Social Computing:
Concepts, Methodologies, Tools, and Applications

Subhasish Dasgupta
George Washington University, USA

Volume IV

Chapter 7.16

The Generative Potential of Appreciative Inquiry as an Essential Social Dimension of the Semantic Web

Kam Hou Vat
Faculty of Science and Technology, University of Macau, Macau

ABSTRACT

The mission of this chapter is to present a framework of ideas concerning the expected form of knowledge sharing over the emerging Semantic Web. Of specific interest is the perspective of appreciative inquiry, which should accommodate the creation of some appreciative knowledge environments (AKE) based on the peculiar organizational concerns that would encourage or better institutionalize knowledge work among people of interest in an organization. The AKE idea is extensible to the building of virtual communities of practice (CoP) whose meta-data requirements have been so much facilitated in today's Web technologies including the ideas of data ownership, software as services, and the socialization and co-creation of content, and it is increasingly visible that the AKE model of knowledge sharing is compatible for the need of virtual collaboration in today's knowledge-centric organizations. The author's investigation should provide a basis to think about the social dimension of today's Semantic Web, in view of the genera-tive potential of various appreciative processes of knowledge sharing among communities of practice distributed throughout an organization.

INTRODUCTION

In the late 20th century, Tim Berners-Lee (1999) had the idea of providing rapid, electronic access to the online technical documents created by the world's high-energy physics laboratories. He sought to make it easier for physicists to access their distributed literature from a range of research centers scattered around the world. In the process, he laid the foundation for the World Wide Web. Berners-Lee has a two-part vision for the working of the World Wide Web (http://public.web.cern.ch/Public/Welcome.html). The first is to make the Web a more collaborative medium. The second is to make the Web understandable and thus serviceable by machines. Yet, it was not his intention that some-day his idea to link technical reports via hypertext then has actually revolutionized essential aspects of human communication and social interaction. Today, the Web provides a dazzling array of infor-

mation services designed for use by human, and has become an ingrained part of our lives. There is another Web coming, however, where online information will be accessed by intelligent agents that will be able to reason about that information and communicate their conclusions in ways that we can only begin to dream about. This is the Semantic Web (Berners-Lee, Hendler, & Lassila, 2001; Berners-Lee, 1998a, 1998b, 1998c; http://www.SemanticWeb.org), representing the next stage in the evolution of communication of human knowledge. The developers of this new technology have no way of envisioning the ultimate ramifications of their work. Still, they are convinced that "creating the ability to capture knowledge in machine understandable form, to publish that knowledge online, to develop agents that can integrate that knowledge and reason about it, and to communicate the results both to people and to other agents, will do nothing short of revolutionize the way people disseminate and utilize information" (Musen, 2006, pp. xii). This article is meant to provide a strategic view and understanding of the Semantic Web, including its attendant technologies. In particular, our discussion situates on an organization's concerns as to how to take advantages of the Semantic Web technologies, by focusing on such specific areas as: diagnosing the problems of information management, providing an architectural vision for the organization, and steering an organization to reap the rewards of the Semantic Web technologies. Of interest here is the introduction of the appreciative context of organizational systems development based on the philosophy of appreciative inquiry (Cooperrider, 1986; Gregen, 1990), a methodology that takes the idea of social construction of reality to its positive extreme especially with its relational ways of knowing.

THE TECHNOLOGICAL BACKGROUND OF SEMANTIC WEB

Most of today's Web content is suitable for human understanding. Typical uses of the Web involve people's seeking and making use of information, searching for and getting in touch with other people, reviewing catalogs of online stores and ordering products by filling out forms, as well as viewing the confirmation. The main tool of concerns is the search engine (Belew, 2000), with its key-word search capability. Interestingly, despite much improvement in search engine technology, the difficulty remains; namely, it is the person who must browse selected documents to extract the information he or she is looking for. That is, there is not much support for retrieving the information, which is a very time-consuming activity. The main obstacle to providing better support to Web users is the non-machine-serviceable nature of Web content (Antoniou & van Harmelen, 2004); namely, when it comes to interpreting sentences and extracting useful information for users, the capabilities of current software are still very limited. One possible solution to this problem is to represent Web content in a form that is more readily machine-processable and to use intelligent techniques (Hendler, 2001) to take advantage of these representations. In other words, it is not necessary for intelligent agents to understand information; it is sufficient for them to process information effectively. This plan of Web revolution is exactly the initiative behind the Semantic Web, recommended by Tim Berners-Lee (1999), the very person who invented the World Wide Web in the late 1980s. Tim expects from this initiative the realization of his original vision of the Web, i.e. the meaning of information should play a far more important role than it does in today's Web. Still, how do we create a Web of data that machines can process? According to Daconta and others (2003), the first step is a paradigm shift in the way we think about data. Traditionally, data has been locked away in proprietary applications,

and it was seen as secondary to the act of processing data. The path to machine-processable data is to make the data progressively smarter, through explicit metadata support (Tozer, 1999). Roughly, there are four stages in this smart data continuum (Daconta, Obrst, & Smith, 2003), comprising the pre-XML stage, the XML stage, the taxonomies stage, and the ontologies stage. In the pre-XML stage where most data in the form of texts and databases, is often proprietary to an application, there is not much smartness that can be added to the data. In the XML stage where data is enabled to be application independent in a specific domain, we start to see data moving smartly between applications. In the third stage, data expected to be composed from multiple domains is classified in a hierarchical taxonomy. Simple relationships between categories in the taxonomy can be used to relate and combine data, which can then be discovered and sensibly combined with other data. In the fourth stage based on ontologies which mean some explicit and formal specifications of a conceptualization (Gruber, 1993), new data can be inferred from existing data by following logical rules. This should allow combination and recombination of data at a more atomic level and very fine-grained analysis of the same. In this stage, data no longer exists as a blob but as a part of a sophisticated microcosm. Thereby, a Semantic Web implies a machine-processable Web of smart data, which refers to the data that is application-independent, composable, classified, and part of a larger information ecosystem (ontology).

Understanding Semantic Web Technologies

Today, XML (extensible markup language; http://www.xml.com) is the syntactic foundation of the Semantic Web. It is derived from SGML (standard generalized markup language), an international standard (ISO8879) for the definition of device- and system-independent methods of representing information, both human- and machine-readable.

The development of XML is driven by the shortcomings of HTML (hypertext markup language), the standard language also derived from SGML, in which Web pages are written. XML is equipped with explicit metadata support to identify and extract information from Web sources. Currently, many other technologies providing features for the Semantic Web are built on top of XML, to guarantee a base level of interoperability, which is important to enable effective communication, thus supporting technological progress and business collaboration. For brevity, the technologies that XML is built upon are Unicode characters and Uniform Resource Identifiers (URI). The former allows XML to be authored using international characters, whereas the URI's are used as unique identifiers for concepts in the Semantic Web. Essentially, at the heart of all Semantic Web applications is the use of ontologies. An ontology is often considered as an explicit and formal specification of a conceptualization of a domain of interest (Gruber, 1993). This definition stresses two key points: that the conceptualization is formal and hence permits reasoning by computer; and that a practical ontology is designed for some particular domain of interest. In general, an ontology describes formally a domain of discourse. It consists of a finite list of terms and the relationships between these terms. The terms denote important concepts (classes of objects) of the domain. The relationships include hierarchies of classes. In the context of the Web, ontologies provide a shared understanding of a domain, which is necessary to overcome differences in terminology. The search engine can look for pages that refer to a precise concept in an ontology instead of collecting all pages in which certain, generally ambiguous, keywords occur. Hence, differences in terminology between Web pages and the queries can be overcome. At present, the most important ontology languages for the Web include (Antoniou & Harmelen, 2004): XML (http://www.w3.org/XML/), which provides a surface syntax for structured documents but imposes no semantic constraints on the meaning

of these documents; XML Schema (http://www.w3.org/XML/Schema), which is a language for restricting the structure of XML documents; RDF (Resource Description Framework) (http://www.w3.org/RDF/), which is a data model for objects ("resources") and relations between them; it provides a simple semantics for this data model; and these data models can be represented in an XML syntax; RDF Schema, (http://www.w3.org/TR/rdf-schema/) which is a vocabulary description language for describing properties and classes of RDF resources, with a semantics for generalization hierarchies of such properties and classes; OWL (http://www.w3.org/TR/owl-guide/), which is a richer vocabulary description language for describing properties and classes, such as relations between classes, cardinality, equality, richer typing of properties, characteristics of properties, and enumerated classes.

