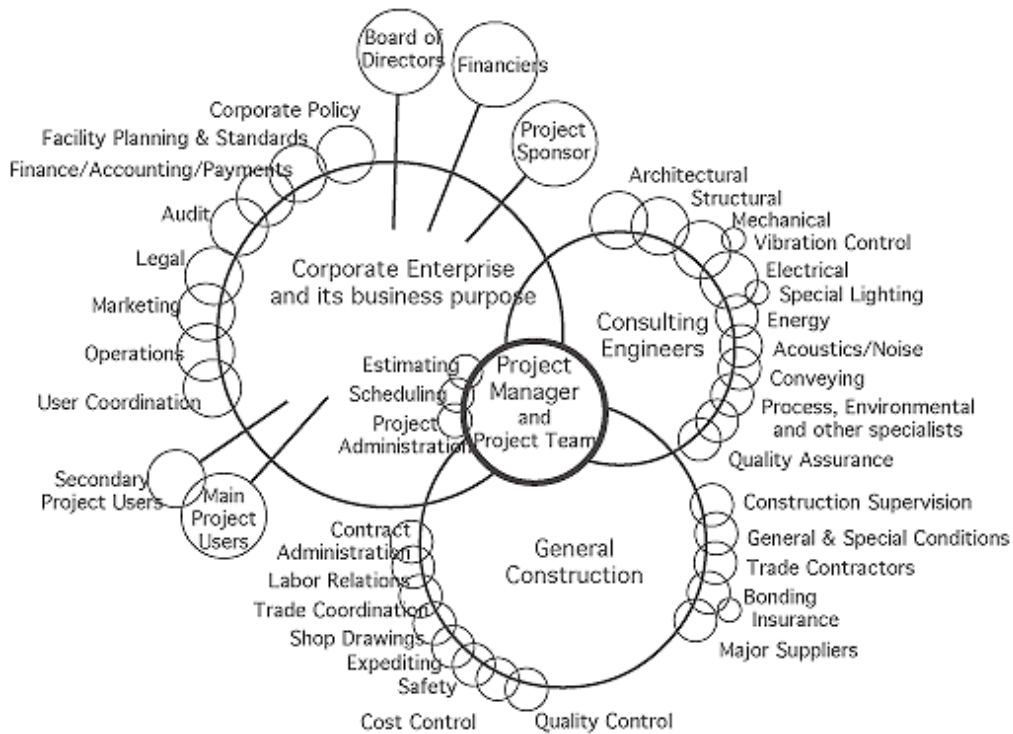
management appears to be my own as shown in Figure 2. [12]

Figure 1: Construction project management in a corporate environment
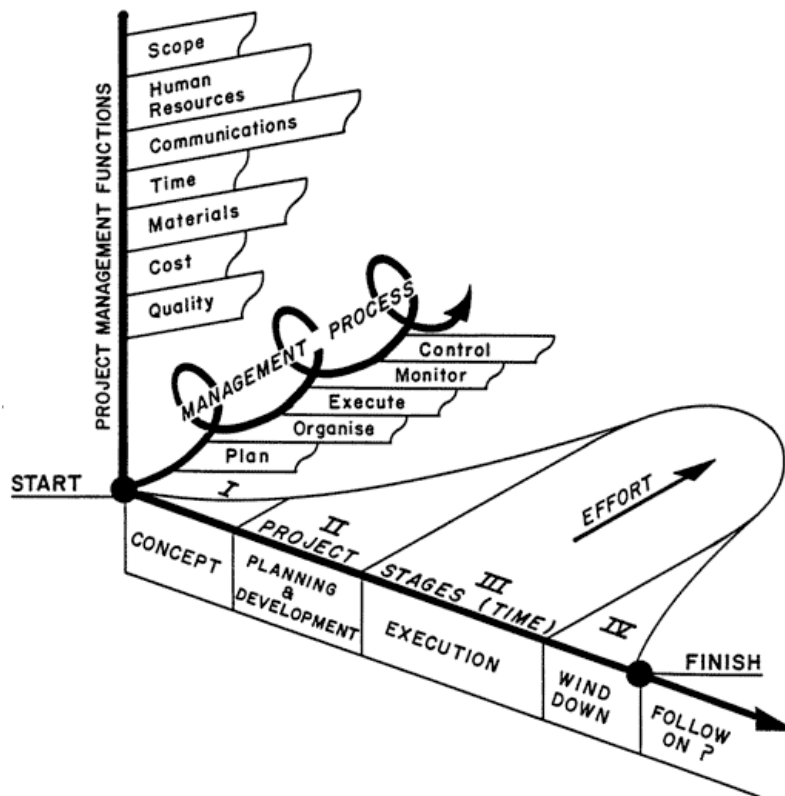

Figure 2: The function-process-time relationship in project management (1983)

Note the absence of risk management in the vertical list of functions. Today's popular topic of project risk management was not introduced until the advent of the Project Management Institute's first Project Management Body of Knowledge published in 1987. The subject of project risk management, not the same as (business) risk management was introduced at my instigation, I might add. Note also the labels assigned to the on-going management process, namely: "Plan, Organize, Execute, Monitor and Control" which follow closely Henri Fayol's classic description of management "To manage is to forecast and plan, to organize, to command, to coordinate and to control."[13] If only these same labels could be used in the Project Management Institute's present body of knowledge, there would be much less confusion with the project life cycle labels! The diagram is intended to show that this management process is a continuing activity involving all of the project management functions and throughout the project life span. Finally, note the indication of level of effort in the four "generic" project stages, now more properly termed "phases", with the level-of-effort biased towards the latter two.

