A Viable System Model:

Consideration of Knowledge Management

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ABSTRACT:

Contends that individual and organizational knowledge is difficult to value and therefore difficult to manage. Looks at the management of knowledge from the perspective of the individual, the network and the organization using Stafford Beer's Viable System Model, a powerful descriptive and diagnostic tool to map management capacities and promote viability.

Introduction

Individuals who are knowledge workers in a knowledge economy may find themselves, at different times and sometimes simultaneously, self-employed, working in an ad hoc network, or earning a salary with an organization. To be successful, they need to have a sense of how different aspects of knowledge management fit together as they guide their own career paths and find ways to add value to ad hoc and formal organizations.

In Western countries, an increasing proportion of the workforce is employed for their knowledge. That knowledge is for the most part up to individuals to acquire and maintain, and it is largely portable. It may be of content or process, tacit or explicit, general or particular, linear or relational, timeless or up to the minute. It is utilized by individuals working alone and in small groups or large organizations. Especially in the private sector, many knowledge workers are self-employed or members of ad hoc virtual or network organizations rather than permanent salaried employees.

The knowledge marketplace is not always a comfortable place for the individuals involved. They may suffer the disadvantages of insecurity and cost absorption which have traditionally been associated with the secondary labor market. The short term arrangements common today effect individuals differently. The same circumstances that provide flexibility and adventure for the young single professional may be highly stressful for someone with a family and a mortgage. These are important considerations: not only for the more independent knowledge worker, but also for the large and small organizations who outsource functions and contract for specialized talent and the networks which provide it. At a minimum, temporary and contract workers must have opportunities to keep their skills up to date to avoid depletion of the talent pool. If organizations are not offering the security of long term employment, other provisions must be made which do not simply download the costs of knowledge maintenance to those individuals least able to afford it.

The Value of Knowledge and Intellectual Capital

The value of an individual's knowledge and intellectual capital is difficult to measure because it is usually time and context specific. Individuals can and often do take a long term view. Some choices, like taking a liberal arts degree, may depress short term earnings but be beneficial in the long run. Others, like pursuing knowledge out of curiosity or for pleasure are their own reward although sometimes they also result in monetary gain. In addition, some knowledge isn't of measurable external value, like knowing how to keep emotionally and physically fit, but it makes whatever a person does more effective. It bears consideration in these days of short term work and talent banks

for individuals to assume conscious management of their personal intellectual assets. At the very least, individuals marketing themselves must know what they are selling to get a fair price and be able to assess the strengths they bring to a networked group.

Networks create value from a combination of content and people knowledge. They vary widely in the strength and permanence of their connections and the resources necessary to maintain them. Some have very informal structures and almost no independent assets. Others do nearly the same work as formal organizations but operate without more than one or two full time employees or big offices. Most are characterized by heavy reliance on electronic communication. The value of their intellectual capital is contingent on the match between the resources they can call upon and the needs of the marketplace.*

[*For the purposes of this paper, I'll assume that the network organization described is closer to the ad hoc project group than to the 'formal organization in all but real estate'. Skunkworks and temporary teams in large organizations often operate as networks and may share many of the same characteristics - including an absence of independent assets.]

Estimating the value of organization's knowledge and intellectual capital is not straightforward either. Some can account for substantial assets in the form of documented intellectual property such as patents, trademarks and copyrights, which can be legally protected. For others, their knowledge assets are in people, processes, infrastructure, customer knowledge and culture. Although some describe the value of an organization's intellectual capital in terms of the difference between book and market value - that assessment is necessarily an aggregate and provides little guidance on its management. Depending on the business environment, the values of long term investments and potential liabilities may not be apparent. Nor does the presence or absence of general strengths such as strong shared internal values necessarily make a difference until the organization hits a turbulent patch.

Integrating and Managing Knowledge

For most individuals, integrating and managing the knowledge and information needed to perform effectively is a challenge. You must learn to manage yourself and your formal and informal exchanges and interactions with others. This must be done in the context of your understanding of who you are: your goals, your capabilities, your knowledge of your own strengths and weaknesses; and your appreciation of your social, technical and business environments. Individuals must be able to engage in activities in different 'markets', keep them from interfering with each other, manage them together, focus an eye on the future, and assess their different aspects from the perspective of the 'big picture' of their whole life's narrative.

Networks and organizations also have the challenge of maintaining continuity and identity over time - sometimes with minimal infrastructure. They too must integrate and manage their knowledge and information and their exchanges with their environments to perform effectively. Continued viability depends on it.

The Viable System Model

This paper looks at the management of knowledge from the perspective of the individual, the network and the organization using Stafford Beer's Viable System Model. The VSM is a powerful descriptive and diagnostic tool to map management capacities to promote viability.

Management cybernetician Stafford Beer (1979, 81, 85) spent many years researching the necessary and sufficient conditions for a complex system to be viable. He determined that viability was maintained by engaging in different activities, keeping them from interfering with each other, managing them together, focusing on the future and doing so in the context of an identity within

which the interests of the whole over time could be considered. This is how the human nervous system works, and how successful collective enterprises work too. Many applications of the VSM have been undertaken, by Beer and others, in business, government, non-profit organizations and non-organizational systems. (Espejo and Harnden, 1985)

The VSM labels these management functions Systems One through Five, and they are repeated at different levels: the individual, the work group, and on to each successive category as long as it remains relevant. The only criterion is that the System One units must which these management functions support must produce something of value for the environment such that it could be, in its own right, a viable system.

The VSM has been used to both diagnose existing organizational structures and to design new ones. It also provides a useful template against which to consider alternative structures and new challenges the system is facing, like integrating its internal and its external knowledge or monitoring the evolution of its identity in a changing market.

