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# Factors Impeding Project Management Learning

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The article presents learning as a critical factor of success for project-oriented organizations. When new project situations require unique adaptations, learning becomes imperative to understanding and deriving improved responses to what will be taking place. Learning involves moving to higher levels of abstraction, in order to evaluate a subject against its context. This fosters the processes of renewal and innovation, and responds to the growing need for project self-regulation. Complex conceptions of learning and confusion about its process can, on the other hand, impede it. Additional forces also impede learning to do things in a better, more useful way. The purpose of this article is to describe practices of individual and organizational learning for use at a company level above projects, yet keep a connection to individualized learning at the project manager level. The authors believe that the project managers, those who carry out the tangible company assignments, are the best suited to illustrate the advantages of learning for a forward-looking company. The article draws from a study of industry-wide adaptation and learning activities. Titled Conditions of Success, it was carried out with 60 international project-based firms. The results illustrated the evolutionary role of learning and the business significance of it for firms that manage large, diverse projects.

## Challenges of a Changing Project Context

Project management education and execution often begins with definitions similar to that found in the PMBOK (1996):

> *"Project management is the application of knowledge, skills and tools, and techniques to project activities in order to meet or exceed project objectives and stakeholder needs and expectations from a project. Meeting or exceeding stakeholder needs and expectations invariably involves balancing competing demands..."*

Project management is thus seen to include a wide variety of subjects. These range from projects for developing a new good or a service, projects for developing or modifying a social organization to projects for relating a technical system to a natural setting. A project can be set up to produce or modify infrastructures, factories or buildings, or to bring new business processes into existence. This variety makes it difficult to describe projects in a way that is sufficiently wide to be inclusive, yet focused enough to be useful. To further complicate the defining process, project environments can quickly get caught up in rapid change processes.

There is much that managers can do to manage projects in a more systematic and integrative manner, yet they are often encouraged to restrict themselves to the tangibility of what is known and hope for luck. Projects present interesting circumstances that challenge reason while inviting luck. Recent articles in the Harvard Review and a management book by Eisenhart (1998) discuss the phenomenon of rapid change linked to the desirability of getting people to embrace it and "compete at the edge of change."We believe there is a need to go further than this by preparing project managers with new theories for how best to manage changing practice at the edge of their reality. In this article theory and practice are seen as mutually important to improvements in project management. Either acting alone is seen as deficient to growing challenges. We base these comments on the legendary dictum of the famous social scientist Kurt Lewin (1951), "there is nothing so practical as a good theory." In the telecommunications project industry, for example, ignoring theory would be to exclude knowledge as to how best to move from second to third generation systems, while excluding practice would have bypassed the experience for why a move was essential to the continuance of the industry.

It seems appropriate to apply Lewin's sage wisdom to finding ways to improve the practice of project management. We strive to support project managers who seek innovative ways to re-

spond to change they know is important, yet don't fully understand. An array of forces are behind these change dynamics, including a continual shift from projects based on goods to those focusing on services, growing technological sophistication of the production, delivery and operation systems, and an emerging decentralization of traditional hierarchical management structures. The complexity grows as the dynamics of change overrun the remaining islands of stability. So too does the gap between the situations that we passively occupy, and ones in which we would prefer to be active participants. We propose that learning is the most effective means to manage complexity and bridge the gap to improvement.

Looking at the shifting themes of professional management meetings illustrates the current rate of change. These meetings are shifting from fixed supply-chain analysis, and mechanisms for its prediction, command and control to much more fluid means to manage that which appears too complex to understand and too exciting to ignore. This can be seen in the theme of the 1999 annual conference of the Strategic Management Society SMS (1999), a widely-respected management meetings. Titled "Winning Strategies in a Deconstructing World" the conference is about deconstructing contemporary theories of the firm and the corporate strategies that guide them.

> *"Deconstruction forces a fundamental rethinking of some of the basic principles of strategy with potentially broad impact on concepts of the portfolio, forms of organizational structure, styles of leadership, mechanisms for acquiring and managing knowledge, and approaches to uncertainty and risk." (SMS 1999).*

## Formal Education vs. Genuine Learning

There is uncertainty as to what knowledge is, and which skills and tools will best complement future project manager work. Perhaps the most we can say at this time is that, under conditions of change, learning is very important while being able to move to a higher level and learning to learn, may be critical. If the intent is to improve project results, as was stated above, through "meeting or exceeding project objectives and stakeholder needs and expectations" then the support framework needs to include more than the limited knowledge of formalized education systems. They are too fixed to tradition and slow to respond. With the objective of expanding such limits, learning herein signifies upgrading the larger cognitive context by accessing higher level thinking activities.

Learning requires higher level processes than education. Education is a formal process that has long helped members of society to acquire knowledge. Its primary means are memory expansion and analytical exercises. Learning processes transcend memory and analysis. They improve knowledge by questioning the viability and validity of what is known; i.e., always seeking to improve cognitive quality. Herein there are two major ingredients to the cognitive qualities of learning: rationality and non-rationality. All project events are presumed to contain a mixture of both. Rationality is the process of reasoning with oneself or others to arrive at a logical framework. This is important for communication and formalization of common objectives and activities to achieve them. Rationality allows for clear identification of what is formally known and what can be done with this knowledge. Reason points to opportunities that can be realized, and risks that can be reduced or avoided. The danger is that project managers come to believe that projects only involve the rational, or at least a manager should restrict his considerations to that which is clearly rational. A large world exists beyond the limits of reason, and it can have significant impacts upon situations and how they improve, deteriorate or otherwise change. This is the area of the non-rational and includes politics, religions, aesthetics, and something project managers call luck. It is easy to describe the educational process for acquiring things of reason, but negotiating with the non-rational requires more; it requires learning. The question then becomes how do you learn about luck?

Luck is an everyday form of predestination. Risks of circumstance and matters of timing are filed under good or bad luck. As such, humans feel there is little they can do to change, control or manage such non-rationality. Herein, learning is developed as a means to deal with the non-rational domain and make it more susceptible to human capabilities. There is a rich body of scientific literature emerging in this area that combines recent knowledge of biology, chemistry, computer design and electrical engineering. The award winning science book of Steven Pinker (1997), How the Mind Works, outlines the most recent developments. The essence of the book is that we must learn to entertain questions that change the frame of reference, not just the details in a continuing frame. We have the capability to do so, but the pervasive attitude is that we shouldn't. Pinker argues that we have much greater capabilities than we use. We can simultaneously deal with very fuzzy and very clear things, yet the normal mind prefers to simplify around what is known. Project managers prefer decisions made on economic, technical or similar narrowly-derived grounds. Messy combinations are avoided. Managers generally prefer clear decisions that are wrong, to ambiguous decisions that have a good chance of being right.

