Becoming NetCentric

Leveraging an Information Network of Communities of Interests, Architectures, and Ontologies

Business-Centric Methodology

For Enterprise Agility and Interoperability

Opportunistic Strategy

Organizations need to take information asset management up a notch. To do this, they need to be opportunistic with their information. Organizations need to take a closer look at how to foster communication among users by promoting the clustering of context-based communities or *Communities of Interests (CoIs)*.

Collectively CoIs are a critical information network topology that reach beyond the scope of the organization to include partners and stakeholders. CoIs allow information to scale globally, persist indefinitely and be distributed to almost any community for adoption. With a *netCentric* approach, these communities are scoped and managed, allowing for a scaleable alternative to today's typical broad swipes of enterprise architecture and standard language development. These communities allow for *alignment of concepts* by leveraging the common features and mitigating the differences within a proper size and scope.

CoIs promote the evolution of information assets that are consistent with organizational goals and objectives. Empowerment and teaming within CoIs leads to more self-organization and allows for automatic adaptation to the needs of the organization. If correctly implemented, organizations that transform into a netCentric enterprise will reap benefits in many areas, such as business line interoperability, traceability of high-level requirements to effective implementations, etc.; In short, visions turned into reality through better communication. This paper outlines a few critical points that need to be addressed to ensure success.
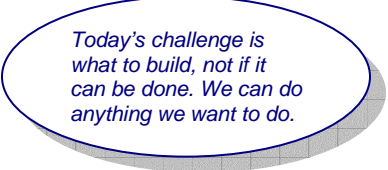
Are We Using the Right Analogy?

Many organizations manage their information assets (such as metadata) in common data stores, and use the analogy of data markets, metadata marketplaces, marketspaces, or data emporiums. In this virtual realm, business migrates to the marketplace—a marketplace created and defined by information technology. If your metadata strategy is a registry of integrated information extracted from heterogeneous sources, then your organization follows the analogy of the marketplace.

This view of autonomous and anonymous individuals interacting through the market is called the *standard formal model* of economics. In this model, consumers and corporations are viewed from an aggregate perspective not as interacting with each other but as interacting with the mythical market. In this model, visibility of the metadata takes prime importance.

With the netCentric view, the metadata market is a network of CoIs all interacting in the *Network Economy*. If your organization has joint ventures, partnerships, outsourcing arrangements, licensing agreements, and/or supply-chain exchanges defined as extended relationships, then your organization should begin to move toward managing your information resources with the network economy model. In this model the individuals are partners establishing relationships as part of the information value-chain. This shift in thinking to this netCentric view is critical in understanding alliances within the organization's real environment. In this model, the metadata supporting the CoIs and business agreements or *contracts* takes prime importance.

Today's challenge is what to build, not if it can be done. We can do anything we want to do.

Understanding Networks

The organization's culture is demonstrated through its social network, whose nodes are individuals and whose links represent various social interactions. CoIs provide a useful starting point for finding answers to questions regarding content, sharing ideas and comments—and thus meeting people with similar interests. The goal of the CoI is to support interactions that are opportunistic and are often based on establishing a shared context for the interaction.

In the past few years, much has been learned about social networks, and for that matter, networks in general. One of the most surprising findings is that most networks in nature are very similar to each other. The social network is not that different from the four-billion-year-old chemical network within our cells or from the decade-old World Wide Web. All networks—whether web-based, natural, societal, technological or economical—exhibit unified behaviors. An understanding of how networks emerge, what they look like, and how they evolve is essential in moving an organization to a netCentric

approach to information management. We can use this newfound understanding and apply it to our organizations only if we understand the underlying principles of the structure and characteristics of networks on which they operate.

In the case of organizations' social networks, each person is a *node* with the communication paths being the professional relationships or *links* between the nodes or other individuals. In addition, nodes are inanimate objects—such as documents, Web pages, databases, concept definitions, messages, etc..—and links are established between these nodes and individual nodes. Nodes for architectures and ontologies will be discussed in more detail later, suffice to say that inanimate objects can have communities centered on them as their main theme.

Networks always start out with a few nodes, to which new nodes are added. A single link from a node to the network is all that is required to become a member of the network—thereby gaining all of the network's collective qualities. Studies show that networks are neither completely random, nor static. They continuously change over time through the addition and/or removal of new nodes and links. Most complex networks share two laws: growth, and a subtle preference to link to the more connected nodes.