Recursion

The repetition of the same patterns and relationships at different levels or scales is called recursion. It enables the same functions to be mapped up and down and compared for appropriate matches of attention, consistency and completeness. From the perspective of any particular level, it is possible to look up a level or down a level to see which information is key. Both individuals and organizations will be part of a number of systems at higher levels of recursion. Recursive levels of networks are fuzzier but may still be explored. Local networks are often part of national or international communities; networks which occupy market niches are embedded in larger market segments; and clusters of users of a specific technology may be linked to more generic user groups.
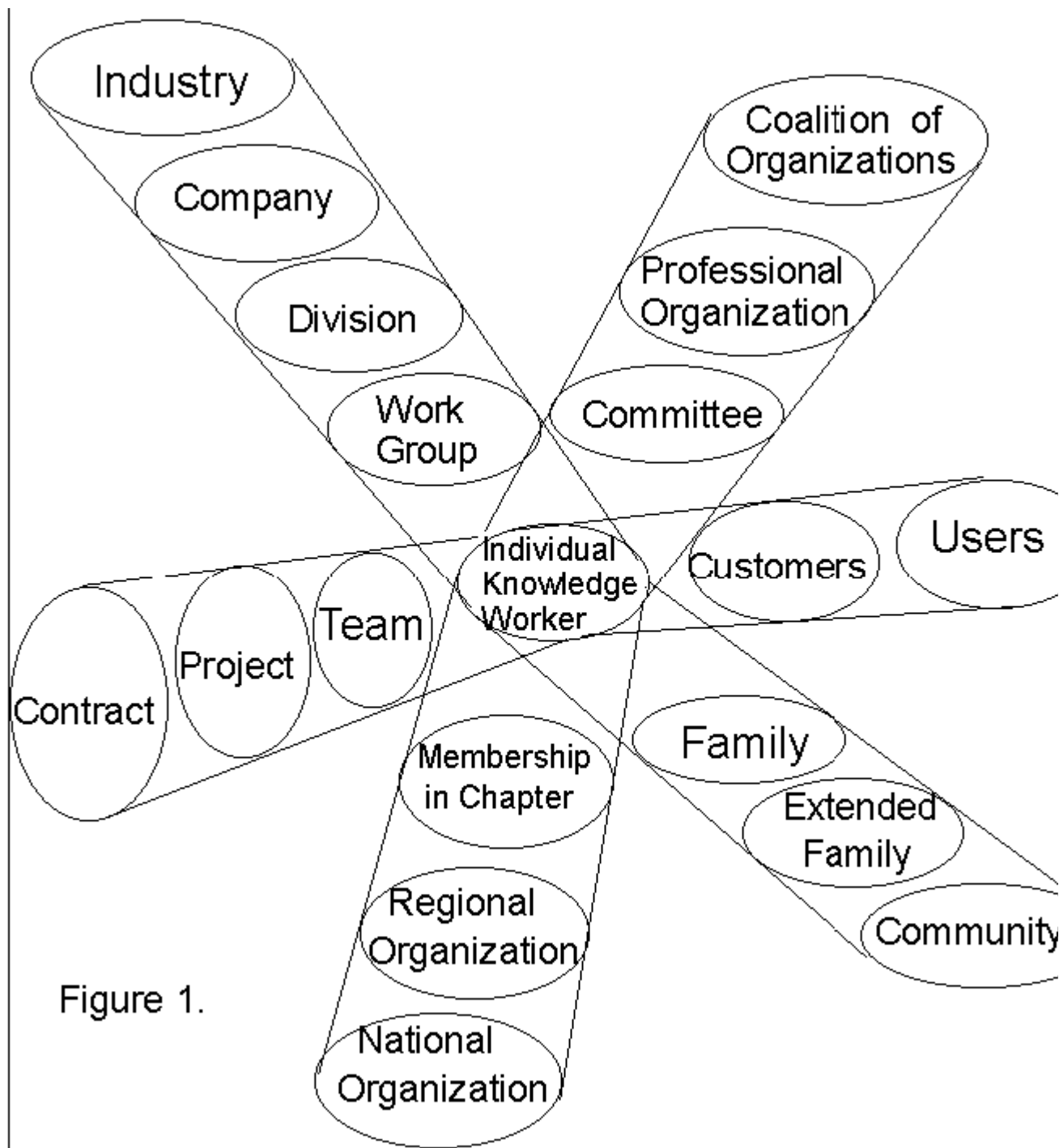
Figure One

A circle with radiating demarcated rays

Some recursive relationships, like government jurisdictions are neatly nested like a set of Russian dolls. Others, like coalitions or work teams have fluctuating boundaries. In each case, an identity is assumed which accepts some restraints on its autonomy in the interests of fitting into the larger system. Each also harmonizes the associated information and criteria of its different memberships - with more or less success.

People in any organization often have roles at more than one level of recursion. When this occurs, the same question may have different answers depending on the hat one is wearing. For example, a question about how extensively to document a process would depend on whether one's perspective is

serving today's customers or integrating product lines from several divisions. The history of a project might be useful to a wider group - or a subgroup - within the organization. Some processes might be standardized and marketed as products in their own right. Others might expose the whole organization to liability when assessed according to a wider range of users or conception of risk. The implications could span many levels of recursion but might not be obvious from any single perspective.

When using the Viable System Model, it is often helpful to consider one level of recursion as the 'system in focus' and to explore the levels of recursion immediately above and below it. This becomes especially useful as complexity increases in an organization with multiple projects, sites or divisions.

Knowledge Management and the Big Picture

The knowledge that individuals and organizations have of themselves provides the framework in which they choose alternatives from among a huge, often uncountable, range of possibilities. Typically, self-knowledge is mediated by the culture and language in which discussions take place and the extent to which it is possible to integrate various perspectives and models in order to act as a purposeful entity.

Large organizations which have gotten into trouble often have done so because they behaved as if their size and their ability to do anything meant they could do everything. Recent management thinking has focused on reining in this tendency: determining core competencies and focusing on them, understanding how culture and values maintain processes and practices, and learning to make behaviour throughout the organization coherent and consistent. (Prahalad and Hamel, 1990, Hammer and Champy, 1993)

Getting a handle on the social and technical resources of knowledge in the organization is a necessary step. Certainly knowledge management is a big picture issue. Just as certainly, deficiencies here expose the organization to the risk of not recognizing opportunities or threats. If it is not known where knowledge assets are and how they are being utilized, much of their potential value may be wasted.

The Concept of Variety

In the language of cybernetics, issues of knowledge management are regarded as problems of handling variety. If there is enough regulatory capability in a control function to manage a situation we say that it has 'requisite variety'. Or, as cybernetician Ross Ashby (1964) put it, "Only variety can absorb variety". If there is not, the situation will be out of control and unintended effects will arise unless the surrounding circumstances are very forgiving. Sometimes control can be introduced simply, such as in the convention of driving on one side of the road and obeying traffic signals. Other situations, such as the management of hazardous or unstable materials, require complex control systems.

Since there is usually too much knowledge and information residing in too many heads and archives to be comprehended without some roadmaps, a filtering function is also necessary. Management needs filters to select what is important from the mountain of available information and models to expand their ability to understand and use it.

The Viable System Model and Variety

The VSM addresses the variety implicit in a management situation from two angles. The first is the horizontal relationship depicted as the link between the environment of customers et al with the productive operation and its direct management. The second is a vertical link which connects the

management of the unit with that of the larger organization. Beer has indicated that these two tend to equate - although not always optimally.

Vertical communications reduce the autonomy of component parts by constraining their conversations and transactions or overriding the application of lower level 'on the ground knowledge' for the good of the larger system. Some common purposes are satisfied if everyone is moving in the same general direction in their own way. Others require close cooperation and tight scheduling to succeed. Still others are subject to higher levels of control because of the safety and security considerations of what they do or the risk to the larger system or the environment if things go wrong. Both horizontal and vertical communications channels are used for formal and informal conversations and transactions.

Viability is enhanced when the ground level operations have the maximum amount of autonomy consistent with their purposes because any intervention from above sacrifices some of the variety which the lower level can use. To justify intervention, there need to be good reasons for incurring the opportunity costs of not fully utilizing the lower level's greater familiarity with the immediate situation.

Second, the Viable System Model distinguishes among five types of management work along the vertical lines and the voices associated with each. Some constraints seek the most effective way of meeting routine requirements or deploying common resources. Others are aimed at getting the most synergy out of their combined strengths, at preparing for the future, or at finding answers to questions about their goals and adopting policies to implement them.