Leading companies now pay a premium for graduates who have developed their abilities in learning to learn, instead of the traditional educational emphasis on developing skill in prediction and control. Learning is one of the most desirable doorways into the future. It is an accepted prerequisite for success in a project company, as emphasized by Artto, et. al. (1998) where they introduced the concept of learning loops. The learning, innovation and creativity loop in project companies emphasizes the crucial importance to project companies fostering their people to develop self-regulating and innovative activities. Instead of reliance on fixed management methods, a project company must employ knowledge intensive and flexible business practices so as to ensure adaptation to new situations. There must be room for innovative and creative solutions.

A distinction was made at the outset between processes for education and the learning process. Via education, assumptions about reality are acquired. For the second, the same assumptions are questioned and criticized. Under conditions of stability, education is efficient and effective. Under dynamic conditions, effectiveness requires learning. Loop learning theory illustrates this. It is able to encourage exploitation of experiences and business practices that further facilitate learning by the organization. A new management paradigm in a project-oriented company, with a specific emphasis in learning, is suggest-

ed by Gareis (1996). It contains a distinction between individual learning and closely related team and organizational learning schemes.

The authors of this article recognize the importance of organizational learning and intend to address it, however, the basic hypothesis behind the content, as based on the authors' experience, is that important strategic and forward-looking decisions generally occur at project manager and operative levels. Thus, the purpose of this article is to provide a theory for introducing the practices of organizational learning into a company at an organizational level just above projects. To do this effectively, we feel that the organizational learning must accommodate the central problems of project managers' and respond to their needs for individual learning. Project managers are increasingly important in the current climate of needing to decentralize authority. A project, for purposes of this article, is an organized, multiple-person, set of activities directed towards improving the situation of those involved. In this way it excludes individual actions directed at narrowly-defined self-fulfillment. Project management learning, obviously needs to result in improved management of projects, but this may increasingly involve learning to managing projects in non-traditional ways.

Project management research generally concentrates on issues of efficiency in answering questions as given. It generally avoids challenging the underlying questions of what is project management and why is it different from other forms of management, e.g., managing repetitive manufacturing regimes. We attempt to open up some deeper questions that address the effectiveness. They can generate significant debate and chances for significant progress, but tend to get "sticky" for those involved. Some stickiness is acceptable and needed to see if the right questions are being asked. The alternative is to continually improve the efficiency in answering the wrong question. We need to reconsider the questions that project management asks. This builds on the Peter Morris (1998) Project Management article and the Karlos Artto (1998) editorial. Their concern is less with improving projects under conditions of stability, and more towards creating a better future during states of change.

## An Evolutionary Perspective on Learning

A new context for learning is needed. An initial attempt is outlined in this section in order to support learning and help improve project management at a higher level. Developed several decades ago, it presents a different sense of what learning does. Generally neglected, often forgotten and frequently misinterpreted, this frame is used here instead of its recent prodigy because it provides more insight for responding to change. The newer "translations" lose something and can lead to tangents and dead-ends. Some aspects of the work of Schon and Argyris (1976), and Nonaka (1996) illustrate this. The frame begins with Kurt Lewin's model that links the concepts of learning and change (Lewin 1951, p. 66):

> *Within what is called learning, we have to distinguish at least the following types of changes: (1) learning as a change in cognitive structure (knowledge), (2) learning as a change in motivation (learning to like or to dislike), (3) learning as a change in group belongingness or ideology (this is an important aspect of merging into a culture), (4) learning in the meaning of voluntary control of the body musculature (this is one important aspect of acquiring skills, such as speech and self-control).*

All four changes can be important to improving a project manager's activities. The improvements range from high-level negotiations with that which leads to significant change in the cognitive context, to simple accommodations of minor modifications to movement. All four types are interesting but the emphasis in this article lies in this first area, in the changing of cognitive structure. A small elaboration on each of the other three is given in the following before returning to the first type.

1. Change in cognitive structure sponsors innovative, and unpredictable, behavior and is perhaps the most critical to changing structures in project management activities. This is important when structural change is needed to meet the challenges of complexities and environmental shifts. This can be seen in project situations that require shifting from strict British hierarchical chains of command to Japanese autonomous work groups.
2. Change of motivations, and finding new motivations, is especially critical to keeping project quality at a high level. This is where a practice, or result, that was previously considered acceptable is seen in a new light that reclassifies it as substandard.
3. Changing group culture is a means for individuals to find new ways to work systemically within a group, a project team, and a company culture, and is one of the long-standing factors of success for a project manager. The interested reader is advised to consult Lereim (1997) for recognition of different groups and related cultures such as different engineers' groups, culture of the company, and individuals'/people's own culture.
4. Changing ergonomic tangibility is always helpful for certain tasks. Traditional measures of project productivity arose from this area of learning. Many decades ago young students were given tests in this area to help determine what kind of profession or trade they should be directed towards in their later studies. Via the growth of importance of computer driven work these tests have been largely suspended.

The first Type of learning, change in cognition that underlies knowledge, appears to provide a fruitful platform for improving the current project environment. This is because cognitive change is the most significant, and a significance is needed to respond to the high change-rate now taking place in project initiation and execution. Even though cognitive learning operates at a high level it has obvious links to traditional project management concerns, e.g., it helps with finding the best traits of a new employee? It is better to seek employees that illustrate a depth of knowledge in a specialty, or to find people with less depth but are able to learn fast? The answer of course also depends on contextual issues of company characteristics, location and expectations. Successful project management firms illustrate success through emphasizing both extremes. A very successful major international firm that participated in the study described in the next section hires from both extremes, although they are

now shifting to the learning side. Their choice was initially based on the country in which the individuals will work but is now trying to respond to the project change rates in most countries.