For comparison, the latest version of this diagram is shown in the next Figure 3.[14] Note the changes in labels, although the intent is essentially the same.
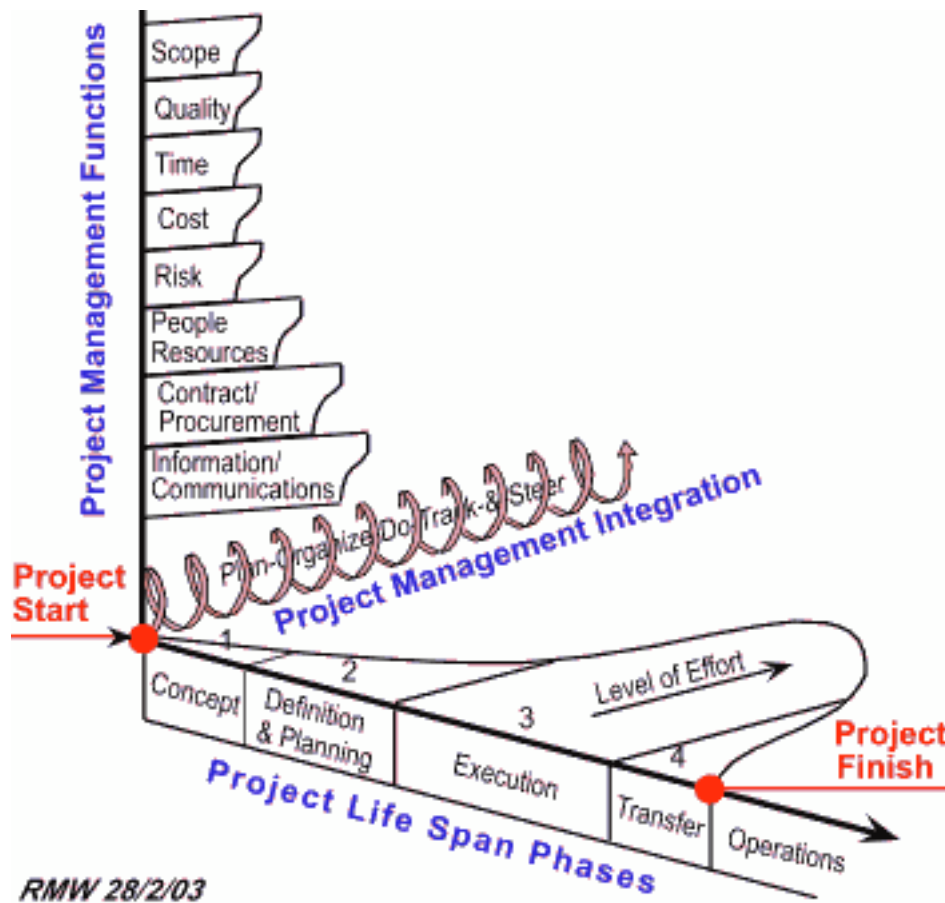

Figure 3: The function-process-time relationship in project management (2003)

Project management models in the late eighties

With the publication of the Project Management Institute's Project Management Body of Knowledge

("PMBOK") in 1987, there were several attempts to illustrate the nature of project management as shown by the following Figures 4, 5, 7 and 8.[15]
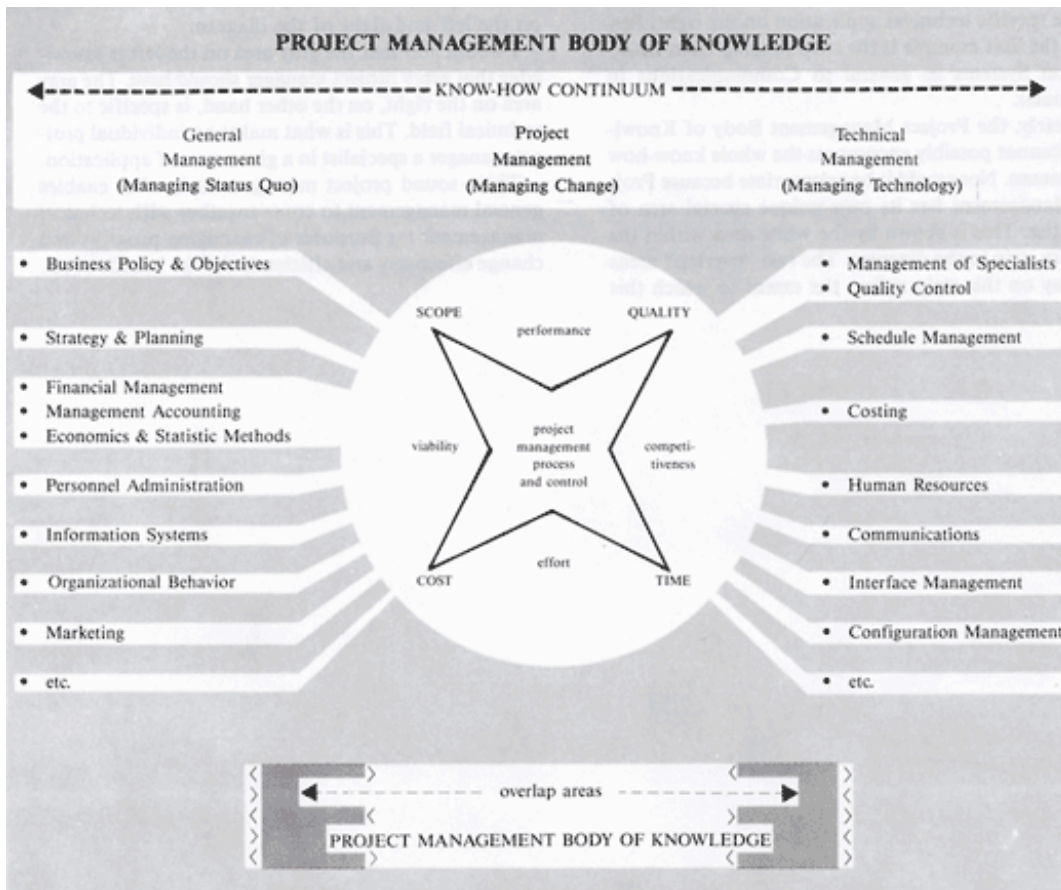

Figure 4: Project management body of knowledge setting

The 1987 PMBOK document describes Figure 4 as follows:

"It is possible to depict the environment of project management and its related body of knowledge in a number of different ways. Venn diagrams [as shown in Figure 5 below] and three dimensional matrices or boxes [as shown in Figures 6 and 7 below] are all feasible. Figure [4 above] attempts to show the role of the PMBOK as a vehicle for creation of change between General Management and Technical Management. The explanation of the diagram is as follows:

The light gray background represents abstract space. Into this space is introduced the top strip which is intended to portray the whole spectrum of knowledge which is required to successfully conduct industry and business. Of course this includes both the public and private sectors. As the diagram shows, this spectrum ranges from the know-how of general management on the left, through project management, to technical management on the right.

The next series of strips immediately below are intended to elaborate on the top strip. The central overlay circle encompasses the four key constraints of scope, cost, time and quality. As every project manager knows, these restraints are inextricable intertwined.

Scope-quality represents performance, scope-cost represents viability, cost-time represents effort, and quality-time represents competitiveness."[16]
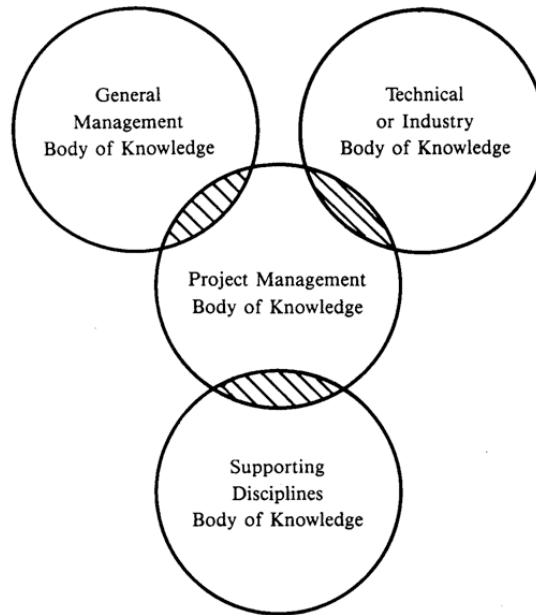

Figure 5:The scope of the project management body of knowledge

In the discussion of Figure 5, the 1987 PMBOK document observes that there is a definite need for overlaps in the various bodies of knowledge as indicated in the figure. That is, project managers and their teams have a great need for an expertise in general management as well as considerable knowledge and expertise in the particular technology of the project. The supporting PMBOK text describes some of the relevant subject areas.