It is important that the VSM management structure not be considered as a version of the traditional organization chart which indicates individuals and their formal connections to one another. On the contrary, what is distinguished is not the individuals themselves but the roles they are playing in particular exchanges. It is rare that a person would play only a single role even in a traditional hierarchical organization; rarer still in the flatter more networked structures common today. Individuals may also play messenger roles or have different functions at different levels of recursion.

The VSM provides a framework for looking at the activities supporting different kinds of knowledge and intellectual capital and where they are used. It may help people to discuss their different models, frameworks, and assumptions and to integrate different kinds of local knowledge. In some circumstances the VSM has been used as a structure for mapping the harmony, and the discord, of the voices of multiple stakeholders.

We will begin by stepping through the five functions of the VSM and noting the sorts of intellectual capital associated with each and the activities that support them. Although the structure of the Viable System Model may be used to study any complex system from an individual human being to a country, this article will focus on the management of information by individuals in a knowledge organization whether they are operating as individual practitioners in an environment of clients and colleagues, in a network or in a large formal organization.

System One

Management of any kind repays its investment by the value it adds to the transactions between the operation and its environment of customers. The operation tries to match the variety of its customers with products and services they find useful. It makes offers and modifies them based on market response. Management (whether it is exercised by an individual, a self-managed team or someone called 'a manager') tries to guide and improve the effectiveness of this exchange. There is a lot more variety in the environment than the operation needs to know about and a lot more variety in operations than management needs to address. Efficient operations and managers develop skills to select the information they need and ignore the rest while remaining alert to signs of change and

incipient instability.

Customer (or client) knowledge is a very important aspect of the knowledge an individual practitioner, a small group or an organization must integrate and manage. It includes both general knowledge based on demographics, markets and preferences; and specific confidential information about who bought what for how much and what they liked or complained about. This information is crucial to attract and retain customers as there are fewer and fewer instances of captive markets left, even in the provision of public services. Customer knowledge also contributes to improving the speed to market of new or modified products - a major competitive advantage.

Its a dynamic situation wherever it occurs. Individual practitioners and private, public and voluntary operations all engage in iterative exchanges with their environments, seeking information from contractors, suppliers, competitors, outside experts and others as well as from their past, current and potential customers. They vary their activities on the basis of this information and evaluate whether the desired results were obtained.

It is worth noting that the boundary between an operation and its environment is often fuzzy or shifting. Customers or suppliers are brought in to contribute to redesign, sales people take on the role of brokers, and collaboration takes place between those providing different products to the same clients. Sometimes contractors take responsibility for internal functions central to the organization's activities. When there are joint ventures and partnerships, large organizations take on some of the characteristics of individuals and small groups. They network, assemble skills on an as needed basis and operate with a minimum of hierarchy. Often, these exchanges lead to joint learning and a shared sense of meaning or significance among the parties. But, it doesn't always work. Unless the organizations involved maintain an attitude of openness and some flexibility in their intended outcomes, they are not likely to obtain the benefits from joint ventures that they intend. (Inkpen, 1996)

Substantial operational knowledge lies in how to perform the processes by which work gets done. Much is tacit knowledge gained through the experience of using the process in new circumstances and learning how to solve problems as they arise. This knowledge is shared mainly by watching and trying it. Some processes are measured and documented in the course of preparing training courses or qualifying for ISO certification, thus rendering tacit knowledge explicit. But, it is difficult to make such documentation complete - especially when judgment is required or where a new problem might be faced.
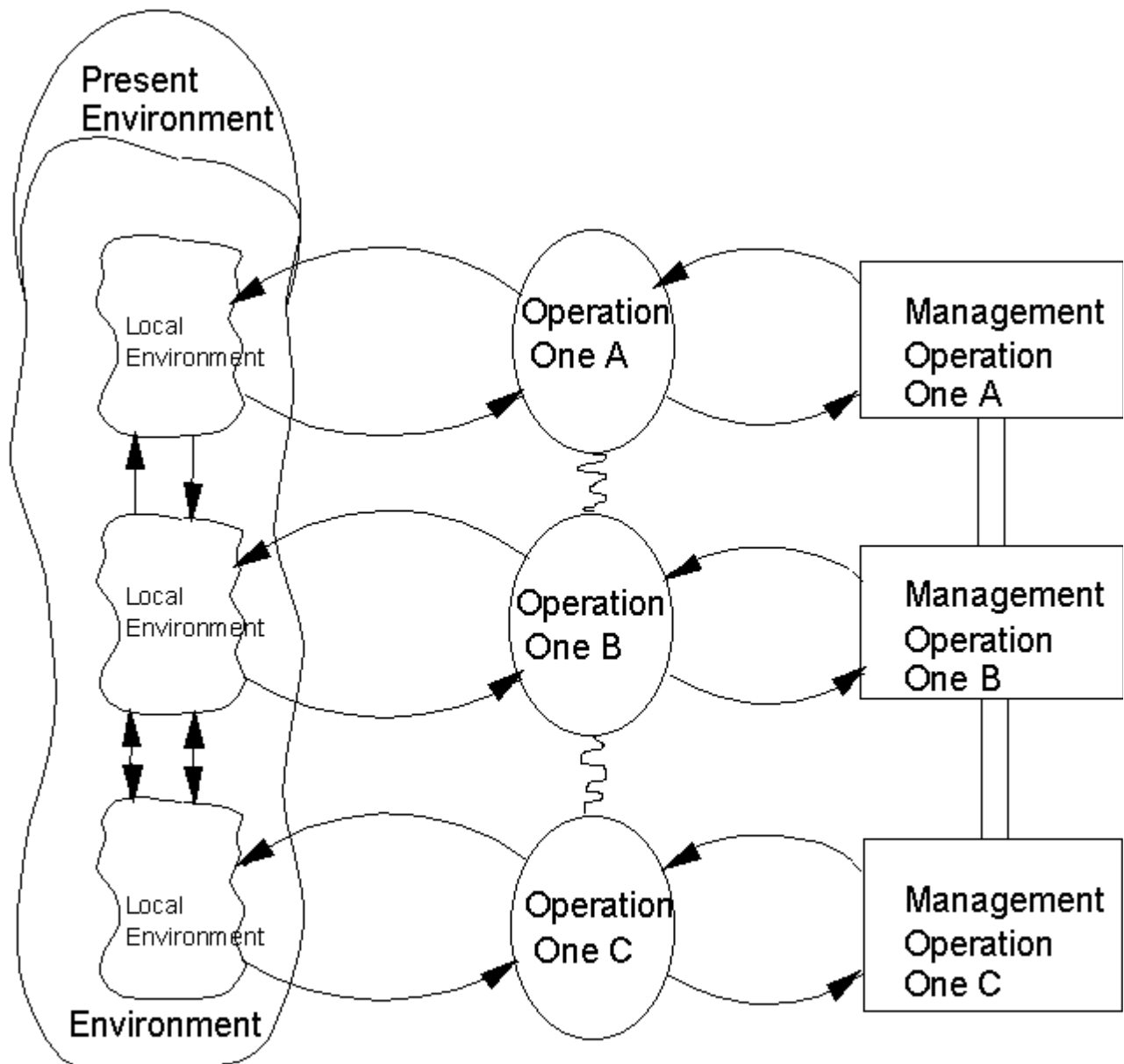
Figure Two

System One units and their environment with their communications connections

Different projects taken on by individuals or small groups and different operations at the same level within the organization also benefit from sharing knowledge and information. Their conversations enhance the pictures they have of themselves and each other. These operations often learn from one another as they may have processes, technology and customers in common or work in vertically integrated product chains. Some communications are formal, such as 'communities of practice'. Others are informal conversations between individuals at the water cooler or over e-mail. They are enhanced by an appreciation of diversity, openness and an atmosphere of trust. Conversely, they are constrained by groupthink, internal competition, intolerance of failures and high levels of risk aversion.