Clarifying the Meta-Data Context of Semantic Web

It is hard to deny the profound impact that the Internet has had on the world of information over the last decade. The ability to access data on a variety of subjects has clearly been improved by the resources of the Web. However, as more data becomes available, the process of finding specific information becomes more complex. The sheer amount of data available to the Web user is seen as both the happy strength and also the pity weakness of the World Wide Web. Undoubtedly, the single feature that has transformed the Web into a common, universal medium for information exchange is this: using standard search engines, anyone can search through a vast number of Web pages and obtain listings of relevant sources of information. Still, we have all experienced such irritation (Tozer, 1999; Belew, 2000) as: the search results returned are incomplete, owing to the inability of the search engine to interpret the match criteria in a context sensitive fashion; too much information is returned; lack of intelligence exists

in the search engine in constructing the criteria for selection. Likewise, what is the Semantic Web good for? Perhaps, a simple example in the area of knowledge management could help clarify the situation. The field of organizational knowledge management typically concerns itself with acquiring, accessing, and maintaining knowledge as the key activity of large businesses (Liebowitz, 2000; Liebowitz & Beckman, 1998). However, the internal knowledge from which many businesses today presumably can draw greater productivity, create new value, and increase their competitiveness, is available in a weakly structured form, say, text, audio and video, owing to some limitations of current technology (Antoniou & Harmelen, 2004, p.4) in such areas as: *searching information*, where companies usually depend on keyword-based search engines, the limitation of which is that even though a search is successful, it is the person who must browse selected documents to extract the information he or she is looking for; *extracting information*, where human time and effort are required to browse the retrieved documents for relevant information, and current intelligent agents are unable to carry out this task in a satisfactory manner; *maintaining information*, where there are current problems such as inconsistencies in terminology and failure to remove outdated information; *uncovering information*, where new knowledge implicitly existing in corporate databases is extracted using data mining, but this task is still difficult for distributed, weakly structured collections of documents; and *viewing information*, where it is often desirable to restrict access to certain information to certain groups of employees, and views which hide certain information, are known from the area of databases but are hard to realize over an intranet or the Web. The aim of the Semantic Web is to allow much more adaptable technologies in handling the scattered knowledge of an organization (Swartz & Hendler, 2001) such as: knowledge will be organized in conceptual spaces according to its intended meaning; automated tools will support maintenance

by checking for inconsistencies and extracting new knowledge; keyword-based search will be replaced by query answering—requested knowledge being retrieved, extracted, and presented in a human-friendly manner; query over several documents will be supported; and defining who may view certain parts of information will also be made possible.

CRAFTING THE KNOWLEDGE-CENTRIC ORGANIZATION

It is not uncommon to hear any Chief Executive Officer (CEO) respond to the question, "What distinguishes your company from its competitors?" with the emphatic "Our knowledge." Yet, it is also not surprised to see the same CEO become somewhat puzzled when the follow-up question, "What comprises your knowledge assets and value on this knowledge?" is presented. Many leading organizations nowadays are discovering they need to do a better job of capturing, distributing, sharing, preserving, securing, and valuing their precious knowledge in order to stay ahead of their competition, or at least survive (Liebowitz, 1999). By the term knowledge-centric (Daconta, Obrst, & Smith, 2003; Liebowitz & Beckman, 1998), we mean the process of managing knowledge in organizations with the focus to provide mechanisms for building the knowledge base of the firm to better apply, share, and manage knowledge across various components in the company. The use of Semantic Web technologies is a means to achieving the knowledge-centric organization by weaving the underlying technologies into every part of the organization's work life cycle, including production, presentation, analysis, dissemination, archiving, reuse, annotation, searches, and versioning of the knowledge work. To situate our discussion on the Semantic Web context, it is helpful to investigate what a typical non-knowledge-centric organization scenario is like in its daily operations.

Making Sense of Information Overload

To remain competitive, many an enterprise today accrue numerous information resources to use in their problem solving, decision making and creative thinking for improving products, processes, and services. Yet, the critical problem for the typical organization is the sheer volume of information coming in, from a wide variety of sources, in various formats (papers, emails, and different electronic media), and it is difficult to manage such resources and turn them into knowledge, which according to Tom Davenport (1997), is a synthesis of information. The knowledge process in a non-knowledge-centric organization typically comprises five stages of information management. The first stage is often characterized by a capture process, in which a human being in the organization takes information from somewhere (newspaper, radio, Internet, database, phone call, or email), and brings it to the organization, via some means such as vocally by mentioning the information to someone, or electronically by sending it through email to someone. If the data is not lost in the process, the recipient writes a paper or presentation, or even a status report. The second stage is often characterized by a securing process, in which the data is put into a database, recorded to a digital file, or indexed into a search engine. Now that entering information is always the first step, but the potential problem is this: each division, group, or project in the organization may enter the information into different systems. Assuming there is only one database per project, and assuming a division has only ten projects, there may be ten different databases containing data in a division. What if there is a different database system for each project? There then will be ten different software systems containing data. What if there are five divisions in the company, with similar systems in use? We now have many data sources that might be individual stovepipes in the organization, each of which perform a specific task

at the expense of trapping the data and robbing the organization of business agility in adapting such data to new systems of interest. The third stage in the knowledge process is often characterized by integration, depending on the complexity of the organization's information architecture, a blueprint based on which different information systems services are rendered. Perhaps, since most of the information systems are stove-piped (namely, information cannot be shared by other systems that need it), there is usually no good way to combine different information systems into a coherent picture. In other words, any attempt to combine the information must involve data conversions across incompatible software systems, in which each database and software system is designed differently and has different interfaces to talk to them. As a result, there is usually little or no integration of these databases, because it is prohibitively difficult and expensive. Even if there is an integration solution, the result is often another stove-piped system. The fourth stage of the knowledge process is often characterized by searching, or discovery of an organization's internal resources. This is a haphazard and time-consuming activity because it involves so many different systems. Imagine we have to login to different databases and search engines, and manually compare and contrast the information we find into a coherent picture or thought. This is the most wasteful part of the knowledge process in person-hours. Finally, the fifth stage is concerned with the application of the search results (if we succeed in the last stage). After the tedious search process, the result is usually a presentation or paper report. Many times, this process of creating the report involves several people. The approval process is done by manual reviews and is often slow. After the new product is created, the information is supposed to be filed, say, onto a Web server that may or may not be indexed by one of the organization's search engines. The issues with this approach of knowledge process are many: How are we to know what version of the document we have? There is

no way to tell if the information has been superseded once this new document is integrated into one of the organization's stove-piped databases. How are we to reuse the information, in terms of the ability to discover, refine, annotate, and incorporate past knowledge?

Making Use of Semantic Web Technologies

The knowledge process in a knowledge-centric organization starts with the discovery and production phase where an individual member of the organization receives an information item and would like to turn that into a knowledge item. It is intended as a process that could be repeated by many others in the same organization. With Semantic Web technologies, any new piece of information must be marked up with XML using a relevant organizational schema. Once this is done, the individual should digitally sign the XML document using the XML signature specification to provide strong assurance that the individual verified the validity of the information. The next step is the annotation process, in which the individual may want to use RDF to annotate the new information with his or her notes or comments, adding to the XML document, but without breaking the digital signature seal of the original material. At the end of the annotation process, the author should digitally sign the annotation with XML signature. Then, the annotated information must be mapped to topics in the taxonomy and entities in the corporate ontology so that pieces of the information can be compared to other pieces of information in the organization's knowledge base. Example annotations include: Who is the person that authored this document? What department does he or she work in? Is the individual an expert on this topic? Is this topic in the organization's taxonomy? Once this is completed, it is time to store the information in an application with a Web service interface. If that is a new Web service, the Web service should be registered in the organiza-

tion's registry, along with its taxonomic classifications. The result of the discovery and production process is that the information coming into the organization has been marked up with standard XML, digitally signed to show assurance of trust, annotated with an author's comments, mapped to the organization's ontology, and published to a Web service and registered in a Web service registry. Consequently, because the Web service is registered in a registry, people and programs in the organization can discover the Web service based on its name or taxonomic classification. Besides, now that any incoming information is stored in an easily accessible format (Web services) and is associated with the organization's ontology and taxonomy, retrieval of information is much facilitated.

