Lessons Learned About Lessons Learned

Jerry Wellman, Honeywell International

Abstract

Organizations capture and deploy what they have learned in one of four ways: *Culture, Old Pros, Archives, and Processes.* This paper describes the four approaches, their strengths and shortcomings, and their interactions. Along the way, it offers guidance and perspective to assist a management team striving to build more effective organizational learning competence.

Lessons Learned About Lessons Learned

"If only TI knew what TI knows," said Jerry Junkins, former Chairman, President, and CEO of Texas Instruments. "I wish we knew what we know at HP," echoed Lew Platt, past Chairman of Hewlett-Packard (O'Dell & Grayson, 1998, p. 3). These concerns reveal that capturing, retaining, and applying organizational learning continues to be a daunting challenge.

Consider the following example. Executives at an aerospace business were dissatisfied that their organization continued to face recurring issues with the design and build of test equipment. The test equipment too often was delivered late, did not sufficiently test the product, or significantly overran the original cost estimates. Problems persisted in spite of increased management focus, more conservative estimating ground rules, and the change of a few key personnel. A team assigned to identify root causes discovered during the course of its investigation that fourteen years ago another team documented many of the very same problems. The earlier team had made specific recommendations that clearly had never been implemented.

The executive concerns and example above pose the same questions: Just how do organizations recognize and capture the valuable lessons they learn? How are those lessons retrieved when needed? Do some old and now irrelevant or disruptive lessons learned still linger within the organization long after they are useful? Or has their usefulness been overlooked? In short, just what lessons have we learned about "lessons learned"?

My answers to these questions have developed from two distinct but related practices of learning and understanding. First, I have enjoyed over thirty years of experience working in the aerospace industry as an engineer, project manager, functional manager, and general manager. Serving Honeywell International during those years, my responsibilities have required that I interact closely with inter- and intra- company engineering development teams. Some of these teams collaborated on a variety of major projects which included the International Space Station, the Iridium satellite constellations, aircraft navigation simulators, and world-wide communications networks. From the breadth of my participation, I developed an understanding of organizational evolution and participant behavior of dozens of business units across the industry.

Complementing this exposure is an eclectic educational background, which includes a degree in electrical engineering, an MBA, a Masters in Human Organization Development (HOD), and a PhD in Human and Organizational Systems (HOS). Both my HOD and HOS research focused on leadership and culture in complex organizations. During the course of my research, I referred to *The Structuring of Organizations* (Mintzberg, 1979) in which the author describes complex organizations as those which deal with "sophisticated innovation, the kind required of a space agency, an avant-garde film company, a factory manufacturing complex prototypes, or an integrated petrochemical company...one that is able to fuse experts drawn from different disciplines into smoothly functioning ad hoc project teams" (p.432). Reflecting on this construct, I have been privileged to serve across the "twin helix" of theoretical and practical organizational learning, enabling my ongoing engagement in both the business and academic environments to foster an integrated perspective. Although the literature on

knowledge management, information systems, and organizational culture tended to compartmentalize concepts and constructs, I discovered that my work environment continually drove me to understand that real world challenges could best be approached and met with a deep understanding of the interactions among those concepts and constructs. It is my first hand experience and belief that cross-discipline dimensions are far more influential and powerful than those which remain in silos. This paper, then, offers an organizational learning model rooted in this cross-discipline perspective.

It is critical that organizations learn to capture business improvement lessons for several reasons. First, the capacity to learn and apply learning is rapidly becoming one of few truly sustainable competitive advantages. Technology changes rapidly and markets are becoming more globally competitive. As a result organizations must very quickly recognize, adapt to, and take advantage of new learning before competitors do so. The most adept learners respond faster and, as a result, keep a competitive advantage while the less adept learners continue to fall behind. Second, learning is an asset not unlike intellectual property, capital investment, or a skilled workforce. Organizations that best use their assets prosper while others fall behind. Third, an effective learning organization is a central element in a healthy organizational gestalt. Learning effectiveness breeds a sense of organizational optimism about the future, the ability to deal with adversity, and a healthy willingness to take advantage of calculated risks.