In addition to their horizontally focused efforts of looking for ways to entrench best practices and facilitate communications with the environment, the management of operations attends to vertical communications which engage in resource bargains with those acting on behalf of the whole. They

indicate where they are running into glitches or potentials for collaboration with other System One units, tag anomalies and send bottom-up signals about threats or opportunities. They may also request a consistency check from a more comprehensive perspective, or from someone one step removed from the situation.

Organizations of any size, (and even individuals) can utilize the notion of dividing their operations into different System One units. With an individual or a small team, the division could be by clients, by projects or even concurrent components of projects. In a larger group, distinctions might be made on the basis of types of customers or users, technology, language, problem focus, product cycle time, distribution channel or pricing structure. Although each of these distinctions is primarily information based, other criteria, such as geography or season of use, may be appropriate. Different distinctions highlight different considerations as well as different (and sometimes conflicting) criteria of success.

System Two

System Two provides a very specific type of regulation. It exists to damp oscillations among different system one units and to coordinate their activities. Much of System Two's work is focused on implementing decisions about common services and resources as smoothly as possible. The decisions may have been made among different System One units or by higher levels in the organization.

One of System Two's major tasks is keeping track of the information on hand. Proprietary and non-proprietary knowledge, skills and information need to be accessible to be used. Individuals rely on manual and computerized filing systems, diaries, calendars, address books and chequebooks to keep their information in order. They back up their files, hold on to their software manuals and save tax receipts. They practice their skills or keep up with their fields to maintain their capacities. Although individuals find it time-consuming to keep themselves organized (all this takes time, they lose phone numbers...), they seldom have trouble understanding how their different information systems fit with each other and with the other System Two activities that maintain their physical fitness, restock their refrigerators, etc.

A large portion of a network's infrastructure is likely to be devoted to maintaining its communications and store of 'self-knowledge'. Formally, System Two will concentrate on schedules, protocols and maintaining the accouterments of identity such as web sites and brochures. It may also attend to certifications and licenses. Networks also draw upon the individual System Two functions of their members for much of their coordination.

Organizations have a much bigger challenge because these functions are disbursed; their procedures may not be compatible and the volume and variety of their transactions is much greater. The library, personnel files, accounts, order books, customer histories, procurement records and the documentation of their IT infrastructure are all part of the knowledge any organization needs to manage and integrate. The choices made here reflect policy, but are not themselves policy decisions. Enough consistency must be provided to prevent glitches between the System One activities or the different System Two coordinating functions.

Handling the computer/communications function is one area where the experiences of the individual practitioner, the network and the large organization are parallel. More often than not any upgrade to either software or hardware sends destabilizing ripples all through the system. Should installing an upgrade of a communications package shut down the printer and deactivate the word processor? Of course not, but... System Two is kept busy!

It is crucial for organizations whose products are predominantly in the knowledge area to provide for appropriate documentation and accessibility of patents and patent applications, qualifications of professional and technical workers, results of market research, specific customer information, project

reports, responses to requests for proposals and think pieces about market opportunities. It is also important that mechanisms exist for disseminating information so that knowledge and best practices are shared as a matter of routine.

Many of these documents contain proprietary information with controlled levels of access for different individuals and purposes. Limiting access to control risk and for security and the protection of confidentiality are familiar issues. An appreciation of the dangers of variety overload suggests others. Individuals can be overwhelmed by too much or insufficiently filtered information, and small groups need to keep a fence around their conversations until they have reached an understanding among themselves.

Since much of the knowledge on which an organization depends goes home in the evening, the personnel information is crucial to knowledge management. Standard personnel files may be augmented by a skills bank where it is possible to search resumes and other information people have provided on a demand basis. It may be a substantial advantage to find someone quickly who worked on Project Acme five years ago, who can read an order written in a foreign language or who has a specific professional certification. If there are no internal resources or there is a need for more sustained effort, parallel records of contractors and consultants fulfill a similar function. The System Two human resources functions also include means to smooth the disruptions caused by staff turnover.

Human resources, knowledge resources, infrastructure and good will are as much a part of inventory today as stocks of raw materials, equipment and finished goods. Like these, they require maintenance to assure that when they are needed they will be ready to hand and ready to go.

System Three

System Three is where the decisions about the day to day running of affairs are made. Its role is to say what the distribution of resources should be among the component System One parts given that it is THIS mix of activities and not another. Individuals, networks and organizations all make choices about how they divide time, attention and money among their different priorities. They also try to find synergy among activities where they can. Individuals may be inclined to call it trying to kill two birds with one stone.

Much of the variety attenuation exercised by System Three takes place in the resource bargains struck with the System One units. Such arrangements set boundaries based on a resources-for-results exchange. The terms of this agreement substantially narrow the variety available to the operation. Within this accountability relationship, the operation should be able to draw on its full measure of variety and retain substantial autonomy. System Three's resource bargaining with the System One units is frequently conducted in real time as adjustments are made to changing conditions.

Legal considerations are among System Three functions most applicable to knowledge management. This includes protection of intellectual (and other) property by designing control systems and the whole structure of patent processing, testing, contract compliance, monitoring adherence to safety regulations, and confidentiality protection.

System Three oversees the procedures which are implemented through System Two and is alert to new sources of oscillation which may arise.

System Three also exercises a command function; making executive decisions and relaying requirements from more comprehensive levels such as laws and regulations imposed by outside authorities. Large organizations are well advised to use this channel only when none of the others will do. The command function is implicit for individuals and networks and is usually focused on compliance and meeting external constraints.

System Three for the networked organization is likely to be focused on contract negotiation and compliance and on the resource bargains between different projects and subgroups. Registering patents and copyrights, the establishment and payment of royalties and coordinated sales functions are other System Three activities which may apply to networks.

Individuals concentrate their System Three functions on balancing the demands of and synergy between the different aspects of their work and life. They also attend to legal matters of contract compliance and patent and copyright registration. Indeed, individuals often hold the copyrights on published material and other creative products and innovations they develop unless they have produced them under contract to an organization.

