Ongoing Discussion "Thought Piece"

Prepared by

John Pourdehnad
Jp2consult@aol.com

April 2007

Ongoing Discussion Host: Bill Bellows
(William.bellows@pwr.utc.com)

for
Pratt & Whitney Rocketdyne's
Enterprise Thinking Network

Synthetic (Integrative) Project Management

John Pourdehnad

Ackoff Center for Advancement of Systems Approaches (ACASA)

University of Pennsylvania

Prepared for publication in the Handbook of Business Strategy, 2007
http://www.emeraldinsight.com/info/journals/hbs/hbs.jsp

Abstract

In recent years, with the growth of the knowledge economy, the number of project-based organizations has escalated considerably. Concurrently, there has been significant progress in the development of computer-aided project management tools to help plan and manage projects. And yet, more often than not, capital projects overrun their budgets, fall behind schedule, and/or fail to meet their business objectives.

This paper examines the nature of this apparently paradoxical situation and proposes a different strategy for improving project performance. Specifically, the paper argues that the problem stems from the nature of the traditional paradigm, which relies on existing knowledge – knowledge gained studying traditional approaches. Specific attention is paid to some of the common problems that cause projects to fail.

"Systems thinking" or "a systems view of the world" is evolving as an alternative to the old paradigms. This paper examines the implications of systems thinking in project management competency learning.

Introduction

Until recently, project management was an under-utilized business approach. Recent surveys of large companies show use of project management to be on the rise. Most large organizations now have many project managers on their payrolls. As major projects all over the world consume fewer resources, many companies are becoming project-based in their operations. Companies that used to produce only goods and services are now creating wealth through concept generation: they design and “orchestrate” new ideas. Nike, for instance, no longer makes shoes; it manages footwear projects. Coca-Cola, which hands most of the bottling and marketing of its drinks to others, is little more than a collection of projects, run by people it calls "orchestrators." Germany's BMW treats each new car "platform," which is the basis of new vehicle ranges, as a separate project. Meanwhile, Capital One, a fast-growing American financial services group, has a special team to handle its M&A projects.

An article in a recent issue of *The Economist* discusses the state of project management, noting both the field's rapid growth and its deficiencies:

> When George Stephenson built a railway from Liverpool to Manchester in the 1820s, it cost 45% more than budget and was subject to several delays as it made its way across the treacherous Chat Moss bog. In the intervening 180 years the management of large-scale projects seems to have improved but little. At the end of May the reconstruction of Wembley Stadium, the hallowed home of English soccer, was threatened when Multiplex, the Australian developer of the site, admitted that it faced mounting losses on the £750m ($1.4 billion) project. Even

> projects deemed a success these days sometimes fail to meet their targets. The 1,770km (1,106 miles) oil pipeline from Azerbaijan's Caspian wells to the Turkish Mediterranean port of Ceyhan was opened with much fanfare on May 25th by the presidents of the three countries under whose soil it lies (Azerbaijan, Georgia and Turkey). But the $4 billion project, led by BP (see page 70), is several months overdue and 5-10% over budget. Big projects today are as likely to be built on software as they are on steel. But IT projects are no better at meeting budgets and deadlines.

The article cites numerous IT projects that have failed, including a project in Britain that, after spending billions of dollars to put the medical records of 50 million Britons online, was considered unsatisfactory. Another such doomed endeavor was one in which "the FBI finally abandoned a $170m internal IT project, two years after problems with it had first surfaced." *The Economist* concludes with the fact that research of IT projects indicates that less than 30% of these succeed. "Cost overruns averaged 56% of original budgets, and projects on average took 84% more time than originally scheduled."

