SOCIABLE TECHNOLOGIES FOR ENTERPRISING SOCIALITY

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ABSTRACT

We are witnessing a proliferation of information and communication technologies (ICT) to support the socializing function in human communities. At the same time there has never been a greater need, and a greater opportunity, for socially-based and socially-oriented enterprise. Enterprises and technologies are rapidly co-evolving, driven by the ecosystem of globally integrated enterprises and enabled by such technologies as Web 2.0 and virtual worlds.

It is particularly timely at this moment in history to focus on the viewpoint that businesses and other enterprises are fundamentally human social systems. There has been recent emphasis on the importance of services and service economies as we move into an anticipated period of deepening integration of ICT into the fabric of global society. Human capabilities and inter-relationships actually constitute the primary source of value in a world of increasingly urgent problems and opportunities, yet the creation of value by human social systems is often ignored or downplayed.

Several theories of human social systems are used to articulate the dimensions of enterprising sociality. A specialized ICT architecture is presented to help understand the dimensions of sociable affordances. These views of both enterprise and technology are then brought together to explore the structural coupling that needs to occur between the organizational and technological domains. Evidence from literature and experience reveals the unexpected power of socializing technologies to enhance and catalyze new ways of pursuing life and work as we move deeper into the 21st Century.

Keywords: ICT, Web 2.0, virtual worlds, human social systems, enterprise, social technology, business architecture

INTRODUCTION

The title of this paper introduces two phrases that are not in widespread use, "sociable technologies" and "enterprising sociality". The choice of unusual terms is by design, so that key concepts are not confused through association with terms that may already have multiple current referents. The word sociality is selected to indicate the interaction of humans in the pursuit of mutual desires. These desires might be comradeship or comfort, familial affection or successful competition. In some cases the desired activities and states may be pursued with an organized economic aspect. In these cases there is an

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enterprising orientation, and so we introduce the concept of enterprising sociality. This is the social dimension of the human condition as manifested in economic terms.

By sociable technologies we mean affordances that specifically support the ability of people to interact on a social level. If this phrase happens to evoke images of relaxing around the fire in a bistro or office, dormitory or barracks, that would be appropriate. If it also evokes the image of telephones, teletypes and e-mail, that would also be appropriate. In this case, these images should further evoke a picture of people working together toward common economic goals, experiencing virtual togetherness via ICT.

This discussion is partially motivated by the understanding that there are ongoing accountability issues at the intersection of social systems and technology. Information technology has become a key role-player in enterprise settings. (McDavid, 1999) Significant invention and innovation is directed toward creating technologies that take over responsibilities from human role-players. But when technology takes the place of functions formerly performed by accountable human beings, or introduces functional capability that was not even possible before, the technology itself is not accountable for expected results or unintended consequences. As technology is increasingly inserted into the fabric of our lives, there is accountability that includes both the creator and the installer of the technology. Anyone in the chain from invention to end-use bears a share of the responsibility for those results as they impact individuals and organizations involved in enterprise. Our focus here is on the social dimension of that impact and responsibility.

We approach this discussion from an architectural viewpoint. We use the term architecture in an expansive sense that goes beyond representation, and includes the dynamic structure of the phenomenon itself. The definition here of "architecture" is similar to Maturana's when he says that, "Autopoiesis occurs only when the dynamic structural architecture of the molecular domain in which it can occur satisfies the conditions for its occurrence." (Maturana, draft) In our case we are speaking of architectures within the cultural domain, referencing organizations and technological complexes.

This paper focuses on the architectures of enterprising sociality and sociable technologies, in a way that will allow us to begin to speak of structural coupling between these two domains. Enterprising sociality and sociable technologies exist within an ongoing coevolution process. We can observe the process whereby business advances depend on technology (e.g., reputation system for e-Bay), and technology advances respond to business drivers (e.g., Moore's law as a mandate for continuous investment). (Spohrer, 2003) The consideration of couplings of respective architectures and characteristics will provide a language to talk about the accountability of providers of technology with respect to the human social systems to be served by various technologies.

Before we get into the domains themselves, we will briefly explore some of the current context that makes this exploration interesting as we find ourselves pretty far into the first decade of the 21st Century.

In order to avoid unnecessary misunderstanding or controversy, we heed Alfred Korzybski when he reminds us, "Whatever you say a thing is, it is not." (Korzybski, 1926) The fact that we talk about the social aspects of enterprise and technology should not be interpreted as an argument that this is the only way, or some specially privileged way of talking about those subjects. Viewing enterprise and IT through a social lens turns out to be especially useful and timely for technologists, organizational designers, executives, and vendors. But this is not to denigrate other ways of looking at these subjects. There are many maps for the same territory, so it is important to be explicit about the kind of map being used here.

PROBLEM AND OPPORTUNITY ENVIRONMENT

The following section highlights a few trends and factors that contribute to the relevance of socially-oriented enterprise and technology. We are also generally focused on the positive potential for an escalated emphasis on the social perspective. It is particularly timely at this moment in history to focus on the viewpoint that businesses and other enterprises are fundamentally human social systems. Both the complex of problems and the complex of opportunities have a fundamentally social aspect. We will briefly review some of the factors that are most interesting for our purposes.

First of all, it is worth noting that there is a rich proliferation of human and ecological problems, from local to global scales. This is no secret, and there are several media industries that are doing quite well for themselves by keeping us informed on all aspects of this problematique a 24-hour a day basis. The pages of any newspaper, or an hour-long television newscast, provide plenty of examples of problems that have their origins in the way humans are living in increasingly complex and widespread social systems.

It is also a truism to mention that we are currently experiencing an increasingly globalized economy. The flat world discussion (Friedman, 2006) is borne out in experience of the globally integrated enterprise (Palmisano, 2006). This creates interdependencies on a planetary scale that go far beyond the experience of previous generations of human beings.