System Three Star

System Three has a special function called Three Star which is an audit function to monitor various aspects of the accountability relations between System Three and the System One units. It provides assurances that budgets and financial information, internal control, quality, safety standards, and other particulars are in order. It also provides a means to 'mop up' extra variety with sporadic or one-off investigations such as reviewing the status of the patents held by a company to see which ones are not being fully exploited and therefore could be sold or licensed to others.

System Three Star has a big role to play when both the product and the means of producing it are substantially knowledge based. As is the case with a tangible asset, auditing intellectual capital involves establishing its existence, its ownership and its value. Such assets may be hard and well documented, such as patents, or soft, such as organizational capabilities and the skills of its knowledge workers.

Those auditing intellectual capital will often find themselves looking at processes of internal control rather than specific transactions. Are there means of capturing knowledge gained in one project for use in the next? If a piece of information or a special skill is needed, how long does it take to establish its location and condition? Is the infrastructure relied upon by the System One units adequate to the tasks of day to day communications? Are the mechanisms set in place by System Two working properly? Are the resource bargains made by System Three satisfactory? Are the questions asked by System Four with respect to present knowledge needed to make future plans being answered? Are risks to reputation and identity being monitored on behalf of System Five? Among the specific items System 3 Star might monitor are the status of patents and copyrights, quality control procedures, information technology usage, including e-mail security, accuracy of skill bank information, and the state of the organization's infrastructure.
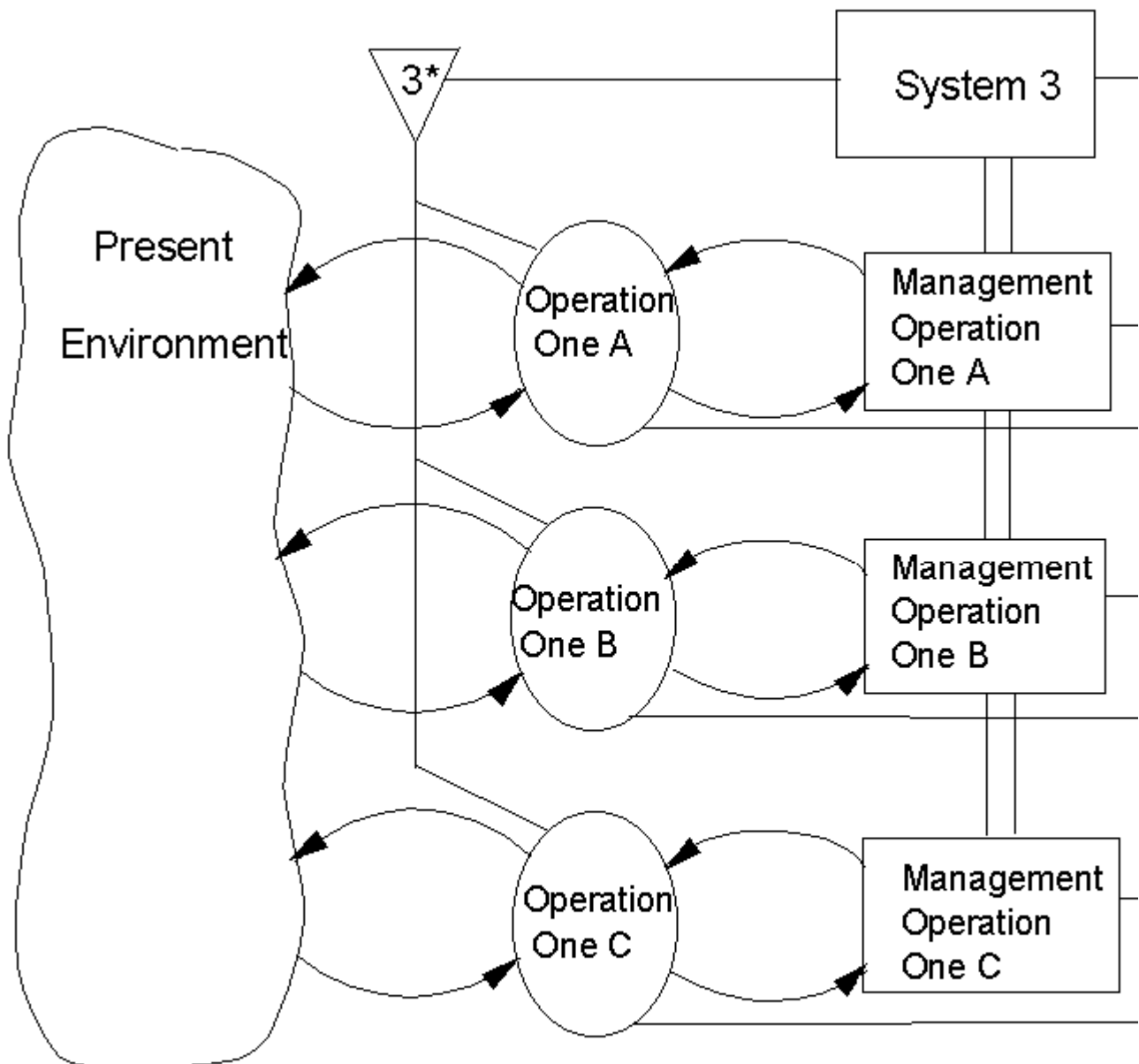
Figure Three

Repeat of the System One units with blocks added to show the work of Systems Two, Three and Three Star

A networked organization needs a System Three Star function to monitor and allocate its resources but must be able to do so without the overhead resources, or indeed the authority, of the formal organization. Its variety mop-up must depend on cooperation and consensus. As the networked organization tends to be a shifting collection of people with special and complementary skills, its boundaries will be porous and its picture of itself will be continually evolving. System Three Star's challenge is focused on checking connections and making sure that information lags and communications failures do not occur.

System Three Star may also assume a role as a monitor and guarantor of quality although most of this function will be exercised informally at the operational level.

Although there are cases where individuals must prepare for recertification by an outside agency periodically, individuals perform most System 3* functions informally. These include matters such as evaluating whether computer and communications equipment is up to par, checking on environmental hazards and security arrangements or performing self-assessment exercises. It may be helpful for an individual to find a friend or colleague in similar circumstances with whom to debrief and compare notes.

System Four

System Four brings together all the functions which look to the future and must be in communication with each other. It is especially active among knowledge workers in knowledge companies because their product cycles are often short and their environments turbulent. A focus on the future is essential to the management of intellectual capital; the people and their perspectives must be integrated as well as the infrastructure, market knowledge and innovations in processes and products.