With all the advancement in the development of project management methods, techniques, tools, and the associated skill training and certification, not much has improved, as is indicated by the poor performance of projects overall. Edward Merrow, who examined 50 large-scale projects almost twenty years ago, found that 88% of them exceeded their budget, 17% exceeded projected schedule, and only half met the expected performance criteria (Merrow, 1988). These problems cause organizations to lose productivity, profitability, market share, and perhaps their reputations. Steve Ulfelder,

contributing writer for *Darwin Magazine*, stated, "OK, so you knew technology initiatives have been giving corporations fits. You may have read some harrowing numbers: fewer than a third of IT projects (a lot less, some say) are completed on time, on budget and with the promised functionality. Or you may have noted an unnerving number of reports on respected U.S. businesses that have suffered project snafus serious enough to impact quarterly results: Hershey Foods, Nike and W.W. Grainger are prominent examples" (Ulfelder, 2001).

It is not as if project management were a new science. It is a discipline with roots in ancient times, a technology which came of age in the early 20th century with its use of planning tools such as critical paths and Gantt charts. The science of project management was legitimized further with the establishment of its own international association. Why, then, do so many projects still go so wrong? The answer one gets depends on the vantage point and experience of the person answering the question!

An analysis of the literature concludes that problems arise most often when: stakeholder input is lacking, project phases are separated, optimistic assumptions are made, objectives are not clear, interaction is restricted, team morale is low, there is poor sponsorship and support, and communications are insufficient.

An objective of this paper is to demonstrate that project failure is an emergent property, co-produced by the interaction of a number of problem areas, such as those mentioned above. While one problem area alone may create an unfavorable situation, it would, in

and of itself, be incapable of causing a project to fail. Similarly, improvement in these problem areas, taken separately, will not achieve project success. Of great significance is the fact that competency training of the current approaches to project management education is being questioned.

Project Management: Some Suggested Remedies

There is consensus in the literature that effective project management can and does unquestionably make a significant difference in the performance of an organization. The challenge confronted by the project management community is, as David Dombkins puts it, "*to deliver a better solution than simply using more of our traditional approaches. If project management is to help our world, we need to step up to the mark with useful project management methodologies to deal with complexity and chaos"* (Dombkins, 2006).

A review of the project management literature suggests that some authors consider project management a science, focusing on its powerful new computer-based tools and techniques, certifications, metrics, and industry standards, while others consider project management an art, focusing on its behavioral and people considerations. According to Gary R. Heerkens in (Klein, 2006), "the art of project management relates to the fact that projects are really about people getting things done. Project management requires a keen knowledge of human behavior and the ability to skillfully apply appropriate interpersonal

skills." The Project Management Institute states that the objective of the project management profession is to “prepare and conduct project activities, applying knowledge, skills, tools and techniques to project activities to meet project requirements.” (PMI, 2000) PMI’s definition underlines the importance of know-how (scope management, activity scheduling, and cost and resource management), but does not specify leadership qualities required for the execution of the projects. Klein says, “If people are considered to be the root cause of project failure, then it follows that people must be at the heart of the solution for project success. Therefore, it is argued that the artistic side of the project manager as a leader is what allows project managers to be who they could best be. Projects do not succeed in creating the wow for customers and society only because the best technology was used; they succeed because the collaboration of minds towards a well-defined objective took place as directed by proper leadership. It is that side of the project manager that makes the miracle happen” (Klein, 2006).

Undoubtedly, the aim of project management is to provide a structured "framework for endeavoring” to ensure the realization of project objectives. Therefore, if the current competency training is appropriate and adequate to the tasks at hand, could the current abundance of project failure be due to a shortage of qualified project managers? The answer is an unqualified no! According to a recent AllPM.com article, “as of 2006, over 200,000 project managers have attained professional certification by the Project Management Institute (PMI), and this number may reach over 250,000 this year” (Klein, 2006). Additionally, there are other educational and training institutions that are in the business of providing all kinds of advanced courses in project management education;

specifically, training in the use of powerful new tools and techniques developed in recent years.