Methods of Capturing Organizational Knowledge

My experience with complex organizations and challenging projects has led me to conclude that organizations capture business improvement lessons by implementing one of four methods or approaches. Each method has unique attributes, and each influences the other to some extent. I have assigned each method a name that lends an understanding of how it serves to capture organizational knowledge. These four methods are *Culture, Old Pros, Archives, and Processes*. Culture is that set of behaviors and operating principles that nearly everyone knows, but which are not written. These social norms and behaviors sometimes capture within them the lessons repeatedly learned by the organization. Nearly all large organizations have a cadre of Old Pros, those who have been around long enough to amass a great deal of experience about an organization and its products, processes, environment, and capabilities. Organizations that become aware that valuable lessons have been overlooked often become frustrated and compensate by using Archives to capture and retrieve what they have learned. Formal Processes, when appropriately managed, can serve as both a repository and a disseminator of lessons learned. At least one, and likely several of these methods are almost certainly present and very active in every organization. The challenge is to recognize, understand, and effectively manage them.

Knowledge within an organization, in this case, the lessons it has learned, may be either explicit or tacit. Explicit learning is relatively easy to identify, store, and retrieve. For example, once we learn the temperature at which a particular solution freezes, or the number of cycles a machine can operate before it must be recalibrated, or the clean room requirements for integrated circuit manufacturing, that learning can be relatively easily documented, retrieved, and applied. Tacit knowledge, on the other hand, is relatively harder to recognize, capture, or apply. Polanyi (1967), who coined the phrase "tacit knowing", asserted that "We can know more than we can tell" (p. 4). According to Polanyi, "We recognize the moods of the human face, without being able to tell, except quite vaguely, by what signs we know it" (p. 4). Leonard and Sensiper (1998) tell us that tacit knowledge is "semiconscious and unconscious knowledge held in peoples' heads and bodies" (p. 114). The former can be readily handled with information technologies while the later is often much too subtle to be readily handled with those technologies. Although tacit knowledge is the most difficult to recognize and handle, it is often the tacit knowledge that leads to significant breakthroughs.

It is important to distinguish between "process" and "Process". The word process refers in everyday language to a specific sequence of organizational actions or steps to accomplish an outcome. Examples include the sequence of steps by which a purchase order is approved or through which an office computer is replaced. On the other hand, Process is used here to refer to a broader organizational perspective, a construct intended to signal an organizational bias toward being intimately aware of how work gets done and consciously controlling it.

Culture, Old Pros, Archives, and Processes methods are different in their ability to respond to tacit versus explicit learning. Organizations that understand such differences tend to be better learners than organizations that do not understand them.

Culture

Culture is not so much a receptacle for lessons learned as it is a receptacle and disseminator of how the organization has chosen to react in the future to what it has experienced in the past. In effect, the reactive behavior is captured and applied but the underlying context and rationale for the behavior is lost. Thus, there is little ability to recognize when the behavior should not apply and the lack of context for the behavior means there is no basis from which to adapt the behavior to future situations.

For example, I once worked as a subcontractor to a major corporation doing a great deal of business directly with

the United States government. All government contractors must maintain a subcontractor and material procurement (S&MP) system that meets specific government criteria to assure fairness to suppliers, equal opportunity for small and disadvantaged businesses, and the best price to the government. When this contractor's system was found to be unacceptable by the government, it was decertified, and the contractor was unable to bid on government contracts until its system was revised and formally recertified. In the meantime, several strategically important opportunities were missed or jeopardized because of the inability to submit bids for work. The company took dramatic steps to make its S&MP organization powerful and relatively independent from other parts of the business in order to assure that none of the specifically identified problems recurred. Since then, over a decade has passed. Today, subcontractor teams working for the organization and program teams within the organization struggle to cope with difficult relationships with an S&MP organization that views itself to have a legal and compliance mandate with little regard for specific program or project needs. The conflict enhances the likelihood the organization's system will remain compliant while reducing the likelihood a project will be done efficiently. The contractor's trauma of decertification is now embedded in its organizational DNA, and its consequences are visible.

Culture determines how suppliers and subcontractors are treated, renders the organization less flexible and agile, and even impedes its ability to give the government the best value solution although its S&MP system has been deemed satisfactory. Today, fewer than a dozen of the tens of thousands of employees in that company have any idea why the S&MP department policies, practices, and attitudes are as they are, and, understandably, complain about them.