In parallel with a globalizing economy, businesses and other enterprises are becoming more fragmented through specialization, and then reintegrating in the form of ecosystems of widespread outsourcing and global supply networks. An example of an enterprise ecosystem is the electronics manufacturing industry, where almost anything that can be outsourced continues to spawn separate specialized companies. Another example is mortgage banking, which is fragmented into various specialized banking institutions, bundling loans, sharing risk, and providing various banking services to each other.

We see the financialization of the global monetary and production economy, where various derivative financial instruments facilitate massive value flows and exchanges on a continuous basis. This has led to a few prominent meltdowns of major high-flying corporation, but it also creates a certain dynamic stability of the world economy, where moneys can flow to where they are needed, and away from emerging dangers. We mentioned the mortgage banking example above. This industry has recently experienced

a crisis with sub-prime mortgages, a crisis made possible by the risk-masking derivatives that are offered within that enterprise ecosystem.

The sheer complexity of both systems and problems today simply requires increased collaboration. As both systems and problems become more complex, they require more interdisciplinary approaches, which in turn drive ever more effective sociality in pursuit of problem solving. An example of how collaboration is evolving is the idea of wikinomics, (Tapscott) where companies open up the product development process to participation by customers. The ICT industry is struggling to find the best kinds of supporting systems for advanced collaboration, and it is critical to enterprise success in the future.

Long-wave View of the Situation
As a specialized lens through which to view the types of problems and opportunities outlined above, we call attention to a recent version of the long-wave economic theory (Perez, 2002). This addresses the observation that technological revolutions have been the drivers of long cycles in the world economy over the last 300 years. The analysis is based on Kondratiev's long-wave economic cycle theory.[2] Perez's view of the theory is that successive surges of technological innovation drive predictable patterns of economic activity. According to this reading of economic history there have been four full long-wave cycles during the period since the industrial revolution, and we are in the middle of a fifth cycle at this point in the early 21st Century. The cycles and approximate start dates are: the industrial revolution (1771), the age of steam and railways (1829), the age of steel, electricity and heavy engineering (1875), the age of oil, automobiles and mass production (1908), and now the age of information and communications technology (ICT) (1971).

Each of these five cycles is perceived to have four distinct phases, with a disruptive transitional mid-point. The first phase is an "Irruption". This is the sudden appearance of a new and interrelated set of technologies, which, taken together comprise a highly disruptive perturbation in the status quo in the economy at large. The Irruption is followed by a "Frenzy" phase, when entrepreneurs and investors pursue the development of the new technologies so furiously that financial capital becomes decoupled from underlying sources and production of value. With the decoupling of finance from value creation, pure speculation takes hold, leading to a bubble and then a major crash. This is followed by sustained period of growth based on the efforts to achieve full deployment of this new set of technologies throughout society. Production capital becomes dominant over financial capital and supports real wealth creation and productivity, especially during the "Synergy" phase, when people find many ways to apply the new technologies. The crashes do not invalidate the value of the technologies themselves (railroads, ICT, etc.). Deep value is obtained through the economic activities unleashed by application of the technologies. Perez stresses the social aspect of the synergy phase: "The turning point has to do with the balance between individual and social interests within capitalism. It is the swing of the pendulum from the extreme individualism of Frenzy to giving greater attention to collective well-being." The fourth and final phase of the long wave is

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[2] http://en.wikipedia.org/wiki/Kondratiev_wave

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"Maturity", when the potential of the technology complex has been largely exploited, and the seeds of the next cycle are being sowed in the form of new invention and discovery.

If the theory holds, we have been in the Synergy phase of the ICT cycle for a few years since the dot-com crash. In the case of the current cycle, the technology itself intrinsically supports human interaction, and therefore enterprising sociality. To some extent this paper is an observation of this phenomenon unfolding, with a bit of speculation about where it seems to be going. One such observation is that the Synergy phase of the ICT wave is coincident with a strong current focus on services, as discussed in the next section.

A Services-Dominant View of the Situation
There has been recent emphasis on the importance of services and service economies as we move into an anticipated period of deepening integration of ICT into the fabric of global society. The growth of services in the economy is sometimes measured by the relative percentage of employment in three major sectors of an economy, agriculture, manufacturing, and services. By this form of reckoning, employment migrated from over 90% agricultural in 1800, to a majority in manufacturing by the end of World War II. Since then services has risen to a dominant position in U.S. employment, and this pattern is rapidly being repeated all over the world.

This so-called "services dominant logic" defines service as "application of specialized competences … through deeds, processes, and performances for benefit of another entity or the entity itself." (Vargo, 2004) In marketing and accounting for economic activity, this view turns attention away from goods and toward exchange of intangibles in the form of specialized skills, knowledge, and processes. Of course, Korzybski reminds us that this is one way of looking at things. Looking at the economy in a services-dominant way does not preclude other viewpoints. On the other hand, some might say that service dominance is not unique to the 21st Century. Vargo and Lusch quote Frederic Bastiat from 1860, "The great economic law is this: Services are exchanged for services… It is trivial, very commonplace; it is, nonetheless, the beginning, the middle, and the end of economic science." Clearly the services-dominant model has been around for a long time. The fact that a more product-centric model has been the standard viewpoint is as much a mindset as a reflection of reality. However, these viewpoints and models have a large effect on choices made and the direction of events. If the economy looks like a product-producing machine, it reinforces machinelike product producing and product consuming behavior.

The services dominant model of the economy reinforces the focus on sociality in enterprise. The canonical service is intrinsically human, with either the recipient, or the provider, or both, being people. Even with increasingly technology-based services (ATMs, downloadable legal assistance, etc.), the functioning of the technology is traceable back to its inventors, makers, and distributors, who, in a very real sense, are people who are providing services to other people but liberated from time and distance constraints by the mediation of technology. A growing and evolving fabric of services performed by people on behalf of machines, as well as by machines for machines, enables all of this. The point here is that service-based enterprise is recognized as a major beneficiary of the deeper incorporation of ICT into existing economies. The social

interactions that are necessary for enterprises are enabled by ICT that allows people to interact at a distance.