Clustering of nodes is a characteristic of the network as it grows; with new nodes being added and linked via a pattern where links are established in a self-organized topology to nodes that already have a large link count. The measure of the clustering nature of the network is called its *clustering coefficient*, which indicates how closely linked nodes are together. A coefficient close to 1 means that all the nodes are well connected with each other, where on the other end of the spectrum, a coefficient of 0 means that only a single *hub* node holds the network together.

The rate at which nodes in a network increase their connectivity depends on their clustering coefficient and their *fitness to compete* for links. This competition for links translates into *multi-scaling*, dependent dynamic exponent, allowing fitter nodes to overcome the more connected but less fit ones. This multi-scaling attribute, following a generalized power law, indirectly clarifies how information can be relayed through large networks

with relatively few hubs. These hubs have a dramatic impact on the behavior of all networks. Clustering, and fit hubs with many links, allow for the expedited information exchange throughout a network, while also providing a degree of robustness by allowing multiple pathways on which information can travel. A thriving network tends to have a large clustering coefficient, in which many highly connected clusters are linked to each other by hubs.

A phenomenon familiar to many is the "six degrees of separation" concept, based on Stanley Milgram's 1967 study indicating that any two people within the U.S. can be connected via six handshakes. This concept is the idea on which the "Kevin Bacon game" is based; players are asked to link actors to Bacon based on movies in which they appeared together. A generic property of networks is that they create small worlds: one can navigate between huge numbers of nodes with only a few links.

Over time, a network reaches a critical mass. The network consists of multi-dimensional patterns of interconnections, which form from need, interest, catalytic events and attractors. To reach critical mass, organizations should promote an organic modular and adaptive approach. If overburdening restrictions aren't placed on the network, the infrastructure will continually interconnect on many layers, with ever-evolving accumulating knowledge being applied to the operational needs and aspirations of individuals, CoIs, and the organization. If the organization resists the inclination to assert complete control—such as holding the bar low to encourage participation—the network will exhibit the desired behavior and participation required to become a mechanism for knowledge delivery. General acceptance leads to standard adoption, rather than standards being imposed. This is the model of the email system today; no one controls or owns it.

Now apply these natural laws that govern all networks to the organization environment to depict an example. EAI vendors have successfully been selling the 'hub and spoke' business broker
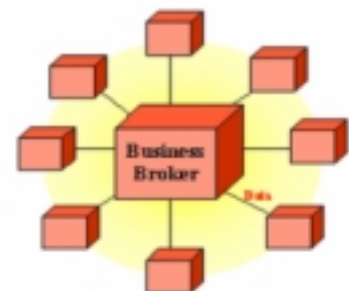
solution with great accomplishment. They are selling the organization into a model that, by design, has a clustering coefficient of 0! This holds true with star topology, such as a centralized metadata registry or content management system as well. Topologies with a very low clustering coefficient will follow a predictable progression: they don't meet the organization's expectations, the organization's support subsequently wanes, and the topology becomes yet another stovepiped system.
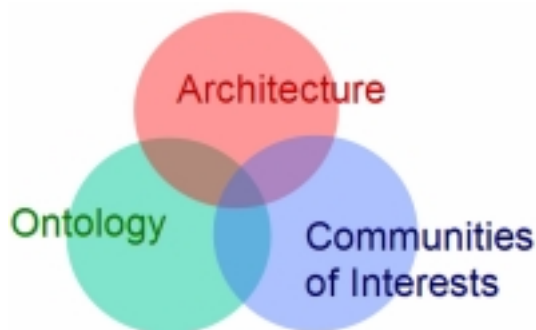

The Information Network

In addition to CoIs, other critical supporting networks are evident in organizations—architectures and ontologies.

Architectures need to have traceability and a fine scope to enable use and focus at various implementation levels. Architects are now beginning to use tools that provide network views of their design patterns, depicting the enterprise as a complex set of relations—allowing the relations to be managed, accounted for and perhaps more importantly visualized, queried, and easily navigated. The importance of maintaining the overall linking of an architecture can best be learned from projects that produce unusable, unlinked, untraceable architectural artifacts using incorrect tools for the task. Simply applying what we have learned about networks and the importance of relationship/link management to this problem, we see immediately why many architects who attempt to apply only software modeling tools to the enterprise challenge fail at achieving their goal.

