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In this issue:

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Architecting of Learning Organizations: The IS Practitioners' Challenge in Systems Thinking

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Abstract

This paper investigates the architecting of learning organizations in the study of information systems (IS) design. Specifically, we emphasize the role of a suitable organizational context in the development of various information systems supporting the specific requirements of today's organizational dynamics. The paper describes our initiatives in systems thinking to substantiate IS education in terms of expositing the practitioners' challenge to tailor the design of appropriate IS's according to the evolving contexts of human activity systems. To realize the various IS services in a learning organization, whose requirements are increasingly innovated over different organizational scenarios, we stress the importance of identifying the locus of transformation so as to ensure the fulfillment of organizational goals. This is done by presenting our 4-R framework to direct the IS efforts in pursuit of the learning organization ideal, and by discussing the collaboration required of the IS teams to facilitate the incremental transformation into a learning organization through a concerted effort in organizational modeling.

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1. INTRODUCTION

The textbook definition of 'organization' given by (Robbins 1990) states the following: "An organization is a consciously coordinated social entity, with a relatively identifiable boundary, that functions on a relatively continuous basis to achieve a common goal or a set of goals." In this definition, the words "consciously coordinated" imply management. The words "social entity" indicate a composition of people who interact with one another and with the outside world, both individually as well as in groups. The words "relatively identifiable boundary" of the organization serve as a kind of binding in the form of either an explicit or implicit contract among the individual organizational members as well as between these members and the organization. Tellingly, in many of today's organizations, activities and functions are grouped, responsibilities are allocated, and patterns of relationships are specified with a view to achieving some set of aims. Historically, the majority of organizational designs have been hierarchical, intended to permit direction, coordination and control of the activities of most of the members by a few; this design is often captured in the familiar kind of pyramidal organizational chart. Over the years, however, dissatisfaction with some aspects of the way hierarchies function, particularly with how well they are adapted to the environments of today's knowledge economy (OECD 1996), had

led to greater experimentation in organizational structures. The idea of a learning organization (Senge 1990) has emerged in the past decade, with the aim to continuously transform an organization by developing the skills of all her people and by achieving what Chris Argyris (1990) has called double-loop learning. This is the questioning and rebuilding of the organization's existing perspectives, interpretation frameworks, or decision making premises on a daily basis through a continuous process of knowledge creation (Nonaka and Takeuchi 1995; Argyris and Schon 1978). Indeed, such ideas imply some mechanisms, which could transfer learning from individuals to a group, provide for organizational renewal, keep an open attitude to the outside world, and support a commitment to knowledge. The key structural element in these mechanisms is the use of organizational networks, clusters, projects, teams and taskforces, where the underlying assumption is the arrangement among different organizational units, which leverage their separate competencies and capabilities. In this paper, we shall discuss how learning organization as a concept, could be employed to architect an organization in the Internet era, whose context is based on an organic view of organizational transformation, including such aspects as reframing, restructuring, revitalizing, and renewal. The paper will also discuss how systems thinking could be applied to the design of the underlying information systems (IS) from the perspective of socio-technical systems at the various levels of the organization.

2. THE IDEA OF LEARNING ORGANIZATIONS

The idea of *learning organization* was popularized by Peter Senge (1990), in his seminal work *The Fifth Discipline: The Art and Practice of the Learning Organization.* Senge describes a learning organization as a place where people continually expand their capacity to create the results they truly desire, where new and expansive patterns of thinking are nurtured, where collective aspiration is set free, and where people are continually learning how to learn together. At the core of the learning organization are five essential learning disciplines: personal mastery, mental models, shared vision, team learning, and systems thinking, that may be briefly described as follows. Personal mastery has to do with individual learning, and can be seen as the basic building block through the actualization of which the learning organization is typically constructed. Mental models are about how individuals reflect on their own knowledge, using such models to improve the internal understanding of an organization's functions, and processes. Shared vision implies a sense of group commitment to a matrix of organizational goals, while team learning describes a sharing and utilization of knowledge involving collective thinking skills. The purpose of systems thinking is to understand relationships and interrelationships, as well as the context and the forces that affect the behavior of a system or organization. For the early half of the 1990s, the idea of learning organization had been criticized as the mere re-incarnation of earlier ideologies, such as organization development and total quality management (Rasmussen 1997). Nonetheless, as more entities adopt the practices underlying the learning organization, it appears that the learning organization concept is passing from buzzword status to a meaningful expression of best organizational practices. Today, most authors in the management field agree that the learning organization is best viewed as an ideal, a model toward which an organization should strive, and that certainly no existing organization perfectly fits the model (Benson 1997; Senge et al. 1994; Jashapara 1993). Meanwhile, many organizations that are engaged in constantly revamping and retooling themselves may be seen as reaching for that ideal goal of learning organizations. In fact, in this modern age of information technology and swift change, learning has become an integral part of the work of an organization (Willard 1994), run along principles intended to encourage constant reshaping and change.