Preparing for Change via the Semantic Web

It follows from our previous discussion that in order to take advantage of Semantic Web technologies, most organizations need to change the way they manage information resources (Van den Hoven, 2001) such as: encouraging the sharing of information resources by using common terminology, definitions, and identifiers across the enterprise; establishing an enterprise-wide information architecture, which show the relationships between information held in various parts of the enterprise; ensuring information integrity through procedures to ensure accuracy and consistency; improving information accessibility and usability by putting it in useful formats to make it accessible in any way that makes business sense; and enforcing security to protect the information resources from accidental or deliberate modification, destruction, or unauthorized access. Fortunately, these changes can mostly be implemented evolutionarily over time so as to realize the vision of a knowledge-centric organization. In fact, the most challenging aspect may not be the technology, but the cultural transformation of the mind-set of employees

because the use of Semantic Web represents a whole system change of the behavior in accessing, integrating, and leveraging knowledge throughout the organization. So, how do we get started? Our learning indicates that the IDEAL model (Gremba & Myers, 1997) originally conceived as a life cycle model for software process improvement based on the capability maturity model (CMM) for software at the CMU-SEI (Paulk, Weber, Curtis & Chrissis, 1994), has been found helpful in the change management process. IDEAL suggests a useable and understandable approach to continuous improvement by outlining the steps required to establish a sustainable improvement program, through five different stages of work. Initiating (I) is to lay the groundwork for a workable improvement effort. Diagnosing (D) is to determine where we are relative to where we want to be. Establishing (E) is to plan the specifics of how we will reach our destination. Activating (A) is to do the work according to the plan. Learning (L) is to learn from the experience and improve our ability to adopt new technologies in the immediate future. In the context of the knowledge-centric organization using Semantic Web, *Initiating* involves developing a clear vision for changing the information management process in the organization. What is the clear and compelling business case for change? How will the Semantic Web technologies enable the organization to achieve its business goal? How does this change link to other, broader corporate goals? If these issues are not well elaborated, it is very hard for members of the organization to buy into the change. A clear, concise, and simple mission statement may help. *Diagnosing* involves setting clear goals and milestones specific to the organization, based on the vision (or mission) communicated in the Initiating stage. Often, visionary goals (not technical goals) are what are needed. An example is: "Be able to look up all project information across the organization by spring 2009." *Establishing* involves identifying critical stakeholders who will be impacted by the change. Oftentimes, it helps to divide stakeholders

into different groups to assess the unique impact on each group and develop targeted plans to help them work through change. For example, what kind of resources or tools can help each group manage the change? It might also help if some change facilitators are made available to address the cultural and organizational change issues identified in the process. *Activating* involves picking a core team to spread the vision throughout the organization. This team preferably composed of both technical and management people, is charged with the mission to mobilize the change efforts among members of the organization. It is also important to identify a change champion to help lead the effort of organizational and cultural transformation to ensure that the company embraces the new technology. At this point, *learning* is the most important because the core team will need to understand the high-level concepts of the Semantic Web, the purpose behind it, and the core business benefits it brings. Once the management and the technical staff are on board the core team, it is time to determine the technical goals to implement the plan. Example technical goals could include (Daconta, Obrst, & Smith, 2003, pp. 252-254): *Mark up documents in XML*—After this step, all new document development in the organization should have XML formats, to enable data content to be separate from presentation, and style sheets can be used to add different presentations to content later. *Expose applications as Web services*—so as to publish the application's interfaces as self-describing knowledge objects, with a goal of delivering small, modular building blocks that can be assembled by the intended users. *Establish an organizational registry*—so as to register different applications and provide query for Web services. *Build ontologies*—so as to overlay higher-level semantic constructs on the documents marked up with XML which provides facilities and syntax for specifying a data structure that can be semantically processed. *Integrate search tools*—so as to allow members of the organization to do searches of documents based on specific ontology. *Provide an enterprise portal*—so as to provide some aggregation points to integrate knowledge management into the organization through specific user-interfaces of search engines.

ORGANIZATIONAL CHALLENGES FACING THE SEMANTIC WEB

Based on our earlier discussion, it is not difficult to see that in an organization with Semantic Web technologies, because any incoming information has been marked up with XML, standard techniques and technologies can be used to store it and style its presentation. Still, because the information has been mapped to the organization's ontology, any new information can be easily associated and compared with other information in the organization. Also, because the original information has been digitally signed, anyone looking at the information will have assurance of its validity. Besides, because author annotations are added and also digitally signed, there is convenient tracking of who found the information and their comments. Furthermore, because it is stored in a Web service, any software program can communicate with it using open standards. Nonetheless, what do all these technology-made conveniences mean for the social dimension of the Semantic Web installed inside an organization? It is no denial that organizational knowledge synthesis (or creation and transfer) is a social as well as an individual process (Nonaka, 2002). Sharing tacit knowledge requires individuals to share their personal beliefs about a situation with others. At that point of sharing, justification often becomes public. Each individual is faced with the tremendous challenge of justifying his or her beliefs in front of others—and it is this need for justification, explanation, persuasion and human connection that makes knowledge synthesis a highly dynamic as well as fragile process (Markova & Foppa, 1990; Vat, 2003). To bring personal knowledge into an

organization, within which it can be amplified or further synthesized, it is necessary to have a field (Ichijo & Nonaka, 2007; Von Krogh, Ichijo, & Nonaka, 2000; Nonaka & Takeuchi, 1995) that provides a place in which individual perspectives are articulated, and conflicts are resolved in the formation of higher-level concepts. In the specific context of Semantic Web, this field of interaction is yet to be defined and engineered by the organization architect of the company, or of the organizational change management behind the Semantic Web. Principally, this field should facilitate the building of mutual trust among members of the organization, and accelerate the creation of some implicit perspective shared by members as a form of tacit knowledge. Then, this shared implicit perspective is conceptualized through continuous dialogue among members. It is a process in which one builds concepts in cooperation with others. It provides the opportunity for one's hypothesis or assumption to be tested. Typically, one has to justify the truthfulness of his or her beliefs based on his or her unique viewpoint, personal sensibility, and individual experience, sized up from the observations of any situation of interest. In fact, the creation of knowledge, from this angle, is not simply a compilation of facts but a uniquely human process that can hardly be reduced or easily replicated. Yet, justification must involve the evaluation standards for judging truthfulness, and there might also be value premises that transcend factual or pragmatic considerations before we arrive at the stage of cross-leveling any knowledge (Von Krogh, Ichijo, & Nonaka, 2000); namely, the concept that has been created and justified is integrated into the knowledge base of the organization. The key to understand the social dimension of the Semantic Web is to ask how it could support or facilitate knowledge sharing among individuals. Putting knowledge sharing (or rather conversation among individuals) to work means bringing the right people with the requisite knowledge together and motivating their online interaction. That way, they could work collaboratively to solve real and immediate problems for the organization. To reach that level of practical impact, there must be trust and commitment among the participants apart from software and online connectivity. In light of our discussion, that means leading and fostering the kind of organizational culture that motivates people to share what they know with their peers (co-workers) without a fear of being questioned, critiqued or put on the defense. In the specific context of this article, this culture of knowledge sharing which should be in the driver's seat for selecting and configuring the Semantic Web technologies for an organization, could be developed from the idea of appreciative inquiry (AI) (Cooperrider & Whitney, 2005).