An examination of project management literature emphasizes focus on the following remedies to avoid project failure:

- Objectives: Establish clear, specific objectives.
- Leadership: Develop project leadership skills..
- Visioning: Make sure the stakeholders are fully engaged in a project's visioning, .
- Communication: Good communication is fundamental.
- Project management maturity: Use benchmarking to establish an organization's maturity in the knowledge areas.
- Project management office (PMO): Establish a PMO to improve project management success rate, and implement standard practices.
- Project Portfolio Management (PPM): Initiate PPM as a helpful tool, allowing managers to acquire and view information about all of their projects.
- Project measurement: Investigate new ways of measuring success.
- Parametric approach: Provide decision support via parametric presentation.
- Distributed virtual project teams: Develop alternatives to traditional project management.

The debate over the relative value of art or science competencies in project management continues, but there are also those who call for a balance of art and science. It is the

author's opinion that both the art and science of project management are required to achieve complete success. But that's not the whole story.

Towards Improved Competency

Organizations are now discovering that traditional approaches to project management and customary responses to implementation problems are proving less and less helpful for producing desired outcomes. And all of this is happening despite scrupulous application of project management techniques and tools. In response, organizations are implementing a variety of corrective programs, including "continuous improvement," and in some cases are strengthening analytical tools and techniques. But the evidence so far indicates that strengthening of analytical techniques by itself will not contribute to project effectiveness. Peter Steele says: "Project problems lead to project failure even when project management techniques are rigorously applied. Radical improvement of project performance is impossible as long as projects are approached in the same way as they have been in the past. Refinements of technique can lead, at best, to incremental gains in project performance and do not solve the systemic and structural problems that plague projects."

The same would be true of exclusively refining the human behavioral aspects of project management. In any case, this failure to attain expected results despite great effort is, to a large extent, attributable to the emergence of complex situations.

How effectively we deal with emergent conditions depends on the quality of the approaches we use and try to implement. These approaches depend more on our philosophy and "worldview" than on science and technology. They lead us to develop paradigms that integrate our experiences and tell us how to approach questions and problems. The underlying assumptions we make are the products of historical circumstances. In general, they are based on assumptions that evolved from the industrial era and the "mechanistic worldview" that prevailed from the Renaissance until about the time of World War II. The overall change now taking place represents a shift in the paradigm (Ackoff, 1999).

In general, project management practices have been developed in the tradition of scientific method. System analysis and system engineering have contributed the most to this development (Yeo 1993). Both disciplines represent a "hard approach"—a systemic paradigm based on quantitative analysis and deductive reasoning. Moreover, this paradigm is based on the assumption that understanding is attained through reductionism (the process of taking a system apart, analyzing the parts, and trying to understand cause and effect). Specifically, the belief is that to improve the performance of a complex system, one should operate those components in such a way that every component behaves as well as it possibly can.

Likewise, the hard approach perceives project organizations as mechanistic systems containing predictable and replaceable parts (people). This assumes that each element can be understood separately and that all functions and activities can be unambiguously

defined, monitored, and controlled (Crawford 2004). Following this thought, if everything can be planned and predicted at the start of the project, then management's only concern is to keep the project on the specified track.

The hard approach puts most of the effort into the tasks of drawing a detailed project plan and designing effective project control mechanisms. In point of fact, an important preliminary step in project planning and control is to create a work breakdown structure (WBS), defined as follows (Gido and Clements, 2005):

"WBS breaks a project down into manageable pieces, or items, to help ensure that all the work elements needed to complete the project scope are identified." Even project life cycle is informed by linear-causal thinking. Again, it is assumed that complex issues can be understood as the sum of elements considered in isolation. The relationship between the elements takes a lesser role.

The whole system operates as a classical control feedback loop. The detailed planning is used to set objectives that are subsequently compared to project progress. If there is an important variation from the expected (plan), an action is taken to revisit the progress or the original plan. The characteristic of the project, as a whole, is considered to be summative and, therefore, the whole is the sum of the parts. This culminates in the belief that the management of actions taken separately is both necessary and sufficient.