3. ARCHITECTING TRANSFORMATION WITH THE 4-R FRAMEWORK

The need for organization transformation into

a learning organization represents a fundamental shift in the relationship of the organization to individuals and to society as a whole. Simply put, organizations need to reconnect with the people that comprise them. Born in the industrial age, our model of organization has been a mechanistic one. Caught now in the Internet era, we have stretched this same model to the limits of implosion. It is time to replace this largely mechanistic view of organization with a more organic one that recognizes the sanctity of individual human life and has compassion for individuals characterizing the knowledge economy (OECD 1996). We believe organizations should take responsibility for the renewal of individuals, and help them to acquire new skills. We also believe organizations should redefine the boundary of their responsibility, accepting accountability for the way they use resources and contribute to the environment. More importantly, organizations should build a new pride in the people who are part of them. The attempt to define this new spirituality of organization, as the backbone for our architecting efforts, adapted from Gouillart and Kelly (1995), is presented in terms of the 4-R framework for organization transformation: Reframing, Restructuring, Revitalizing, and Renewing.

3.1 Reframing

Organizations often get stuck in a certain way of thinking, and lose the ability to develop fresh mental models of what they are and what they could become. Reframing opens the organization's mind and infuses it with new visions and a new resolve. The three important constituents of reframing are conceived to include: achieve mobilization, create a vision, and build a measurement system. Briefly, mobilization is the process of mustering the mental energy needed to feed the transformation program. It involves expanding the realm of motivation and commitment from the level of the individual to the team, and finally to the entire organization. Whereas mobilization prepares an organization to create a better future, vision provides a shared mental framework that gives form to that future. The vision often represents a significant stretch from current reality, becoming the organization's new sense of purpose. Once the organization has been mobilized, and armed with an inspiring vision, leadership must translate the vision into a set of measures and targets, and define the actions needed to reach the targets. Therefore, the measurement system creates a sense of commitment.

3.2 Restructuring

Restructuring deals with the body of the organization, and its competitiveness – the need to be lean and fit – is the primary consideration. It is the domain where cultural difficulties are supposed to be greatest. Nonetheless, if the payoffs are invested to fuel longer-term transformation programs, many wounds could be healed. The three major constituents of restructuring are conceived to include: construct an economic model, align the physical infrastructure, and redesign the work architecture. Briefly, constructing an economic model involves the systematic, top-down dis-aggregation of an organization in financial terms, typically from stakeholder value considerations to activity-based and service-level assessment. It gives the organization a detailed view of where and how value is created (or destroyed), and like the human cardiovascular system, is supposed to transport resources to where they are most needed inside the organization. On the other hand, the redesign of an organization's physical infrastructure is one of the most visible and telling measures of the overall health and strategic direction of an organization. The physical infrastructure, like the human skeletal system, is the network of facilities and other assets upon which work processes depend. Some facilities or assets are like the spine of the human body: When they fall out of alignment, they pinch vital nerves, causing pain and partial paralysis. Others may fracture under stress, immobilizing whole sections of the corporate body and requiring mechanical realignment to allow the healing process to occur. More, in an organization, work gets done through a complex network of processes, the work architecture. Like muscles, such work processes can be considered in isolation,

but are in fact so interconnected that a change in one may affect them all. Also, they must continuously adapt to the demands placed on them or fall into atrophy from lack of stimulation. If properly configured and aligned, and if properly orchestrated by an integrated set of goals and measures, they produce a symphony of value creation so fluid that process boundaries seem to disappear.