Also, because not all information is known within the scope of each CoI, the information network provides for external linking of information artifacts to other communities at appropriate resolutions. The BCM

Templates provide the guidelines to connect natural and *choice points* together within the organization's developmental framework. Choice points are connection links that are business-driven, based on constraints outside the scope of the definition, with resolution provided by state of the overall business pattern. Architectural patterns provide reuse and clarification with ease of sharing ideas quickly between members of a CoI, enterprise or partners. Suffice to say, as modeling tools mature, architects will have views of the enterprise and the ability to define choice points; but today enterprise architects need a suite of tools to perform their task.
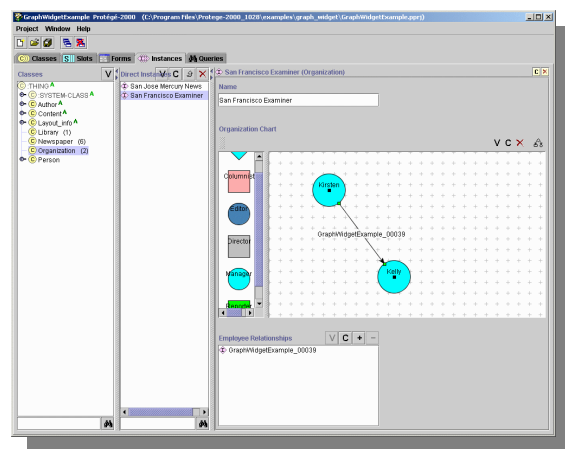
Ontologies support effective collaboration within a community by

- capturing knowledge,
- using concepts to align disparate vocabularies,
- identifying concepts authoritative sources,
- adding additional constraints on the concepts based on the relation-types between entities, and
- classifying the concept and business components and their attributes by facets.

Language can be viewed as a network of synonyms, with a few highly connected terms such as "maneuver," "get," or "put," each with hundreds of synonyms, holding the various lexical nodes together. When considering concepts, one must consider the descriptive qualities that determine the intrinsic nature of the concept, and the descriptive qualities that determine the extrinsic nature of a concept. In other words, what is the essence of something and how do we perceive it. We can define the extrinsic qualities of a concept, i.e., how we perceive a

concept, by placing the concept into a set of concepts. Ontology captures the knowledge in the area of discovering and describing conceptual messaging.

In each aspect,--architectures and ontologies—CoIs collectively afford the vital knowledge of the participating organizations in the communication of design, development, test, deploy, and operational phases of rolling out capabilities as related nodes. CoIs and supporting artifacts—Frequently Asked Questions (FAQ), issues lists, archived dialogs—are persisted over the lifetime of the object in CoI context. The preparation, collection, transport, retrieval, storage access, presentation and transformation of information take place between humans, between humans and machines, and/or between machines. The persistence of these allows for later retrieval, eases change as the organization evolves to address new customer requirements and reduces the threat of paralysis. In adjunct, CoIs house the business strategies and are the conduit for getting the enterprise vision to implementation. But what roadmap exists to aid an organization in this new realm?

*T*he scientific approach of disassembly or reductionism has provided amazing results to understand the nature by taking things apart. While this may work well in taking requirements to architectures to designs, designs definitions to service implementations, organizations need to evolve skills to address the demands of a netCentric world. Many times this simplification hides the complexity of the real-world relationships. This reductionism looses the linkages by virtue of analytical decomposition, it is often impossible to reintegrate the linkages. In addition, when things are examined in artificial isolation from their natural linkages, the dynamics of reality are lost.

Synthesis as opposed to analytical decomposition is a particularly critical part of strategic thinking. Synthesis permits the discovery of the whole that is greater than the sum of the parts. The Business-Centric Methodology (BCM) exploits the synthesis of Communities of Interests, architectures and ontologies to harness tacit knowledge to facilitate communication, sharing and innovation. Understanding how to use this synthesis and the steps outlined to extract order from an organization's chaos through a methodology in a proactive rather than a reactive manner is a means to an organization's success.

The *Business-Centric Methodology* (*BCM*) provides an approach that is based on such an information architecture. An information architecture driven by contracts (agreements) with a solid foundation of unconstrained business concepts to support the organization, rather than the alternative of building based on technology and standard data across the entire value-chain. CoIs frame the constraints based on their defined boundaries, which aids in scoping and understanding the semantics of conversation. The information within communities, the persistence of information within architectures and the linguistics of an array of ontology components not only comprise the make-up of the information network, but feed off each other in providing a holistic approach.

Supporting the Information Network

Institutional CoIs can support early stages of initiating collaboration by providing users with opportunities to become aware of the activities of others that share common interests in a structure suited to the organization's topology. These CoIs are supported directly by the organization through sanctioning the application of resources to the CoI. Much work and many products are on the market that allow for collaborations across an array of tools such as online project management, business workflow, email notifications, task tracking, issue management, file sharing, discussions, group meetings, calendars, budgets, polling results and contacts management, to name just a few. It isn't the scope of this paper to cover the issue of services in general, but specifically how the information network can be applied to CoIs.

