

***EXPLORING KEY RELATIONSHIPS
IN THE NEXT GENERATION
KNOWLEDGE ORGANIZATION***

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ABSTRACT

After a brief summary of our paper "Characterizing the Next Generation Knowledge Organization" published in the inaugural issue of "Knowledge and Innovation," [1, Pp. 8-42] we highlight some basic properties of complex adaptive systems and introduce the concept of optimal performance. We then describe the ICAS model with its eight emergent characteristics and four major processes that enable ICAS organizations to transform external forces and opportunities, and internal ideas into effective actions that influence and take advantage of their external environment. This sets the stage for investigating the relationships among the emergent characteristics and these four major processes. These relationships significantly impact the level of synergy and alignment throughout the ICAS organization and play a strong role in creating and maintaining a sustainable competitive advantage in a changing, dynamic and uncertain world. After describing the relationship between organizational intelligence and the four major processes we consider how the emergent characteristics of the ICAS relate to each other and specifically how they support organizational intelligence. We conclude that it is these relationships together with the orchestration and co-evolution of the overall ICAS system that will determine its long-term success.

Summary of the Next Generation Knowledge Organization

Five major environmental forces affecting the phenomena of change, complexity and uncertainty are: (1) connectivity; (2) data, information and knowledge; (3) speed (in terms of the movement of goods and services, creation of new ideas through virtual collaboration, spread of information through increased bandwidth, and the sharing and diffusing of knowledge); (4) access (in terms of the context of information, competition, changed perspective and expectations of employees, and opportunity to the organization); and (5) digitization. These forces impact how firms structure themselves and what strategies they take, as well as how they engage with employees, customers, legislative policies and international relationships, all of which carry over to influence every organization's ability to meet its objectives.

What is needed to respond to these forces is an organizational system that can enter into a symbiotic relationship with its external environment, a living

organizational system composed of other living systems that combine and interact to provide the capabilities of an advanced, intelligent techno-sociological adaptive enterprise. A model proposed for this future organization is the ICAS (Intelligent Complex Adaptive System).

There are eight major system characteristics and four major processes of the ICAS. When operating properly, these eight characteristics (all emergent phenomena arising out of the structure and relationships of the ICAS organization) will allow the organization of the future to survive and exhibit sustainable competitive advantage. These characteristics are: organizational intelligence, unity and shared purpose, optimum complexity, selectivity, knowledge-centricity, flow, permeable boundaries and multi-dimensionality. The four processes through which the ICAS transforms its capabilities into actions are creativity, problem solving, decision-making and implementation. These four processes are embedded within the ICAS and under ideal conditions become a natural part of its culture, a culture resulting from the processes, structure, relationships and people that make up the next generation knowledge organization. These processes—working together within the framework provided by the eight emergent characteristics—will create and sustain the Intelligent Complex Adaptive System as it maneuvers through change, complexity and uncertainty to fulfill its mission.

While culture is notoriously a difficult concept to define, with many interpretations in the literature, the one most appropriate for our purposes is taken from Edgar Schein's work on Organizational Culture and Leadership [2, P. 12]:

“A pattern of shared basic assumptions that the group learned as it solved its problems of external adaptation and internal integration, that has worked well enough to be considered valid and, therefore, to be taught to new members as the correct way to perceive, think, and feel in relation to those problems.”

Thus an effective ICAS organization will embed the four major processes throughout the organization in such a way that they are efficient, effective and adaptive and, as Schein notes, they should be considered valid and taught to new members as the right way to perceive, think and feel as they are applied to a problem.

Complex Adaptive Systems

Complex adaptive systems are composed of a large number of self-organizing, independent agents that seek to maximize their own goals but operate according to rules and in the context of relationships with other independent agents. Their advantages include creativity, learning and adaptation. Complex adaptive systems are frequently composed of hierarchical levels of self-organizing groups of agents, which can take the form of teams, divisions or other structures that

have a common bond. In the ICAS the agents are people, teams, or what we refer to as units.