System Four's human capital work includes sponsoring the learning and development required to keep up with events, planning for recruitment and succession to support strategic plans and making sure there is a social and physical environment conducive to making the necessary connections. Conversations between people inside the organization with customers and suppliers in its environment are crucial to sensing trends and emerging needs.
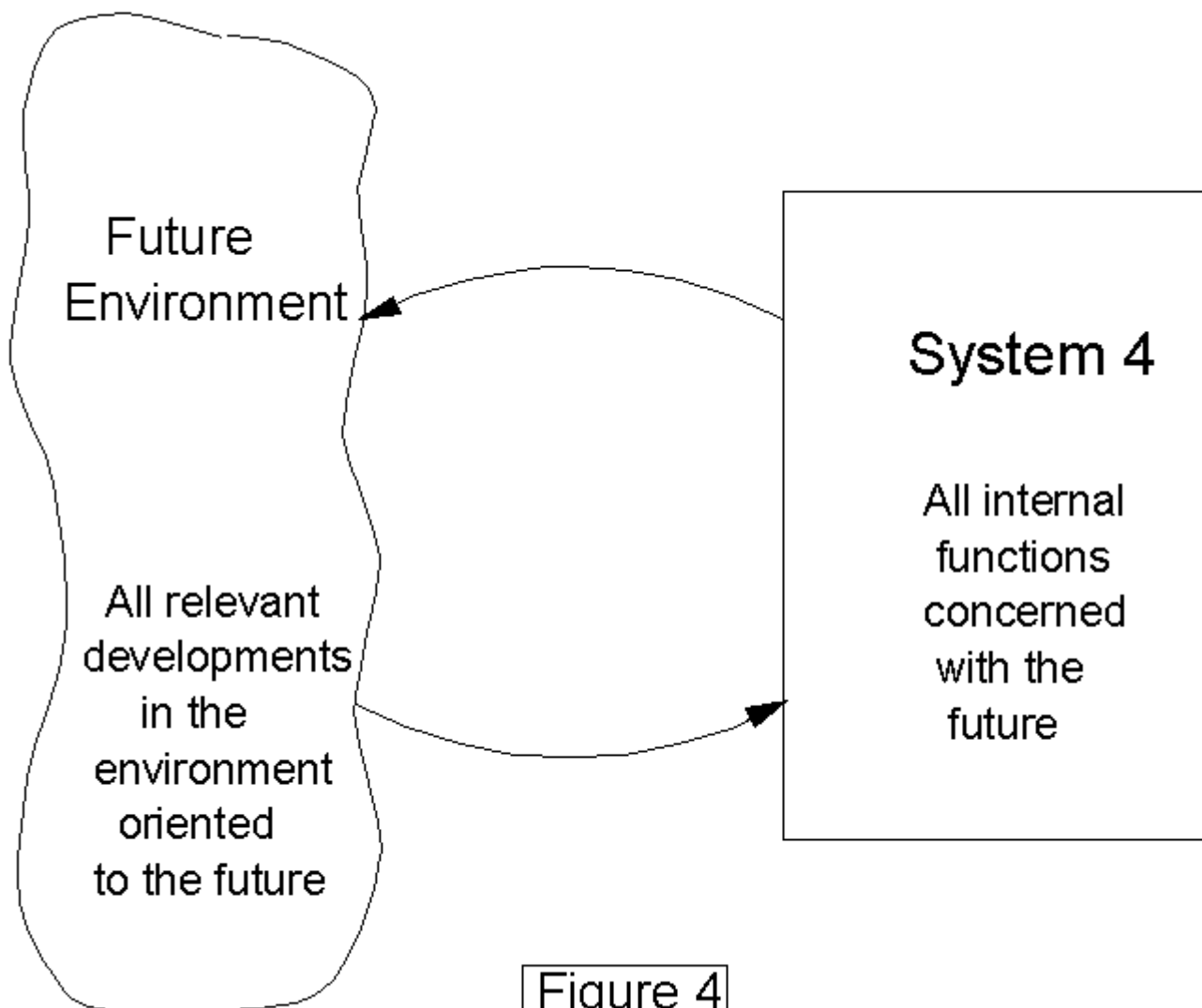

Future Environment

All relevant developments in the environment oriented to the future

System 4

All internal functions concerned with the future

Figure 4

System Four with its interacting parts and the future environment it probes

The research and development to prepare the first product in many knowledge organizations incurs high costs, while the cost of their subsequent replication or manufacture is minimal. This is true with pharmaceutical products, computer chips, and all the information and entertainment products sold on CD-ROM, disks and tape. It is also true of the information 'service' industries including publishing, advertising and public relations, and consultancy.

System Four may also engage in simulations and explore different risk scenarios. It must take a proactive view of the protection of intellectual property and the conversion of intellectual capital to intellectual property because the legal infrastructure is in the process of development and therefore does not yet have requisite variety.

Networked organizations may get together from time to time with their customers to see how their preferences are changing or for planning purposes but will probably rely mainly on their members efforts as individuals to provide them with information about and options for the future. Sometimes, networks come together to provide training for their current members or to bring new members on board. They may attend conferences together or sponsor a booth at a trade show. Some networks begin to edge toward the characteristics of formal organizations and jointly engage market research or a project manager.

Individual System Four activities include marketing themselves, pursuing their personal learning and self-development objectives, cultivating their relationships and networks and the various formal and informal means they use to acquire new knowledge and skills. This often involves travel, attending conferences, participating in workshops and extensive reading. It is also likely to include the pursuit of broader personal goals with family and friends or in solitude. The time frame for individual System Four exploration varies from the next week or the next contract to ten or twenty year plans.

The Three/Four Homeostat

Individuals, networks and organizations must maintain a balance between their activities in the present and those oriented toward the future. In knowledge-based fields, this balance is likely to be tilted more toward the future than it is with manufacturing organizations. A homeostat, such as the furnace thermostat, keeps a variable within acceptable limits. In the VSM, the function of the Three/Four homeostat is to maintain the right balance between present and future attention for each situation.

One of the challenges of this balance for organizations is to transfer innovations from the staff of System Four where they originate to the line managers who will implement them. Frequent informal meetings supplemented by periodic in depth opportunities for Systems Three and Four to become familiar with one another's perspectives are necessary.