As part of the background of the world situation, we observe that ICT itself is evolving to support a service and people-oriented economy. Communication networks and continuous connectivity are becoming nearly ubiquitous. We are living in a mash-up world, in which Internet technologies make global markets commonplace. These developments have made possible a range of on-line marketplaces (e-Bay, etc.) for previously undervalued and low-demand specialty assets. People are flocking to social networking applications, such as Facebook, and LinkedIn. We are rapidly moving from Goffman's presentation of self in everyday life (Goffman , 19) to the projection of self. The projection of self is being made possible be feeding images and other information into and through various ICT-created spaces. *New York Times* columnist Frank Rich highlights the extreme version of projection of self via the Internet as he comments on U.S. presidential candidates' web sites: "You could learn a ton about the Clinton campaign's cultural tone-deafness from its stodgy generic Web site. A similar torpor afflicts JohnMcCain.com, which last week gave its graphics a face-lift that unabashedly mimics BarackObama.com and devoted prime home page real estate to hawking "McCain Golf Gear." … The blogs, video and social networking are static and sparse… ." (Rich, 2008)

Ironically, in this apparent age of services economic systems we observe that often the capability and potential of people in services relationships is undervalued and undercapitalized. In many circumstances people are treated as factors of cost, rather than as engines of value-creation. It can be argued that human capabilities and inter-relationships actually constitute the primary source of value in a world of increasingly urgent problems and opportunities, yet the creation of value by individuals operating within human social systems is often ignored or downplayed.

All of these factors of the problem and opportunity environment converge to reinforce the perception that the social aspect of enterprise is of utmost importance, and deserves specific attention and cultivation. The next section provides some such attention.

ENTERPRISING SOCIALITY

This section examines the architecture of enterprise, with an emphasis on social aspects. The word enterprise as we are using it represents something along the lines of "a purposeful or industrious undertaking."[3] Earlier we defined the concept of enterprising sociality as the social dimension of the human condition as manifested in economic termsIt is reasonable to talk about enterprises that do not have economic implications, but certainly businesses and public sector organizations would fall under that definition.

Enterprise has its genesis in human desire. The mechanism of enterprising sociality starts with the perception that there is some differential between the current state of affairs and the desired state that requires some form of collaboration. The activities and exchanges

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[3] Onelook.com - http://www.onelook.com/?w=enterprise&ls=a

that are directed toward achievement of these desired states are the very essence of enterprise.

In the same way that we were careful not to claim that the prevalence of services is a new phenomenon, we also recognize that there has always been enterprising sociality. There have always been social aspects to economic activity, from hunting and gathering onward. In fact, one could make the case that we have been going through a period when economic activity has become focused on consumption of products to the detriment of sociality in many spheres of life. The socially-oriented enterprise may be revisiting earlier forms of behavior. While enterprise sociality may not be new, it appears that there has never been a greater need, and a greater opportunity, for socially-based and socially-oriented enterprise.

Enterprises as Systems

For our purposes we choose to take a systems view of enterprise. We are not alone in thinking of businesses as systems. Peter Drucker says, "There is a fundamental insight underlying all management sciences. It is that the business enterprise is a *system* of the highest order: a system whose parts are human beings, contributing voluntarily of their knowledge, skill and dedication to a joint venture." (Drucker, 2004) Lou Mobley, who established the management and executive development program for IBM, notes that, "The information age has been born out of systems thinking. The only way to capitalize on complexity is to order it with systems. Without systems, complexity dissolves into chaos… [Y]ou can apply systems to leadership, marketing, and finance… Systems thinking evolved out of four pursuits -- operations research, game theory, cybernetics, and finally, the most far-reaching, general systems theory." (Mobley, 1989)

Autopoietic Systems
A large variety of phenomena can be swept into the general category of systems, so it is fair to ask what kind of systems we are talking about. The short answer, which says a lot about our subject and our point of view, is that enterprises are autopoietic social systems. The aspects of autopoiesis that are most relevant include the interplay of closure and openness, and the ongoing co-creation between the parts and the whole within self-created boundaries. This does not force us to take a strong position on whether an enterprise is a living system. Surely a human social system is in a different class than biological life in the form of an organism. But to the extent that autopoiesis implies life-like characteristics, we will say that the architecture of enterprising sociality must account for life-like behavior.

A biological system is closed inasmuch as it creates its own boundary, within which its processes create its parts, which it integrates into itself as it creates its own structure. The biological system can also be perceived as open (von Bertalanffy, 1968) in local defiance of the 2nd Law of Thermodynamics. The biological system is sustained through structural coupling with its environment, exchanging chemical compounds in gaseous, liquid and solid form, as well as light and other electromagnetism.

The enterprise, as an institutional system, is both open and closed in a similar fashion. As the biological system is open to its needed inputs and outputs (transputs), the social system of enterprise is open to relational interactions with other social systems in the

environment. Since it is also composed of relational interactions, this is an interesting analog of the chemical compounds that flow through the biological system. In the one case chemical reactions beget chemical reactions inside and between systems, and in the other case relational interactions beget relational interactions within and among systems. Of course the social system is also open to all the biological transputs by virtue of the participation of humans as biological systems. But more importantly, many of the relational interactions of social systems are designed and evolve to manage the biological transputs. Even if we choose not to see them as living by some strict definition of life, enterprises and other human social systems are composed of the stuff of life and can have quite lifelike behavior.

Living Systems?
Interestingly, this is not an outlandish point of view for many people. Business executives often use living systems metaphors when speaking about the enterprises they lead. Sam Palmisano, current CEO of IBM is quoted in an interview as saying, "An organic system, which is what a company is, needs to adapt. And we think values–that's what we call them today at IBM, but you can call them "beliefs" or "principles" or "precepts" or even "DNA"–are what enable you to do that. They let you change everything, from your products to your strategies to your business model, but remain true to your essence, your basic mission and identity." (Palmisano, 2004). Irving Wladawsky-Berger, a retired IBM executive and technological evangelist says, "While business systems are clearly engineered, that is, designed, built and managed by people, they share many characteristics with biological systems, in particular, the need to be flexible and adaptable so they can evolve and survive as their environment changes. The connection between business and biological systems is not new, but it is particularly important in these times given our fast changing, global, highly competitive marketplace. It seems that the key for a company to stay alive, in spite of the odds and market pressures, is to have something in its basic culture - its DNA - that somehow keeps it going and enables it to adapt itself to wildly different market environments."[4]

The following functions have been abstracted from several scholarly definitions of what it means to be living.[5] The synthesis of definitions from these sources reveals key dimensions and dynamic tensions over which living systems range:

- A living system maintains an identity over time in the face of changing conditions.