Culture has several attributes that make it very difficult to manage. First, it is mysterious. The reasons for a particular cultural norm may be lost in organizational antiquity. The behavior may have arisen when the organization was doing a different type of business, had an entirely different leadership personality, or was faced with a series of challenges that have not existed for years. Second, Culture is viscous. It is difficult and time consuming to embed lessons learned in the Culture, sometimes taking years of persistence. Third, Culture often has embedded in it lessons learned that are no longer true. As a result, the organization is likely applying lessons learned without even recognizing precisely what they are, and thus without the ability to disregard or adapt them where and when appropriate. As Will Rogers reminds us, "It isn't what you don't know that will hurt you; it's what you do know that isn't true." Fourth, Culture is pervasive. It is reinforced by the interaction of subtle and seemingly trivial policies, procedures, and processes woven into the fabric of everyday activity.

While an understanding of the management of organizational Culture is well beyond the scope of this paper, several suggestions for addressing the organizational learning dimension are offered here. First, senior leadership must acknowledge the existence and influence of Culture and its role within the organization. When people are able to speak of the strength and weaknesses of organizational behavior, they become more attuned to just how Culture affects their own activity and performance. Then it becomes less mysterious and more malleable. Second, senior leadership must have a very clear, holistic, and persistent vision of the Culture and of any changes to be made. Leadership teams must communicate clearly what must be changed and why. They must acknowledge the difficulty in making change. They must persist in the vision for change until the Culture has adapted. Third, senior leadership must consciously manage Culture. Helpful tools and techniques may include periodic organizational health assessments, correlation of those assessments with customer and supplier perceptions, and correlation with employee surveys. Brown and Duguid (1998) note that a study of interorganizational work done by Kreiner and Schultz (no date available) suggests that "the tendency of knowledge to spread easily reflect not suitable technology, but suitable social contexts" (p. 102). This corroborates my own experience.

Old Pros

Most businesses have one or more Old Pros around. These Old Pros have learned many personal and organizational lessons that are critical to organizational success. They have stored in their memories many years of experience that is not available anywhere else. However, capturing and storing the organizations lessons learned from Old Pros can create as many problems as it solves. First, Old Pros are not always available when and where they are needed. We can only capture and apply the lessons stored in Frank's brain when Frank is directly engaged in the specific problem that requires his knowledge. Second, we may not recognize we need a particular Old Pro. The technician currently applying lubricants may not recognize the difference in lubricant characteristics. Even if someone recognizes the odd lubricant sheen, that individual may not know that Frank, who now works in customer service, has years of knowledge about lubricants and would immediately understand the meaning of that unusual sheen. This illustrates that lessons learned are often not applied because the situation-knowledge connection is never made. Third, the Old Pros often do not consciously recognize the lessons they have learned or when they are being applied. Their stored knowledge may only emerge when they happen to come across a specific set of circumstances that evoke some subconscious connection with a past experience. Since no one, not even the individual him or herself,

knows just what lessons are stored in his or her brain, those lessons are of only accidental use to the organization. Fourth, Old Pros retire. When Frank decides to spend more time with his grandchildren, he leaves with decades of precious lessons learned that will no longer be available to the business.

Old Pros are a fact of organizational life. Astute managers must appreciate their strengths and weaknesses and facilitate their effectiveness across the organization. Leaders may officially recognize Old Pros and give them a place in the organizational structure. They may be given a title such as "engineering fellow" reporting to a senior executive with discretion to assign them to tasks and projects where their experience is potentially most relevant. Such an approach accomplishes three important outcomes: First, it communicates to the organization the value of Old Pros and the value of their experience to the business. Second, it empowers Old Pros to work across different parts of the organization, increasing their overall experience as well as their overall utilization. Finally, Old Pros can be assigned where they are able to have the most beneficial organizational impact.

Senior leaders may also elect to invest in gathering organizational wisdom through the use of Old Pros. These experienced employees may be used to facilitate lessons learned workshops at the end of major activities. Those involved in the activity can share their experiences with one another and with outsiders. As a result, the lessons learned are identified, codified, and embedded in the collective memories of the participants. Thus, Old Pros themselves become wiser while other individuals have also captured the knowledge, lessening the dependence on a very few Old Pros. For example, the U.S. Army conducts After Action Reviews (AARs), exercises that involve "an examination of what was supposed to happen in a mission or action, what actually happened, why there was a difference between the two, and what can be learned from the disparities" (Davenport & Prusak, 1998, p. 9).

Management must recognize that Old Pros are operating in the organization, whether or not they are acknowledged and managed, and that they are a valuable asset that must be appreciated and facilitated. Employees will acknowledge them, seek them, anoint them, and respond to them. Management's failure to do the same minimizes their effectiveness and weakens the ability to apply lessons learned.