The 1987 PMBOK committee felt that the fundamental building blocks of project management were the three basic project management functions or elements of every project, namely schedule, cost and technical performance presented as a triangle. Interestingly, this "basic" triangle was adopted by Professor H. Kerzner as the motif for the cover jacket of his book "Project Management: A Systems Approach to Planning, scheduling and Controlling" as shown in Figure 6.[17]

Figure 6: Kerzner's cover jacket

Given the fundamental building blocks (of Figure 6), the PMBOK committee of the day felt that the simplest format was to portray the essential characteristics of every project in three dimensions as shown in Figure 7.
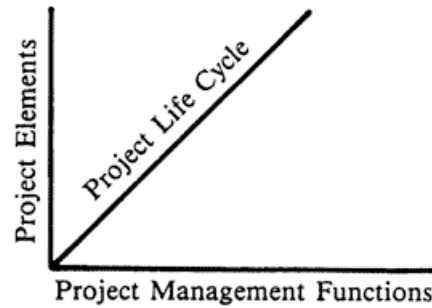

Figure 7: A three dimensional matrix

There was little argument about the "Project Life Cycle" but the relationship between the other two was more problematic. This resulted in the enlarged matrix as shown in Figure 8 that was considered a more flexible and useful framework on which to build.[18]

Figure 8: Project management matrix model

By 1988, members of the Project Management Institute's "PMBOK Committee" felt that these illustrations were inadequate given "the difficulties involved in creating a comprehensive yet concise, universal yet specifically applicable document defining the domain of a new profession."[19] Professor Alan Stretton was therefore asked to prepare a critique. To summarize his findings, Stretton came up with a "Three-Dimensional Core PMBOK Framework Model" sometimes referred to as the "Suitcase" (of project management tools and techniques) as shown in Figure 9. The text accompanying the illustration described the model in detail and was further elaborated in Dinsmore's 1993 Handbook of Project Management.[20] Stretton pointed to a number of shortcomings in the original PMBOK and made several recommendations for consistency. However, the Institute appears to have abandoned this course in favor of producing "A Guide to the Project Management Body of Knowledge".
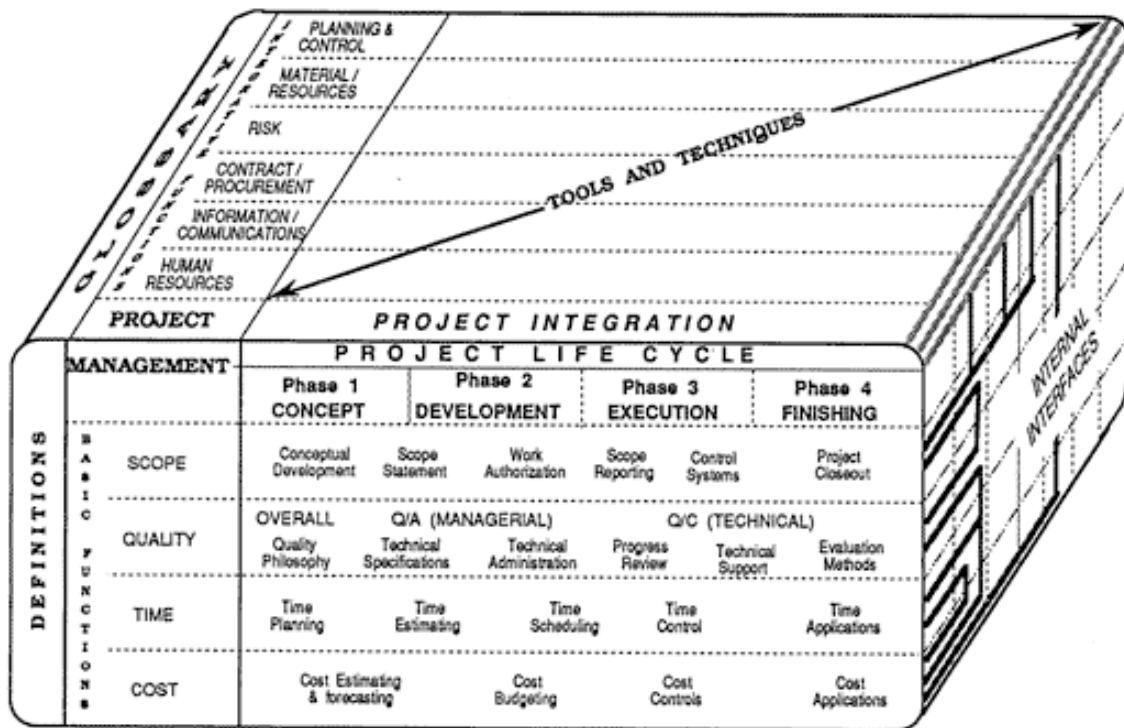
Figure 9: Stretton's suitcase of project manager's tools and techniques
(Note: This illustration is a subsequent elaboration,
as the type size in the original is too small for display in this media.)