As opposed to the "hard" approach, our view considers projects as complex dynamic systems that are very hard to understand and therefore very hard to sufficiently predict and control. This kind of thinking has implications for integrating the project's varied tasks; creating governance structures and completely defining project deliverables and control resources ahead of time. Stakeholders' culture, their value systems, and their attitudes would further complicate these circumstances. We believe that management of these complex ambiguous projects is difficult, if not impossible, when one relies purely on the mechanistic hard methodology.

Consequently, project problems that lead to project failures, even when project management techniques are rigorously applied, are considered to be anomalies or dilemmas. (Dilemmas are problems that cannot be solved within the current worldview.) Albert Einstein once said: "Without changing our pattern of thought, we will not be able to solve the problems we created with our current pattern of thought."

Based on the evidence in the literature on project management, radical improvement of project performance is impossible as long as projects are approached in the same old way and with the same mindset. Consequently, there is a need for a new paradigm—one that would make it easier for the qualitative and the quantitative features to be brought together, i.e., synthesized. However, creating this paradigm requires a fundamental shift in the worldview from mechanistic to systemic.

Several authors who believe that the practice of project management will be well served by this shift in paradigm support the above proposition. The shift from mechanistic to systemic can be achieved by augmenting analytical approaches with synthesized (systems) models. A project's success or failure results from a complex pattern of changing conditions in the internal and external environments of that project. These changes happen because of a concurrence or convergence of conditions that did not exist previously but is now present.

Since recognition of opportunities and threats depends, in part, on cognitive structures possessed by individuals (frameworks developed through their previous life experience), it follows that the emphasis in competency training should be put on educating project managers about integrative frameworks. These frameworks should enable project managers and project team members "to perceive connections between seemingly unrelated changes or events." In other words, they should provide the cognitive basis for "connecting the dots" into patterns that suggest project opportunities or threats (Baron, 2006).

Additionally, project plan development should also be considered a cognitive process through which stakeholders conclude that they have identified a workable project. By tapping the intelligence of stakeholders—specifically, the people close to the work—sophisticated and more workable solutions will emerge. This is only the initial step in a continuing process, and it is distinct from the detailed application of project management

techniques and tools used to plan and control for scope, schedule, cost, and quality.

Idealized Design for a Competency-Based Learning Framework

From the outset, synthetic (integrative) project management competency-based learning should provide learners with a more effective perspective by helping them to develop an appreciation for the concepts of "world views" and "mental models." They will specifically understand the systemic mental model and its evolution. Developing understanding, knowledge, skills, and attitudes that are derived from an effective point of view will enable them to recognize and handle challenging problems that arise in their projects.

This approach functions in contrast to the prevailing machine-like, parts-oriented worldview, which unfortunately still influences the way we manage projects. The first step in traditional project planning requires planners to "divide and subdivide the project scope into major 'pieces,' or 'work packages.'" However, projects seen as social systems are purposeful systems that contain purposeful parts, and are themselves contained in a larger purposeful system. Unless the purposes of the parts are in alignment with the purpose of the whole, the components will work antagonistically and the performance of the whole project will deteriorate.

The essence of systems thinking is the concept of systemic wholeness, which is grasped by looking at the whole instead of the parts. A project considered as a system implies an interconnected complex of functionally related components. The effectiveness of each unit (work package) depends on how it fits into the whole, and the effectiveness of the whole depends on the way each unit functions.

Failing to consider the systemic properties as derived from the interaction of the parts leads to sub-optimization of the parts and commonly even deterioration in performance (as typically occurs during blind reengineering).

Systems thinking replaces reductionism (i.e., the belief that everything can be reduced to individual parts), analysis (as a way to understand a system), cause and effect (environment free theory of explanation), and determinism (fatalism) with expansionism (the system can always be a sub-system of some larger system), synthesis (explaining the role of the system in the larger system of which it is a part), producer-product (environment full theory of explanation) and indeterminism (probabilistic thinking). Additionally, systems thinkers are more interested in putting things together than in taking them apart. Neither way of thinking negates the value of the other, but by synthetic thinking we can gain understanding of individual and collective human behavior that cannot be obtained by analysis alone. Systems thinking brings about a practical balance by focusing on both the art and science of project management.