3.3 Revitalizing

Revitalizing is the ignition of growth by linking the organization body to the environment. Every organization wants to grow, but the sources of growth are often elusive, making the process of achieving growth more challenging. Revitalization provides three essential channels of growth including achieve organizational focus, invent new businesses, and change the rules through information technology. Focusing on customers is a good place to start, because providing the benefits customers seek – often new and as yet to-be-discovered benefits – is what leads to business growth. Organizational focus is to the enterprise what the senses are to the human body, connecting the organization's mind and body to its environment. On the other hand, growth also comes by starting new businesses from scratch. This requires the cross-fertilization of capabilities often scattered throughout an organization's business portfolio, and the creative assembling of them to develop new offerings. In many cases, the capabilities of other organizations are required, spawning alliances, partnerships, mergers, or acquisitions. Inventing new businesses also brings new life to the organization; it is the organizational equivalent of the human reproductive system. Often technology can provide the basis of new ways to compete. Information technology, in particular, can redefine the rules of the game in an industry. Technology is the equivalent of the human nervous system, connecting all parts of the body and allowing it to experience sensations produced by the environment.

3.4 Renewing

Renewing deals with the people side of the transformation, and with the spirit of the organization. It is about investing individuals with new skills and new purposes, thus allowing the organization to regenerate itself. It involves creating a new kind of metabolism, the rapid dissemination of knowledge inside the organization, and it involves the cultivation of a reflex of adaptation to environmental changes. Renewal is the most subtle and difficult, the least explored, and potentially the most powerful of transformation's dimensions. The three major constituents of renewal are conceived to include: create a reward structure, build individual learning, and develop organizational learning. Briefly, rewards are not the only motivators of people, but they are very powerful ones. When they are mis-aligned with organizational objectives, they can be equally powerful de-motivators. The organizational compensation system should reward risk-takers, and encourage people to link their own futures to the transformation of the organization. The reward structure builds a sense of gratification among individuals in the organization. Nevertheless, there can be no organizational transformation without the transformation of a large number of individuals. Organizations must commit themselves to the development of their people by encouraging the acquisition of skills and by cultivating mutual learning. Individual learning promotes self-actualization in the individuals who make up the organization. Further, organizations need to organize themselves for learning, so that they can adapt, constantly, to their changing environments. Developing organizational learning fosters a sense of community among individuals.

4. ADOPTING THE PRACTICE OF SYSTEMS THINKING

The practice of systems thinking, according to Peter Checkland (1999, 1983, 1981), refers to a consciously organized process of thinking using systems ideas, which emerged as a generalization of ideas about organisms, and which were developed in the first half of the twentieth century, through the systems movement attributed to the Austrian Ludwig von Bertalanffy (1968). At the core of systems thinking is a concept, which clearly derives

from our intuitive knowledge of organisms: the concept of a whole entity, which can adapt and survive, within limits, in a changing environment. This notion of the adaptive whole is the central image in systems thinking, and the systems movement can be regarded as the attempt to explore the usefulness of this particular concept in many different fields. In order to understand and use this concept we need a handful of further ideas, which together constitute the bedrock of systems thinking.

4.1 Core Systems Ideas

There are four core ideas acting together as an interactive whole to support the notion of adaptive whole: emergent property, layered structure, communication, and control. Emergent property is the property of the whole, not the property of the parts, and cannot be deduced from the properties of the parts. However, they are a product of interactions, not a sum of the actions of the parts, and therefore have to be understood on their own terms. For example, the parts of a bicycle, in a sack, are simply an aggregate. When assembled in the particular structure we call a bicycle, that entity has vehicular potential, which is an emergent property of the whole. Besides, wholes having emergent properties may well have smaller wholes with their own emergent properties; for example, it is meaningful to think of a department of a university as having autonomous emergent properties (the resources and authority to put on a particular course). Equally, the larger whole (the university) may be only a part in a yet larger whole (the university sector of higher education) with its own emergent properties. In other words, the idea of layered structure is essential in systems thinking. Moreover, if our entity is to survive in environments which change, it must have available to it ways of finding out about its environments and ways of responding internally to them. Namely, it must have processes of communication and control, which may be automatic or created by human activities, depending on the kind of entity being considered.