- Like all systems it is embedded in an environment.

- A living system creates its own boundary.

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[4] http://blog.irvingwb.com/blog/2007/04/the_life_cycle_.html
[5] The source of this list of living system characteristics is a presentation – Doug McDavid and Sukanya Patwardhan, "Co-Sustenance of Well-being in Socio-Technological Ecosystems," ISSS 2006, Sonoma State University. The scholars whose definitions of life are summarized in this abstraction are: Erwin Schrödinger, Robert Rosen, Ludwig von Bertalanffy, Lynn Margulis, James Grier Miller, Humberto Maturana and Francisco Varela, Stafford Beer, Niklas Luhmann

- It forms itself from parts that it both creates and interrelates.

- It can be seen as a closed system within an open system: a structurally closed autopoietic system within a thermodynamically open system.

- It maintains dynamic stability within a flux of material, energy, and information.

- It has autonomy as a system and interdependence with the environment of other living systems.

- Autonomous interdependence leads to both cooperation and competition with other living systems.

- A living system undergoes a life cycle that includes emergence as a living entity, sustainment of itself over a certain period of time, and then ultimately disintegration.

- Sustainment requires the abilities to: spontaneously emerge from a codified design, self-regulate, manage variety, self-regenerate, maintain relationship among elements, grow, metabolize, adapt, respond to stimuli, learn, form a purpose, decide, communicate, produce, and reproduce.

The point of this recitation is to provide a framework for thinking about architectural viewpoints on enterprise. Whether enterprises are living or merely life-like, the architecture of an enterprise should be able to reflect its fundamentally life-like characteristics. To what extent the foregoing is a meaningful characterization of human social systems such as enterprises is the key question. To the extent it is meaningful then these core issues for living systems provide some indicators of the dimensions and constructs that we might expect to see in a full-blown architectural representation of a business or other human enterprise.

Architectural Viewpoints

In this section we will briefly review or introduce a number of ways to look at enterprise, and in particular the social aspect that we are calling enterprising sociality. These are viewpoints, or specially focused models, that appear to be useful ways to analyze business for a number of purposes. These architectural statements form a map or model of what we want to talk about. No one should confuse this with a complete definition or description of an enterprise, keeping in mind that "whatever you *say* a thing is, it is *not*." The focus here is on viewpoints and representations of the enterprise that emphasize our previous characterization of it as a life-like, if not living, system, to some significant extent composed of human social relationships.

Before we move on, let us make a distinction between architecture and typology. Architecture is a pattern of structure and behavior, which is either discovered or designed. Typology is the observation and classification of individual instances and groups of instances of phenomena under consideration. Variation of the architectural components and relationships of the phenomenon in focus creates variation among the factors that are available to classify instances of the phenomenon. For example, as we narrow our focus to enterprising sociality, there are social aspects of enterprise that become the basis for an

architectural representation. This is based on classifiers that have social significance, such as power apportionment, or degree of encouragement of trans-organizational communication. In a complementary fashion, as new classifiers of the subject are emphasised, this requires new architectural representations to capture these salient characteristics in a coherent manner.

Levels of Analysis
At the heart of this issue is the business organization as a human social system. The key challenge is that social systems are intrinsically invisible. No one can point a finger at a social system, or reach out and touch one. A social system consists entirely of relationships among humans, and as such is invisible, intangible, colorless, tasteless and odorless. To that extent, a social system is more like software than hardware, and even less deterministic and controllable than any artificial system. This makes it important to have various lenses through which to view and construct representations that provide useful information in a usable form. Part of the representation question depends on how close you look.

The **micro-architecture** of business is something like the molecular structure of the fundamental stuff from which businesses are made. At a micro-architecture level, there is significant apparent commonality and simplicity. The micro-architecture of all business organizations is composed of a structure of conversations, commitments, contracts, and transactions. This apparent simplicity is somewhat misleading, since the properties of the system may be vastly different than the properties of the elemental building blocks. The simple set of four nucleotides of the DNA molecule is a starter program that underlies all the complexity of life.

The **macro-level** of business architecture addresses the equivalent of the anatomy of an individual enterprise. There are many ways to look at the macro-architecture of business structure and functionality. A traditional organization chart is a point in time snapshot of how an enterprise has assigned responsibility for various functions. Enterprise reorganizations are commonplace, so an analytical framework can benefit from a macro-architectural view that is independent of the current organizational reporting structure. Such a macroscopic view recognizes functions, roles, and accountabilities beyond current authority structures. In a relatively unchanging way all enterprises need sensing mechanisms, information transmitters and expressers, memory maintainers, a locating function, producers of the intrinsic products and services of the business, resource maintainers, business relationship maintainers, arbiters of behavioral norms, strategic direction setters, and bottom line oriented managers. (McDavid, 1999a)

The **eco-architecture** of business addresses multiple enterprises as they interact with each other in a marketplace environment. Increasingly partnerships of supply chains are competing against other supply chains to gain market share. It is more difficult these days to distinguish the internal complexity of an organization from the relationships across the ecosystem. Aside from falling back on the formal or legal constitution of the organization, it is more useful to consider whether an organization is viable, outside of its embedded corporate structure – can it be "hived off" and still continue to function? (Beer, 1985)

Architectural Viewpoints

A number of distinct views of the architecture of enterprising sociality are listed below. This is really little more than a list, with some description of the basic architectural elements that are featured in each of these viewpoints, along with some types of things the viewpoint can be applied to, and the kind of light it sheds on the social domain of enterprise.