By engaging all stakeholders in creating an idealized and shared vision for the project, the entire project organization commits to the project objectives. Resurfacing the premises and assumptions and increasing the awareness are important in systems thinking because these actions help minimize the failures accompanying incorrect or outdated assumptions.

Moreover, a performance-based learning process should be used to allow the learner to demonstrate his/her level of attainment on project management by actually practicing what has been learned. The ability "to do" something, to put knowledge and principles into practice, should be the single most important aspect of the learning. Participants are also required to take more responsibility for their own learning process.

Therefore, the competency-based training model that is suggested below has four interconnected levels.

In level one, systems thinking as an alternative worldview is presented. World views provide a framework for interpreting new information and for determining appropriate responses to new situations, as well as for guiding people's perceptions, decisions, and behavior. The abandonment of linear causality in favor of circular, systemic causality is encouraged, as the concept of interdependence is fundamental to defining a project as a system.

It is imperative that the learners understand the characteristics of a project as a system, which is very different from the characteristics of a project as an aggregate of tasks. For example, they should appreciate the relationship between the task and the project in a different light:

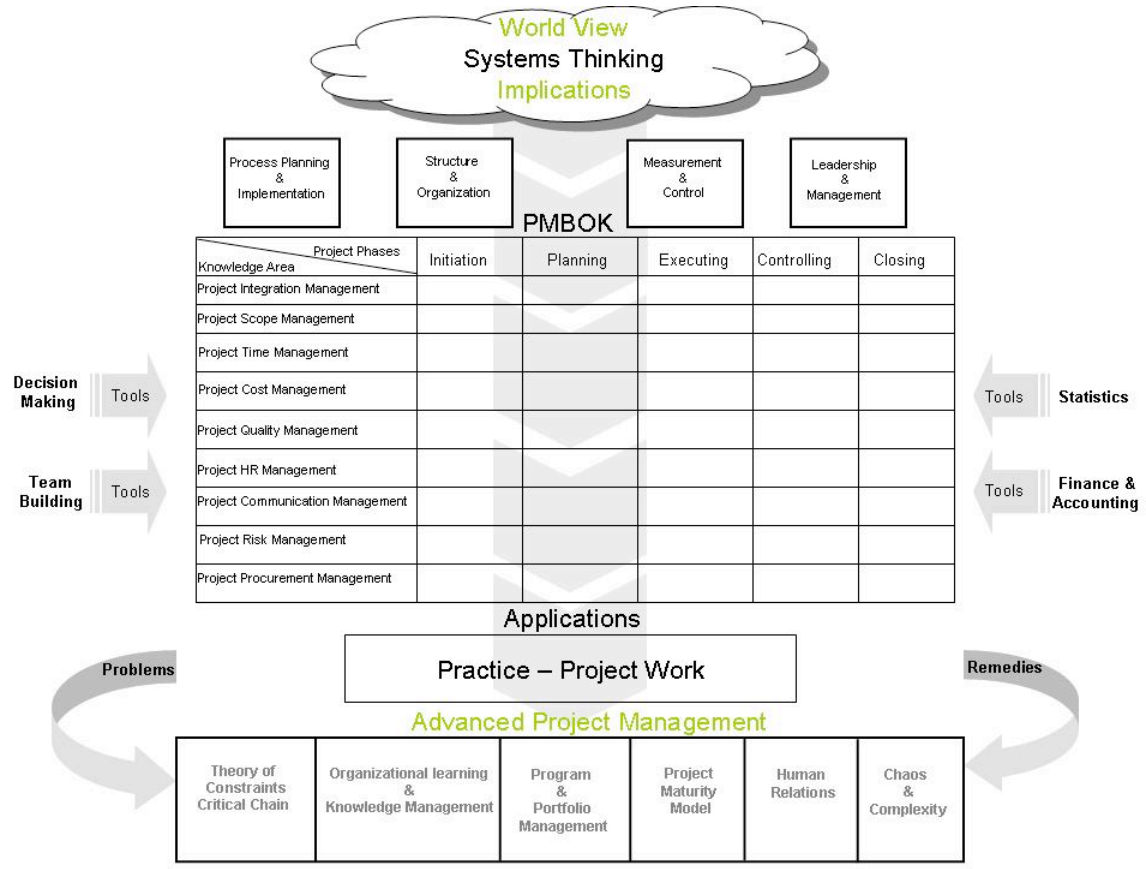
- Each essential task within the project can affect the essential defining function, behavior of, or property of the project as a whole.