4.2 Tracks of Systems Thinking

Today, systems-thinking has emerged as a meta-discipline and as a meta-language which can be used in the study of many different fields (Checkland 1994), including natural systems (the study of the wholes created by nature in physical sciences), designed systems (the study of the wholes designed and made by human beings in engineering disciplines) as well as management systems (the study of human activities in social sciences). Not surprisingly the two areas of work, involving natural and designed wholes, are ones in which there is in general good mapping between the systems concepts and the observed real world. But, such mapping is much more problematic in the third broad area of application, that of human activities. In the 1960s, the main development of systems thinking within human activities was essentially systematic in character. Namely, it is confined to a small subset of situations in which objectives are undisputed, so that problems are only 'how to do it?' problems, not problems of 'what to do?' In the 1970s and 1980s, it was found that what usually made the situations problematic in applying systems thinking, was the inability to define objectives precisely, given the changing, multiple, ambiguous, and conflicting alternatives. The problems were at the level of 'what to do?' as well as 'how to do it?' The way out of this dilemma was to consider the real-world ubiquity of purpose in human activities and to treat a linked set of human activities that constitute a purposeful whole as a new system-type we now call the human activity system (HAS), the models of which could then be used as devices to structure questioning of the problem situation. This process, which later became known as the soft system methodology (SSM) (Checkland and Scholes 1990; Wilson 2001) is systemic in nature; it is a learning system, a system of enquiry, which happens to make use of models of human activity systems.

4.3 The Hard and Soft Branches

The difference between the systemic thinking (how to do without what to do) and the systematic thinking (how to do with what to do),

according to (Checkland 1983), is now thought of as marking the difference between the soft systems thinking of the 1970s and 1980s and the hard systems thinking of the earlier approaches. The key difference between them is that the hard tradition assumes that systems exist in the world and can be engineered to achieve declared objectives. The soft tradition assumes that the world is problematic, always more complex than any of our accounts of it, but that the process of enquiry into the world can itself be engineered as a learning system, one in which soft systems thinkers have the option consciously to adopt the hard stance if necessary. It is this shift of systemicity, from assuming systems to exist in the world to assuming that the process of enquiry into the world can be organized as a learning system, which defines the two tracks of systems thinking today.

4.4 Implications for Information Systems

If information is interpreted as what we get when human being attribute meaning to data in a particular context, then an information system (IS), in the full sense, will be a meaning attribution system in which people select certain data out of the mass potentially available and get them processed to make them meaningful in a particular context in order to support people who are engaged in purposeful action (Checkland and Holwell 1995). Systems-thinking offers an important insight into this role of information systems, which are not created for their own sake. IS's serve or support people engaged in what for them is meaningful action. The implications of systems thinking, especially soft system thinking are as follows: SSM can provide a way of conceptualizing the social processes in which, in a particular organizational context, a particular group of people can conceptualize their world and hence the purposeful action they wish to undertake. That provides the basis for ascertaining what information support is needed by those who undertake that action. Only then does it become appropriate to ask how modern information technology (IT) can help to provide that support, and to provide it. This is to see information systems as systems, which attribute meaning to selected data in which someone has an interest, by processing it – usually by means of IT – in a way which makes it meaningful to users of the system. It should also be of interest to note that meaning attribution can never be completely institutionalized, which will continue to make IS a rich and fascinating area of work.