Organization structures – One of the most common ways of thinking about the architecture of enterprise is the organization chart. Everyone is interested in the "org chart" because it lays out in a clear and simple way many of the important functional specializations and power relationships in the enterprise. The org chart not a stable architecture, because in most enterprises the chart itself, as well as incumbent responsibilities of groups and individuals, is in a constant state of flux. However, no one who is interested in the social architecture of a particular enterprise should ignore the evolving versions of the org chart.

- Elements: organization, manager, reporting relationship
- Types: hierarchy, matrix
- Sociality: The social aspects of the organization chart are limited to a power reporting structure

Processes and procedures – The word process is linked with the word procedure here for a reason. Process is a highly used word, and has many meanings, depending on the context. One common way it is used is to signify the organized activities of the operational side of the enterprise. This tends to connote the idea of proceduralization, whereby the processes of interest are relatively deterministic and repeatable. This is an area where business has focused massive attention, on the assumption that ICT can be used most effectively, to enforce procedures, to support repetition, and to take over from people various behaviors that can be completely codified. This is also an area where the architectural view has spawned a number of tools to help the practitioner. A business process designer now has a number of alternatives that support various different process architectures, and tie into ICT activities in various ways.

- Elements: activities, roles, role-players, outcomes, inputs, resources, flows, triggering events
- Types: Typology of process is largely determined by types of results. So an automotive production process is quite diverse from a market campaign development process. Another key typology differentiator is the type of role-player, keeping in mind that ICT is considered here to be a role-player.
- Sociality: Role-players, often human, are involved in most processes, so there is an intrinsic sociality. Even the most robotic process has a human recipient, though in such cases the sociality is greatly reduced and intermediated by technology that stands between human participants.

Practices – The idea of work practice is specifically juxtaposed against the process or procedural viewpoint. At the heart of this view is the recognition that practitioners have

various skills and know-how that are brought to bear when called upon. Practitioners form communities based on learning and improvement of their knowledge and skills. This seems to be a natural form of socializing in enterprises. The architecture of practice includes specific types of role-players, such as mentor and legitimate peripheral participant. (Lave, 1991) This sets up specific kinds of relationships between master and apprentice, or similar senior-junior practitioner complementary role-playing. Practices deal in both skills and lore. Practices have processes, and they participate in processes that invoke various practices.

- Elements: Practitioners, communities, knowledge, skills, lore, role-players, tools, specialized language, relationship to processes
- Types: manner of learning and practicing, type of practice outcome (mechanical repair, law, medicine, entertainment, etc.)
- Sociality: Since practices are practiced by humans (not automation) they are intrinsically sociable

Social networks – Another viewpoint corresponds to the observation that in addition to any formal organizational structure, and documented, repeatable processes, a lot of what is accomplished in organizations is done informally and almost in spite of the standard systems. A discipline has grown up around studying patterns of informal interaction, and forms the basis for this architectural view. As with all of these viewpoints, it is impossible to get into many details, but it is important to note that this viewpoint is the heart of our concern for sociality of enterprise. There are tools and applications today that address social networking, so this is an emerging set of capabilities that purport to enable communities of interest and practice. (Granovetter, 1973)

- Elements: role-players, organizations, ties, strength of tie, information transfer
- Types: A key aspect of social networks is how far they range. Some social networks bridge across organizations and types of organization.
- Sociality: By definition social networks are social. This is a wild card kind of sociality that managers and organization designers ignore at their peril.

Roles and accountabilities – A specific viewpoint on enterprise social interaction is the role and accountability (R&A) model. Steve Haeckel proposes a design pattern where organizational roles are populated by individuals who are accountable for delivering negotiated outcomes to other roles. Negotiated terms and conditions (funding, authority, resources, etc.) can be associated with the primary deliverables. (Haeckel, 2008)

- Elements: role, role-player, negotiated accountability, outcome, terms and conditions
- Types: The main variances of this architectural pattern is the type of enterprise where it is applied.
- Sociality: This pattern is prescriptive, and in effect it creates a form of bounded sociality where a few simple rules of engagement give rise to organizations with maximum adaptability in the face of changing environments.

Institutional architecture – The idea of institution here is an organizational element that shapes enterprise behavior based on established custom or law. An example often given is "the institution of marriage". A significant aspect of designing organizations is the selection of institutional elements to be applied to the architecture of the enterprise being designed. Our usage is based on the concept as used by institutional economists. (North, 2005)

- Elements: rules, guidelines, mandates

- Types: corporate forms (corporation, partnership, franchise); legal (tort, intellectual property, contract, election); property (title, escrow, equity, investment); market (exchange, auction); transaction (offering, acceptance, consideration, charity); payment (fee for service, pay per use, gift, credit, billing); evaluation (ratings, peer review, reputation);rehearsal; research protocols; friendship; esthetics – and many more.

- Sociality: The institutional architecture as described here is a whole collection of mechanisms for bounding and encouraging social interaction. One of the reasons they are important for this discussion is that these institutions form the basis of much of the encoding that is supported by ICT.

Brand architecture – There is a branch of marketing devoted to study of brands. People in that discipline use the term "brand architecture". This is a key viewpoint for the architecture of enterprise sociality. Brand "reflects the extent to which the brand spans product categories, subcategories, and markets," (Aaker, 2004) and addresses the scope of a given brand in relation to other company brands, as well as its relation to competitor brands and portfolios. To a significant extent, technology is used as a means to make the business system visible to those that would interact with it.

- Elements: portfolio, brands, sub-brands, product-market offerings, co-brands, other firms, portfolio role (*Strategic Brand, Branded Energizer, etc.),* relationship of brands within the portfolio (*Brand Groupings, Hierarchies*, and *Network Models.*)

- Types: Corporate branding, individual branding

- Sociality: Branding is one area of enterprise that is deeply psychological. A brand is intended to attract individuals to interact with the enterprise. This is a complex social form, mediated by products and services in the marketplace.