THE GENERATIVE POTENTIAL OF APPRECIATIVE INQUIRY

The contributions behind the work of appreciative inquiry (AI), is mainly attributed to David L. Cooperrider's (1986) doctoral research at Case Western Reserve University. The context of AI is about the co-evolutionary search for the best in people, their organizations, and the relevant world around them. In its broadest focus, it involves systematic discovery of what gives life to a living system when it is most alive, most effective, and most constructively capable in economic, ecological, and human terms. Principally, AI involves the art and practice of asking questions that strengthen a system's capacity to apprehend, anticipate, and heighten positive potential. AI has been described in different ways since its publication: as a paradigm of conscious evolution geared for the realities of the new century (Hubbard, 1998); as a methodology that takes the idea of the social construction of reality to its positive extreme especially with its relational ways of knowing (Gergen, 1990); as the most important advance in action research in the last decade of the 20th century (Bushe, 1995); as offspring to Abraham Maslow's vision of a positive social

science (Chin, 1998; Curran, 1991); as a powerful second generation practice of organizational development (Watkins & Cooperrider, 1996); as model of a much needed participatory science (Harman, 1990); as a radically affirmative approach to change which completely lets go of problem solving mode of management (White, 1996), and others as an approach to leadership and human development (Cooperrider & Whitney, 2005). In essence, AI is an attempt to determine the organization's core values (or life giving forces). It seeks to generate a collective image of a future by exploring the best of what is in order to provide an impetus for imagining what might be (Cooperrider & Srivastva, 1987). Positively, Thatchenkery and Chowdhry (2007, p.33) says it well, "To be appreciative, we must experience a situation, accept the situation, make sense of the situation (pros/cons), and do a bit of mental gymnastics to understand the situation, with an appreciative lens. Not only that, the appreciative lens that we put on the situation impacts our next experience as well." Indeed, the interpretive scheme we bring to a situation significantly influences what we will find. Seeing the world is always an act of judgment. We can take an appreciative judgment or a critical or deficit oriented judgment. AI takes the former. Geoffrey Vickers (1965, 1968, 1972), a professional manager turned social scientist, was the first to talk about appreciation in a systematic way. Vickers' main contribution is that of appreciation and the appreciative process which constitutes a system. An appreciative system may be that of an individual, group, or an organization. In explaining appreciation, Vickers used systems thinking (Checkland & Casar, 1986), which provided basic concepts to describe the circular human processes of perceiving, judging, and acting. Specifically, Vickers focused on five key elements of appreciation, including respectively: the experience of day-to-day life as a flux of interacting events and ideas; reality judgments about what goes in the present or moment and a value judgment about what ought to be good or

bad, both of which are historically influenced; an insistence on relationship maintaining (or norm seeking) as a richer concept of human action than the popular notion of goal seeking; a concept of action judgments stemming from both reality and value judgments; and action, as a result of appreciation, contributing to the flux of events and ideas, as does the mental act of appreciation itself. This leads to the notion that the cycle of judgments and actions is organized as a system. Simply put, as humans, we are in a state of flux. We judge the events we experience based on our individual history. We make meaning based on the interactions with other humans to enrich our lives. Our judgments, relationships, and values dictate how we act in subsequent events. By framing our perceptions and judgments on appreciation, we can change our behavior. In the context of fostering a knowledge-centric culture for an organization including possibly various communities of practice (Wenger, 1998), we can change the way we hoard knowledge to a philosophy of sharing knowledge. Indeed, the basic rationale of AI is to begin with a grounded observation of the best of what is, articulate what might be, ensure the consent of those in the system to what should be, and collectively experiment with what can be.

VIRTUAL ORGANIZING IN SUPPORT OF APPRECIATIVE INQUIRY

The idea of virtual organizing, attributed to Venkatraman and Henderson (1998), can be considered as a method to operationalize the context of appreciative inquiry, dynamically assembling and disassembling nodes on a network of people or groups of people in an organization, to meet the demands of a particular business context. This term emerged in response to the concept of *virtual organization*, which appeared in the literature around the late twentieth century (Byrne, Brandt, & Port 1993; Cheng 1996; Davidow, & Malone 1992; Goldman, Nagel, & Preiss 1995; Hedberg,

Dahlgren, Hansson, & Olve 1997; Mowshowitz, 1997). There are two main assertions associated with virtual organizing. First, virtual organization should not be considered as a distinct structure such as a network organization in an extreme and far-reaching form (Jagers, Jansen, & Steenbakkers 1998), but virtuality is a strategic characteristic applicable to every organization. Second, information technology (IT) (not excluding Semantic Web technologies) is a powerful enabler of the critical requirements for effective virtual organizing. In practice, virtual organizing helps emphasize the ongoing process nature of the organization, and it presents a framework of achieving virtuality in terms of three distinct yet interdependent vectors: virtual encounter for organization-wide interactions, virtual sourcing for asset configuration, and virtual expertise for knowledge leverage. The challenge of virtual organizing is to integrate the three hitherto separate vectors into an interoperable IT platform that supports and shapes any new organizational initiative, paying attention to the internal consistency across the three vectors.

Understanding the Three-Vector Framework

The first of the three vectors of virtual organizing deals with the new challenges and opportunities for interacting with the members of an organization. The second focuses on the organization's requirements to be virtually integrated in a network of interdependent (business) partners, so as to manage a dynamic portfolio of relationships to assemble and coordinate the necessary assets for delivering value for the organization. The third is concerned with the opportunities for leveraging diverse sources of expertise within and across organizational boundaries to become drivers of value creation and organizational effectiveness. All these three vectors are accomplished by the provision of suitable information system (IS) support, whose ongoing design represents the IS challenge of every organization in the Internet age.

- **Virtual Encounter:** This idea of providing remote interaction with the organization is not new, but has indeed been redefined since the introduction of the Internet, and particularly, the World Wide Web. Many an organization feels compelled to assess how its products and services can be experienced virtually in the new medium of the Internet. The issue of customization is important. It requires a continuous information exchange with parties of interest, which in turn requires an organizational design that is fundamentally committed to operating in this direction. Practically, organizations need to change from an inside-out perspective to an outside-in perspective. This is often characterized by the emergence of online customer communities, with the capacity to influence the organization's directions with a distinct focus. It is believed that with virtual organizing becoming widespread, organizations are increasingly recognizing communities as part of their value system and must respond appropriately in their strategies.

- **Virtual Sourcing:** This vector focuses on creating and deploying intellectual and intangible assets for the organization in the form of a continuous reconfiguration of critical capabilities assembled through different relationships in the business network. The mission is to set up a resource network, in which the organization is part of a vibrant, dynamic network of complementary capabilities. The strategic leadership challenge is to orchestrate an organization's position in a dynamic, fast-changing resource network where the organization can carefully analyze her relative dependence on other players in the resource coalition and ensure her unique capabilities.

- **Virtual Expertise:** This vector focuses on the possibilities for leveraging expertise at different levels of the organization. In

today's organizations, many tasks are being redefined and decomposed so that they can be done at different locations and time periods. However, the real challenge in maximizing work-unit expertise often rests not so much in designing the technological platform to support group work but in designing the organization structure and processes. The message is clear: knowledge lives in the human act of knowing, and it is an accumulation of experience that is more a living process than a static body of information; so, knowledge must be systematically nurtured and managed. In effect, organizations are increasingly leveraging the expertise not only from the domain of a local organization but also from the extended network (Figallo & Rhine, 2002) of broader professional community.

Adapting the Three-Vectors to an Appreciative Knowledge Environment

What makes managing knowledge through the Semantic Web a challenge is that knowledge comes often not as an object that can be stored, owned, and moved around like a piece of equipment or a document. It resides in the skills, understanding, and relationships of its members as well as in the tools and processes that embody aspects of this knowledge. In order for knowledge sharing within an organization to be successful, it is convinced that the people involved must be excited about the process of sharing knowledge. For many people, the primary reason for knowledge sharing is not that they expect to be repaid in the form of other knowledge, but the conviction that their individual knowledge is worth knowing, and that sharing this knowledge with others will be beneficial to their reputation (van den Hoof et al., 2004, p.1). There is some psychological benefit to sharing knowledge as the sharer may be held in higher esteem by the receiver(s) of the knowledge and

may gain status as a result. Thereby, an appreciative sharing of knowledge must be viewed as the non-threatening and accepting approach that makes people realize what they do can make a difference. One common example is the communities of practice (CoP) (Wenger, McDermott, & Snyder, 2002) (be it physical or online) mentioned earlier. Many organizations today are comprised of a network of interconnected communities of practice each dealing with specific aspects such as the uniqueness of a long-standing client, or technical inventions. Knowledge is created, shared, organized, revised, and passed on within and among these communities. In a deep sense, it is by these communities that knowledge is owned in practice. Yet, knowledge exists not just at the core of an organization, but on its peripheries as well (as part of the knowledge network) (Tsoukas, 1996; Figallo & Rhine, 2002). So, communities of practice truly become organizational assets when their core and their boundaries are active in complementary ways, to generate an intentionally appreciative climate for organizational knowledge synthesis. In response to the knowledge challenge in a knowledge-centric organization, it is useful to conceive of an appreciative knowledge environment (AKE) based on virtual organizing, and experiment with how the ideas of its three vectors can be applied to nurture online the growth of different communities of practice (Wenger, 1998) scattered throughout an organization.