Complex adaptive systems have been formally studied over the past two decades and their current understanding can best be described as “work in process.” Nevertheless, there are numerous examples of these systems: cities, the brain, the immune system, ecosystems, computer models and, of course, organizations. Unfortunately, although many researchers in the field intuitively believe that there are general principles that rule CAS behavior, few if any of these principles have been found to date. Their dynamic, emergent nature makes it possible to measure and observe past behaviors, but difficult at best to render reliable, precise predictions about current and future behavior.

There *are* some basic properties in most complex adaptive systems. Examples are self-organization, non-linearity, aggregation, diversity, and flows. See Holland, [3] Battram, [4] and/or Stacy [5] for particularly lucid explanations. For more in-depth analysis see Kauffman, [6] Axelrod, [7] Morowitz and Singer, [8] and Axelrod and Cohen. [9]

By complex, we mean an organization that can take on a very large number of states. A complex system is made of a large number of individual, intelligent agents, each with its own ability to make certain types of decisions and strive for certain goals. The word adaptive implies that the entire organization is capable of using its experience and internal processes to guide changes in its structure and to take actions that enable it to make better use of the environment for its own purposes.

Optimal Performance as Sustainable Competitive Advantage

The optimal performance of an organization is that performance which allows the organization to achieve its goals and objectives over time. In the highly competitive environment of business, those goals and objectives are often described as sustainable competitive advantage. Sustainability means long-term survival, competitiveness that increases market share and quality, and product acceptance by customers.

Even blue chip firms have difficulty staying in the Fortune 100 for many years. As time passes, the environment takes on new characteristics such that what worked yesterday may not work today and most likely won't work tomorrow. Sustainability is a continuous challenge for every organization, and as the environment becomes more complex and dynamic this challenge will tax the economic world. Historically, most new firms fail within the first three to five years, but some have lived as long as 700 years or more. What makes the difference between short-term life/failure and extremely long-term survival/success has been a subject of interest to both scholars and practitioners.

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Can a study of the past help guide the future organization? Perhaps, but we suggest caution.

For example, in *Built to Last*, [10] Collins and Porras did a six-year study of 18 companies who had outstanding performance over time periods between 50 and 200 years. Yet they found that even these companies had problems: “Indeed, all of the visionary companies in our study faced setbacks and made mistakes at some point during their lives, and some are experiencing difficulty as we write this book. Yet—and this is a key point—visionary companies display a remarkable resiliency, an ability to bounce back from adversity.” [10, P. 4]

In seeking the fundamental factors creating high performance, Collins and Porras also found core ideology, a strong drive for progress, alignment, and a well-designed organizational structure to be of importance in order to preserve the core and to stimulate progress. They further note that these factors are universal requirements and are independent of time. [10, P. 216] While we agree with these factors up to a point, in the future, progress and organizational structure may take on a different meaning.

If our forecast of the future is even close to being true, the rate of change in the growth of knowledge and in technology will be so high that long-term progress may be impossible and even medium-term progress may be a dream. Success will likely be achieved in the form of survival through constant adaptation, including constantly changing internal processes and organizational structures. For these reasons, the ICAS organization, while having a clear value set and unity of purpose over moderate time periods, must be designed for constant internal change, learning and adaptation. These are the strengths of complex adaptive systems, which when coupled with intelligence, knowledge, and internal variety may provide long-term survival and growth.

Another view of adaptation is co-evolution with the environment. Rather than taking the classic commercial *make it and sell it* approach, the ICAS will watch, interpret, create, act and respond symbiotically with its environment, not against it.

The theory behind researching historically successful organizations is that if we can understand what leads to success in the past, and it can be repeated, it may lead to success in the future. Handy [11] goes further to state that most of us would do better to look at the interplay of the variables. [We] “need understanding, or theories, of the way the variables affect each other. We need to know those which we can alter and how by altering them we shall change the total situation.” [Ibid. P.19] While this is good advice in times of relative stability, in the future, when not only the variables change value but new variables come in and out of the system it will become almost impossible to track and measure their impact on the organization. Therefore historical research of past successes

may be of little use to future managers. Their best option will be to grow an ICAS that has real-time, locally-distributed, quick response capability. Again self-organizing, intelligent agents who behave most like the adaptivity paradigm which generates emergence in CAS's would appear to be the most robust entities. They have the knowledge and processes to make good decisions, and are empowered to change as necessary to adapt and take advantage of the environment.