Project management models in the nineties

In the early nineties, a number of senior project management practitioners felt that the discussion of a project management model was becoming too academic and that a more practical illustration was required with a particular focus on the target, stakeholder satisfaction and success. Several iterations resulted in the "Arrow" diagram as shown in Figure 10.[21] The illustration encompasses all of the topics previously identified, segregates "core" functions from "facilitating" functions, i.e. the "hard" and "soft" sides of project management, and emphasizes the cyclical nature of management throughout the project life span.
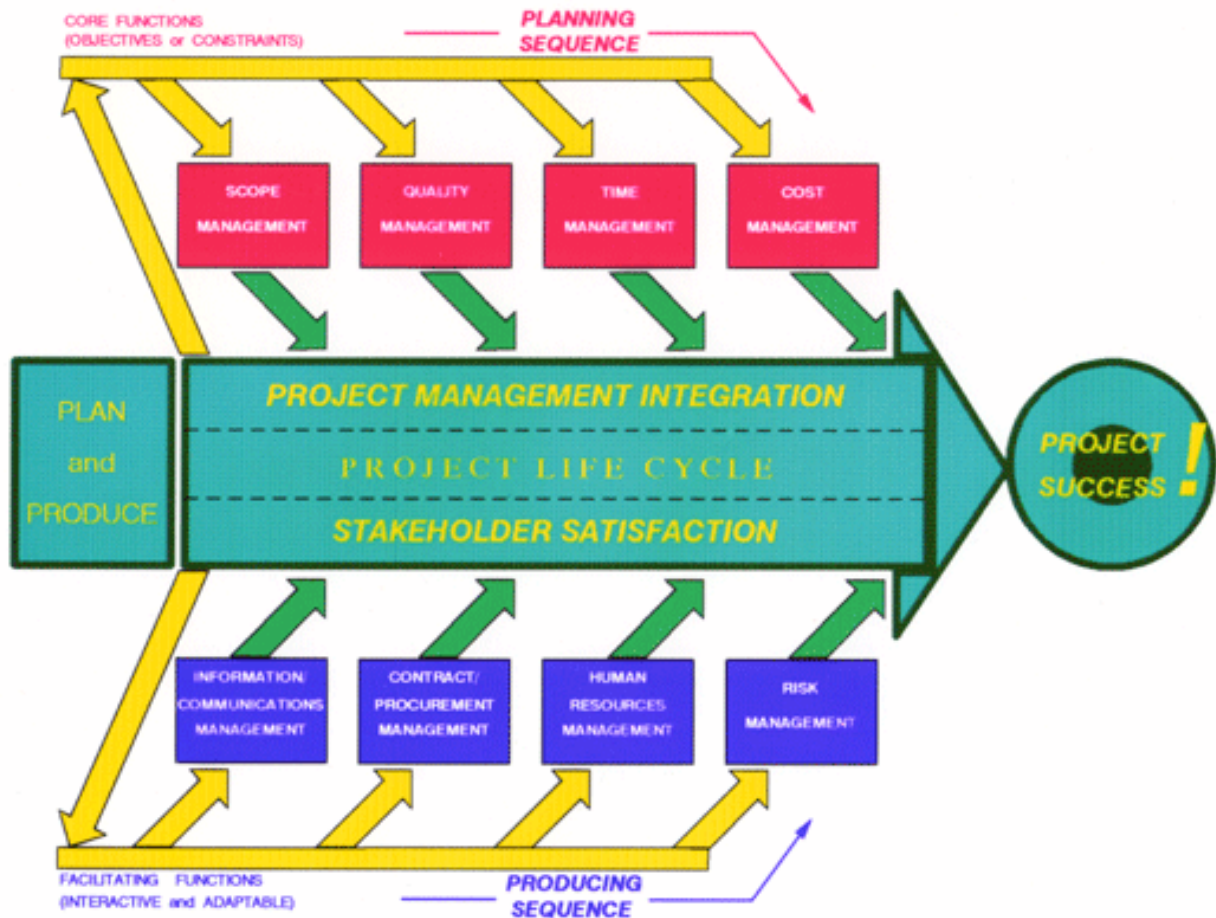
Figure 10: Fletcher's arrow diagram

In late 1991, Warren Allen postulated a more comprehensive three dimensional model of project management knowledge in a paper titled "The Universe of Project Management: A Comprehensive Project Management Classification Structure (PCMS) to Update and Expand the Dimensions of PMI's PMBOK". The paper arose out of a discussion amongst a group of interested PMI members prior to the annual seminar/symposium. Allen's model related the nine or more "Level 1" project management functions with the generic project life cycle and with the potential for considerably extended knowledge in various industry applications.

The paper provides a good summary of the requirements for such a model and a detailed description of its various elements.[22] It shows how the generic body of PM knowledge is only a small fraction of the total body of knowledge. Unfortunately, the Project Management Institute subsequently declined the paper for publication, failing to see its prophetic nature, and it appears that the author lost interest. The model is shown in Figure 10a.
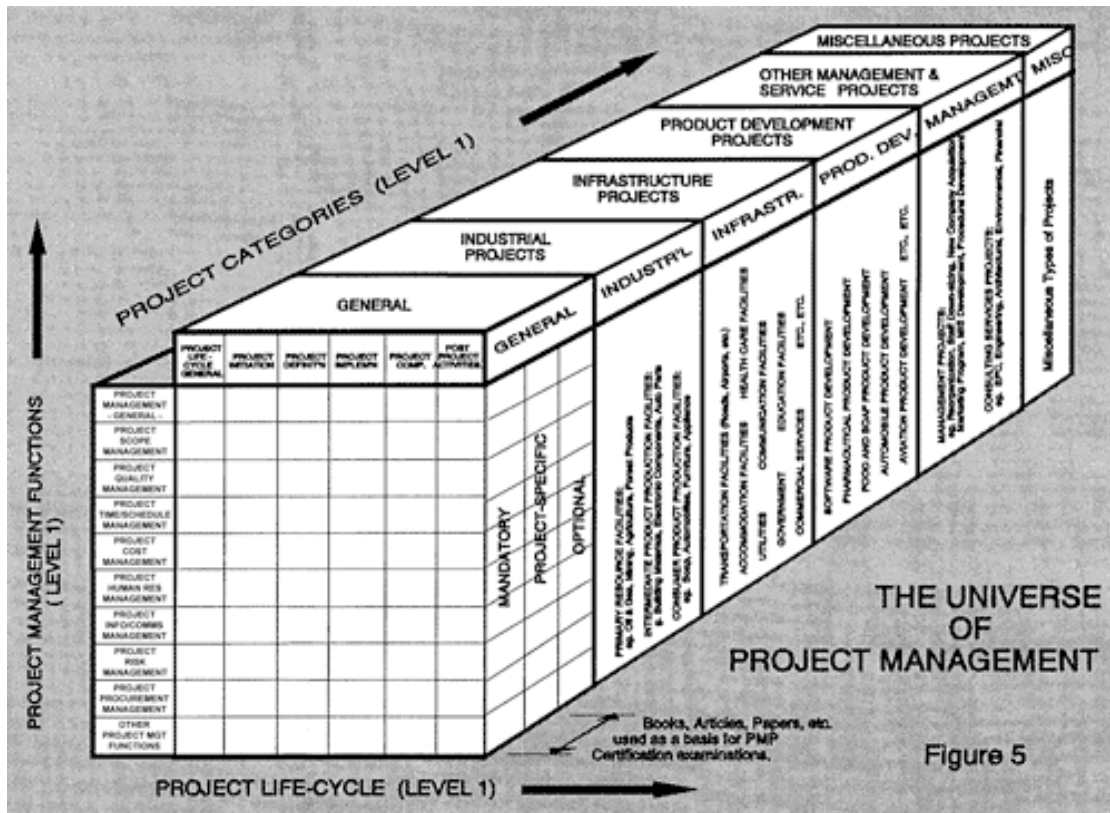
Figure 10a: Allen's Project Management Classification Structure