The model of learning presented here clearly favors finding employees with abilities for learning to learn, over capabilities in knowing. There are several reasons for this, where the most important one may come from the limits of pragmatism. This dilemma confronts the historic limits of knowledge. The dictum of pragmatism has been, "If it works, use it!" The dilemma is what happens when it doesn't work? Project pragmatism worked very well in the 1950s, and later, but has gradually became less and less successful. In the turbulence of the 1990s it has almost been abandoned. The philosophy of pragmatism, especially American pragmatism of the 1930s as described by Will James, John Dewey and Singer, provided a profound foundation for American project, business and educational development. James (1978) illustrates this most clearly in his work in the 1930s. He found what worked and helped to place it in practice. The American approach to industrial management and development made rich use of this philosophy, but the dilemma for the school, and for America, eventually arose when "what worked" was no longer so obvious. U.S. Society then had to turn back once again to its base in research and theory building. While initially done for security and space exploration reasons, the knowledge gained therein has found its way into project management.

The following outlines a theory of learning that was important to U.S. self-criticism and the push to develop research. It emphasized Lewin's first type of change, as outlined above, "Learning as a change in cognitive structure." This is a change in the cognition of what is and isn't. It helps in responding to situations where "practice doesn't work." And fundamentally new knowledge is needed. This need is presented in five different levels in the following, where the progression is from less to more significance.

The essence of this theory of learning is learning by asking questions at ever-higher levels. Using this, a project manager could manage change by the questions he asked. Known as the Socratic method, where the essence is on dynamic thinking so as to be more sympathetic to the process of change, this activity avoids formalization and fixations. It has long been the underlying method of developmental science. The anthropologist Gregory Bateson (1973) was the author of the structure of the theory of learning used in the following.

## Learning at Different Levels

Five levels of learning are suggested in the following. They lead up to the cognitive changes suggested by Lewin outline in the previous section. They are:

**Zero learning** - No learning takes place here. The activity is characterized by simple and direct responses, which, regardless of whether they are right or wrong, are not subject to any change or correction. (For example, there is a command and control simplicity, where hierarchical orders are given and taken without question.)

**Level I learning** - This is change in aspects of specific responses. Correcting errors of choice is allowed, but only within a narrow range of alternatives. (For example, alternatives to a set of project specifications are allowed, or given.)

**Level II learning** - This is change in the process of Level I; such as making a corrective change in the set of alternatives from which a choice is made, or change in how the sequence of experiences are punctuated. (For example there is a moving between assignments, or learning to do a variety of jobs)

**Level III learning** - is change in the process of Level II, e.g., a corrective change in the system of sets of alternatives from which choice is made. (We shall see later that to demand this level of performance of some men and some mammals is sometimes pathogenic. This could involve redefining the sexual habits of men in a protestant community, or to have those building nuclear power stations to switch to photovolteic stations.)

**Level IV learning** - is a change in Level III, but probably does not occur in any adult living organism on this earth. Evolutionary process has, however, created organisms whose ontogeny brings them to Level III. The combination of phylogenesis with ontogenesis, in fact, achieves Level IV. (This would involve people learning to not go to war, to achieve a new relationship to nature.)

Learning is a vehicle for building, upgrading and setting aside fixed knowledge, and making room for new knowledge. In this way knowledge is placed in a context where it can be evaluated and improved. This differs from how knowledge might be conceived in a process such as competence building, where the act of questioning is given a low priority. In the above model, learning begins at level II. The learning first examines the presuppositions about an action to be taken, just like Socrates delving into ever-deeper levels of what is known, in order to access the mind. This is like a project manager asking why something is being done instead of how to do it? It opens up a new area of human potentiality but can easily lead to confusion associated with accompanying dilemmas, double binds and contradictions without obvious exits.

Double binds, as first identified by Bateson (1973) are situations where in a project situation you must give a "gift" in order to gain a contract, yet your home country's laws say it is illegal to give any such "payment" to potential clients. Closely related to this, but in a much more popularized manner was the key concept of Joseph Heller (1994), called Catch-22s. These are similar to double binds, except more ironic and dynamic. In a Catch-22 situation the rules keep changing, yet the participants don't know why or how. Studies of the design process illustrate how creativity is directly linked to effective generation of responses to double binds and Catch 22s. Perhaps this is why design is increasingly seen as an important skill in many firms in most industries. (Hawk, 1992) The logic for Learning II helps set the basis for this by assessing what we think we are capable of, and then eliciting creative responses to change the basis of these thoughts. This has been used to help project managers and other kinds of workers deal with change. (Hawk, 1992)

Learning III is different. It offers high learning rewards once accessed, but humans have great trouble accessing it. One reason is that humans tend to be tied to hierarchical processes that in fact probably don't exist in the mind, and this kind of learning is non-hierarchical. The limitation is greatly eased here when humans leave behind the security of hierarchical structures. Leading international firms, e.g., ABB, illustrate some of what this means. This is

consistent with current developments in management theory where hierarchical structures are being broken down, or left behind. Non-hierarchical forms of learning begin to emerge in level II learning but are not critical until level III. Bateson argues that there is no evidence of any humans being capable of accessing learning in level IV. He believes that only evolutionary development in nature illustrates this learning form.

Firms are looking for ways to manage the challenges they face when traditionally separated business practices become ever move tightly woven into a systemic fabric. Magazines and journals commonly refer to this as increasing complexity. Emerging models of project management parallel this development and reach for ways to deal with growing site chaos and complexity. Increasing sophistication, technological complexity, and continuous environmental change challenge discipline-based approaches. This may help explain the growing importance of the project concept in helping to cope with growing complexity. Recent articles (Runeson and Skitmore 1999, Stocks and Singh 1999, Price and Mangin 1997) illustrate the need to go much further and move to higher levels of learning. Our objective is a model of learning that supports this work.

## Learning Inputs: Data, Information and Knowledge & Wisdom

It is important to distinguish between what is and is not learning. Part of this can be seen in the shifting focus of concern for learning over the years. Shifts have been taking place in universities and companies since the 1950s. IBM illustrates this clearly. The sixties, was truly an age of data. Data collection was the prime objective. More data was always better. IBM seized the conditions to attain tremendous growth by helping people collect data. During the early seventies the focus shifted from data to its organization. IBM's worked to redefine itself around what they thought would be an emerging era of information. They articulated the key concepts of management information systems (MIS) as designed systems to organize data and give information. The era of MIS continued into the late eighties, when it was discovered that having more information was not the same as being more informed. Issues of knowledge and competence were beginning to enter the discourse. "Knowledge creating firms" and "knowledge assets" began replacing the MIS terminology.

| | Inputs | Activity | Objective |
|---|---|---|---|
| 1 | Data | Collecting | To acquire |
| 2 | Information | Organizing data | To inform |
| 3 | Knowledge | Organizing information | To know |
| 4+n | Wisdom | Seeking meaning | To unlearn |

*Figure 1. Learning Stages*

It is likely that this progression will continue. If so, it is possible that wisdom may become an emphasis in the future. Knowledge is organized information, and information is organized data, but wisdom is not hierarchical, cumulative, linear, obvious nor organized knowledge. In fact, it may begin with the disorganization of what is known, and a discarding of some knowledge. The search for wisdom will not be so easy.