Major Relationships in the ICAS

Figure One shows the major elements in the ICAS model and the top-level conceptual relationships among them. The rectangle at the top identifies the four major processes and their broad relationships to each other. It also shows that organizational intelligence has a major role in the quality of those processes. The middle rectangle identifies the eight emergent characteristics of the ICAS organization, together with their major relationships. The bottom two rectangles represent the major characteristics in the external environment.

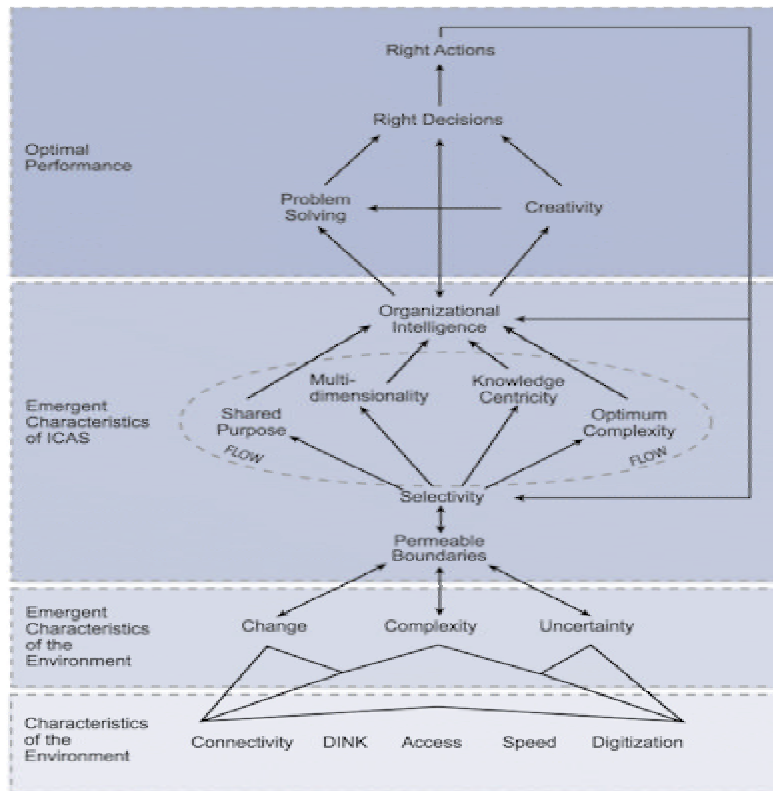


Figure One -- Major Relationships in the ICAS

As the rate of change of problems, demands and opportunities speed up, and with them the increased variability and unpredictability of the environment, the ICAS must react faster and with pinpoint accuracy. Underlying such a capability

is the generic concept of relationships. Relationships among individuals, across internal boundaries, between people and technology and with external customers and other stakeholders are the mainstay of trust, collaboration, rapid action and intelligent behavior. How well these relationships are created and maintained is the key to adaptation and optimum performance. In this article we are concerned with how the emergent characteristics of our ICAS (see figure above) relate to each other and how, as a group, they support the four major processes of creativity, problem solving, decision-making and implementation.

Organizations take inputs from their environment, transform those inputs into higher-value outputs and provide these to the environment. They do this by using internal and external resources in efficient and effective ways that create added value above and beyond the value of the incoming resources. Briefly, the organization solves problems (or takes on opportunities) that usually create options for action that then produces some product. It does this through its available resources—people, technology, relationships, experience, partnering etc. When the challenge is not routine the organization needs to be creative and generate new ways of solving problems and developing new products. At this point it must make a decision as to what action will best produce the desired solution, then how to carry out the action in a manner that best ensures the anticipated outcome.

While this sequence is easy to describe, it becomes very complex and challenging in the real world, particularly when things are moving quickly, the problem is not well understood, there are many opinions, and a successful outcome is dependent on external events. Successfully implementing such processes is a real challenge to ICAS organizational intelligence. The processes themselves become the production tools that every intelligent organization must master. For a more in-depth discussion of these processes see Bennet and Bennet [1] or Bennet [12].