Beer's Team Syntegrity process (Beer 1994) is an example of a process which facilitates the information exchange between Systems Three and Four. In a Syntegration (TM) eighteen to thirty people spend 3 to 5 days together sharing explicit and tacit knowledge. The process begins with a free floating exchange of ideas. These are narrowed down to twelve selected topics and three sets of meetings on each are held. The Syntegration proceeds according to a strict schedule. and protocol. The process draws upon geometry, graph theory, neurophysiology and communications theory to attain a 90%+ sharing of information among participants. A Syntegration utilizes the three dimensional figure of the icosahedron to organize discussions. The twelve topics are represented by the vertices; and the thirty people by the edges. This provides a non-hierarchical discussion structure in which everyone plays an equivalent role. The process is useful whenever there is a complex situation and a need to integrate multiple perspectives.
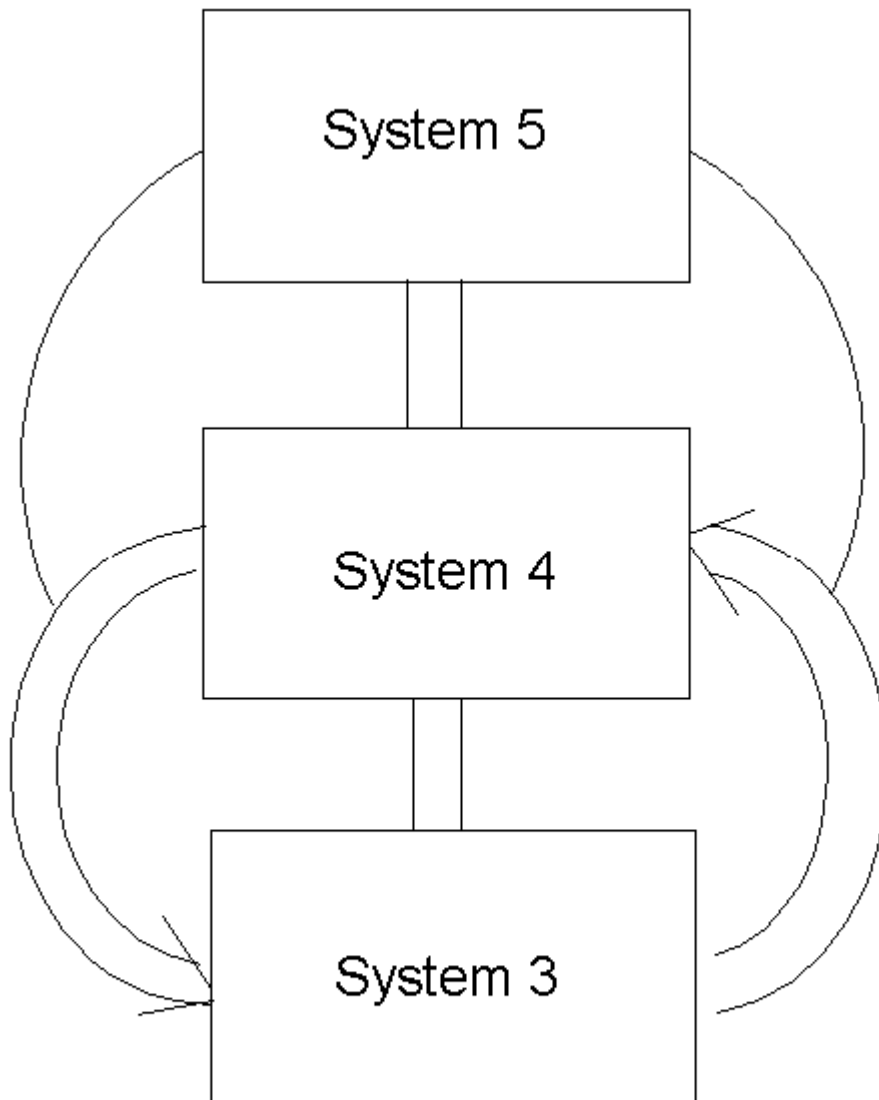
Figure 5

Syntegrity Icosahedron

System Five

In a knowledge organization, System Five's functions include setting context, building and maintaining identity, fostering coherence and providing closure to internal dialogues. Without a framework of meaning, data and information are only potentially valuable. System Five's role in monitoring the homeostatic balance between the activities of System Three and System Four is also important as the optimum balance point tends to fluctuate over time.

The general and specific manifestations of individual, network and organizational culture also reside in System Five. One specific example is the reward system. Perhaps nothing is more damaging to an environment of shared knowledge than a reward system which gives no credit for building on a predecessor's work. While not all new executives immediately kill off existing projects like lions taking over a new pride, many will let them starve to death with the attendant loss of information, value and morale unless there are sufficient resources both to build on existing initiatives and to begin new ones. Shooting messengers is another destructive process. Unless bad news can be

delivered in safety, the chances are that it won't be delivered - at least in time to correct a problem when it is manageable. In the quality area, broad management support has shifted the focus of problem solving in manufacturing and service delivery to as close to source as possible and regarding error patterns as opportunities for redesign. Acceptance of this culture in knowledge management must come from values internalized in and promulgated by System Five.

Culture and identity are powerful and necessary attenuators of variety for individuals, networks and organizations. A certain amount of 'self' knowledge is required to be able to say THIS opportunity is one to pursue and THAT is not. It provides the focus without which it is not possible to choose and follow a direction. An individual, a network or an organization can have conflicting priorities and multiple internal voices which arise from history of their past experiences, their relationships, the social, business and economic environment in which they exist, their age or level of development... They may all reflect legitimate concerns. Somehow, though, all of this needs to be integrated into a coherent whole so that efforts can be marshaled and goals attained. The dominant attitude toward personal and organizational learning set in System Five may determine which lessons are learned and which don't even appear on the radar.

The Viable System Model includes a special alarm signal to alert System Five to a threat or opportunity which has implications for the whole. It signals the need for rapid response and can come from any part of the system at any level of recursion. It is called the algedonic, or pain/pleasure, signal and is comparable to the response which pulls away from touching a hot stove or reaches out to catch 'the brass ring'.
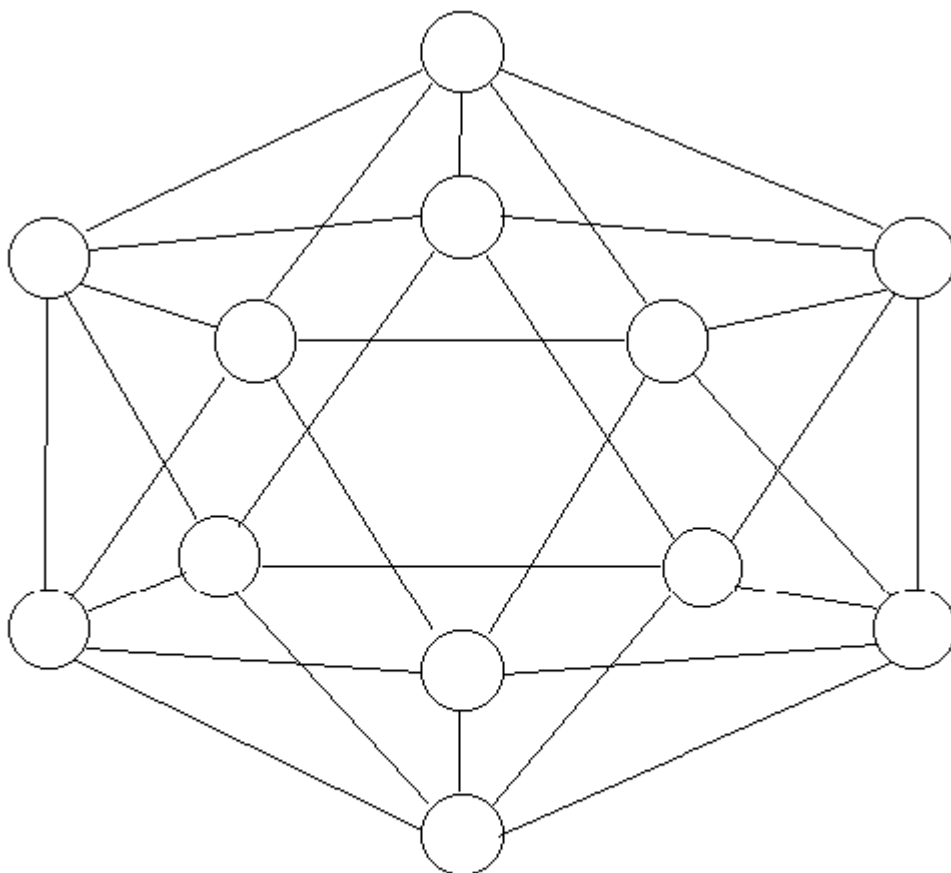

Figure 6

Systems Three, Four and Five showing System Five monitoring the homeostatic loop between Three and Four

System Five of a network may be more implicit than explicit and may evolve with changes in membership or trends in project work. Personal relationships among members of a network determine its identity and coherence to a considerable extent as network affiliation is largely voluntary and must advance the aims of its members. Vibrant networks are likely to include some rituals, like an annual retreat or social events to top-up their sense of identity and link up individuals who may not be currently working on projects together.