- **Virtual Encountering the AKE:** From a management perspective, it is important to identify what CoP's currently exist in the organization, and how, if they are not already online, to enable them to be online in order to provide more chances of virtual encounter of such communities, to the organizational members. For those communities already online, it is also important to design opportunities of interaction among different online communities, to activate their knowledge sharing. Since it is not a

CoP's practice to reduce knowledge to an object, what counts as knowledge is often produced through a process of communal involvement, which includes all the controversies, debate and accommodations. This collective character of knowledge construction is best supported online with individuals given suitable IS support to participate and contribute their own ideas. An IS subsystem, operated through virtual encounter, must help achieve many of the primary tasks of a community of practice, such as establishing a common baseline of knowledge and standardizing what is well understood so that people in a specific community can focus their creative energies on the more advanced issues.

- **Virtual Sourcing the AKE:** From the discussion built up in the first vector, it is not difficult to visualize the importance of identifying the specific expertise of each potential CoP in the organization, and if not yet available, planning for its acquisition through a purposeful nurture of expertise in various specific CoP's. In order to enable an organization to be part of a vibrant, dynamic network of complementary capabilities, in which the same organization could claim others' dependence and ensure her unique capabilities, an IS subsystem, operated through virtual sourcing, must help the organization understand precisely what knowledge will give it the competitive edge. The organization then needs to acquire this knowledge, keep it on the cutting edge, deploy it, leverage it in operations, and steward it across the organization.
- **Virtual Expertizing the AKE:** It is important to understand that not everything we know can be codified as documents and tools. Sharing tacit knowledge requires interaction and informal learning processes such as storytelling, conversation,

coaching, and apprenticeship. The tacit aspects of knowledge often consist of embodied expertise—a deep understanding of complex, interdependent elements that enables dynamic responses to context-specific problems. This type of knowledge is very difficult to replicate. In order to leverage such knowledge, an IS subsystem, operated through virtual expertise, must help hooking people with related expertise into various networks of specialists, to facilitate stewarding such knowledge to the rest of the organization.

FUTURE TREND OF THE SEMANTIC WEB

The future of the Semantic Web must not be seen only from its technological possibilities, but also from its social dimension to operationalize knowledge sharing among members of the organization (Argyris, 1993). In order to facilitate the stewarding of knowledge through the various online communities of practice in an organization, it is important to have a vision that orients the kind of knowledge an organization must acquire, and wins spontaneous commitment by the individuals and groups involved in knowledge creation (Dierkes, Marz, and Teele, 2001; Kim, 1993; Stopford, 2001). This knowledge vision should not only define what kind of knowledge the organization should create in what domains, but also help determine how an organization and its knowledge base will evolve in the long run (Leonard-Barton, 1995; Nonaka & Takeuchi, 1995). The central requirement for organizational knowledge synthesis (or sharing) is to provide the organization with a strategic ability to acquire, create, exploit, and accumulate new knowledge continuously and repeatedly. To meet this requirement, we need an interpretation framework, which could facilitate the development of this strategic ability through the various communities. It is

believed that there are at least three major appreciative processes constituting the interpretation framework of a knowledge-centric organization, including the personal process, the social process, and the organizational process. What follows is our appreciation of these three important processes (Checkland & Holwell, 1998, pp.98-109; Checkland, & Casar, 1986) considered as indispensable in the daily operations of the organization with the Semantic Web capability. Of particular interest here is the idea of providing meta-data support for various appreciative settings, which according to Vickers (1972, p.98), refer to the body of linked connotations of personal interest, discrimination and valuation which we bring to the exercise of judgment and which tacitly determine what we shall notice, how we shall discriminate situations from the general confusion of ongoing event, and how we shall regard them.

- **The Personal Process:** Consider us as individuals each conscious of the world outside our physical boundaries. This consciousness means that we can think about the world in different ways, relate these concepts to our experience of the world and so form judgments which can affect our intentions and, ultimately, our actions. This line of thought suggests a basic model for the active human agent in the world. In this model we are able to perceive parts of the world, attribute meanings to what we perceive, make judgments about our perceptions, form intentions to take particular actions, and carry out those actions. These change the perceived world, however slightly, so that the process begins again, becoming a cycle. In fact, this simple model requires some elaborations. First, we always selectively perceive parts of the world, as a result of our interests and previous history. Secondly, the act of attributing meaning and making judgments implies the existence of standards against

which comparisons can be made. Thirdly, the source of standards, for which there is normally no ultimate authority, can only be the previous history of the very process we are describing, and the standards will themselves often change over time as new experience accumulates. This is the process model for the active human agents in the world of individual learning, through their individual appreciative settings. This model has to allow for the visions and actions, which ultimately belong to an autonomous individual, even though there may be great pressure to conform to the perceptions, meaning attributions and judgments, which belong to the social environment, which, in our discussion, is the community of practice.

- **The Social Process:** Although each human being retains at least the potential selectively to perceive and interpret the world in their own unique way, the norm for a social being is that our perceptions of the world, our meaning attributions and our judgments of it will all be strongly conditioned by our exchanges with others. The most obvious characteristic of group life is the never-ending dialogue, discussion, debate and discourse in which we all try to affect one another's perceptions, judgments, intentions and actions. This means that we can assume that while the personal process model continues to apply to the individual, the social situation will be that much of the process will be carried out inter-subjectively in discourse among individuals, the purpose of which is to affect the thinking and actions of at least one other party. As a result of the discourse that ensues, accommodations may be reached which lead to action being taken. Consequently, this model of the social process which leads to purposeful or intentional action, then, is one in which appreciative settings lead to

particular features of situations as well as the situations themselves, being noticed and judged in specific ways by standards built up from previous experience. Meanwhile, the standards by which judgments are made may well be changed through time as our personal and social history unfolds. There is no permanent social reality except at the broadest possible level, immune from the events and ideas, which, in the normal social process, continually change it.

- **The Organizational Process:** Our personal appreciative settings may well be unique since we all have a unique experience of the world, but oftentimes these settings will overlap with those of people with whom we are closely associated or who have had similar experiences. Tellingly, appreciative settings may be attributed to a group of people, including members of a community, or the larger organization as a whole, even though we must remember that there will hardly be complete congruence between the individual and the group settings. It would also be naïve to assume that all members of an organization share the same settings, those that lead them unambiguously to collaborate together in pursuit of collective goals. The reality is that though the idea of the attributed appreciative settings of an organization as a whole is a usable concept, the content of those settings, whatever attributions are made, will never be completely static. Changes both internal and external to the organization will change individual and group perceptions and judgments, leading to new accommodations related to evolving intentions and purposes. Subsequently, the organizational process will be one in which the data-rich world outside is perceived selectively by individuals and by groups of individuals. The selectivity will be the result of our predispositions to "select,

amplify, reject, attenuate or distort" (Land, 1985, p.212) because of previous experience, and individuals will interact with the world not only as individuals but also through their simultaneous membership of multiple groups, some formally organized, some informal. Perceptions will be exchanged, shared, challenged, and argued over, in a discourse, which will consist of the inter-subjective creation of selected data and meanings. Those meanings will create information and knowledge which will lead to accommodations being made, intentions being formed and purposeful action undertaken. Both the thinking and the action will change the perceived world, and may change the appreciative settings that filter our perceptions. This organizational process is a cyclic one and it is a process of continuous learning, and should be richer if more people take part in it. And it should fit into the context of the appreciative knowledge environment scenario.