The Drivers of Organizational intelligence

Since organizational intelligence is the generic *competency behind the processes* we will address it first. In our previous article we interpreted organizational intelligence as the ability of an organization to perceive, interpret and respond to its environment so as to meet its goals while satisfying various stakeholders: customers, employees, investors, community and environment. In the future environment that we have characterized as rapidly changing, highly complex and unpredictable, the acts of perceiving, interpreting and responding effectively become complicated and challenging in and of themselves. Perception, the adaptive discrimination of an object or event from background or other objects or events [13, P. 49], becomes difficult because nothing stays the same for very long and the variety and disconnectedness of things make discrimination and/or coherence difficult. Interpretation, or sense-making becomes hard because of the

complexity of events and their seeming independence. Context is frequently hidden in the noise of crises. To determine meaning is to understand both context and continuity of phenomena. Both kinds of understanding are made difficult by complexity and randomness. Nevertheless, this is the challenge faced by the ICAS and all other organizations who would thrive in the future.

An intelligent complex adaptive system must be able to generate, manage and apply knowledge in a rapid, coherent manner. Recall that knowledge, while consisting of data and information, is taken as the ability to create understanding and find meaning in a situation by recognizing the relationships, causal phenomena and theories and rules underlying them [see 1, P. 19]. To generate shared unity and consistency of understanding, the organization must coordinate relevant information and knowledge across all regions and among all teams and other autonomous units. Finally, intelligence depends upon Wiig's suggested competencies of good behavior, being well prepared, adopting the right posture, good problem solving and effective actions. [14, P. 38] Thus we consider some of the key variables underlying organizational intelligence to be knowledge, coordination and individual and team competency. Beginning with unity and shared purpose, we now consider how organizational intelligence is supported by the other emergent characteristics of ICAS.

Shared Purpose and Organizational Intelligence

The ICAS characteristic we have called unity and shared purpose plays a significant role in support of organizational intelligence. Perhaps its most important contribution is to help integrate and unify the various parts of the organization.

An ICAS is made up of a number of self-organized, autonomous units providing innovation and rapid response to its stakeholders. At the same time, the entire organization must be able to marshal resources that maximize its response capability as needed. For this to occur, every part of an ICAS should have a clear understanding of the direction and purpose of the overall organization

This shared vision serves as the standard for behavior, as the goal for actions, and as the metric for measuring competency and success. On a broader scale, unity and shared purpose brings the organization into focus, creating a common culture and a sense of belonging and ownership compatible with the autonomy of each team or unit. All self-organizing units must operate within certain rules or boundary conditions whose nature depends upon the units, the organization and its immediate environment. These rules may vary from unit to unit but they should be self-consistent throughout the ICAS.

For example, many organizations create their own shared assumptions and expected behavior patterns that work for them in their particular environment.

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Such values may both restrict behavior and action and encourage creativity and pro-activity. Knowing what is and is not acceptable, where the organization is going and how it will get there provides self-organizing units the needed freedom in decision-making and implementation. At the same time it constrains them to stay within the boundaries of the ICAS purpose and objectives.

Unity and shared purpose also serves to integrate ICAS activities and enables the ICAS to mobilize resources to gain the synergy of complementary talents and to coalesce personnel resources to meet surge requirements. By synergy we mean the working together of two or more people when the results are greater than the sum of their individual talents. If all parts of the ICAS can be kept informed and up to date on the overall direction, the autonomous units can then respond rapidly, collectively, and collaboratively, without the often seen confusion over what is wanted, needed or why. When an ICAS is behaving intelligently it is similar to the conscious mind working intentionally, using its unconscious experience, its incoming information and its full capability to focus on the task at hand. Such an organizational capability as this requires a number of special collaborative communication channels to facilitate continuous dialogue and unity of purpose. These channels need to be open, meaningful and easy to use. They also serve as knowledge sharing, problem identification and performance self-awareness vehicles. They should not be management or performance monitoring vehicles as this may dampen their usage. To be effective, a culture of trust, openness and collaborative relationships should be created and nurtured by all organizational personnel.

Another way that unity and shared purpose supports organizational intelligence is through its contribution to situational understanding. When people agree and understand the organization's vision and purpose, they tend to see the present and potential world. This allows them to apply their experience and professionalism to problems and opportunities in ways that can best contribute to ICAS objectives. Some departures from this uniform outlook are essential to prevent organizational paradigm lock that can prevent alternative views from being seriously considered.