The individual knowledge worker's System Five will be a balance between their identities as whole individuals and the sum total of their personal, civic and occupational affiliations. Individual knowledge workers should engage in periodic reflection and review of their goals in the context of changes in their internal and external environments. They consider the balance between their System Three and Four activities and the affiliations they have with groups at higher levels of recursion. Their viability as autonomous knowledge workers depends upon exercising this responsibility on their own behalf.

Figure Seven
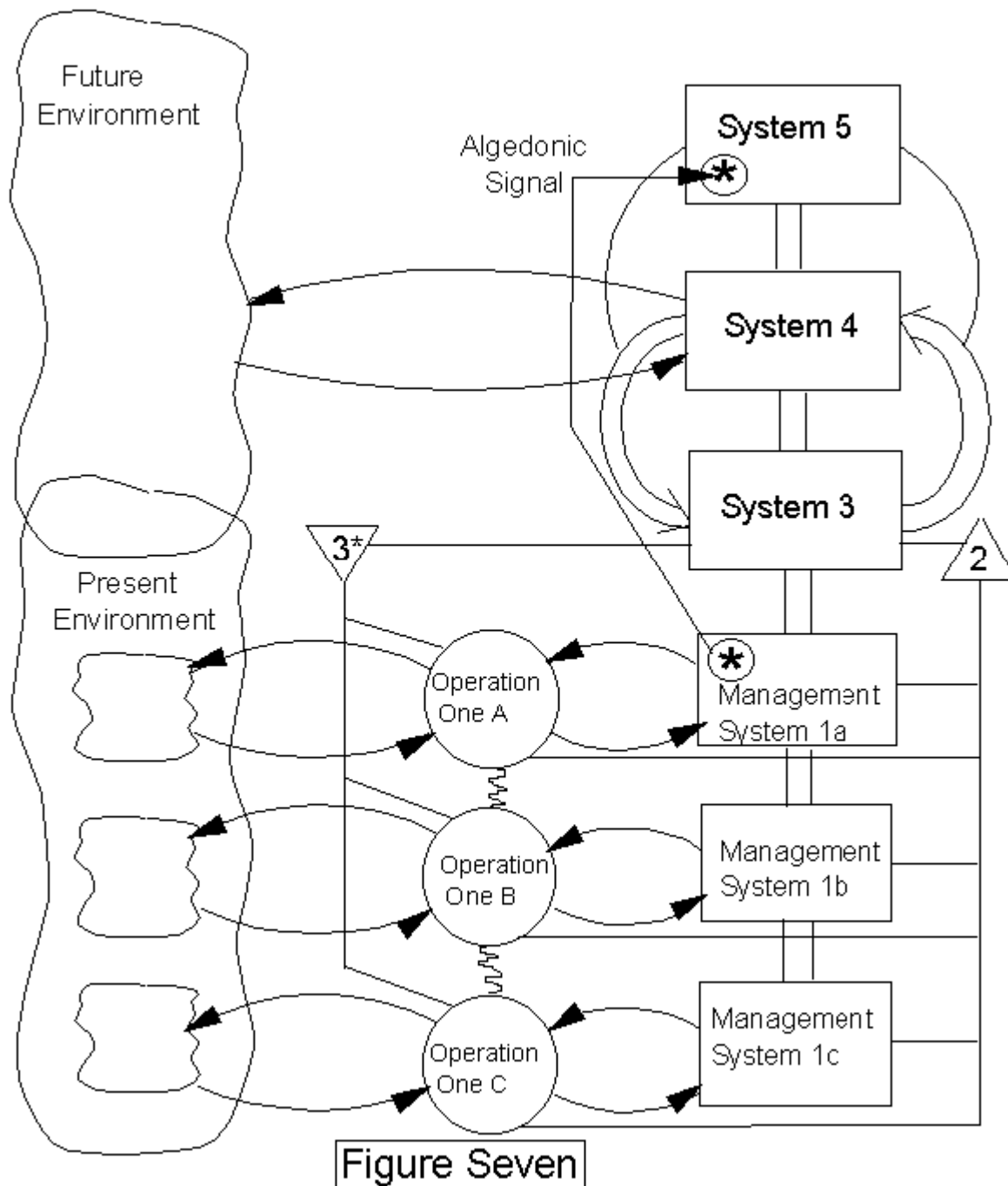
Whole VSM with notes of where functions of knowledge management fit

Taken together, the five management functions of the VSM include most of the aspects of intellectual capital and knowledge management which must be considered and managed as a whole by organizations, networks and individuals. It helps to balance the attention to detail with attention to relationships and integration of parts into the whole. The recursive structure of the VSM allows for these relationships to be followed and compared through all the levels which are affected by particular activities and decisions. For example, can the documentation conventions established by System Two at one level be accessed by others? Or, does the scenario building which occurs in System Four take into account the pictures of the future held one level up or down in the organization? Each of the five management functions can (and probably should) have at least a general knowledge of how their counterparts are proceeding. This enhances their coordination and is likely to reveal if there are any gaps or duplications. Finally, attention to the variety of the VSM's functions and communications channels increases the likelihood that the system will perceive and be

able to act on circumstances which could have an impact on its viability.

Conclusion

Organizations, networks and individuals are all faced with the need to constantly reinvent themselves to adapt to their environments. Those participating in knowledge industries or performing knowledge work do so with shorter time cycles and higher risks if they cannot mobilize what they know and see what they need to take the next step. Probably no personal, network or organizational set of assets is as ineffectively deployed as its knowledge and intellectual capital. It leads to massive waste of tangible and intangible resources and sometimes to disaster. Making improvements in the distribution and management of knowledge is probably the greatest source of untapped value and security available to any organization, network or individual. But, it must include improvements in the relations among parts as well as within them because knowledge management is a whole system issue. Whatever our role in knowledge management, we can all benefit from improving the appreciation of how our role fits with those of others. The process begins with individuals taking responsibility for their places in the knowledge economy and thinking through their ability to exercise autonomy and control over their the use of their productive capacities. This could improve the transparency and understanding of the implications of different choices about transactions in the knowledge economy and highlight the issues where social, political and commercial interests intersect.

Using the Viable System Model provides an effective tool to bring together and discuss all the aspects of knowledge management relevant to an organization, a network or an individual and to model them dynamically over time. Practitioners will also find it helpful as a generalized framework from which to explore how perspectives on knowledge management vary depending on individual, network and organizational contexts and what direction future developments might take.

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