Meantime, much thought amongst members of the Internal Project Management Association ("IPMA") in Europe was being given to the content of project management. However, great difficulty was encountered in trying to reach any sort of agreement on relationship structure. As a compromise, the "Sun Wheel" was published around 1996 consisting of 28 subject areas as shown in Figure 11.
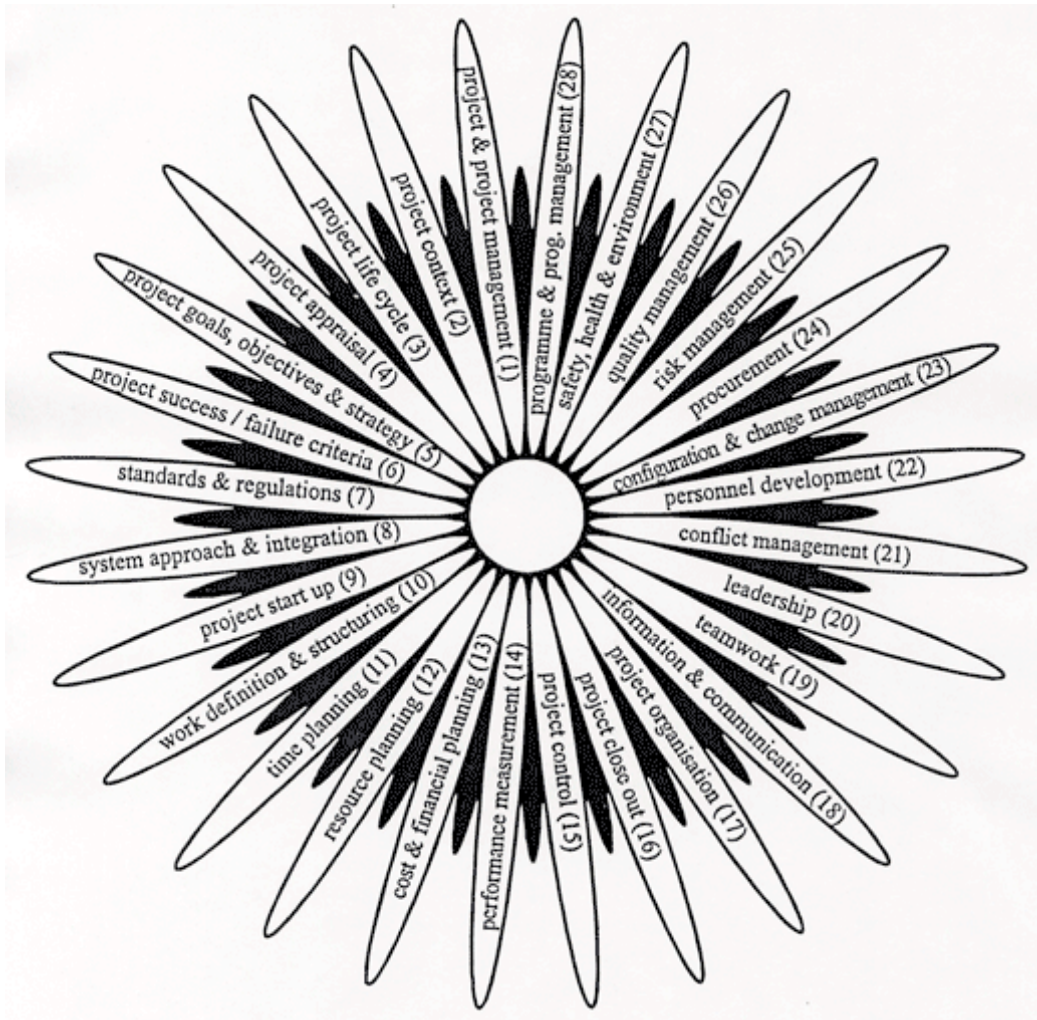
Figure 11: The IPMA's sun wheel

Another serious attempt was made by this author in a presentation at the Project Management Institute's 1997 annual seminar/symposium. The paper was entitled "A Project Management Knowledge Structure for the Next Century" and so addressed not how to do project management, the subject of most papers, but what such a "knowledge structure" should look like, and the need and value of an acceptable model. The work was based on the idea of "concept mapping" and drew heavily on work by previous authors over the years.

The paper discussed how to set about such a concept map, the right perspective, the objectives, assumptions necessary, what to include or not, and relevant definitions of terms. However, at the core of the concept map is the idea of a "Project Commitment", between a project manager and his/her team and a client/sponsor, to produce some agreed product within prescribed constraints. The resulting concept map is shown in Figure 12, complete with object relationships and attributed. The full paper can be seen at http://www.maxwideman.com/papers/knowledge/intro.htm
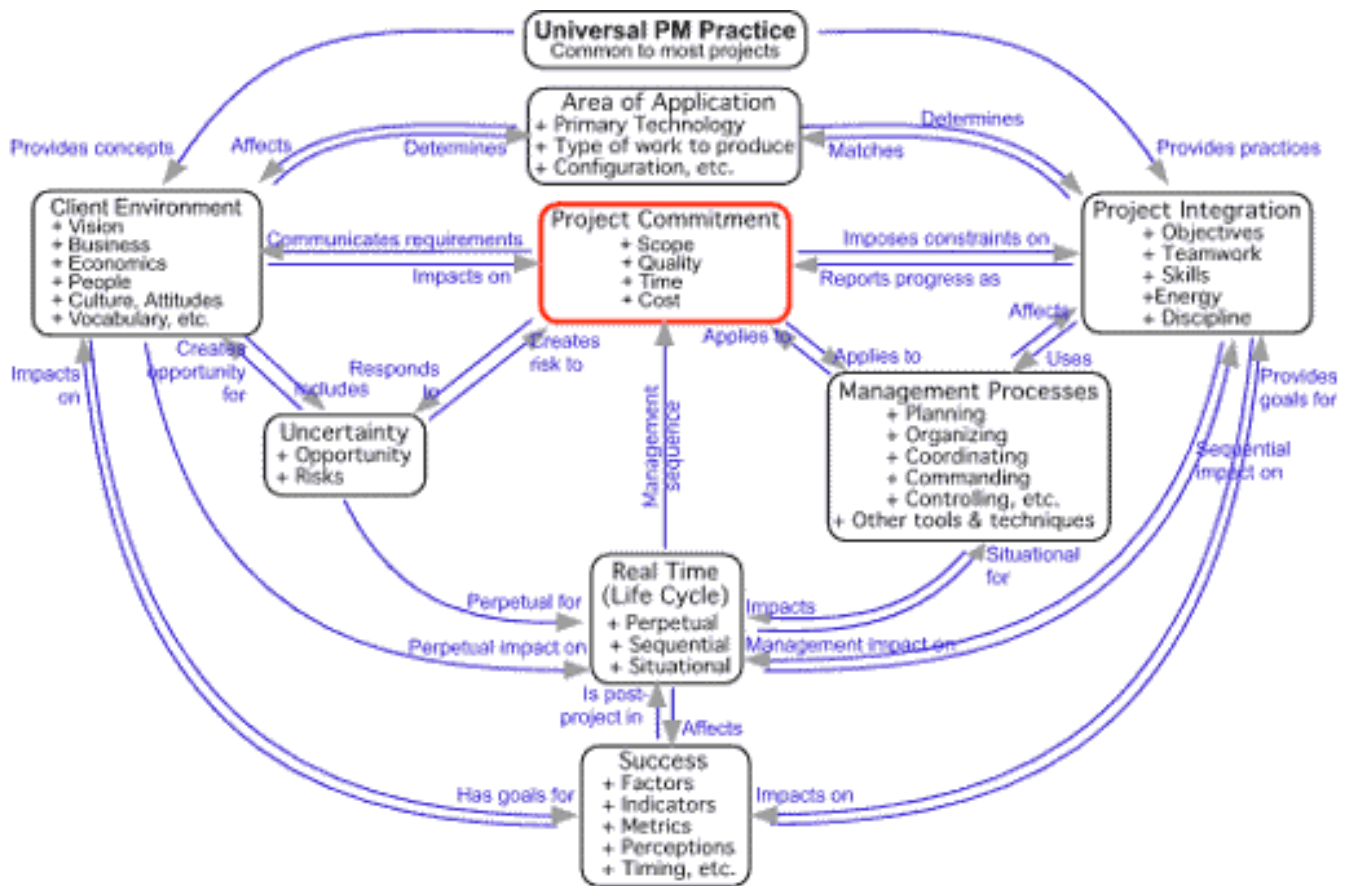
Figure 12: Wideman's concept map of project management