As Figure 1 illustrates, the key to moving from one stage of an operation to another is to shift to a higher form of organization. Organized data becomes useful information, just as organized information becomes knowledge, and organized knowledge allows access to wisdom. The above schema illustrates the depth of the problem, not the solution. Those devoting their lives to data end up finding small challenges. They can live with an easy belief that more is better - a million data points is obviously superior to a hundred thousand. Much of the work of Wharton's Larry Klien, and more recently Harvard's Michael Porter, illustrates the tendency to seek knowledge from assembling data, but not organizing it. This well-grounded approach was handed to the social sciences from classical physics in the last century. The world of pre-Heisenburg, pre-chaos and pre-complexity allowed data to rest in positivistic objectivity so that truth might arise from it. Modern science has become much more skeptical and demanding. It looks for qualitative differences in data, makes the filters for seeing it more explicit, and requires more innovative methods for giving it a sense of organization.

A fascination with the idea of "information" is more recent, but here too, there was a belief that more is better, although the believers had to work harder to remain faithful to the ideology. When they came to believe that information is everywhere, and everything is information, and via the use of advancing technology they can eventually gather and organize all information ad infinitum they eventually began to ask deeper questions. The Human Genome Project (the US National Institutes of Health project to find and classified all DNA) exemplifies this.

It is interesting to note that the early development of information systems began with discussions about the difference between information and wisdom. Data was presumed to simply be there as a resource. Several of the early Bell Labs people concentrated on the information level via their theory about the importance of getting the message between A and B. Simultaneously, Norbert Wiener, Gregory Bateson, et.al., (1972) tried to redirect concern from information and to meaning via cybernetics means to clarify meaning and improve human wisdom. Bateson in particular argued for rising above the limits of rational human thought in order to get beyond what he then called "unaided rationality." This was an early articulation of Nobel Prize winner Herbert Simon's concern about operating within "bounded rationality." Within a decade both concerns were buried under a quest for data, and technologies for its management. This was the hardware problem that IBM eventually turned into a 1974 software problem with design of the MIS challenge. This became the doorway into IBM's soft underbelly that Microsoft since took such great advantage of. Many tools for project management were developed along the way of this evolution, but all have been disappointing.

## Reaching Towards Wisdom

Interest in information is the current

focus of information sciences and some areas of management theory. It is here that the dilemma of meaning surfaces. While those lower on the information food chain concentrate on how to make men think like machines, those at a higher level try to make machines think like men. In his development of heterarchical and N-Form (knowledge-seeking) organizations Gunnar Hedlund, (1994) attempted to avoid both groups and look instead at the bio-chaotic, holographic processes involved in learning. This work could be very helpful to managing projects, as it has been in firms like ABB.

During the past years, management concerns have moved towards the idea of knowledge creation, with concern as to what knowledge is. The work of Hedlund (1991) and Nonaka (1996) illustrates this emergence. They began with the model of learning used herein but then developed it in a direction that allowed it to initially seem more optimistic, but eventually was seen to lack the potential of the initial model. They avoided the highest level of human achievement, called wisdom, in that they felt it was too difficult for humans to relate to. Based on work in a Lucent Bell Labs project, e.g, Hawk (1994), it may be that they were right, and that wisdom may be of a very different logical type than knowledge, but it remain as important. Meaningless knowledge can in fact be shown to get in the way of wisdom, and meaningful knowledge requires avoiding of useless information. This is consistent with the Japanese belief that it is important to forget what was known in order to learn to do things in new ways. The key question then become, if learning is such an obviously good idea, why is it not an integral part of business organizations?

Heresy often accompanies wisdom, in that wisdom is often preceded by the asking of questions about the most closely held beliefs in a given system. Heresy is where a member of a "church" ask fundamental questions about the basis of the church; e.g., "what do of rules of the church really mean?" Whitehead and Russell, in, Principia Mathematica (1997), set the stage for this process when they established the theory of different logical types. The content of Figure 1 is set up as a logical typing model, not a hierarchical scheme. It is a logical framework that allows modeling of the resources that can go into learning as segmented or integrated inputs. Whitehead and Russell saw learning as a doorway into ways to organize and then question closely held assumptions. Their model was instrumental to early development of ideas about communication and information technology.

In an era of increasing applications of information technology, and thus increasing the importance of self-regulation and decentralization of authority and information, theories such as Whitehead and Russell's are important to decentralized discourse. This sets the stage for significant innovation and variety. Eric Trist's afterword in Cal Pava's (1983) book on how information technology decentralized the management of work addresses this point in an especially helpful manner. This work introduces the concept of deliberation as a key aspect of improved operations and management, where information technology is especially adapt at increasing the possibilities for project deliberations around alternatives and improvements. This can be helpful to project management firms that must prepare their employees for these new contingencies, potentialities and dangers. As Trist pointed out, the stumbling block is the conventional industrial model of control that has great difficulty with complexity.

> *"In conventional technocratic and bureaucratic organizations the structural foreground is occupied by static positions that delineate the responsibilities of the office-holders and their authority to discharge them. These positions confer ownership of expertise and access to privileged knowledge in ways the falsely politicize the resolution of complex issues dependent rather on pooled knowledge and interpositional collaboration." (1983, p. 167)*

## Impediments to Project Management Learning

The model of learning described and discussed herein is for project managers and firms who are driven to find ways to improve what they do and how they do it. Many firms are members of this group, and they wish to respond by experimenting with innovative learning processes. What then stands in the way they and their most motivated employees fully embracing the learning process described in the prior section? What are the impediments to learning?

Human endeavors are exceedingly complex phenomena. They are complicated to begin with, and then after we invest a great deal in understanding them, they seem to move and change into something else entirely. An early impediment to learning thus becomes the notion that "learning isn't worth the time and trouble it takes." This is soon countered by a realization that the change process itself must be learned about so it can be managed, thus learning needs to be moved to a higher level where it can in some ways anticipate change. This sometimes leads to attempts to manage change, thus calling for learning at an even higher level of operations.