Cultures – For people who want to get beyond the obvious architectural constructs of procedural processes and the organization chart, often one of the first considerations is culture – sometimes referred to as "corporate culture". Hard-nosed business people take culture very seriously. "In all of my business career, I would have always said that culture is one of the five or six things you worry about if you're a leader. You worry about markets, and competitors, and financial assets and strategy. And somewhere on the list is culture. What I learned at IBM is that culture isn't part of the game. It *is* the game." (Gerstner, 2002)

- Elements: norms, guidelines, styles, founding stories (myths), personality of the founders, internal branding, ceremonies, manner of working

- Types: natural, artificial

- Sociality: The social interactions of the enterprise are largely shaped by cultural factors. This is a major dimension that is often overlooked in the haste to apply ICT innovations.

Decisions –The enterprise is constantly making decisions across a broad range of impact areas. Some decisions are fundamental and far-ranging strategic decisions. Some are rapid-fire operational decisions that must be made as events impinge in real time.

- Elements: perceptions, deviations from desired state, role-players, alternative courses of action, empowerment.

- Types: relationships (partners, employees, customer or client), business or organizational structure, transaction, offer

- Sociality: In enterprises, significant decisions are made in a collaborative fashion, hence fundamentally social. Small operational decisions may be less collaborative, and more in the manner of automaticity. But the pre-decided parameters of automatic decisions have been worked out in management collaborations. And all decisions of the enterprise are likely to have social impact on its various constituencies (customers, vendors, etc.)

Social bonds – Intrinsic to understanding enterprise sociality is an architecture from the viewpoint of social bonds themselves. Of the types of bonds available to humans, there is variable acceptability in the context of enterprise. The most pervasive is still today probably power relationship. This is a complex topic, deserving of its own treatment, but the basic relationship in most enterprises is that of employer and employee, extended through limited power sharing to that of boss and subordinate. In the regime of enterprising sociality we expect to see more emphasis on other types of social bonds, especially where they can coexist with acceptable levels of the power relationship.

- Elements: bond, role-players, emotion, desire, purpose, preferences (utilitarian, aesthetic, ethical), image of self, image of other, attraction, trust, characteristics, experience, capabilities

- Types: power, friendship, collegiality, sexual, dependence

- Sociality: This is the heart of sociality.

Meaning, or enterprise semantic architecture cuts across these other architectures. It is a way of exploring what people really talk about and worry about within the context of their shared enterprising. These issues call for a separation of concepts from the language that is used to express the concepts. This is a very tricky matter, and is the key issue for effective analysis and positive intervention in the affairs of communities seeking improved communication, coordination, or collaboration. The problem is that as human beings, we really only have one way to express concepts to each other, and that is through language of one kind or another. So that the minute we try to separate concepts from language, we find ourselves using language again to express the concepts that we are trying to isolate. It is possible to do this, and there have been techniques developed

specifically for this purpose, but it is beyond our scope to go into detail. McDavid, D. (1996).

- Elements: concepts, terms, definitions, lexical relationships, logic
- Types: folksonomies, tagging, ontology language, database, glossary
- Sociality: The architecture of enterprise meaning is fundamental to understanding issues of sociality. Everything expressed within the enterprise is expressed in language. The lack of commonly understood languages is a well-understood limitation to effective enterprise sociality.

Boundary Concepts

The study of languages leads to the study of language communities. This section is a longer treatment of one particular architectural view of enterprise. The viewpoint here is toward communities of practice, and in particular how boundaries are created and bridged by boundary objects. This has a major impact on functioning enterprises, though it is not widely recognized as other views (org chart, process, etc.)

Boundary objects were introduced by a study of the Museum of Vertebrate Zoology in the University of California at Berkeley. (Star, 1989) Star and Griesemer studied the museum as it existed in the early 20th century, when it had set itself the daunting task of documenting the ecology of the entire state of California. Professional scientists, amateur naturalists and, backwoods trappers worked together to capture and document species and their habitats. A brief form was provided by the museum, so that the non-scientists could write a few key observations about each specimen. This simple written form served as the primary boundary object. It adequately bridged the gap between the non-scientists and the scientists in the museum, to the extent that they needed to communicate in this structured way. Star and Griesemer identify four types of boundary object:

- Repositories – Modular, indexed collection of objects that people from different worlds can draw on without direct negotiation with each other.
- Ideal types – An abstraction based on a template of common characteristics.
- Coincident boundaries – Concepts that have common and agreed upon scope for all participating communities, but that have different internal contents in each.
- Standardized forms – Templates and standardized indexes.

A number of scholars have expanded on the study of organizational boundaries. "Bridging representations" (Barnard, P., 1991) span gaps between theory and practice. These normative representations tend to be developed in one community and imposed on downstream communities. The concept of trading zone (Chrisman, on-line) is borrowed from Peter Galison's *Image and Logic* where dynamic "trading zones" in the field of modern microphysics require instrument makers, theorists, and experimentalists to meet and share knowledge. Within such trading zones a kind of pidgin language arises which allows diverse communities to conduct a form of trade using shared terms and concepts that are agreed to by all,. The pidgin consists of subsets of each of the languages of the communities involved in the zone.

Organizational memory (Ackerman, 1998) is a process whereby individuals translate among various memory states to achieve a useful understanding of shared business situations. Memory states in the form of boundary objects are often decontextualized from their original point of observation and recording, and then must be recontextualized by a receiving community in some different part of the enterprise.

An intermediate dependent entity (Nieman, 2002) is a boundary creating object that differentiates and puts boundaries around communities. An example of boundary creation was the case of mad cow disease, when both scientists and politicians tried to define the problem into each other's domain, with a boundary definition that attempted to reduce responsibility for the problem.

An interesting concept to contemplate is the pervasive boundary object of currency.[6] A currency can be a strong definer of the boundary of the social system within which it is valid and valued. It is also a boundary spanning mechanism to transfer value across system boundaries.