REMARKS OF CHALLENGE FOR KNOWLEDGE-CENTRIC ORGANIZATIONS

Earlier in the manuscript, we have associated the social context of Semantic Web to that of a knowledge-centric organization, and the appreciative importance of communities of practice (CoP) online. In this regard, there is an active role such communities can play in enabling the organization to learn from the experience of its members. Traditional organization (hierarchical) structures are designed to control activities and often discourage the easy sharing of knowledge and learning. Communities, nonetheless, help to foster relationships based on mutual trust, which are the unspoken and often unrecognized channels through which knowledge is shared. In fact, CoPs have profound implications for the management

of knowledge work. They highlight the limits of management control in that CoPs are voluntary entities, depending entirely on the interest and commitment of their members. They cannot be designed or imposed in a top-down manner. Knowledge does not circulate through them in any officially prescribed form or procedures. Rather knowledge exchange through suitable means such as stories, jokes and anecdotes which serve to enliven and enhance a shared learning experience, has become important under the following contexts:

- **Perceiving the importance of story-telling:** It is not difficult to understand why story-telling has become a more important way of communicating knowledge than codifying it using specific IS/IT systems (Brown & Duguid, 1991): Firstly, stories present information in an interesting way with a beginning, a body, and an end, as well as people behaving goodly or badly. Secondly, stories present information in a way people can empathize with—recounting a situation which each of us might face, so it has greater perceived relevance. Thirdly, stories personalize the information—instead of talking about the situations in the abstract, we hear about the doings of individuals whom we might know or have heard of. Fourthly, stories bring people together, emphasizing a shared social identity and interests—we share knowledge rather than transfer it. More, stories express values—they often contain a moral about certain kinds of behavior leading to either positive or negative outcomes. In this way, stories link information with interest, values and relevance, giving us a sense of the context in which experience has been developed and helping us to grasp the tacit nature of some of the knowledge being communicated.
- **Understanding the nature of community**

knowing: Perceptively, the importance of story-telling also provides an insight into the limits of technology for managing knowledge. Often, the design of IS/IT systems is based on a cognitive model of seeing knowledge as a "thing" (Malhortra, 2000) which is possessed by individuals, whereas the CoPs see it as the product of social interaction and learning among members of the same. By being a member of a community, individuals are able to develop their practice, sharing experience and ideas with others involved in the same pursuit. In light of this, the essence of understanding the social dimensions of managing knowledge work through the Semantic Web comes down to a few key points about the nature of knowing (Nonaka and Takeuchi, 1995; O'Leary, 1998; Wenger, 1998; Wenger et al., 2002):

- **Knowledge lives in the human act of knowing:** In many instances of our daily living, our knowledge can hardly be reduced to an object that can be packaged for storage and retrieval. Our knowledge is often an accumulation of experience—a kind of residue of our actions, thinking, and conversations—that remains a dynamic part of our ongoing experience. This type of knowledge is much more a living process than a static body of information.
- **Knowledge is tacit as well as explicit:** Not everything we know can be codified as explicit knowledge such as documents or tools. Sharing tacit knowledge requires interaction and informal learning processes which often involve a deep understanding of complex, interdependent elements that enables dynamic responses to context-specific problems, even though it is very difficult to document such knowledge in whatever manner

serves the needs of practitioners.

- ◦ **Knowledge is dynamic, social as well as individual:** It is important to accept that though our experience of knowing is individual, knowledge is not. Appreciating the collective nature of knowledge is especially important in an age when almost every field changes too much, too fast for individuals to master. Today's complex problems solving requires multiple perspectives. We need others to complement and develop our own expertise. In fact, our collective knowledge of any field is changing at an accelerating rate. What was true yesterday must be adapted to accommodate new factors, new data, new inventions, and new problems.

- **Positioning an appropriate appreciation for the Semantic Web:** The move to Semantic Web has been developing rapidly over the last decade, and has attracted a lot of attention in the development of different demonstration projects (Davies, Studer, & Warren, 2006) that can serve as reference implementations for future developers. Yet, what makes managing knowledge work through the Semantic Web a challenge is that today many an organization has come to the realization that unless knowledge is owned by people to whom it matters, it will not be developed, used, and kept up to date optimally. Knowledge is not a thing that can be managed at a distance like in an inventory. It is part of the shared practice of communities that need it, create it, use it, debate it, distribute it, adapt it, and transform it. As the property of a community, knowledge is not static; it involves interactions, conversations, actions, and inventions. Thereby, networking knowledge in a virtual community of practice is not primarily a technological challenge, but one

of community development. Addressing the kind of dynamic knowing that makes a difference in practice requires the participation of people who are fully engaged in the process of creating, refining, communicating, and using knowledge. The thrust to develop, organize, and communicate knowledge must come from those who will use it. What matters is not how much knowledge can be captured, but how documenting can support people's abilities to know and to learn when the community itself becomes the living repository of people's knowledge. The Semantic Web works best when it is used to connect communities, not just to capture or transfer knowledge. Because much knowledge is embedded in particular communities, developing a shared understanding and a degree of trust is often the most critical step towards knowledge sharing in an organization. The use of Semantic Web technologies can complement but not replace the importance of social networks in this aspect (DiSessa & Minstrell, 1998). Indeed, the Semantic Web can support the development of new communities of practice through problem-solving interactions that allow individuals to appreciate the different perspectives which others bring to their work. Specifically, the Semantic Web can sustain the development of communities by allowing them to develop and exchange shared cultural objects of interest, such as texts, stories, and images, which help reinforce the meaning and purpose of the communities (Bodker, 1991). From a knowledge-building perspective (Bajjaly, 1999; Cohill & Kavanaugh, 1997), the design of Semantic Web must be based on understanding such concerns as: communities must be viewed as supporting networks of personal relationships in which people can collaboratively construct understanding to enable the exchange of resources and

the development of a common framework for the analysis and evaluation of such resources. Thereby, it is important to consider how different strategies of the Semantic Web implementation can progressively involve individual members by helping them become resources for other community members.

- **Managing the knowledge-centric resources:** In 1969, Peter Drucker emphasized that knowledge had become the crucial resource of the economy. He claims the credit for coining the notion of 'knowledge work', which he contrasted with more traditional forms of work such as service work and manual work. Today, the term 'knowledge work' tends to refer to specific occupations which are "characterized by an emphasis on theoretical knowledge, creativity and use of analytical and social skills" (Frenkel et al., 1995, p.773). Knowledge work, interpreted this way, encompasses both what is traditionally referred to as professional work, such as accountancy, scientific and legal work, and more contemporary types of work, such as consultancy, software development, advertising and public relations. Understandably, these types of knowledge work are not susceptible to be easily imitated because there is a significant application of both tacit and explicit knowledge (Nonaka, 1994). Those engaged in these types of work are often individuals with high levels of education and specialist skills, who demand autonomy over their work processes to get the job done; namely, to demonstrate their ability to apply those skills to identify and solve problems. What is significant about these types of knowledge workers is that they own the organization's primary means of production—that is, knowledge. Nowadays, with the advent of the Semantic Web, we are ready to construct

knowledge portfolio (Birchall & Tovstiga, 2002; Dove, 1999) for the organization, to track the knowledge contributions of individual knowledge workers, and different grouping of the same in the form of group-based project work. The management of knowledge workers assumes greater importance for sustaining productivity than the management of machines, technologies, or work processes. Like musicians, Drucker (1988) sees such employees exploring outlets for their creative abilities, seeking interesting challenges, enjoying the stimulation of working with other specialists. This, he argues, poses new management challenges in knowledge-centric organizations: developing rewards, recognition and career opportunities; giving an organization of specialists a common vision; devising a management structure for coordinating tasks and task teams; and ensuring the supply and skills of top management people.

CONCLUSION

Finally, in closing our discussion, it is essential to articulate the promise of appreciative inquiry (AI) (Reed, 2007; Lewis, Passmore, & Cantore, 2008) for a knowledge-centric organization. In the broadest sense, the major theme of appreciative knowledge sharing in and among virtual communities of practice (Hoadley & Pea, 2002) could be understood from the perspective of effectively applying information and communications technologies, ICT (including the Semantic Web technologies) to improve the lives of people (organizational members), in terms of getting knowledge to those of a community who need it in the right time. Of much concern here is an effort to theorize the social dimensions of this ICT-based knowledge sharing. In the words of David Hakken (2002, p.362), we have to ask "what kinds of

theorizations make sense in analyzing what happens when a concerted effort is made to introduce a technology supportive of knowledge sharing in a 'holistic' way—that is, to try to anticipate and address the social context/consequences of the interventions." In simpler terms, we can describe AI as an exciting philosophy for change. The major assumption of AI is that in every organization something works and change can be managed through the identification of what works, and the analysis of how to do more of what works. A key characteristic of AI is that it is a generative process. That means it is a moving target, and is created and constantly re-created by the people who use it. While the electronic stewarding of knowledge in an online community is based upon the Semantic Web technologies, its success rests with its people (Linn, 2000)—organizers, information and knowledge providers, sponsors, users, volunteers—who support the organization (comprising various CoPs) in a variety of ways. Therefore, when attempting to design technology in support of a knowledge-centric organization, it is important to remember "what is working around here?" in the organization. The tangible result of the appreciative inquiry process should be a series of vision statements that describe where the organization wants to be, based on the high moments of where they have been. Because the statements are grounded in real experience and history, it is convinced that people in the organization know how to repeat their success. In retrospect, think about a time when you shared something that you knew that enabled you or your company to do something better or achieve success. What happened? Share your story. Such activities include not only information capture and transmission, but also the establishment of social relationships in which people can collaboratively construct understanding. It is this energy that distinguishes AI's generative potential that presumably has no end because it is a living process. And it is quite promising for any knowledge-centric organization pursing the Semantic Web technologies.