Unity and shared purpose encourages self-organized autonomous units to contribute to overall organizational objectives while concomitantly maintaining their individuality and creativity. These latter characteristics are badly needed to respond intelligently to the dynamic complexity of the external environment. Creativity provides new ideas, solutions and ways of perceiving and acting upon the environment. Individuality provides a range of options available to the organization. These options increase the organization's own internal complexity, and paradoxically if they are structured properly through the culture and communication channels discussed above, they can be used to counter the challenges presented by very high complexity in the external environment.

Finally, it must be recognized that unity and shared purpose represents an ICAS characteristic that communicates and enables in such a way as to provide a balance between focus and diversity. It is not meant to be a funneling of activity that prevents variety or inhibits new adventures. Neither must it become a permanent direction or fixed purpose. Times change, forces shift and responses must be agile and precise. It is the ability of the ICAS to rapidly change its focus as an entire organization that signifies the sought after intelligent behavior. We can look at unity and shared purpose as necessary but not sufficient for organizational intelligence. Another ICAS characteristic that contributes to organizational intelligence is multi-dimensionality.

Multi-Dimensionality and Organizational Intelligence

Multi-dimensionality represents a number of capabilities that provide an ICAS with the ability to view the environment from many different perspectives and to apply a variety of thinking styles to issues and problems. These capabilities include an organization's ability to continuously forget and learn; to identify and deal with risk; to think in terms of systems; to shift its frequency of operations; to perceive and analyze in terms of wide scope and long-time-frames; and to keep its identity and unity. There is no one part of an ICAS, or one individual in the organization, that possesses these capabilities; they must be spread throughout the system.

Thinking skills such as systems thinking, logic, creative approaches, analysis, judgment and intuition are all needed at some time during an organization's operations. The time and space dimensions of thinking become important when organizations try to recognize and anticipate patterns in their environment. For example, when markets shift or political changes are bubbling around, it is important to be able to estimate the right time scale of anticipated changes, be it three months or ten years.

A similar need occurs over space as external forces vary over spatial scales, i.e., local, regional or global. Historically, lower level personnel in organizations thought and acted in the short-term and senior managers thought and prepared for long-term trends. In the future, external forces are likely to require all ICAS units to scale both their thinking and their actions to match environmental patterns. As they learn to do so, organizational intelligence will increase because of the improved interpretations and responses that result.

Risk has always been part of organizational life. As complexity, change and uncertainty increase so will the risk of making poor decisions, developing non-marketable technology or losing a competitive edge. The ability to recognize, understand, manage and influence risk will then have to become a competency throughout the ICAS. This will require technical competencies such as probability theory, modeling, trend analysis, and forecasting techniques. As the

world accelerates into ultra complexity, successful thinking about risk will demand instinct, intuition, and broad social and cultural knowledge, coupled with a deep understanding of the flow of events. This need will tax the organizational intelligence of every extant firm. Perhaps surprisingly, understanding and dealing with risk is almost the same as understanding and dealing with opportunities. Thus, a competency in the area of managing risk will become a strength of the ICAS as a result of its development of the multi-dimensionality characteristic.

As can be seen, a broad range of thinking and implementation skills are categorized under the heading of multi-dimensionality, all of which relate directly to the ability of ICAS to perceive, interpret and respond to its environment. Each ICAS will determine its own specific set of skills and competencies needed for its particular objectives and environment. The set of skills and competencies represents fundamental capabilities that most organizations are likely to need. We next consider knowledge-centricity and its relationship to organizational intelligence.

Knowledge-Centricity and Organizational Intelligence

Knowledge and its application are at the heart of the ICAS organization. Its knowledge-centric characteristic ensures the creation, sharing, and availability of the right knowledge to the right people at the right time. Recall that knowledge-centricity is closely related to organizational intelligence in that to behave intelligently, any complex adaptive system must achieve continuous, interdependent collaboration and interplay among all levels of the system to facilitate knowledge diffusion among agents, components and external systems. Knowledge, the deep understanding and sense of context and meaning in situations, is a critical part of intelligent behavior and thinking.