The 1997 paper was followed the following year with another paper in which more detail was suggested together with a concomitant work breakdown structure, a technique more familiar to most project management practitioners. The 1998 paper titled "Defining Project Management Knowledge as a Basis for Global Communication, Learning and Professionalism" can be seen at http://www.maxwideman.com/papers/global/intro.htm .

Project management models in the new century

Around the same time as the 1997 and 1998 papers were being prepared, Forsberg, Mooz and Cotterham were developing a new and innovative perspective on project management. This work was based on their extensive collective experience with thousands of working project managers and reflected what they considered to be the four essential elements of project management. These four elements are: a common vocabulary, teamwork, the sequential project life cycle, and management elements. The relationship between these elements is shown in Figure 13.

Figure 13: The Forsberg, Mooz & Cotterham "orthogonal" model of project management

The model is intended to by dynamic and consists of three parts. First, a wheel consisting of nine spokes representing: Project Requirements; Organizing Options; Project Team; Project Planning; Opportunity and Risk; Project Control; Project Visibility; Project Status; and Corrective Action. The rim, Project Leadership, holds the whole wheel together. This wheel rotates and progresses along the Life Cycle axle.

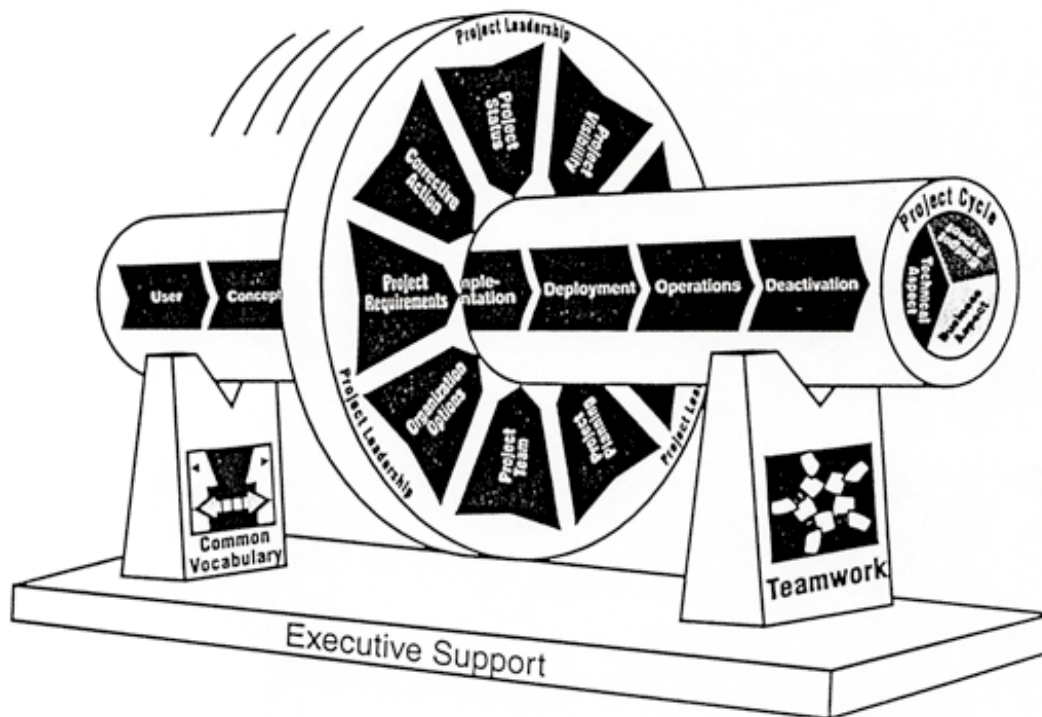The axle consists of a series of stages: User; Concept; System; Plan; Sourcing; Implementation; Deployment; Operations; and Deactivation. However, the axle itself also consists of the three aspects of: Technical, Business, and Budget, which must be simultaneously managed if the project is to succeed in all three. The whole is supported on the two pillars of: Common Vocabulary and Teamwork, held together by Executive Support, as shown in the illustration.

The authors describe the model as follows:

> "The axle and the wheel represent the overall project management process. Crucial to our project management approach is the recognition of sequential and situational aspects of management as separate domains. The axle represents the gated project cycle and the wheel represents the situational application of the techniques and tools of the ten management elements to manage the project throughout the cycle. The relationship among the project cycle phases (the axle) and the management elements (the wheel) is orthogonal and dynamic, as the wheel moves along the axle with progress. The wheel and axle rest on the two piers of vocabulary and teamwork, two perpetual essentials without which the cycle and elements could not function effectively. These four essentials are reinforced by executive support."[23]

Another ongoing initiative is the voluntary efforts of a group of worldwide knowledgeable participants under the leadership of Professor Lynn Crawford, Director of Program, Project Management, University of Technology, Sydney, Australia. This group has met intermittently for the purpose of identifying and developing a globally agreed body of project management knowledge as the basis for genuinely global and transferable project management standards, certification and accreditation programs . . . The philosophy is that the work of the group draws credibility from the voluntary participation of recognized opinion leaders in project management, contributing on the basis that all inputs of the group will be in the public domain. This group is working together in the interests of development of project management as a profession and a discipline.[24]