4.5 Implementation of the 4-R Framework through Systems Thinking

The idea of the 4-R philosophy introduced earlier represents the respective contexts for constructing organizational scenarios in characterizing the behavior of the organization, and it serves as the important input for conceiving the suitable IS support. It is understood that the variety of real-world problems concerning IS support for knowledge work, is enormous; however, it is useful to see them as lying within a spectrum which extends from 'hard' to 'soft.' There are a number of ways in which 'hard' and 'soft' can be defined, but the definition often cited is in terms of the degree of agreement about what the problem is among the particular population of individuals to whom the problem is of concern. For example, for a problem-based learning (PBL) group, conceiving the suitable learning organization information systems (LOIS) support for group-based project work could be considered as both a hard and soft problem. Typically, the design of a piece of software to meet a given specification is a hard problem (assuming process explicitness for LOIS support) as long as the specification is given, whereas the specification of information requirements to meet the needs of knowledge work is a soft problem (assuming process implicitness for LOIS support) particularly if the needs as specified by potential users are at odds with those required to support the knowledge tasks themselves, or if indeed the information requirements themselves are problematic.

At the hard end of the problem spectrum, the methodology applicable essentially consists of the following stages, with stages 2 and 3 being plausibly iterative: 1) define the problem; 2) assemble the appropriate techniques; 3) use

techniques to derive possible solutions; 4) select most suitable solution; and 5) implement the solution. This structured approach to conceiving IS support for knowledge work, requires judgment in terms of a set of guidelines, which stimulate the intellectual process of analysis. At the soft end of the problem spectrum, the first of the above stages 'define the problem' is itself problematic since it usually depends on who defines it. Given that there will usually be a number of people concerned with or involved in 'the problem' there will be a number of legitimate definitions. Thus, the methodology applicable here, has to start by defining, not a problem but a situation that is problematic. Its stages of development could be characterized as follows with plausible iterations in stages 3, 4 and 5: 1) define the situation that is problematic; 2) express the situation with different sets of concerns; 3) select concepts that may be relevant; 4) assemble concepts into an intellectual structure; 5) use this structure to explore the situation; 6) define changes to the situation as the problems to be tackled; and 7) implement the change processes.

It should be noted that in the 'hard' methodology, the techniques contain both the concepts and the structure, and they are often well defined, whereas in the 'soft' methodology, the concepts and the structure are independent and need to be specified separately. This may involve greater iteration around the stages mentioned as progress is made in learning about the situation. Thereby, we may consider methodology be it hard or soft, as a description of how to think about the process of analysis prior to doing it. The intellectual process of choosing concepts and deciding how they might be structured in a methodology is indeed concerned with thinking about how to think. This is itself an unusual process; however, it has the advantage that the resultant methodology is tailored to fit the particular situation, and the analyst know why they are doing what they are doing and how and what they are doing relates to what they will be doing next. Given the great variety of organizational design problems for LOIS support of knowledge work, considerable flexibility must exist in the concepts and structures available to the analysts. It is believed that unless the particular methodology is assembled as a conscious part of the analysis, it is very unlikely that the changes and solutions identified will represent an effective output of the analysis. More importantly, the specific methodology needs to be explicit in order to provide a defensible audit trail from recommendations back to initial assumptions and judgments. Consequently, thinking about how to think in designing LOIS support situated in the 4-R framework is about planning the intellectual process to follow up with the design itself.

5. TAILORING THE LEARNING ORGANIZATION CONTEXT AS HUMAN ACTIVITY SYSTEMS

Those engaged in attempting to build learning organizations are involved in the delicate business of creating, within the organization, a conglomeration of different human activity systems (HAS) using the term from soft systems thinking. To create an entirely new organizational dynamics through the HAS's actually requires effort and commitment on the part of everyone involved, as well as a good imagination in the mind of the person charged with directing its implementation. The organization's members need to thoroughly know their organization as it currently exists, as well as have a vision of what its members desire for it to become in the future (Gregory 2000). However, a number of management theorists have compiled lists of plausible elements that an organization striving to become a learning organization should demonstrate (King 1996). The following represent some of those attributes with which a learning organization is supposed to exhibit. First is the facilitation of effective communication throughout the organization in order to diffuse needed information quickly and effectively, coupled with a willingness on the part of the organization's members both to accept and put that information to use. Second is the retention of organizational memory; it is essential that access to information be assured whenever it is needed and at whatever level of

the organization it may be needed. Third is the establishment of information systems that will allow new information to be related to other information and to existing knowledge in order to create new knowledge and know-how. In other words, a learning organization requires the creation of a knowledge infrastructure that can serve both as a repository of knowledge and as a facilitator for the creation of knowledge in a form that is usable and suitable for individual needs, while simultaneously allowing for the distribution of that knowledge to the members of the organization when and where the information is needed, and when the organizational members are ready to accept and to put the provided information to work. It is believed that the knowledge infrastructure is the means through which an organization makes available resources to support people in their work. The infrastructure should, as a minimum, include such key elements as follows:

- A communications mechanism to facilitate teamwork
- A knowledge mechanism to foster the creation of knowledge, and to allow that knowledge to be easily shared and diffused throughout all levels of the organization
- A strategic capabilities mechanism to identify, develop and nurture the core capabilities of the organization
- A human assets mechanism to identify the people and their special skills available within the organization
- A partner mechanism to encompass information about external people and organizations that can be utilized to form strategic alliances or that may be potential providers of outsourced operations
- A dialogue mechanism to encourage genuine conversation among organizational members
- A tasking mechanism to encourage the organization and coordination between projects and teams
- A resource allocation mechanism to accommodate all of the above

In line with the above suggestions, Slocum et al (1994) have identified three new practices essential for a learning organization: a strategic intent to learn new capabilities; a commitment to continuous experimentation; and the ability to learn from both past successes and failures. Following this reasoning, we believe that an essential innovation in infrastructure for learning organizations should enable people to develop capabilities in the five learning disciplines – lifelong programs of study and practice proposed by Senge (1990):

- Personal Mastery – Learning to expand our personal capacity to create the results we most desire, and creating an organizational environment which encourages all its members to develop themselves toward the goals and purposes they choose.
- Mental Models – Reflecting upon, continually clarifying, and improving our internal pictures of the world, and seeing how they shape our actions and decisions.
- Shared Visions – Building a sense of commitment in a group, by developing shared images of the future we seek to create, and the principles and guiding practices by which we hope to get there.
- Team Learning – Transforming conversational and collective thinking skills, so that groups of people can reliably develop intelligence and ability greater than the sum of individual members' talents.
- Systems Thinking – Cultivating a way of thinking about, and a language for describing and understanding, the forces and inter-relationships that shape the behavior of systems. This discipline helps us see how to change systems more effectively, and to act more in tune with the larger processes of the external world.

6. THE USE OF ORGANIZATIONAL MODELING

The IS staff assigned to redesign the organization in terms of various human activity systems, must be able to create the necessarily detailed models in support of different learning organization objectives. This work often involves with different design alternatives and the IS team must collaborate to

make decisions at different levels of design from the comprehensive architectural level (functional structures + resources needed) down to the detailed, dynamic levels of events. To minimize the pitfalls associated with haphazard decision-making, we need a framework by which the organization may be designed and re-designed. This framework must comprise a consistent set of constructs, representing the organizational pieces, their interconnections, and their behaviors. We call this framework an instance of an evolving organization model, and the creation of such framework, the practice of organization modeling (Morabito, Sack and Bhate 1999). Oftentimes, we consider an organization model as composed of its static and dynamic portions. The static portion is often referred to as the organizational architecture, and the dynamic portion its specific organizational behavior. The major constituents of the organizational architecture are its organizational domains, representing areas of interest to the organization, which are typically composed of two types of constructs: the core and the derived (Daft 2001). Basically, we maintain that an organization can be described in a relatively stable fashion with a constant set of core constructs, such as people, strategy, structure, process and technology. Still, many other management notions are advanced every now and then, which represent variations of existing core constructs. We call such variations the derived constructs, examples of which include culture, empowerment, individual learning, organizational learning, and knowledge management. In practice, it is useful to interpret an organization as a set of behavioral specifications, each of which represents a view (a HAS view) that is designed to characterize the organization premised on some set of organizational domains. Meanwhile, modeling a learning organization requires managerial choice at every stage of development: choice associated with the constructs chosen by management to represent the organization, choice with respect to the organizational domains which management is interested in proactively designing, choice of alignment among such domains, and choice of possible implementation. Throughout the organization modeling process, which includes establishing an organizational philosophy, identifying domains in need of design, specifying an organization's invariant (rules) at all levels of abstraction, it is likened to the act of composing a symphony or painting a picture. The artist starts with an image – the final rendering is visualized even if not fully formed. Planned or emergent, the molded image is a product of visualization. It is the process that interweaves strategic intent, architecture, and change into molding the organization image. In creating the organization model, we understand that the architecture and the behaviors with which it operates, form not only the foundation, but also the character of design, and ultimately, of the organization itself. The great challenge is to shape the organization so that all of its pieces (organization domains) work together in consonance.