The concept of knowledge-centricity places knowledge as central to the ICAS, the nerve center of the organization. Since knowledge is created within the individual, knowledge centric also means people-centric. Since it is people, or teams, that exhibit intelligence, the application of their intellectual capital is the mechanism for achieving the mission and vision of the organization. Because the creation of new knowledge is as important as the sharing and use of current knowledge, continuous learning becomes an essential requirement for perceiving, interpreting and responding to the external environment of the ICAS. Knowledge-centricity therefore promotes organizational learning, directly impacting organizational intelligence, multi-dimensionality and selectivity.

Knowledge-centricity, through its three mechanisms of human, social, and organizational capital, provides the data, information and knowledge needed for ICAS units to perform their functions and responsibilities. It provides the socio-technical subsystems and processes that tie the organization together to ensure

unity of purpose though coherent operations and quality decision-making. Like flow (discussed below), it supports all parts of ICAS, giving it a quick reaction capability and a higher level of organizational intelligence.

Optimum Complexity and Organizational Intelligence

As stated earlier, we see the Knowledge Revolution on the close-in radar screen and the Complexity Revolution soon to follow. It is to operate effectively within this incoming explosion of complexity that we anticipate the ICAS, or some similar organizational construct, will become essential for survival and growth. Although complexity is often taken to be a measure of the number of states that a system can take on, for our use we consider complexity to be a measure of the number of *meaningful* states that a system can have. Meaningful refers to those states that make a difference to the ICAS, that is, those states that influence the organization's ability to meet its goals and objectives. This discrimination will significantly lower the number of states and hence the complexity of a system. It also injects the subjective interpretation of meaningfulness into the description. However, an ICAS must look at the world from its own perspective, which means from its own objectives, vision, history and culture. While evolving in a hyper-complex environment it must optimize its own internal complexity and minimize external complexity by whatever means possible. Using its own criteria of meaningfulness, the ICAS will ignore, or filter, external states that are important to its purpose and internally generate new ways of taking advantage of opportunities or rebutting threats.

One approach is to clearly determine an ICAS's purpose and shared vision and insure that all members of the ICAS are able to apply their knowledge of the shared vision and purpose to discern meaning from both internal and external events, problems and opportunities. Doing this enables the organization to filter many unwanted and oftentimes confusing states. To do this will require individuals to develop a knowledge base of the entire ICAS within the framework of its reason for being.

When this is achieved, the internal organization, with its multi-dimensionality and knowledge-centricity, can have the maximum number of possible states that can make a difference in terms of its ability to perceive, interpret and respond to the external environment. It will also have the minimum acceptable complexity by eliminating all states that are not relevant to the vision and purpose of the ICAS. Stated in another way, the organization strives to achieve its own maximum useful complexity and its own minimum unnecessary complexity.

This level of optimum complexity provides support to organizational intelligence by offering the largest useful variety of possible perceptions and actions to respond to the increasingly complex external environment. In return, the ability to develop knowledge, to learn and forget, and to coordinate actions and share

information, all enable self-organizing units and individual agents to determine relevance of activities and events and to use their local optimum complexity to effectuate responses. Achieving an organizational state of optimum complexity also guides the scope and depth of data, information and knowledge needed by the ICAS. In other words, it can create boundaries for the knowledge-centric characteristics which support the rest of the organization, and particularly its organizational intelligence.

The Interweaving of Flow

Flow provides the connections, the continuity and the coalescing patterns of behavior that ensure the unity of behavior and the exercise of organizational intelligence. Flow moves throughout the emergent characteristics of unity and shared purpose, multi-dimensionality, knowledge centrality and optimum complexity. Recall that in “Characterizing the Next Generation Knowledge Organization” [1] we discussed flow in terms of the flow of data, information and knowledge; the flow of people in and out of the organizational setting; and the optimal human experience.