- The way any part (task) affects the whole depends on what at least one other part is doing (no part of the project system has an independent effect on the whole).

- Moreover, if you take these parts and group them in any way, they form subgroups. These subgroups will be subject to the same conditions as the original parts were.

As discussed elsewhere, systems thinking is a lens through which you can look at the world. That lens determines what you see and also often determines what you can do about what you see. Systems thinking is, first and foremost, a point of view and a methodology arising out of that point of view.

Once the fundamentals of systems thinking have been explored, it is appropriate to discuss the implications for planning and implementation, structure and organization, measurement and control, and leadership and management.



In level two, traditional project management education is provided. There are three attributes commonly used to evaluate the effectiveness of project management: performance, cost, and time. Performance relates to the degree to which project output meets the specification set for it; cost refers to resources being expended for the project execution; and time refers to the timelines of progress in terms of a schedule, which has been set up for the project.

For this purpose, the Project Management Institute (PMI) has created a guide to the Project Management Body of Knowledge (PMBOK). The PMI has created a hard

analytic approach, designed to provide managers with full control over their projects. It provides a very structured approach to managing project resources, tasks and activities. The PMI divides project activities into the five phases, known as process groups: initiation, planning, execution, controlling and closing. These phases that constitute the project life cycle, are completed according to predetermined linear sequence with one phase completed before the next one begins (PMBOK).

For each phase, the PMI has developed tools and techniques that are organized in nine knowledge areas (project integration management, project scope management, project time management, project cost management, project quality management, project human resource management, project communication management, project risk management, project procurement management) which provide methodology for summarizing the inputs, tasks, and responsibilities and measuring the progress of the performed steps. Proficiency with statistics and quantitative approaches to decision making are required. This is depicted in the table above which presents application of the knowledge areas to the specific steps of the project life cycle.

In level three, it is expected that learners put into practice what they have learned from the previous two levels as well as their own and others' experience. A central characteristic of level three is experiential learning or action learning, which is a facilitated process. It is frequently done by a group of people and can be defined as a process in which a group of learners come together more or less regularly to help each other to learn from their experience. This is combined with so-called action research,

which is defined as a process by which change and understanding can be pursued at the same time. It is usually described as cyclic, with action and critical reflection taking place in turn. The reflection is used to review the previous action and plan the next one.

Note: There could be several designs for level three activity, including pairing learners from various situations, each of them having been involved in different projects and having faced individual problems. The program could also be designed specifically for learners within one organization with a common task or problem.

In level four, advanced project management topics such as Theory of Constraints and Critical Chain; Organizational Learning and Knowledge Management; Program and Portfolio Management; Project Maturity Model; Human Relations; Chaos and Complexity are offered. All of these courses will have project management focus.

Theory of Constraints (TOC) and Critical Chain – a general improvement methodology .

Organizational Learning and Knowledge Management - Developing the ability to adapt to changes we can't control and to learn about the ones we can control..

Program and Portfolio Management – as described above

Project Maturity Model – as described above

Human Relations – Advance courses in human interaction

Chaos and Complexity – There are new models that have been developed that deal with both, project and environment complexity.