REFERENCES

Antoniou, G., & van Harmelen, F. (2004). *A Semantic Web primer*. Cambridge, MA: The MIT Press.

Argyris, C. (1993). *Knowledge for action: A guide to overcoming barriers to organizational change*. San Francisco: Jossey-Bass.

Bajjaly, S. T. (1999). *The community networking handbook*. Chicago: American Library Association.

Belew, R. K. (2000). *Finding out about: A cognitive perspective on search engine technology and the WWW*. Cambridge, UK: Cambridge University Press.

Berners-Lee, T. (1998a). *Semantic Web road map*. Retrieved July 30, 2008, from http://www.w3c.org/DesignIssues/Semantic.html

Berners-Lee, T. (1998b). *Evolvability*. Retrieved July 30, 2008, from http://www.w3c.org/DesignIssues/Evolution.html

Berners-Lee, T. (1998c). *What the Semantic Web can represent*. Retrieved July 30, 2008, from http://www.w3c.org/DesignIssues/RDFnot.html

Berners-Lee, T. (1999). *Weaving the Web*. San Francisco, CA: Harper San Francisco.

Berners-Lee, T., Hendler, J., & Lassila, O. (2001, May). The Semantic Web. *The Scientific American*. Retrieved July 30, 2008, from http://www.sciam.com/article.cfm?id=the-semantic-web

Birchall, D. W., & Tovstiga, G. (2002). Assessing the firm's strategic knowledge portfolio: A framework and methodology. *International Journal of Technology Management*, *24*(4), 419–434. doi:10.1504/IJTM.2002.003063

Bodker, S. (1991). *Through the interface: A human activity approach to user interface design*. Hillsdale, NJ: Lawrence Erlbaum.

Brown, J., & Duguid, P. (1991). Organizational learning and communities-of-practice: Towards a unified view of working, learning and innovation. *Organization Science*, *2*, 40–57. doi:10.1287/orsc.2.1.40

Browne, J., Sacket, P. J., & Wortmann, J. C. (1995). Future manufacturing systems—towards the extended enterprise. *Computers in Industry*, *25*, 235–254. doi:10.1016/0166-3615(94)00035-O

Bushe, G. R. (1995). Advances in appreciative inquiry as an organization development intervention. *Organization Development Journal*, *13*(3), 14–22.

Byrne, J. A., Brandt, R., & Port, O. (1993, February 8). The virtual corporation. *Business Week*, 36–41.

Checkland, P., & Holwell, S. (1998). *Information, systems and information systems: Making sense of the field*. New York: John Wiley & Sons Ltd.

Checkland, P. B., & Casar, A. (1986). Vicker's concept of an appreciative system: A systematic account. *Journal of Applied Systems Analysis*, *3*, 3–17.

Cheng, W. (1996, February 5-7). *The virtual enterprise: Beyond time, place and form* (Economic Bulletin). Singapore International Chamber of Commerce.

Chin, A. (1998). Future visions. *Journal of Organizational Change Management*, *11*(1).

Cohill, A. M., & Kavanaugh, A. L. (1997). *Community networks: Lessons from Blacksberg, Virginia*. Norwood, MA: Artech House.

Cooperrider, D. (1986). *Appreciative inquiry: Toward a methodology for understanding and enhancing organizational innovation*. Unpublished doctoral dissertation, Case Western Reserve University, Cleveland, Ohio.

Cooperrider, D. L., & Srivastva, S. (1987). Appreciative inquiry in organizational life. In W. Pasmore & R. Woodman (Eds.), *Research in organization change and development* (Vol. 1, pp. 129-169). Greenwich, CT: JAI Press.

Cooperrider, D. L., & Whitney, D. (2005). *Appreciative inquiry: A positive revolution in change*. San Francisco: Berrett-Koehler.

Curran, M. (1991). Appreciative inquiry: A third wave approach to organization development. *Vision/Action,* (December), 12-14.

Daconta, M. C., Obrst, L. J., & Smith, K. T. (2003). *The Semantic Web: A guide to the future of XML, Web services, and knowledge management.* Indianapolis, IN: Wiley Publishing, Inc.

Davenport, T. H. (1997). *Information ecology: Mastering the information and knowledge environment.* Oxford, England: Oxford University Press.

Davidow, W. H., & Malone, M. S. (1992). *The virtual corporation—structuring and revitalizing the corporation for the 21st century*. New York: HarperCollins.

Davies, J., Studer, R., & Warren, P. (2006). *Semantic Web technologies: Trends and research in ontology-based systems.* Chichester, England: John Wiley & Sons Ltd.

Davis, B. H., & Brewer, J. (1997). *Electronic discourse: Linguistic individuals in virtual space*. Albany, NY: State University of New York Press.

Dierkes, M., Marz, L., & Teele, C. (2001). Technological visions, technological development, and organizational learning. In M. Dierkes, A. B. Antal, et al. (Eds.), *Handbook of organizational learning and knowledge* (pp. 282-304). Oxford, UK: Oxford University Press.

DiSessa, A. A., & Minstrell, J. (1998). Cultivating conceptual change with benchmark lessons. In J. G. Greeno & S. Goldman (Eds.), *Thinking practices* (pp. 155-187). Mahwah, NJ: Lawrence Erlbaum.

Dove, R. (1999). Managing the knowledge portfolio. *Automotive Manufacturing & Production, April*(52). Retrieved July 30, 2008 from http://www.parshift.com/Essays/essay052.htm

Drucker, P. F. (1988). The coming of the new organization. *Harvard Business Review*, (Summer): 53–65.

Figallo, C., & Rhine, N. (2002). *Building the knowledge management network*. New York: John Wiley & Sons.

Frenkel, S., Korczynski, M., Donoghue, L., & Shire, K. (1995). Re-constituting work: Trends towards knowledge work and info-normative control. *Work, Employment and Society*, *9*(4), 773–796.

Gergen, K. J. (1990). Affect and organization in postmodern society. In S. Srivastva, D. L. Cooperrider, et al. (Eds.), *Appreciative management and leadership: The power of positive thought and action in organizations* (1st ed., pp. 289-322). San Francisco, CA: Jossey-Bass Inc.

Goldman, S., Nagel, R., & Preiss, K. (1995). *Agile competitors and virtual organizations: Strategies for enriching the customer*. New York: van Nostrand Reinhold.

Gremba, J., & Myers, C. (1997). *The IDEAL model: A practical guide for improvement*. Pittsburgh, PA: CMU-SEI. Retrieved July 30, 2008, from http://www.sei.cmu.edu/ideal/ideal.bridge.html

Gruber, T. (1993). A translation approach to portable ontologies. *Knowledge Acquisition, 5*(2), 199-220. Retrieved July 30, 2008, from http://ksl-web.stanford.edu/KSL_Abstracts/KSL-92-71.html

Hakken, D. (2002). Building our knowledge of virtual community: Some responses. In K. A. Renninger & W. Shumar (Eds.), *Building virtual communities: Learning and change in cyberspace* (pp. 355-367). Cambridge, UK: Cambridge University Press.

Harman, W. W. (1990). Shifting context for executive behavior: Signs of change and re-evaluation. In S. Srivastva, D. L. Cooperrider, et al. (Eds.), *Appreciative management and leardership: The power of positive thought and action in organizations* (1st ed., pp. 37-54). San Francisco, CA: Jossey-Bass Inc.

Hedberg, B., Dahlgren, G., Hansson, J., & Olve, N. (1997). *Virtual organizations and beyond: Discover imaginary systems*. New York: John Wiley & Sons Ltd.

Hemlin, S., Allwood, C. M., & Martin, B. R. (2004). *Creative knowledge environments: The influences on creativity in research and innovation*. Northampton, MA: Edward Elgar.

Hendler, J. (2001). Agents and the Semantic Web. *IEEE Intelligent Systems*, *16*(March-April), 30–37. doi:10.1109/5254.920597

Hoadley, C., & Pea, R. D. (2002). Finding the ties that bind: Tools in support of a knowledge-building community. In K. A. Renninger & W. Shumar (Eds.), *Building virtual communities: Learning and change in cyberspace* (pp. 321-354). Cambridge, UK: Cambridge University Press.