The Flow of Data, Information and Knowledge

The flow of data, information and knowledge moves across networks of systems and people, is shared through teams, communities and events, and is facilitated through knowledge repositories and portals. It enables knowledge-centricity. This free flow of data, information and knowledge in the ICAS is built on push/pull strategies. While the organization is responsible for building structures and vehicles to facilitate this free flow, and for embedding the awards and incentives to maximize this flow; it is ultimately each individual’s responsibility to assure they have what they need when they need it to make the best decisions (in alignment with the mission and vision of the organization). This flow is both horizontal and vertical, including the continuous, rapid two-way communication between key components of the organization and top-level decision-makers that is essential to unity and shared purpose.

With the influx of new data and information comes the need to develop discernment and discretion, the ability of individuals, teams and organizations to recognize the data and information that is of benefit or importance to work, business or growth, and discard or ignore that which is of no benefit or importance. In the world of today, with access to exponentially increasing amounts of data and information, the capability of discernment and discretion will strongly contribute to achieving the optimum complexity for organizational success.

In our earlier paper we discussed the interdependent relationship of the Knowledge Revolution and Complexity Revolution, a challenge and response

type of relationship where each drives the other. [1, P. 23] Selectivity (discernment and discretion at the highest level of decision making) determines the data and information that are meaningful and make a difference within the organization, or in the external world of concern to the organization, building the optimum complexity for responding to the external environment and internal demands. (See Figure One.)

This free flow of data and information is as much about people as for people; the context of the data and information must be part of the flow, including information about people's capabilities, interests and potential. As the richness of context builds in the ICAS, the realization of the multi-dimensionality or potential multi-dimensionality of the organization also builds. Specific skills and capabilities of individuals and teams become common knowledge, a part of organizational capital.

The Flow of People In and Out of the ICAS

A continual flow of employees into and out of the organization allows the organization to stay in close touch with the environment, increasing the innovative ideas available. While effective acclimatization of new employees ensures for continuous improvement, unity and shared purpose may be negatively impacted by the flow of people in and out of the organizational setting, primarily due to the time delay involved in creating alignment of new people via the vision and culture of the organization.

The effect on multi-dimensional capabilities can be framed in both negative and positive contexts. The positive context would focus on bringing new capabilities in-house; the negative context would focus on the potential loss of capabilities. However, the true intelligent complex adaptive system recognizes that it is not necessary to have resources in-house, only to be able to access them when needed. Thus, if relationships are maintained, employees who leave the organization, remain part of the organizational capability bank, becoming potential resources to meet future needs.

Since the ICAS is knowledge-centric, knowledge core to the business of the organization is captured and shared. The more groups and teams are used in the organization, the more this core knowledge is used, shared and built upon in terms of innovation and the creation of new knowledge. While each individual is important to this process, it is the continuous flow of data and information among people provided with context that generates organizational learning.

Flow in Terms of the Optimal Human Experience

Flow in terms of the optimal human experience in the organizational setting, occurs when there is close alignment of people and organizational goals.

Autotelic workers are those workers whose work and family lives are challenging yet harmoniously integrated, where their personal goals are closely aligned with organizational goals. [15, P. 145] Thus, unity and shared purpose are essential ingredients to achieving Flow in the organizational setting.

Multi-dimensionality, knowledge centrality and optimum complexity are characteristics that support individuals achieving the optimal human experience, providing the depth and breadth of potential and experience that help achieve the optimum state for Flow. In his treatment of Flow, Csikszentmihalyi says that people are able to achieve harmony of mind, and grow in complexity, even when some of the worst things imaginable happen to them. [14, P. 193] The inference here is twofold: that people work toward harmony of mind and that the growth of complexity is a natural complement of life.

Permeable Boundaries and Selectivity

Permeable boundaries and selectivity work hand-in-hand to ensure the organization's ability to meet needs and take advantage of opportunities, while retaining the ability to select and control what makes a difference. Selectivity, the filtering of incoming information from outside the organization, includes the use of discernment and discretion applied at every level of decision making in it. Any permeable boundary is by definition a selection system since permeability by its nature is specifically designed to be porous, i.e. to provide for the movement in and out of people and information, but with safeguards to prevent the entry of information that does not make a difference to the ICAS. Permeable boundaries also may blur the historic understanding of relationships in terms of time and space, often placing people and information simultaneously both inside and outside of the perceived organizational construct.