The crux of the CoI network problem is in finding a balance between the benefits of having access to a large, diverse body of people, and the level of effort necessary to find someone. Organizations need to provide mechanisms that offer opportunities for informal collaboration. And these mechanisms need to be more obvious and more pervasive by lowering the bar necessary to become aware, or join a CoI. From an organizational standpoint, the motivation for increasing awareness of common work contexts is the potential of users leveraging each other's knowledge and experiences more frequently. This could allow them to be more productive by managing change where it occurs.
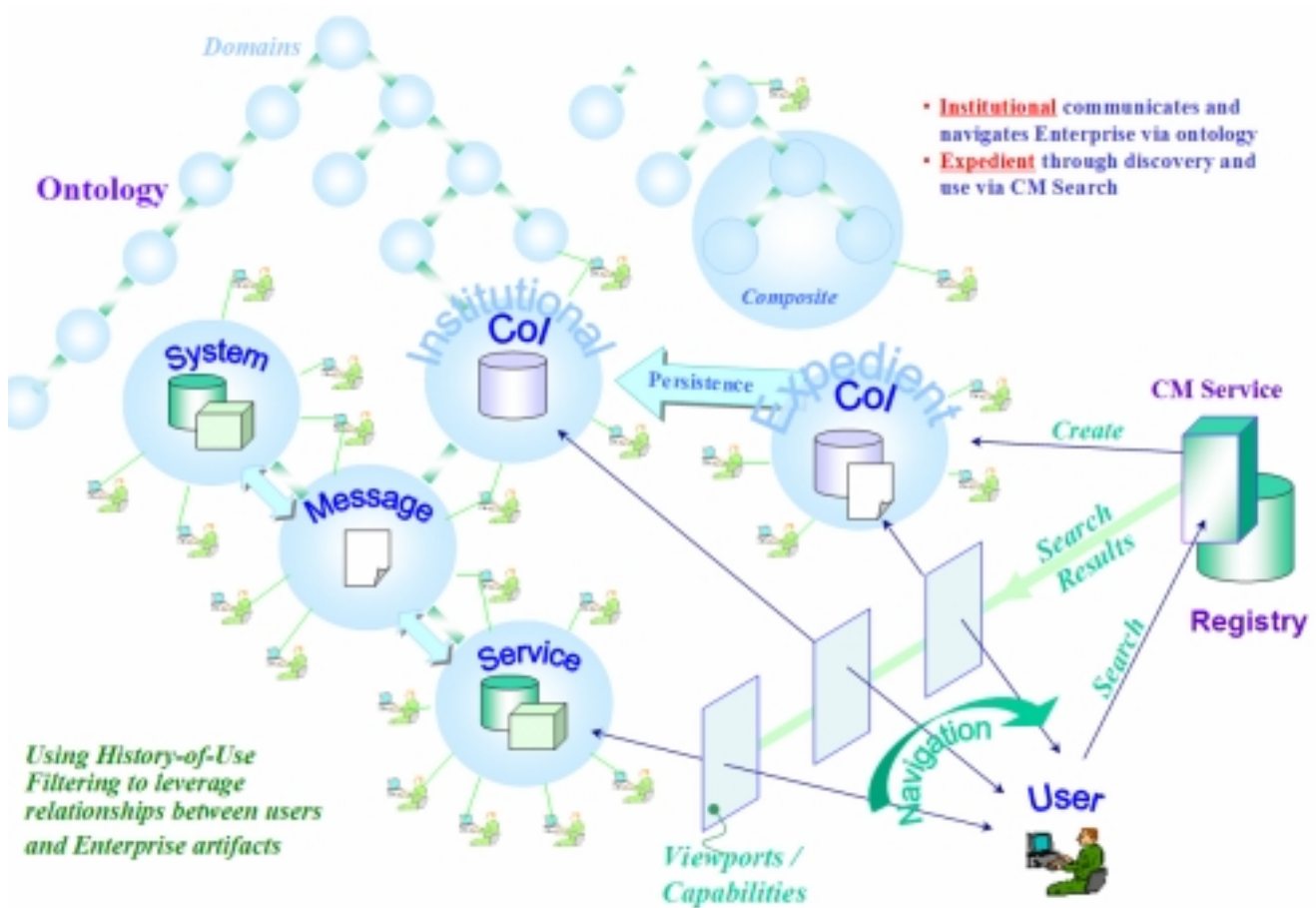
Access to great numbers of community citizens means somebody relevant is probably available. Current traditional communication services take a significant amount of time and resources to find the right person(s), perhaps at a cost that far outweighs the benefits. Organizations need to foster CoIs by providing opportunities for collaboration based on the metadata; information in the ontology, architecture artifacts, or other work information products; facts, data, or instructions, by discovering potential collaborators who are processing analogous documents. These ad hoc introductions can lead to *expedient CoIs,* allowing users engaged in traditionally lone activities to discover common objectives and collaborate with each other, while reducing the overhead of orchestrating collaboration by linking to architecture and/or ontology artifacts.