Archives

Archives typically first emerge as a result of management frustration. Some senior executive may become upset that the organization seems to have repeated a preventable mistake, costing a lot of money, and upsetting a customer. That executive may then decide to capture, store, and retrieve lessons learned to prevent such a recurrence. But such Archives are too often inadequately maintained and soon fall into disuse. Over the last decade the maturation of databases and search engines offers hope that more powerful computing capability will enable us to more effectively store and retrieve lessons learned. To date, there has been little sustained success to turn that hope into reality. The National Aeronautics and Space Administration (NASA) has attempted to deploy effective lessons learned systems over several years. Members of the Earth Observing System (EOS) Program Office at the Goddard Space Flight Center conducted a one-year experiment to improve the lessons learned process. That experiment emphasized two automated information retrieval systems, the Reusable Experience with Case-Based Reasoning for Automating Lessons Learned (RECALL) and the Lessons Learned Information System (LLIS). Their experience concluded that there was limited sharing across different projects, it was difficult to retrieve the "right" lessons at the "right" time, and there was a reluctance to share negative lessons. They cited cultural history and management practices as specific barriers to learning, including such cultural phenomena as "silo" thinking within areas, the value of personal technical expertise over knowledge sharing, and over-reliance on explicit rather than tacit information. (Goddard Space Flight Center, 2003).

My experiences have enabled me to witness half-dozen attempts to deploy Archives. Yet, only two were ever actually deployed, and both systems fell into disuse within two years. The reasons have little to do with the tools that were deployed, and more to do with complex human interactions when lessons are entered into a system, and again when they are retrieved and interpreted. The root cause is often grounded in the fact that such systems and tools are inherently incapable of dealing with tacit knowledge. The effort to reduce tacit knowledge to something compatible with the tools nearly always skews the knowledge and separates it from its vital context. The following are typical barriers to addressing tacit lessons learned.

First, it is a challenge to determine whose lessons should be archived. We each have a different personal rationalization for the experiences we live through. We interpret events, relationship, and causation subjectively, not objectively. Our individual past experiences, our individual world views about how life works, our personal objectives, and our emotional state all interact so that we form entirely different conclusions about just what lessons were learned from a particular experience. Thus, we each come away from an experience having learned different lessons. This dilemma raises several questions. Who decides just what lessons learned should be archived? Can, or should, all perspectives be archived? Will such information be useful or confusing when it is retrieved?

Do the relative power positions of the individuals involved impact what lessons are archived? Is the consensus of the lessons learned worthy of being archived or merely a result of the relative power of those involved? These questions suggest why it is so difficult to determine just what lessons should be archived.

Second, learning is often not accurately captured. Assume for a moment that there is a clear consensus about just what lesson was learned from an experience. Now someone is faced with the dilemma of choosing the specific words and data to capture that learning. The perspective of the archive author colors the learning. Will that author include enough information, background, and perspective to tell the story accurately, completely, or clearly?

Third, the context relevant to the learning is too often captured incompletely, inaccurately, or not at all. The organization may be far more competent today than it was yesterday when the learning event occurred. Perhaps more skilled employees are now employed. Perhaps processes have been improved and are monitored more closely. Thus the lessons learned may no longer apply. An incomplete, inaccurate, or missing context description creates a real risk of misapplication of the lessons learned.

Fourth, lessons learned often change as time passes. What today seems mundane may turn out to have been a critical event or decision. What today seems tragic or wonderful may turn out to have had very little impact on the business. This leaves the question of how to determine the appropriate time to capture our perspective of the lessons learned. Should it be captured immediately after the event, or perhaps six months later? Why not two years later? Quite likely the interpretation of just what lessons were learned may be different at these different points in time. Which is correct?

The lessons learned stored in Archives suffer from another time dimension issue. It has been said that we are all victims of our most recent history. If we just left a project that had major supplier problems we will be sensitive to current supplier issues. If another such issue arises we will perceive a trend and declare the need to capture a lesson learned about supplier management. Thus, too often Archives capture current anxieties rather than lessons learned.

Fifth, lessons learned are often misinterpreted. Recall the challenge of trying to accurately capture a lesson learned in a format that all can agree is accurate and complete. Those retrieving that carefully crafted information and its appropriate context must interpret it. They see the information from their own personal perspective and thus may interpret it differently than intended. They may also misunderstand the documented context. The user may elect to extend the learning to a different context. In every event the learning is at risk of being misinterpreted and misapplied.