Considerable progress has been made since the first meeting in 1998, with the most recent meeting in Lille, France, 2003. This resulted in Working Report No 1: Global Performance Based Standards for Project Management Personnel.[25] A brief abstract of the resulting observations relative to our area of interest, i.e. models of project management, follows:

> "This report presents the results of a three day Working Session held in Lille, France, from 24th to 26th February, 2003 with the aim of progressing the development of a framework of Global Performance Based Standards for Project Management Personnel. The Working Session was attended by 21 people representing a wide range of stakeholder perspectives and a considerable breadth and depth of project management experience . . .
>
> From detailed examination of [the available] standards and guides, as well as selected knowledge guides, 48 concepts/topics were identified as being represented in one or more of the documents under review. In order to ensure that development of a global framework reflected the content of existing standards and guides, these 48 concepts/topics were used as a starting point at the Lille Working Session . . .
>
> Over three days of intense discussion and interaction, Working Session participants reviewed and synthesized these base concepts and came to agreement on:
>> A definition of the role of the Project Manager
>> Identification of 13 Units describing significant functions that need to be performed by most Project Managers in most contexts . . .
>
> Defining a body of knowledge and developing guides and standards for practice as a basis for education, training and associated certification or qualification programs are activities generally associated with the formation of a profession . . .
>
> The purpose of this initiative is therefore to develop an agreed framework for Global Performance Based Standards for Project Management Personnel that can be used by organizations, academic institutions, professional associations and government standards and qualifications bodies globally . . .
>
> For purposes of working towards a framework of Global Performance Based Standards for Project Management Personnel, a 'framework' is defined as a structure that describes

elements and relationships, enabling stakeholders with divergent views and vested interests to achieve a common understanding and enter into productive dialogue . . .

Performance based competency standards describe what people can be expected to do in their working roles, as well as the knowledge and understanding of their occupation that is needed to underpin these roles at a specific level of competence . . .

The definition of Competency, within the context of performance based or occupational competency standards, is considered as addressing two questions:
>   What is usually done in the workplace in this particular occupation/profession/role?
>   What standard of performance is normally required? . . .

Facilitation of the Lille Working Session was carefully planned to
>   draw upon the knowledge and experience of expert participants
>   assist the expert participants in developing a shared understanding of the nature of performance based standards and the processes involved in their development
>   provide a platform that would enable the participants, representing a wide range of interests and world views, to interact productively, reach new insights and achieve agreement
>   ensure that the content of existing standards and guides was recognized in, and could be mapped to, the outcomes from the Working Session . . .

The focus of attention at this Working Session was the occupation or role of the Project Manager . . .

The attendees at the Lille Working Session developed a generic description [for this] role [for] MOST Project Managers in MOST contexts: This role includes individuals who are directly accountable for project execution and outcomes in an organizationally complex environment involving multiple, significant groups of stakeholders . . .

Using the 48 concepts/topics, derived from research and representing the content of existing standards and guides, Working Session participants, through a carefully facilitated process, developed and agreed on 13 groupings of the concepts/topics that represented significant functions that need to be performed by most Project Managers in most contexts. These are presented as the first level or Units of a proposed global framework of performance based standards for project management personnel . . ."

The resulting "mind map" is shown in Figure 14.

Goals, Objectives, Strategies (11) · Project Initiation / Start-up (28) · Success (Criteria & Factors) (43) — **Project Start-up (28)**

Resource Management (37) — Resource Management (37) · Procurement (23) · Project Organisation (32) · Personnel / Human Resource Management (20)

Information and Communication Management (12)

Reporting (35) · Documentation Management (8) · Stakeholder Management (45) · Benefits Management (1) · Team Building / Development (44) — **Relationship Management (41)**

Project Planning & Control — Project Monitoring and Control (31) · Change Control (3) · Project Planning (30)

Leadership (14) · Problem Solving (22) · Teamwork (44) · Conflict Management (5) · Negotiation (17) — **Interpersonal**

Project Evaluation and Improvement — Organisational Learning (18) · Project Evaluation and Review (21) · Performance Management (19)

Integration Management (13) · Project Context / Environment (27) · Estimating (9) · Project Life Cycle / Phasing (UKU) (29) — **Cross Unit Outcomes**

Project Manager Role Units 01/03/2003 - v13

Scope Management (48) — Project Scope · Product Scope

Time Management (40)

Cost Management (6)

Program / Programme Management (24)

Marketing (16)

Quality Management (33) — Project Management Quality · Product Quality

Requirements Management (36) · Configuration Management (4) · Technology Management (46) · Design Management (7) · Value Management (47) — **Product Functionality**

Risk Management (38)

Finalisation — Project Closeout / Finalisation (26) · Testing, Commission, Handover, Acceptance (45)

Strategic Alignment (42) · Project appraisal (25) · Business case (2) · Financial Management (10) — **Strategic Alignment (42)**

Legal Issues (15) — Legal Issues (15) · Regulations (34) · Safety, Health & Environment (39)

Units considered to be applicable only to some Project Managers in some contexts are shown shaded

Figure 14: The Lille workshop "mind map" developed from 48 concepts/topics[26]

This mapping of some 48 topics seems to me to be a big step forward. If it could become generally accepted as the basis for project management content, then the Lille working session has made a valuable contribution to the discipline of project management. I do, however, have some suggestions for further improvement.

I think that the use of the term "project execution" in the definition of the role of the project manager is unfortunate and restrictive. It suggests that the role is limited to the execution phases of the project and does not include the earlier project conceptualization and definition. It also implies that a "real" project only exists once it is in the execution phases. A more general alternative description might be "carrying out the project", or similar wording.

Similarly, the description "in an organizationally complex environment involving multiple, significant groups of stakeholders" also seems to be unnecessarily limiting. There are very many projects that may not meet these criteria but still require thorough project management. In any case, who defines what constitutes "an organizationally complex environment" and how many stakeholders must there be to be "significant"?

I think the model could still be further simplified. Considering that Patel and Morris have stated publicly and unequivocally that the project life cycle is the single characteristic that distinguishes projects from non-projects,[27] this should have a higher profile in the structure. True that the project life cycle is inherent as a cross-unit outcome, and two elements do indeed show up at the upper level, namely: Project Start-up (28) and Finalization (29). However, there is an awful lot that goes on in between these two, as Professor Rodney Turner has rightly opined. Therefore, I would simplify by

amalgamating Project Start-up (28) and Finalization (##?) under a Project Life Cycle Unit and give the content more "body" of what goes on in between. In my view, one of the great weaknesses of current "knowledges" is their lack of attention to the project life cycle as a basis for executive and management control.

And while we are on the idea of simplification, the relative lack of content for the well established functions of scope, quality, time and cost (as indicated under these headings in Appendix E of the Report, pp38-39) suggests that we could (properly) elevate the topic "Integration Management (13)" to contain and consolidate these four together with Estimating (9) which would seem to fit nicely.