There are other impediments to project management learning that, when examined more closely, become strong arguments for learning. One of these is the strategy for dealing with growing complexity by avoiding it. Project managers have widely noted that the projects must manage appear to be getting ever more complex, and increasingly difficult to comprehend and manage. This is due to the growth in number of project parts and the increase in relationships between parts. The concern is highest when complexity is directed linked to an expensive project failure that resulted from a failure to understand. Many believe the only response to this is to invest more hours, thus leaving no "spare time" available for "learning." Research illustrates that a simple addition of more hours seldom aids in management of complexity. When we say something is complex, it's a sign that we don't understand how it is organized, thus we need to learn about organizational principles and other things at a level above the project. Since complexity is generally in the eye of the beholder, not the phenomenon being viewed, it is the viewer's vision that needs improved, not his work efficiency. The complexity argument that normally inhibits learning then becomes a key argument for why learning is essential.

An additional class of impediments is just as important although less obvious. These impediments can include how a method for doing something in a closely specified way can become a rationale for not doing it better. This can also be called attitude, where

method and attitude can reinforce the weaknesses of each, especially if both are conceived as closed systems. A new method can temporarily open up the process, but often ends as up as another fixed recipe. It too can quickly lose its capacity to handle new inputs. The history of operations research (OR) illustrates the process.

## Impeded Operations Research as Impeded Learning

Much can be learned by looking at the history of a significant discipline that has long been important to project management education and practice. Called operations research, it has passed through a life-cycle of birth, rapid rise, stagnation and fall from grace. Examining it illustrates the process of knowledge building, organizing and obsolescence.

OR methods have been used throughout project management. Early OR leaders believed that its seven prescribed problem-solving methods could be used to solve all human problems. The creative challenge was to describe problems so that they could be fitted into a method's framework. The most innovative stage of OR development came out during the life-threatening urgencies of World War II. It saw rapid improvement during the 1950s and by the 1960s was common to most conceptual and operational decisions of leading organizations. By the 1970s, leading firms had begun to move from a focus on OR, where those most skilled in its methods were placed at the organization's margin. Firms were by then looking for methods and people that were systematic, systemic and strategic.

A great deal of effort was put into applying systems theory, communication theory, management information systems, and strategic warfare scenarios to the emerging challenges of business. Change has continued where current attention is now with use of neural networks to design and manage projects. It seems that just as a set of concepts become clarified and operational, i.e., rationally useful, they are no longer capable of accommodating change. Since change seems endemic to the project process what should project managers do? Analyzing the development of one of the leaders in the initial effort to apply OR, and then to abandon it, may help highlight the process.

Russell Ackoff was centrally responsible for bringing science to project and operations management via development of operations research. His various text-books on different operations research (OR) techniques and their applications to business needs have been used throughout the industrial world. His 1962 book, Scientific Methods, was translated into 26 languages during its first two years (Ackoff, 1962). It became a model for modeling efficiency and quality analysis in many industries in many countries.

Ackoff turned away from this tradition in 1974, and left its focus on positivism, quantification, CPM and PERT charts. He then published an alternative to traditional project operations management which he called "project redesign." (Ackoff, 1974) Instead of struggling with management of the more problematical aspects of projects, he advocated their redesigning. He argued for tapping into the underlying human capabilities linked to learning and innovation. He criticized his earlier OR methods for having become too focused and fixed, and unable to respond to the dynamics from growing challenges. He argued that business problems were changing more rapidly than the methods set up to manage them. He felt that OR had stopped learning, and that this had happened due to the arrogance it attained from its early gains.

## Proactivist Attitudes as an Impediment to Learning

Attitude can also be an impediment to learning. "Proactivism," while effective under some conditions, can impede the will to learn new things. Ackoff illustrated this for managers in terms of the model in Figure 2. He wanted to encourage an interdisciplinary, interactive approach to problem and project management but found that certain attitudes would get in the way. Figure 2 illustrates this in terms of four different approaches to dealing with the future. These approaches can also be called "postures." They are the reactivist, inactivist, proactivist and interactivst.

- Reactivists were those who felt the best future and best chance for them lay in a context that resembled the past. Thus, each decision they would make would be an incremental effort to bring the past into the future. They often prefaced a decision-point with the comment: "In the good old days, we..."
- Inactivist preferred the sanctuary offered by the present. Their decisions, and work, attempted to keep things from changing. They rely heavily on committees to slow down, or eliminate good ideas, and "keep things from happening."
- Proactivists were quite different. They either longed for the hope that could be offered by the future, or felt it was inevitable and thus they should improve their role in it by getting there prior to others. They continually searched for the next wave heading for the future, where these were primarily structured by new technology.
- Interactivists were of a different type. They felt that the prediction and forecasting basis of the other three was counter-productive to the dynamics of living systems. Instead of building better information for a more efficient central control, they seek to decentralize responsibility so individuals can work out the qualities of information in real time. They are more interested in "creating" a future that ought to be, instead to trying to predict what is assumed to inevitable. The interactive participants are to be members of the other three groups, since those represented all available people.

Figure 2 is not from Ackoff's model but illustrates how attitudes towards time can become an impediment to learning. Ackoff's model points to the importance of problem solving that can step outside the limitations associated with time. There is a deeply seated tendency to rely on time to resolve problems, such as difficulties in project management. Via prediction, forecasting and/or simply waiting, it is hoped that a resolution will occur. This is one of the most important and most common characteristics of problem solving methods. It can be avoided, thus encouraging a more active, innovative and integrative stance.

The Ackoff scheme is growing in importance just now. This may be because the proactive manager is currently the object of affection in most magazines and consultant recommendations. Managers are counseled to become "more proactive" in what they do. A

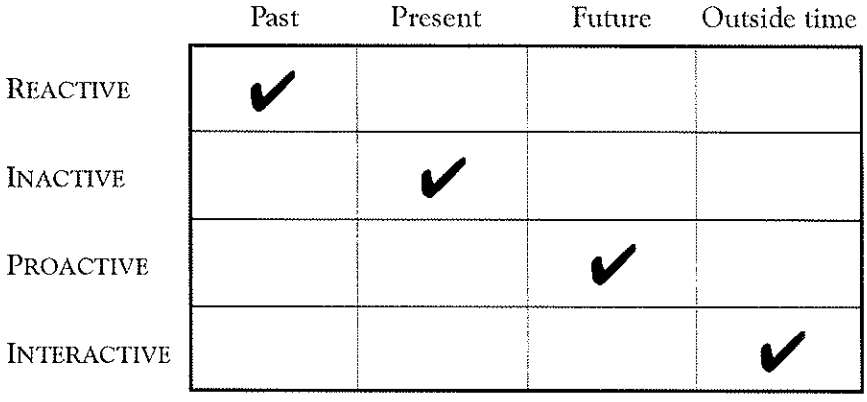


*Figure 2. Attitudes for Solving Problems*

proactive person is thought to be the most ideal form of manager in 1999. In the original 1974 Ackoff model, the proactive person was thought to be far too compliant and complacent. He depicted proactivists as closely tied to prediction and control strategies, and unwilling to tap into the significant potentials in redesigning and reinventing improved futures. Proactive choices, as defined by the author of the concept, were intrinsically linked to and limited by time.