Processes

Perhaps the most disciplined and sustainable means of capturing and retrieving lessons learned – and also the most challenging – is Process. To illustrate, let me share an experience during which I led a team in the mid 1980s tasked to design a computer chip set for a series of military satellites. At the time, an individual integrated circuit chip would contain no more than 100,000 gates. My team planned to have a successful design after three design cycles, which we anticipated would take three years to complete. The team included a few senior staff engineers, Old Pros, with two to three decades of experience. Ten years later, in the mid 1990s, a similar team was able to design up to a 1,000,000 gate device in one or two attempts, completing its work in approximately 18 months. Noteworthy is that the design team from the 1990s had an average of 10 years less experience than their predecessors in the 1980s. Today, a 6,000,000 gate device can be designed in about 12 months, with a 75% probability of first time success – and the team might have an average of only two to three years design experience.

Such dramatic improvements in circuit density, design quality, and cycle-time have been accomplished in part because of the improvements in tools and in part because of improvements in design and fabrication processes. These designs were created through the use of sophisticated computer programs, design databases, and carefully controlled processes. Design teams around the world were using the tools and processes over and over again, discovering good practices and bad, finding useful shortcuts, and building on what was learned in the past. The tools and processes were improved over and over again, enabling dramatic improvement in performance in only a decade or so.

The knowledge possessed by Old Pros and stored in Archives during the 1980s now resides within the processes ground rules, constraints, standards, etc. that in essence, captures those lessons learned and requires the designers to use them as a part of the task itself.

Davenport and Prusak (1998) contend "the knowledge management process has to be 'baked' into key knowledge work processes. How companies create, gather, store, share, and apply knowledge must blend well with how market researchers, scientists, consultants, engineers, and managers work on a daily basis" (p. xi). The illustration above provides one strong example of their argument.

Why is Process such a powerful organizational learning competence? First, like Culture it is a part of everyday

work, making the knowledge captured available at all times. For example, an integrated circuit designer cannot accomplish a task without using the specific tools and processes provided because the work is just too complex to do otherwise. Another example is a technician who may find it much easier and faster to align and calibrate a piece of equipment using a specific process because it enables the use of specific tools and techniques that make the job faster, easier, and more accurate. In each case the process enables task performance. Thus, any knowledge stored within it is continually available – virtually unavoidable – every time the task is accomplished.

Second, Process knowledge is perpetually monitored and controlled. It has assigned owners responsible for the integrity, efficiency, and currency of each process. This individual or department has a continual and formal interest in keeping it healthy. That interest extends to ensuring and assuring that the knowledge captured is accurate, relevant, and used.

Third, Process knowledge is more easily pruned and expanded than the knowledge contained within the Culture, Old Pros, or Archives. As organizational strategy, technology, and competitive environment change, so do the processes and process interactions within the organization. People continually work with process flow maps, process performance, and process improvement. As a result, they are more adept at managing Process than they are at managing Culture. Process benefits from an array of process management tools that are reintroduced to the workforce every decade or so , but significantly fewer and less mature tools or training exists to help with the management of Culture.

Nevertheless, the successful management of Process knowledge is challenging. The senior leadership team must adopt and extol a Process business perspective. Leaders who understand and communicate openly about the critical organizational processes and their interactions will empower others to adopt a similar perspective. Over time the organization will develop a Process maturity that will open the door to effectively managing the knowledge in the various processes.

Putting Them Together

All four means of capturing and codifying organizational learning are simplifications of complex, aggregated organizational interactions. As explained, unacknowledged Process may be viewed as Culture, and Culture influences how the organization may choose to understand its processes. For example, organizations with a strong production heritage may tend to see themselves as organized around a linear flow with one specific process leading to another, while organizations with a less repetitive work discipline (consulting, product development, or large scale construction) may more readily see themselves organized around parallel and interactive activities. A Culture that encourages cooperation and shared goals among functional groups may see processes that exist across functional boundaries while a Culture that encourages or enables fiefdoms will likely see processes that exist primarily within each functional organization. The former will more likely acknowledge and address the interaction between processes while the latter will be apt to define the processes with few and specific interactions. Thus, Culture shapes the Process potential of an organization.