I am not so sure where the remaining entry "Project Context / Environment (27)" under "Cross Unit Outcomes (##?)" belongs, but perhaps it really belongs under "Strategic Alignment (42)"

Leaving aside the areas designated as "gray", we would then be left with nine (very strong) core Project Manager Role units, which number falls within Miller's famous mental limit of "seven, plus or minus two".

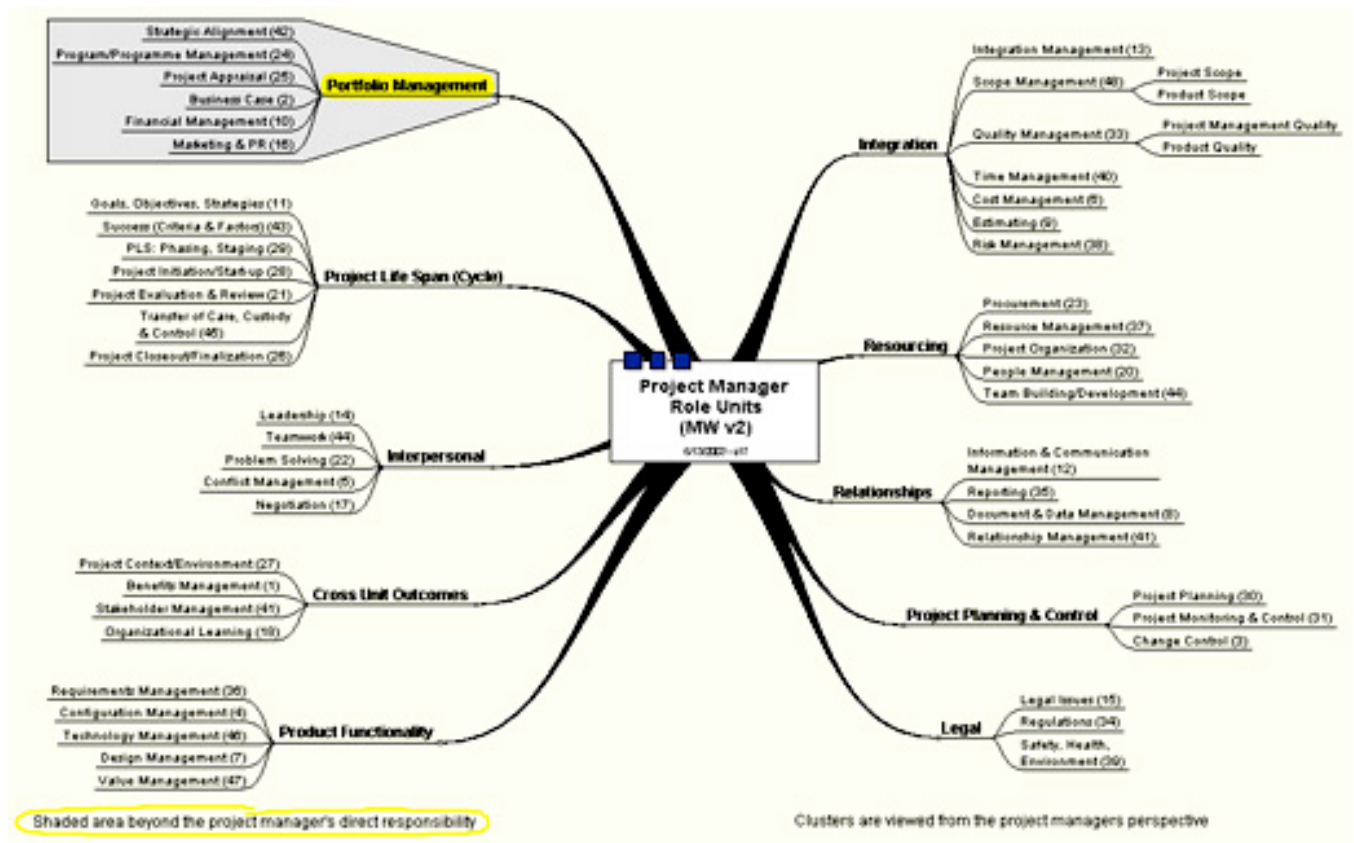The resulting diagram would then be as shown Figure 15.

Figure 15: Wideman's suggested "simplification" of the project manager role units mind map.

Note: Larger images of Figures 14 and 15 can be found on my web site, see
http://www.maxwideman.com/papers/pm-models/intro.htm

Summary

If the illustrations I have shown can be accepted as evidence, then project management has clearly come a long way since the 1970s. For example, judging from the mind map in Figure 14, the subject is now much more comprehensive. Conceivably it could still be expanded further by such potential additions as stakeholder management, cash flow management, data management, document storage and retrieval management, management of cultural differences, and even vocabulary management as implied in Figure 13. With a little imagination, and research reading, one could add several more, such as critical chain buffer management,[28] customer relations management, issues management, public relations management, and even knowledge management[29] itself – the list seems almost endless. So, how best to depict project management graphically is problematic and depends partly on the purpose of the illustration. Hence, it is essential to specify the purpose.

The write-up to Figure 14 is fairly clear in this regard. It is viewed from the perspective of the project manager and what that person should know to be able to perform a competent job. To some extent it shows relative importance of content by assembling major topics with secondary subject content. This may not satisfy "experts" in particular subject areas such as scheduling or earned value as they would see this as a reduction in rank of their favorite subjects.

But by the same token, are we aiming high enough? If project management is to succeed as pervasively as projects have now become, it must capture the attention and imagination of senior executives. Their perspective is quite different as the grayed areas in Figure 14 begin to suggest. What would the illustration look like from that perspective?

Hence, what we see over the years is a steady progression from an internal project focus to a much broader strategic view and clearly there is still plenty to learn in the latter area. For example, with the increased recognition of the importance of project portfolio management, the strategic design of the project organization's life span phase controls, i.e. the executive controls, become increasing significant. However, what we also see in the succession of illustrations are a number of promising avenues abandoned without further consideration.

For example, I believe that to understand what project management is, what it does and how it works (which is where I started), understanding the relationships between the various elements is vital. I also believe that the commitment to delivery between the project management team and the project sponsor, owner or client as suggested in Figure 12, is the compelling rationale for project management. And further, that this commitment must be conducted consistent with a rational project life span.

And what about the proper definition of the management process and its integration with each of the specialist functions through the project life span as implied in Figure 2? As suggested in Figure 4, the combination of scope and quality is recognized as "performance". Similarly, cost and time are recognized as effort, but what about scope and cost as viability, or quality and time as competitiveness?

As Forsberg, Mooz and Cotterham have observed:
> "Of all the project management concepts, *Lessons Learned* from prior failures and

successis the most neglected."[30]

It appears that this observation applies equally to the modeling of project management and the challenge is to examine past works more thoroughly to ensure that we are building on what we have rather than perpetually reinventing the wheel!

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