An interesting question is why, in the later 1990s, does management embrace part of the Ackoff model but only first three-fourths of it? In a context of there being many possibilities for future development, due to technological (internet) and managerial changes (decentralization of control), it seems that the interactive posture is now much more appropriate and viable. It provides great potential for improved project management. There are many additional impediments to learning that need to be considered. Three examples are.

1. Comfort can get in the way of learning. Being comfortable has often been an impediment to learning. When we accept the status quo we are no longer very motivated to change it or prepare ourselves to deal with unexpected change in the future.
2. Client beliefs can impede learning. Clients are not always right. It has become fashionable to say that a decision depends on the client but this in fact has become an easy way out of a situation that demands more of the project manager. Often a client does not know what to do. That is sometimes why a project is launched in the first place, and why it must be innovative.
3. Profit is seldom complementary to learning. Profit is not the most important aspect of a project. Assuming that a project is set up to accomplish some improvement, in not profit the objective of the project, but a reward for accomplishing it. This is a critical distinction. The idea that we are out to make a profit is often used for ignoring learning, research and development activities.

Information about these and other impediments to learning was gained from a study project done at the Stockholm School of Economics under the title of Conditions of Success (Hawk 1992). It involved 60 international project-based firms and is outlined in the following section.

## Examples of Project Learning from the Conditions of Success Study

A major international management study, titled "Conditions of Success," was carried out by Hawk (1992) during the period from 9/89 - 6/92. It was set up to help the participants better understand what their world would be like at the end of the century, and how best to locate themselves and their companies within it. The work was funded and directed by the participating companies, which included 60 major international firms from seven countries: England, Finland, France, Germany, Japan, Sweden and the United States. Eighteen of the world's largest construction firms participated, as did several large engineering, design, component manufacturing, materials and financial organizations. A few major clients were also involved. The essence of the project was an action research venture to help participants learn how best to internationalize as they studied what it meant for their industry. Incorporating learning came to be an important subject in the study.

The study was of company internationalization in an industry organized around project business. The industry had been slow to consider the consequences of globalizing its business methods and operations. The participating companies defined their industry as one that provided building, water, energy and information infrastructures so as to support the activities of other industries.

The study began with a presumption that no human activity is successful, or unsuccessful, in abstraction. Success factors depended upon the relationship of an act to a set of conditions within which the act is carried out. The complexities increase as the conditions change, which generates new acts, and leads to new relationships, which in turn can generate new conditions. Surviving in this environment requires continuous learning, where learning is different than the process of continuing education.

One example from the study centered on the practice of construction management (CM), as it began in the 1970s, as a form of project management. For some applications CM was the right approach, while for others it was distinctly wrong. The complexity was that any use of CM, right or wrong, could lead to changes in context. This meant that CM success in the short term depended on the conditions where it was applied, yet over the longer term a minor or even wrong application of CM could then spread to generate new conditions where CM was highly successful. An example of this is outlined in the following.

A large Swedish construction firm, participating in the study, argued that construction management might sometimes be helpful, but that it shouldn't be allowed in Sweden. "In Sweden only general contracting should be allowed." CM, as it was used in the project, refers to the principle where a contractor has a very different relationship to a client. They take responsibility for a project in the form managing the work of sub-contractors to achieve a fixed price delivery of set objectives. General contracting, in the Swedish context of the time involved having legions of internally employed workers carrying out a cost-plus or related

scheme. Risk and responsibility management were handled very different in the two approaches. This situation of this major firm being fervently against CM was especially interesting to the other participants in the study, since outside of Sweden the same firm had switched to only doing contracts via the CM process. Participants were interested as to why the difference?

The answer came from understanding the conditions of national and industrial structure, and how income was accrued in the Swedish construction industry at the time. The firm could, at least for a few years beyond the study, resist the obvious conclusions that construction management was a good idea for clients although it would create new challenges for construction in Sweden. As long as they could control the national context, and keep the advantages of general construction, they would. They could not do this internationally. In other countries they did not have the control option and had to be more adaptive. Over the next five years they developed a very high form of CM in non-Swedish projects; i.e., they learned a great deal. The same firm is now much more successful in their international work than the work they do in Sweden. Officers in this company recently discussed this "lag in learning" in their home context, and the long-term price they had paid for short-term risk reduction at home. They are thankful for their international operations. This illustrates a clear difference between the educated knowledge of what to do at home and learning that had to be done to meet new challenges and risks abroad.

The study focused on the issue of learning at the level of the executives that participated in it. This was to set the stage for learning within their companies and their industry. The study was structured around concepts of product development, since most other industries had already internationalized via these concepts and thus a great deal was known about what worked and what didn't, but these were brought down to helping to manage projects. In this framework the study worked to identify the best information, knowledge and need for learning over the next decade. A hint of this can be seen in what the industry felt to be the most promising business development ideas over the next decade. This was then used for the industry to identify its main research priorities during the same period. Finally, this was seen in light of the critical factors to applying or not-applying the new knowledge that had been gained. This collection of information was then to be used as a basis for learning. The stream of the inquiry is indicated by the conclusions outlined in Figures 3-5.

In the figures, the information is arrayed in terms of national clusters, pointing to differences and similarities between countries. This was because the individual company responses needed to be kept confidential and thus grouping them with others from their own nation made them opaque yet provided rich information with which each could ascertain where they stood.

Figures 3, 4 and 5 offer some results from information generated in the study. The three charts focus on the learning aspect of organizational and industrial development as it was defined within the study. The numbers represent composite scores for all studied companies from each of the seven countries. They were combined to mask their individual identities, while presenting a national perspective towards the various topics being studied.

The numbers represent the priorities of each category. Number one is the highest priority and number seven is the lowest. The dash line means that the topic, while proposed by the composite group, was not under active consideration by country group. The category of "other" refers to something a national set of firms was looking at, although it had not been included in the formal list from the composite industry.