Culture and Old Pros also interact strongly. An organization that respects individual achievers may more effectively use its aggressive Old Pros and tend to isolate its less aggressive ones. As a result the organization limits its ability to use valuable lessons learned captured in the minds of more timid employees. On the other hand, an organization that values knowledge and contribution over personality may make better use of its entire Old Pro population.

Archives and Culture interact as well. Archives are less likely to succeed in organizations that value individual achievers because they tend to discount the wisdom stored in those archival systems. Cultures that have a more orderly worldview tend to embrace the notion of Archives and are more likely to say they are successful.

Summary

Every organization is a learning organization, although some are more effective than others. Best-in-class learning organizations appreciate the power, complexity, and challenge of managing all four methods, the Culture, the Old Pros, the Archives, and the Processes that determine just how effectively the organization learns and applies that learning. These organizations embrace the organizational development techniques that shape Culture, make use of Old Pros, deploy Archives appropriately, and successfully master the principles and tools that enable them to perpetually control their ever-evolving Processes.

The constructs described here emerged from my experiences in the aerospace industry, representative of what Mintzberg (1979) calls a "complex" organization. Future studies might investigate how these constructs fit with other complex environments such as the consulting or movie industries. Such studies might also evaluate the fit with non-complex organizations (per Mintzberg's description) such as manufacturing or services.

Endnotes

A gate is an electronic switch that allows or prevents the flow of current in a circuit. As a matter of perspective one might think of the design challenge as follows:

Attempt to draw a vertical line from top to bottom of an 8 1/2"by 11"sheet of paper. Now attempt to draw 1,000 such lines on that sheet of paper without allowing any of the lines to touch. Quite a challenge! Now attempt to draw those 1,000 lines on the edge of the sheet of paper! Now draw those 1,000 lines in intertwined loops and turns, but still without touching one another. That's more or less the challenge faced by the design teams in the 1980s. The challenge has grown more than a 100-fold since then.

Examples include current enthusiasm for Six Sigma and ISO (International Organization for Standardization) 9000/1. Predecessors have included the Baldrige National Quality Program, Total Quality Management, and the"Zero Defects"movement to name a few. Each embodiment included an emphasis on process definition, process mapping, process metrics, process control, and process change.

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Author's Reflection

My background and current role is unlike many of the HR professionals and academics who have contributed to this special edition. My current role is to provide general manager leadership across a 2,000 person business unit of Honeywell's government services business. With over 30 years of experience working in the aerospace industry and an eclectic educational background in electrical engineering, Human Organizational Development (HOD) and Human and Organizational Systems (HOS), I have been privileged to travel across the"twin helix"of theoretical and practical organization learning.

My academic experience was tested in such a complex organization. The business units were executing 75 to 100 individual projects at any one time. Activities ranged from feasibility studies, to technology development, to customer product development, to low rate production. The product offerings ranged from computer chip sets, to electronic boxes, to mechanical assemblies, to software. Project teams were continually dealing with changing customer requirements, cutting edge technology, and conflicting resource requirements. Innovation and adaptation were a normal part of everyday work.

The lessons learned and described in this paper were influenced by my experience as a project manager and later as a business unit general manager. The former exposed me to the challenges of trying to find, and benefit from, the knowledge and experience gained in previous projects—trying to avoid repeating the mistakes of others. The later exposed me to the challenges of building and maintaining an organizational structure and culture that values learning, retains learning, and effectively deploys that learning.

The lessons learned and described in this paper were also influenced by insights I gained through the study of organizational structure (e.g., Mintzberg, Galbraith, and Burns and Stalker), knowledge management (e.g., Davenport, Prusack), information systems (e.g., Stinchecombe and Davenport), and organizational culture (e.g., Barrett, Hall, and Handy).

My on-going engagement with both the business and academic environments fostered an integrating perspective. For example, the literature on knowledge management, information systems, and organizational culture tended toward compartmentalization and separation rather than interaction. But, my work environment continually drove me to understand that the challenges could only be met in the real world through a deep understanding of those interactions – the cross-discipline dimensions were the more influential and powerful ones. This paper offers an organizational learning model rooted in that perspective.

Author's Bio

Jerry Wellman is Vice President of a 2,000 person business unit within Honeywell International. He has 32 years experience as an engineer and a leader in Honeywell's aerospace businesses. He also holds a BSEE, an MBA, a MA in HOD, and a Ph.D. in HOS. Email: jlwell@aol.com