Hubbard, B. M. (1998). *Conscious evolution: Awakening the power of our social potential*. Novato, CA: New World Library.

Ichijo, K., & Nonaka, I. (Eds.). (2007). *Knowledge creation and management: New challenges for managers*. New York: Oxford University Press.

Jagers, H., Jansen, W., & Steenbakkers, W. (1998, April 27-28). Characteristics of virtual organizations. In P. Sieber & J. Griese (Eds.), *Organizational virtualness, Proceedings of the VoNet-Workshop*. Bern, Switzerland: Simowa Verlag.

Kim, D. (1993). The link between individual and organizational learning. *Sloan Management Review*, (Fall): 37–50.

Land, F. (1985). Is an information theory enough? *The Computer Journal*, *28*(3), 211–215. doi:10.1093/comjnl/28.3.211

Leonard-Barton, D. (1995). *Wellsprings of knowledge: Building and sustaining the sources of innovation*. Boston: Harvard Business School Press.

Lewis, S., Passmore, J., & Cantore, S. (2008). *Appreciative inquiry for change management: Using AI to facilitate organization development.* London: Kogan Page.

Liebowitz, J. (1999). *Knowledge management handbook.* Boca Raton, FL: CRC Press.

Liebowitz, J. (2000). *Building organizational intelligence: A knowledge management primer.* Boca Raton, FL: CRC Press.

Liebowitz, J., & Beckman, T. (1998). *Knowledge organizations: What every manager should know.* Boca Raton, FL: CRC Press.

Linn, M. C. (2000). Designing the knowledge integration environment: The partnership inquiry process. *International Journal of Science Education*, *22*(8), 781–796. doi:10.1080/095006900412275

Malhotra, Y. (2000). Knowledge management and new organization forms: A framework for business model innovation. In Y. Malhotra (Ed.), *Knowledge management and virtual organizations* (pp. 2-19). Hershey, PA: Idea Group Publishing.

Markova, I., & Foppa, K. (Eds.). (1990). *The dynamic of dialogue*. New York: Harvester Wheatsheaf.

Mowshowitz, A. (1997). Virtual organization. *Communications of the ACM*, *40*(9), 30–37. doi:10.1145/260750.260759

Musen, M. A. (2006). Foreword. In J. Davies, R. Studer, & P. Warren (Eds.), *Semantic Web technologies: Trends and research in ontology-based systems* (pp. xi-xiii). Chichester, England: John Wiley & Sons, Ltd.

Nonaka, I. (2002). A dynamic theory of organizational knowledge creation. In C. W. Choo & N. Bontis (Eds.), *The strategic management of intellectual capital and organizational knowledge* (pp. 437-462). Oxford, UK: Oxford University Press.

Nonaka, I., & Takeuchi, H. (1995). *The knowledge creating company: How Japanese companies create the dynamics of innovation*. Oxford, UK: Oxford University Press.

O'Leary, D. E. (1998). Enterprise knowledge management. *IEEE Computer*, *31*(3), 54–61.

Paulk, M. C., Weber, C. V., Curtis, B., & Chrissis, M. B. (1994). *The capability maturity model: Guidelines for improving the software process*. Reading, Ma: Addison Wesley.

Reed, J. (2007). *Appreciative inquiry: Research for change*. London: Sage Publications.

Stopford, J. M. (2001). Organizational learning as guided responses to market signals. In M. Dierkes, A. B. Antal, et al. (Eds.), *Handbook of organizational learning and knowledge* (pp. 264-281). New York: Oxford University Press.

Swartz, A., & Hendler, J. (2001). The Semantic Web: A network of content for the digital city. In *Proceedings of the Second Annual Digital Cities Workshop*, Kyoto, Japan. Retrieved July 30, 2008, from http://blogspace.com/rdf/SwartzHendler.html

Thatchenkery, T. (2005). *Appreciative sharing of knowledge: Leveraging knowledge management for strategic change*. Chagrin Falls, OH: Taos Institute Publishing.

Thatchenkery, T., & Chowdhry, D. (2007). *Appreciative inquiry and knowledge management.* Northampton, MA: Edward Elgar.

The Complete Oxford English Dictionary. (1971). Oxford: Oxford University Press.

Tozer, G. (1999). *Metadata management for information control and business success*. Norwood, MA: Artech House, Inc.

Tsoukas, H. (1996). The firm as a distributed knowledge system: A social constructionist approach. *Strategic Management Journal, 17*(Winter Special Issue), 11-25.

van den Hoof, B., de Ridder, J., & Aukema, E. (2004). *The eagerness to share: Knowledge sharing, ICT and social capital* (Working Paper). Amsterdam, The Netherlands: Amsterdam School of Communication Research, University of Amsterdam.

Van den Hoven, J. (2001). Information resource management: Foundation for knowledge management. *Information Systems Management*, *18*(2), 80–83.

Vat, K. H. (2003, June 24-27). Toward an actionable framework of knowledge synthesis in the pursuit of learning organization. In *Proceedings of the 2003 Informing Science + IT Education Conference (IsITE2003)*, Pori, Finland.

Venkatraman, N., & Henderson, J. C. (1998). Real strategies for virtual organizing. *Sloan Management Review*, *40*(1), 33–48.

Vickers, G. (1965). *The art of judgment*. New York: Basic Books.

Vickers, G. (1968). *Value systems and social process*. New York: Basic Books.

Vickers, G. (1972). Communication and appreciation. In G. B. Adams et al. (Eds.), *Policymaking, communication and social learning: Essays of Sir Geoffrey Vickers*. New Brunswick, NJ: Transaction Books.

Von Krogh, G., Ichijo, K., & Nonaka, I. (2000). *Enabling knowledge creation: How to unlock the mystery of tacit knowledge and release the power of innovation.* New York: Oxford University Press.

Watkins, J. M., & Cooperrider, D. L. (1996). Organization inquiry model for global social change organizations. *Organization Development Journal*, *14*(4), 97–112.

Wenger, E. (1998). *Communities of practice: Learning, meaning, and identity*. Cambridge, UK: Cambridge University Press.

Wenger, E., McDermott, R., & Snyder, W. M. (2002). *Cultivating communities of practice: A guide to managing knowledge.* Cambridge, MA: Harvard Business School Press.

White, T. W. (1996). Working in interesting times. *Vital Speeches of the Day*, *LXII*(15), 472–474.

KEY TERMS AND DEFINITIONS

Appreciative Inquiry (AI): Appreciative Inquiry is about the co-evolutionary search for the best in people, their organizations, and the relevant world around them. In its broadest focus, it involves systematic discovery of what gives

"life" to a living system when it is most alive, most effective, and most constructively capable in economic, ecological, and human terms.

Appreciative Processes: These are processes to leverage the collective individual learning of an organization such as a group of people, to produce a higher-level organization-wide intellectual asset. This is supposed to be a continuous process of creating, acquiring, and transferring knowledge accompanied by a possible modification of behavior to reflect new knowledge and insight, and to produce a higher-level intellectual content.

Appreciative Settings: A body of linked connotations of personal or collective interest, discrimination and valuation which we bring to the exercise of judgment and which tacitly determine what we shall notice, how we shall discriminate situations of concern from the general confusion of ongoing event, and how we shall regard them.

Appreciative Knowledge Environment (AKE): A work, research or learning environment to incorporate the philosophy of appreciative inquiry in support of a cultural practice of knowledge sharing among organizational members.

Community of Practice (CoP): These are people who come together around common interests and expertise. They create, share, and apply knowledge within and across the boundaries of teams, business units, and even entire organizations—providing a concrete path toward creating a true knowledge organization.

Knowledge-Centric Organization: Any organization whose knowledge focus is to provide mechanisms for building the knowledge base of the firm to better apply, share, and manage knowledge resources across various components in the company.

Semantic Web: The Semantic Web is an evolving extension of the World Wide Web in which the semantics of information and services on the web is defined, making it possible for the web to understand and satisfy the requests of people and machines to use the Web content. It derives from W3C director Tim Berners-Lee's vision of the Web as a universal medium for data, information, and knowledge exchange.

Virtual Organizing: A method to operationlize the context of appreciative inquiry, with the technology-enabled capability to assemble and disassemble nodes on a network of people or groups of people in an organization, to meet the demands of a particular business context. In virtual organizing, virtuality is a strategic characteristic applicable to every organization.