For example, "lateral thinking" was thought to be the most promising business idea for the UK and US firms, and "decentralization" was the least promising area for future business development of UK firms. Meanwhile, Swedish firms were looking into "other." The figures point to individual and organizational learning as critical to successful internationalization of the industry studied. There was a consensus that the "industry" would need to help the companies and their people move beyond formal education and towards "learn to learn."

> *"Construction firms traditionally would hire people with a moderate education, depending on where they were to be placed in the value-adding stream, and count on those people to function reasonably well in a relatively stable environment. The environment now changes too rapidly for this tradition. Employees need to enter with higher degrees of training and need to have access to a continual learning system while on the job. Some firms do this with internal corporate programs. Others rely on continuing education in outside institutions. Most do neither. It is imperative that a learning system be an integral part of the industry and its companies. The industry will need to have a system that rivals what is found in advanced technology industries. Therefore, learning to learn is a critical attribute of future firms in the industry."(Hawk, 1992, p. 10)*

## Implications from Conditions of Success

The results suggest a number of implications. A most general one was that a firm's internal "radical" thinking, which they had tried to keep secret, was in fact widely known and even appreciated in the larger industry. Once this was discovered, the problem shifted from secrecy to one of how to develop a collective basis for high-level, mutual and individual learning. They soon found that there was much that they could do to help each other while not interfering with individual rights to pursue a "competitive advantage." A small group even proposed shifting from competing against each other, and move to learning how to jointly compete against industry-wide ignorance. To successfully operate in the global conditions of this industry firms felt they must find new ways to learn new things. They moved to reach this in ways that included questioning existing practices and developing fluid approaches to embracing risk. One conclusion in this regard was that "globalization is happening, and learning is critical to successful participation in the dynamics of the process, but participation is not for all firms."

The essence of Figure 3 is that the majority of the firms were looking to areas for learning as the most promising basis for future business during the next decade. "Intelligent systems" and "lateral thinking" were seen as the most fruitful areas. The more pragmatic concerns of possible business development opportunities, e.g., "developing leisure-

| | Leisure-time facilities | Creating Owners | Intelligent Systems | Environmental Concerns | Decentralization | Lateral Thinking | Other |
|---|---|---|---|---|---|---|---|
| American | - | 5 | 2 | 3 | 4 | 1 | 6 |
| English | 3 | 2 | 4 | 5 | 6 | 1 | - |
| Finnish | 5 | - | 1 | 3 | 6 | 2 | 4 |
| French | - | 5 | 1 | 2 | 4 | 3 | 6 |
| German | - | 5 | 4 | 1 | 2 | 6 | 3 |
| Japanese | 4 | 5 | 1 | 3 | 6 | 2 | 7 |
| Swedish | 7 | 5 | 4 | 6 | 1 | 3 | 2 |

*Figure 3. Most Promising Business Ideas for Next 10 Years*

| | New Materials Development | Old Materials Development | Building Production Technologies | Building Operations Technologies | Management Information Systems | Environmental Technologies | Other |
|---|---|---|---|---|---|---|---|
| American | 5 | 6 | 1 | 3 | 2 | 4 | 7 |
| English | 6 | 5 | 4 | 1 | 2 | 3 | - |
| Finnish | 4 | 5 | 1 | 3 | 2 | 6 | 7 |
| French | 6 | 5 | 3 | 1 | 2 | 4 | 7 |
| German | 7 | 5 | 3 | 6 | 4 | 1 | 2 |
| Japanese | 2 | 7 | 3 | 4 | 5 | 6 | 1 |
| Swedish | - | 3 | 5 | 6 | 1 | 4 | 2 |

*Figure 4. Research Priorities for Next 10 Years*

| | Organizational Communication | Organizational Synergy | Knowing Customers | Cost-Benefit Analysis | Management Systems | Perception of Difficulty | Other |
|---|---|---|---|---|---|---|---|
| American | 4 | 2 | 3 | 1 | 5 | 6 | - |
| English | 2 | - | 3 | 1 | 4 | 5 | - |
| Finnish | 2 | 1 | - | 3 | 4 | 5 | - |
| French | 3 | 4 | 2 | - | 1 | 5 | 6 |
| German | - | 5 | 4 | 3 | 6 | 1 | 2 |
| Japanese | 4 | 2 | 1 | - | 5 | 3 | 6 |
| Swedish | 1 | - | 5 | 3 | 2 | 4 | 6 |

*Figure 5. Impediments to Applying R&D Knowledge*

time facilities," that were initially assumed to be the "best" targets, ended up with a very low priority. Only the Swedish firms differed and felt that future business development would first need organizational restructuring via "decentralization," prior to focusing concern on learning. The second priority for Swedish firms', noted as "other," was development of future business by moving into creating "industrial learning environments" for customers.

The essence of Figure 4 is that the research priorities in most of firms were directed at topics that required significant learning. At the time of the beginning of the study management information systems were defined to include information and communications technology, knowledge management systems, and training of personnel in all of the above. For most of the firms, the area became a very high priority for research investments. The exceptions were German firms, that were going to concentrate on environmental concerns, and Japanese firms, that were going to concentrate on intelligent technologies, that they wanted to define in a way that did not fit with the larger group.

The essence of Figure 5 illustrates what firms felt to be the largest impediments to their being able to apply what is learned in research. It is important to note that there is no clear pattern in the responses. This is very interesting in that the impediments to learning seem not to be industry-wide. They instead appear to be culture-based. As the figure illustrates, the reasons for not implementing an improved practice can include almost anything. The reasons come from what was previously called the non-rational domain. Knowing this often elicits a response that we should thus ignore them. This is dangerous. These impediments in fact can be seen as "culturally-based" and can thus be effectively dealt with on their own terms. Learning is important to this. Several companies ended up setting up or modifying their own R&D and learning centers after the research to help employees better deal with future contingencies. In some instances these complemented their prior educational centers, and in other instances they replaced them. Many participating firms have since worked out joint ventures, mergers and acquisitions with each other to better share mutual resources.

In addition, the participants learned a great deal about the variety of attitude and skill types that were needed in a successful project. The following is an abstraction of this work as it comes from the study. It points to four different kinds of people that are commonly found in a project. At first glance most would argue for one or two of these as most critical to a project's success. In fact, due to the divergence of belief between the companies, as to which type was the best to hire, it was decided that all were valuable. What was instead needed was a more sophisticated management model that could include variety, so as too best meet the objectives of a project, instead of current emphasis on one type of person.