- Elements: distinguishable social entity, trading zones, standardized methods, representations that link theory and practice, objects that define boundaries, power positions, boundary objects (repositories, abstractions, shared scope, standardized forms)
- Types: community of interest, community of practice, department, profession,
- Sociality: covered in the elaborated discussion above.

SOCIABLE AFFORDANCES

In the previous section we have developed ideas about the nature of enterprise, with an emphasis on sociality in the enterprise context. We turn now to a discussion of information and communication technologies (ICT). In particular we are interested in specific ways that ICT can be used to support the socializing function in human communities. We consider sociable technology to be any ICT that is applied to help "coordinate the coordination of our doings" (Maturana, 1998). Again, as in the enterprise domain, we take an architectural approach to analyzing the domain of socializing affordances[7] in order to help understand the dimensions of ICT capabilities. As we move deeper into the 21st Century evidence from literature and experience reveals the unexpected power of socializing technologies to enhance and catalyze new ways of pursuing life and work.

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[6] Niklas Damiris, personal communication

[7] "...the term affordance refers to the perceived and actual properties of the thing, primarily those fundamental properties that determine just how the thing could possibly be used. [...] Affordances provide strong clues to the operations of things. Plates are for pushing. Knobs are for turning. Slots are for inserting things into. Balls are for throwing or bouncing. When affordances are taken advantage of, the user knows what to do just by looking: no picture, label, or instruction needed." (Norman, 1988)

Background

Before diving into the details of the emerging socially-oriented technologies, let's take a look at a bit of ICT history to set the stage. This is easy to do, since the history of enterprise use of ICT is relatively brief. Business computing is traceable back the emergence of the COBOL language and the IBM System 360 in the 1960s. The emergence of databases of computerized records, separate from the programs that operated on the data, was a huge step forward in the ability to maintain and access histories of transactions. Accounting for business conditions has become possible at a fraction of the cost and with much greater functionality since it has been addressed by computerized applications. The accounting function has spread further into the enterprise, through the shop floor and out into the supply chain, as the cost of computing has plummeted and as computers began to talk to each other in the late 1970s. The flip side of the supply chain is the customer relationship, and major software vendors address that aspect of business, as well. Today, with the Internet and a new generation of middleware technologies, these applications are becoming more interactive and readily available. The current generation of business software is moving toward service-oriented architectures (SOA) whereby software functionality is distributed across the network, and invoked on demand by any other software that is enabled to interact with the service.

We mentioned customer relationships above, as a significant ICT application area. Customer relationships in business can be quite sociable. Lunches and golf outings are the proverbial social interactions of the business enterprise. But customer relationship management (CRM) software is anything but an appealing manifestation of sociability. Screens of text and pop-up windows are pretty utilitarian and dry. Still, these relationship management applications, whether the relationships are with customers, suppliers, or employees, are one form of sociable technology.

In recent years we have witnessed a new phenomenon in ICT as the Internet has become virtually ubiquitous. Enabled by the existence of bandwidth, and the standards of the World Wide Web, the technologies known as Web 2.0 have been emerging. People are pretty familiar with blogs, less so with wikis and tagging software. It is hard to avoid Web 2.0 applications that are native to the Web, such as Facebook, LinkedIn, Flikr, YouTube, etc.

Sociability-Supporting Affordances

In the section that follows, we will lay out a set of affordances that the Web now provides, which can be brought together into mashups of functionality that work together to provide business applications, and even whole businesses that are largely enabled on-line. Above we mentioned service-oriented architectures that allow technology to interoperate (be social) with other technology, but that is not our focus here. We are focusing on technological capabilities that are good for the projection of self, including personality dimensions that one chooses to accentuate, and for the ability to collaborate around projects and various work and play activities.

Purposes to be Served
When we think about ICT that supports sociality, we are primarily talking about projection of self and collaborative work. There can be any number of motivations for

reaching out and interacting with other people via ICT, including instruction, entertainment, and persuasion. We see people projecting various levels of insight into themselves as subjects, including their relationships at work, professional affiliations, and friends, as indications of their social networks. In the enterprise, there are many opinions about how much of this social insight is helpful, or even appropriate, but experience suggests that working relationships that have the personal dimension can produce enhanced productivity and innovation through a kind of mind meld based on shared interests and trust. The focus of interest for social networks includes cohort membership, such as alumni groups, and various activities, hobbies, and sports.

The New Media Consortium tracks the evolution and emergence of technology used in higher education and other learning environments. They have identified a trend that they call social operating systems. Social networking systems have led us to a new understanding of how people connect. Relationships are the currency of these systems, but we are only beginning to realize how valuable a currency they truly are. The next generation of social networking systems—social operating systems—will change the way we search for, work with, and understand information by placing people at the center of the network." (New Media Consortium, 2008) This focus on human relationships at the heart of social networking is very much in keeping with the case being made here for enterprising sociality.

There is one additional point to be made about sociality. In the enterprise we are talking about the human interrelationships in formal and informal groups and communities. This is not a judgment on the worthiness of that behavior. There can be social interactions in enterprises that have asocial or even downright anti-social outcomes and consequences, depending on one's point of view. An Army platoon behaves in a highly social manner in the middle of a firefight, but the enemy would not regard that behavior in a positive light.

An Architecture of Affordances
In this section we list a number of generic ICT capabilities that are available to Web 2.0 applications and businesses, and consequently have special relevance in a social context. This section covers a number of types of technology that are socially interesting. We say "types of technology" advisedly, because this is not about particular products or applications, but rather the kinds of functionality from which social applications can be assembled. This list spans from very generic and foundational capabilities to more complex and higher technical functionality. In each case we define the capability and focus on how it supports social interaction, such as effective communication, projection of self, and workplace collaboration.

We also want to remember the difference between architecture and characteristics. As we vary the architectural elements, we bring into our model different sets of characteristics that we can talk about. Similarly, as we register characteristics that we want to capture, the architectural structure of our model will have to change to accommodate variations in characteristics of interest.