Conclusion

In response to the epidemic of project management failures, suggested remedies abound. Most of this literature focuses on either the art or the science of project management. However, some proposed solutions emphasize both. Such holistic endeavors require a systems approach, which in turn presupposes a systemic worldview/mindset. The systems approach is based on a formal awareness of the interactions among the parts of a system. Systemic properties are derived, not from the separate actions of the parts, but from the interaction of the parts of the system. Implicit in the definition of a project as a system is the concept of "relations among them." The implication is that the network of relations, not the nature of the elements, is what defines something as a system of a given type. Both opportunities and threats to a project should be considered as emergent properties that are co-produced by the interaction of various factors. Recognizing these patterns is made easier when the project manager employs the appropriate frame of mind.

The essential challenge for the project management community is to redefine traditional project management education. The model proposed in this paper calls for a multi-level learner-centered competency-based program that begins with exposing learners to a systems thinking worldview and its implication for management. This should be followed by traditional project

management education. On the other hand, no theory is complete without practice. Learners should be required to put into practice the theories they have learned. Finally, and in order to further advance, there are a number of additional courses that are suggested.

References

Klein Matt, *Powerful Project management: A Balanced Blend of Art and Science*, Jan 26, 2006. http://allpm.com/modules.php?op=modload&name=News&file=article&sid=1476

Ackoff, Russell L: *Re-Creating The Corporation*, 1999 by Oxford University Press, Inc.

Baron, Robert A: *Opportunity Recognition as Pattern Recognition: How Entrepreneurs "Connect the Dots" To Identify New Business Opportunities*, Perspectives, February, 2006, The Academy of Management, Volume 20 Number 1.

Crawford L., and J. Pollack, *Hard and Soft Projects: A Framework for Analysis*. International Journal of Project Management 22: 645-653, 2004.

Dombkin, David, and Norman Gray: Project Management and Organizational Change, February 2006, this paper was presented at:

http://anzsog-research.anu.edu.au/pdfs/Conference%202006/index.htm

The Economist Journal: *Overdue and Over budget, Over and Over Again*, June 6, 2005, Vol. 375, Issue 8430, p57-58

http://economist.com/displaystory.cfm?story_id=E1_QDGVGVP

Merrow, E. W., *Understanding the Outcomes of Megaprojects: A Quantitative Analysis of Very Large Civilian Projects*. Rand Corporation: Santa Monica, 1988.

Project Management Institute (PMI), *A Guide to the Project Management Body of Knowledge,* 2000.

Ulfelder, Steve*: The Dirty Half-Dozen: Six Ways I.T. Projects Fail- And How You Can Avoid Them,* Darwin Magazine, June 2001
http://www.darwinmag.com/read/060101/dirty.html

Yeo, K T: *Systems Thinking and Project Management – Time to Reunite*, International Journal of Project Management, May , 1993, Volume 11 No 2, Butteworth-Heinemann.

Quotations:

"Systems thinking is a lens through which you can look at the world. That lens determines what you see and also often determines what you can do about what you see. Systems thinking is, first and foremost, a point of view and a methodology arising out of that point of view."

"By engaging all stakeholders in creating an idealized and shared vision for the project, the entire project organization commits to the project objectives."

" . . . both the art and science of project management are required to achieve complete success. The combination of effective leaders and skilled technicians will greatly reduce project failure and ensure the proper foundation under which to create successfully."

Biography and photo:

 John Pourdehnad is Associate Director of the Ackoff Center for Advancement of Systems Approaches (ACASA). Dr. Pourdehnad holds his Ph.D. in Systems Sciences from the Wharton School and is currently Adjunct Professor of Systems Engineering at the University of Pennsylvania's School of Engineering and Affiliated Faculty with the Organizational Dynamics Program at Penn's School of Arts and Sciences. His primary areas of focus and research include implications of systems thinking in complex problem formulation and systems redesign, project management, knowledge development in creation of new products and services, and the development of socio-technical systems for learning and knowledge-to-wisdom management in complex adaptive systems (with specific focus on decision making). He is the coauthor of *Internal Markets*, published in 1993 by John Wiley and Sons.