Organizations initially spend much time agonizing over the labels put on their initial types of CoIs, attempting to accurately portray the number and composition of their institutional CoIs. In fact, the amount of time spent at this early stage of agonizing over the labels is a harbinger of the difficulty the organization will have transforming itself into a netCentric organization. Resources are better spent defining each CoI and its proper placement in the overall enterprise ontology. For those organizations that 'get it' about becoming netCentric, having circles of innovation, etc., this period is short. For others, entrenched in their ways, this transformation takes much longer.

Leadership is key here to convey the meaning and usefulness of the transformation, and to clearly define the impact on its day-to-day processes. Over time, the distinction between CoI types blurs, expedient CoIs become institutional CoIs due to their persistence, we see ontologies driving CoIs, and architectures driving CoIs. CoIs divide and come together as emphasis alters and resolutions are increased in fundamental areas. Querying CoIs to obtain answers to questions outside domains using consistent channels expedites response time, allows organizations to capitalize on opportunities, and in some cases establishes another link in the network.

Infrastructure should be packaged for distribution, and this is especially true when it comes to supporting the nodes and cross cutting services across all nodes. This packaging allows for better interoperability, in line with current thinking of loosely-coupled components based architectures such as Web services. In other words, organizations need to move from policy to packaging.

Summary

Organizations need to acquire new skills to better understand the ubiquitous properties of networks, to have a different perspective on the world. Without these new skills, systems appear hopelessly entangled and complicated. But by applying netCentric thinking, these systems become surprisingly simple and elegant.

Organizations that couple and foster growth via CoIs, architectures, and ontologies change the dynamics of how people think and interact with each other and gain

Organizations will have to clearly understand the paradoxes of networks and what they bring, deduce their implications, and adapt them appropriately. Leaders will not only have to think paradoxically but convince their teams that a seemingly illogical action as guarded by conventional wisdom is the right approach.

Although a network economy model may first seem counter-intuitive for an organization to successfully manage its information resources, a netCentric advance will allow better control through participation as well as better overall performance. Previous attempts to centralize via (metadata) marketplaces have failed due to low participation and interests if net citizens were required to obey too many rules that are removed from their daily operations. In this case, information becomes unmanaged and/or not shared, splintering into many fragments with the central store becoming yet another stovepipe system onto itself. On the other hand, if an

Author: Bruce T. Peat, eProcess Solutions. BPeat@eProcessSolutions.com For more information on the *Business-Centric Methodology* visit http://www.DFAS.info Many thanks to Albert-László Barabási; author of "Linked – How Everything Is Connected to Everything Else and What It Means for Business, Science, and Everyday Life."

further advances in becoming NetCentric. These organizations adopt new analogies to leverage their key information assets by taking advantage of their information network. In addition, the organization learns how to use the context of current tasks to better scope problems and solutions, tailoring solutions while meeting enterprise requirements, or allowing for the understanding of the semantics of messages between stakeholders. This point should not be underestimated, as millions, if not billions, of dollars are spent needlessly where these project attributes are not well-defined early in the development process. To do this effectively, an overall information strategy around CoIs, Architectures, and Ontologies is required if the enterprise is to become agile and provide for interoperability. This strategy leads the organization into a network economy in which the organization's information assets and its stakeholders assets are not only properly scoped and managed, but where the organization realizes its return on investment through multiplication of leveraging its value-chain through CoIs.

organization relinquishes a certain degree of control, we see self-organization taking charge, wherein net citizens create viable sustainable collaborative environments. These collaborative environments allow for superior mass customization and customer interaction to achieve its goals defined by the CoI. Organizations that realize these advantages, and move to alter their cultures, witness greater and fresh use of information, positioning themselves to capitalize on new opportunities in an opportunistic world.