7. THE ISSUE OF COLLABORATION

Although organization has to do with participation, it is not always clear to the people in an organization as to in what they are participating. One of the things that people do when they are together is continually clarify this matter. What makes an organization is people's mutual understanding of their own and others' interests and purposes, and the recognition that their interests are somehow bound up in doing something to which they all contribute. In a strict sense, organization is found in the interaction among people and organization is an emergent phenomenon. It is in the course of interaction that people's sense of purpose and even their contributions, come to be defined. From this standpoint, collaboration enables organizations to generate emergent results. And a collaborative group's role is to create an environment in which emergent outcomes occur. As collaborators in an IS team, we face the tremendous challenge of how team members move from being individual spokespeople to a unified, collaborative body. In his book on group decision-making, Sam Kaner (1996) calls the transition from the divergent zone of the individual to the convergent zone of the team

member the "groan zone." In a team, even though every member wants to contribute to success and to get the project going, each has a different perspective, a different experience, or a different context to bring to the project. Each person's thinking is divergent, bringing diversity to the process, but not much agreement. Convergence occurs as the group's individual ideas are integrated into a whole solution. This process of integration does not entail compromise, in which every one gives up something and no one is happy with the result, nor does it mean that everyone is in complete agreement. What convergence means is that everyone has participated and will support the final decision. Kaner calls this period between divergence and convergence the groan zone because it is the time during which team members groan and complain. In the divergent zone, most group members voice their opinions to make sure their ideas being heard by the group. In the groan zone, however, an individual digs behind other people's ideas to try to uncover their reasons, assumptions and mental models. Difficult problems and wrenching decisions cause teams to spend time in the groan zone because of the required interchange, sharing, and resolution of ideas, and viewpoints. Likewise, the groan zone is also used to describe the transition zone in which innovative, emergent results are generated. Indeed, collaborative groups, especially those in fast-paced environments, groan a lot. They struggle to create the services that converge on the mission profile. They struggle to integrate their own, and others' diverse perspectives.

8. REMARKS FOR CONTINUING CHALLENGES

To support the continual architecting of a learning organization in changing environments, planning, whether it is applied to develop an organizational model, or to articulate detailed project management tasks, is too deterministic an activity. Planning, with an intention to define a specific goal and the path (the tasks) by which to achieve it, largely restricts exploration, implicitly if not explicitly. Speculating (Highsmith 2000), with an intention to define a broader goal and allowing for alternative paths, seems closer to what actually occurs because speculating explicitly recognizes uncertainty and leaves open more possibilities. When we speculate, we define a mission to the best of our ability, but we accommodate the fact that the probability of mistakes is high. So, we have to be bold to postulate a general idea of where we are going, and put mechanisms in place to adapt – to explore the territory. Viewing a project as an exploration, as a learning journey is at the heart of the systems thinking process. Indeed, it iterates through the viewpoints of interest, and then iterates back through them to make changes as more details emerge affecting the overall architecture. If learning organizations are considered as complex human activity systems in which emergent results occur in the groan zones of the IS teams, then creative collaboration is the key. It thrives on diversity, rich relationships, unfettered information flow, and good leadership. As collaborative teams, we need the ability to critically examine ourselves, in particular to examine the assumptions or mental models that underlie our processes and practices. This process of learning through experience challenges the team and the stakeholders to use the results of each architecting cycle to adapt the next so that, team participants typically learn from small, rather than large mistakes. Meanwhile, if we view collaboration as an act of shared creation or discovery (Schrage 1990), it requires more than listening to the stakeholders; it requires negotiating sustainable decisions that each participant (including stakeholders) supports. The goal is a unified position that does not fall apart hours after the decision meeting has concluded.

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