Permeable boundaries and selectivity directly impact all of the other six emergent characteristics as they represent the gateway to the external world. The balance between what and how much information and what kind of relationships span the boundaries and what selection rules are followed to focus effort and reduce external complexity is a critical part of ICAS success. On the one hand, partners, virtual networks, image management and close customer relations are vital to a sustained competitive advantage. On the other hand, the organization may be overwhelmed (and confused) by the almost infinite number and variety of external demands, threats and random events.

Thus, the rules that the ICAS develops to selectively manage its external complexity are major challenges. Since the ICAS is composed of a large number of self-organizing autonomous agents, these rules must be both firm corporate policy and robust enough to permit local flexibility. These rules and their balance will come from unity and shared purpose for uniformity and consistency, from

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knowledge-centricity for understanding and from organizational intelligence for learning and application.

There is another side of selectivity that becomes important. Looking at the ICAS from the outside, some organizational responses will be reinforced by the environment and others will be rejected. This environmental selection phenomenon serves to select the best ICAS responses, and in doing so reinforces their internal generation. This is the Darwinian mechanism that promotes ICAS learning and adaptation.

These successes and failures that occur through the porous boundary and the selectivity process may be the single most important events that determine the survival or failure of the organization. As the pace of external change rises, the speed and fidelity with which the autonomous agents can react, learn and relay their perceptions and interpretations across the entire ICAS organization will determine its ability to adapt, learn and forget. Both flow and knowledge-centricity drive this communication and collaboration process. Multi-dimensionality and organizational Intelligence determine the rate of learning, forgetting, and how well the organization can implement effective responses.

The relationships and interfaces among all of the emergent characteristics may well be the single strongest leverage point within the ICAS organization. Because these characteristics are emergent, rather than designed, the challenge is to identify the underlying rules and general principles among the self-organizing autonomous units that will create the desired set of relationships.

From this short discussion of the relationship between permeable boundaries and selectivity, it is also clear that the character of these two emergent characteristics is very different from the six previously discussed, and that the other six are dependent on permeable boundaries and selectivity. However, ICAS activities and processes may be independent of selectivity and permeable boundaries for a short time. For example, projects underway in an organization have defined directions and boundaries; at least for some period of time, regardless of the activity of the environment, i.e. excepting some life-threatening event, they take on a life of their own. Yet eventually to ensure success they must respond to the ever-changing external environment.

Concluding Thoughts

We find that for an ICAS to be effective, the organizational relationships among all eight of the emergent characteristics (organizational intelligence, unity and shared purpose, optimum complexity, selectivity, knowledge-centricity, flow, permeable boundaries and multi-dimensionality) become the critical parameter and provide the high leverage point of the system. The characteristics are closely intertwined and therefore highly dependent upon each other. This

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interdependency, while partially due to the overlap of functions and roles of the characteristics, derives primarily from their relationships with each other. To perform their roles, they must be closely coupled and mutually supportive. This interdependency is what potentially can give the ICAS its rapid response, variety of activities, and resilience against threats.

While each of these eight emergent characteristics contributes to the overall ICAS, their correlation is what leads to superior performance. As time passes and the environment changes, the relative importance of each characteristic will undoubtedly change – challenging all parts of the organization to recognize and act upon the new balance needed within the organization. Continuous adaptation means constant internal change, which leads to internal uncertainty with its attendant risk.

As with current organizations, the real gemstone is the individuals who perform the day-to-day work that creates value. How they perceive their working world is significantly influenced by the organization's self-image, its culture and its reason for being. While this internal environment is nurtured by superior leadership and good management, the essence of performance comes from the interplay between individuals and their organization's *umwelt*. This system -- people, technology, knowledge, policies, processes, actions and challenges – is created through the generation and evolution of the eight emergent characteristics described earlier. These, when coupled with the four major processes, strong values, and an enlightened leadership, may produce an organization fit for the future.

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Ms. Alex Bennet, internationally recognized as an expert in knowledge management and an agent for organizational change, is the United States Department of the Navy (DON) Deputy Chief Information Officer for Enterprise Integration and Chief Knowledge Officer (CKO). During her 17 years with the DON she has served as Acquisition Reform Executive, Standards Improvement Executive, and Director of Communications, Education and Training for

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