Careful consideration of each illustrates that it offers a unique set of attributes, but emphasizing any one in isolation becomes dangerous to the firm and the project. Learning is different for each, but mutual learning helps all. This is similar to the problem posed in the Ackoff model in Figure 2, where a focus on the assumed advantages of the proactivist project manager can turn out to be as large of an obstacle as were the known limitations of the reactivist and inactivist attitudes. How to manage their interactions is more important to success than selection of a preference.

**I. Strategist** - Knows, but doesn't implement. Currently the most sought after type of project manager. In practice perhaps the greatest problem for longer-term project management. This person's actions eventually come to illustrate why successful strategy is always deceit, but that deceit is eventually counter-productive. Also illustrates how learning to uncover deceit becomes learning to deceive at a higher level.

**II. Servant** - Knows, and does, in predictable, dependable style. This is the individual that tries to be as dutiful as possible in carrying out the assigned tasks. Hired with the presumption that he knows how to do certain tasks very well, and will carry them out to the best of his ability with limited management. Little management is needed, except instructions. This person is generally not expected to learn, and doesn't. Seen as a tremendous short-term asset but becomes a longer-term liability.

**III. Innocent** - Doesn't know, and doesn't do. Seemingly a problem but in fact can be a valuable resource to successful project management. Can become a learning benchmark.

**IV. Inventor** - Doesn't know, yet works to invent ways to do. This individual, when challenged by not knowing, finds a way out. Some expense, and risk, is involved but depending on the circumstances the cost can be worth the effort. In each industry there is a presumption that internal development takes place via these people. When noticed, they are often removed from project work and placed in R&D. This is not a good use of their capabilities. Little management is needed or helpful to these people. This individual manifests the essence of one aspect of learning, but needs to be with the other types.

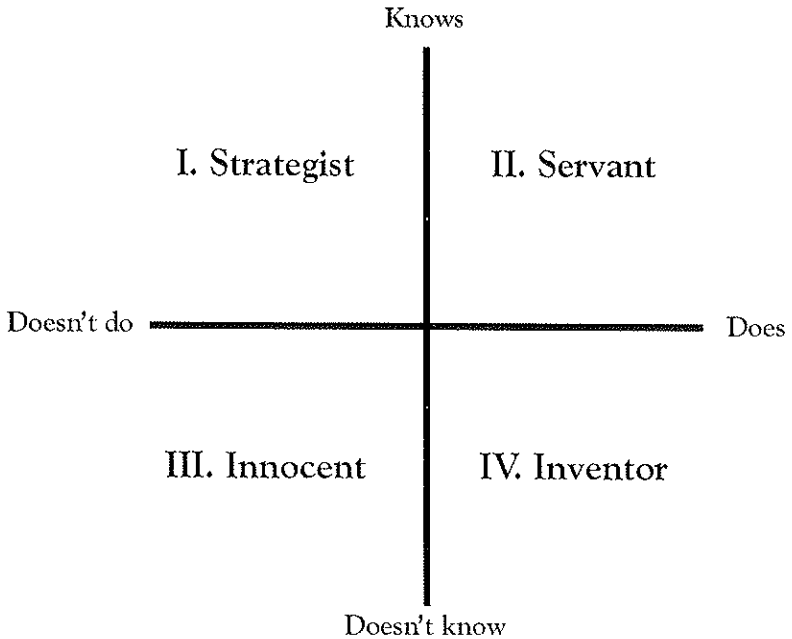


*Figure 6. A Constellation of Project Participants*

## Conclusions

Learning is clearly a necessary feature to any forward-looking project-oriented organization. Being a vehicle of change, it can help to mobilize an organization's people to work together by giving them renewed purpose, yet being able to accommodate wide differences. To do both learning needs a common framework for organizing innovation as well as the differences that innovation encourages. We presented a model of learning in this article that focused on the importance of questioning and criticizing business as usual. Through continually challenging the usual, best practices are strengthened and worst practices can be improved or replaced. On the other hand, this is not an easy process. Serious impediments stand in the way of attempts to improve via questioning the practices and norms of current operations.

Conceptions of learning can be impediments. One of these is where learning is too closely associated with the limits of traditional classroom events and the weaknesses of the formal educational process. Resources for learning can also form impediments. Inputs such as data, information and knowledge can become rigidly structured in an organization or project. Project learning, as it was presented here, needs to be associated with much more dynamic inputs and processes. In this way learning is more consistent with the needs of managing projects are continually unique and constantly changing. Even the widely accepted concept of time, where dreams about past, present and future events become sanctuaries from efforts of genuine problem-solving, can stand in the way of learning. A framework for interactive problem-solving, as distinct from its more popular proactive form was introduced. Via inter-personal interaction, e.g., using internet-based real-time systems, time is no longer the central issue, as either an asset or a limitation.

A study of 60 project-based companies demonstrates the above points and points to the growing importance of learning as an asset to leading firms. This is due to the growing complexity of projects and project-based firms, and their need to invent ways to operate in an increasingly complex international

environment. The Conditions of Success study, and other referenced works, illustrate that learning occurs most clearly when experiences gained from working are evaluation at higher levels of abstraction. In this way practice can be better understood, and improved practices initiated. This best takes place in an environment of self-regulation that fosters decentralization. The innovative aspects of knowledge intensive project organizations are thus encouraged.

The article introduced learning at a company organization level, that is above projects, but the focus began and ended with individual learning at the project manager level. In the end, these are the individuals who will conduct the strategic forward-looking activities in a company that will promote organizational learning. This takes place in terms of the resources known as data, information, knowledge, and wisdom. Traditional modes of education, as related to traditional conceptions of data, information and knowledge, while emphasizing their separations, are obstacles to wisdom-seeking, innovative, creative solutions. This is while learning often requires unlearning what is known. Wisdom is the most difficult yet attractive. It appears to involve learning but learning that is neither hierarchical nor cumulative.

Finally, the article presents a constellation of personality types that appear in virtually all projects. Project managers, and those they manage, can be categorized as strategists, servants, innocents or inventors. The essence of learning presented in this article is to find ways to accommodate and integrate all four, plus more, and not allow any one to either be excluded or given sole authority over a situation. Letting a personality type, or a narrowly defined specialty, assume emphasis in a situation is to restrict that situation to limited improvement, or serious problems. Just now it is popular to manage people as strategic resources that know, but we feel it is more rewarding to instead find innovative ways to manage resources to help people learn to learn.

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