Some very basic building blocks are required for sociable technology. These are generic enough that they are needed for other, less sociable ICT applications. At the same time there are many other generic ICT capabilities we could mention that are not so relevant

from a social perspective, such as the obvious computing functions of performing mathematical operations, sorting, windowing, etc.

The ability to **store and retrieve** data in various forms can provide persistence that is needed for the continuity of social relationship. **File service** and **document sharing** are variations on storage and retrieval, and can be selected based on the depth and complexity of the social relationships being supported. **Versioning** can be important for collaborative work where the object of the work is some kind of document that various parties are working on together.

Basic internet technology provides various mechanisms to track interactions through access data that is accumulated by web servers. It is pretty much automatic that a web site will capture data on the **hits** that come to the site, and where they come from. A more sophisticated function is available to track **click-throughs** where a user not only visits a site, but follows a link that is provided by that site to still another site. On the other side, **cookies** provide the ability for the user, and others, to know the history of sites that have been visited. The data about user interactions can be used to track and enhance social interaction for purposes of research, marketing, and group effectiveness.

Consideration of **content types** is important to the design of sociable software. For our purposes we consider the basic types as **textual**, **graphical**, and **audio**. Text (and numerics) have been the staples of computing. But in the Internet era, graphic content has taken on a more visible (pun intended) role in application design. In the social domain, the ability to project images and voice is very important to provide the human dimension. It is also important to note that the two modes of **still** vs. **behavioral** content have an impact on sociality. Text is intrinsically still, and audio is intrinsically active. Graphic content can be either (still photos and other pictorial material, videos of live or animated subjects). The canonical realm of the active graphic is YouTube, and the moving picture with audio is fast becoming an expected form of content wherever the social intersects the enterprise.

To the extent that ICT is a medium for social interaction, it is critical that content from people be accessible to other people. A key to this is simply the ability to find content. This requires some form of **search**, which is a standard function that has been implemented many times, and most successfully by Google. There are various forms of search, but the basic function is that content can be found based on text that it contains. A more proactive way to help accessibility is some form of classification scheme. The basic scheme in wide use is **tagging**, whereby keywords are consciously assigned to some content, either by the author or by subsequent users. More sophisticated classification is sometimes accomplished with **ontologies** and controlled vocabularies constitute a form of standardized semantics. Complementing this structural support is the capability of **text analytics**, which seeks to make sense of large bodies of textual content. People who say things in a social content definitely want to be heard, and these semantic technologies can help make that so.

Boundaries are important considerations in the social domain, as we have seen earlier. Internet technology provides **zones of availability** on a very large-grained scale. An **intranet** application is available only to selected individuals, such as employees or business partners. An **extranet** is a site dedicated to a particular enterprise, but open to

the general user for purposes of learning about or interacting with the enterprise. The **Internet** itself is open to all comers. These are important distinctions to delineate the scope of sociality that is supported by an enterprise. But finer-grained **access control** based on user IDs, passwords and other identity controls, such as biometrics, is often desired to help create the membrane of community boundaries.

On the other side of the coin, boundary-spanning is a fundamental social affordance. **Links**, both inward, outward allow communities to span from their virtual presence to others. Internet linkage provides a high degree of flexibility and control that can be used by leaders and members of social groupings within and across enterprises.

The communications side of ICT enables linkage within and among communities. There are key modalities to consider with respect to social communications. This includes **broadcast** where some entity sends out messages to anyone who is able to listen, **narrowcast**, where messages go out to a limited set of potential recipients, **pointcast** where messages are directed individually or in tailored bundles to an individual recipient, **peer-to-peer**, where computers communicate directly with each other, rather than mediated by a 3rd party server, **publish and subscribe** (pub/sub), where both users and creators express interest in categories of content and make contacts based on common categories, **pull**, that allows users to set up an RSS feed (for example) that automatically sends links to new and changed content from specified sources.

The modes just mentioned convey the general sense of an author or performer with an audience of some kind. A more fully social experience is multidirectional and less structured, and can be supported by various forms of interaction technologies. Interaction here means a back and forth process similar to a verbal conversation between two or more people together similar to normal spoken conversation, but mediated by ICT. When enabled by ICT, such interaction has various alternative degrees of freedom. Interaction can be accomplished in **real-time** mode, such as instant text messaging (IM), or in **asynchronous** mode, such as embedded comments in a blog, e-mail, phone tag etc. Interactivity can be two-way or with **multiple participants** as in teleconferencing or web conferencing. It is important to note that this whole class of affordances is optional, such that one might design a supposedly social application in with which no feedback or interaction channels are provided. This raises an interesting question of how social such an application would be, in actuality.

Threading of interactivity is important to maintain the continuity of a conversation to help build an ongoing social relationship. Threads are possible for text chat of course, but other modes like voice and video can allow for threaded chains of responses (a video posted in response to another video, etc.)

Based on the more generic capabilities outlined above, there are various more complex ICT services that are useful for social activities in the enterprise. Things like **calendar** functions, and mechanisms for **managing work** allocation, such as project management, are common. In many socially oriented applications, **groups** can be defined, with subgroups, roles and responsibilities of members, various rules of conduct, shared property and access rights, etc. Workflow and group management often take advantage of **automated origination** of messages and replies. These may be meant to convey more or less an illusion of human communication. These can be helpful or annoying depending on

the design of the application and its match to the culture of the enterprise. At an even higher level of automated support is the whole area of ICT-aided **decision-making**.

Social technologies are providing the ability to express an **opinion**, as well as ways to indicate that it is an opinion, rather than a fact. A structured opinion might be the **rating** of any possible thing, from a short video to our work together on an extended project. A variation on rating is **ranking**, which asks that a population of choices be put in order, like the finishing positions of a horse race. These ratings and rankings may be used on a **personal** basis (such as matching preferences) or they can be **collective** where gathering opinions across populations of individuals is the goal. Ratings and rankings may lead directly or indirectly to **rewards**. Socially oriented systems may benefit from having the ability to support rewards. One of the common reward structures is a **reputation** system, where at least part of the reward is public recognition and esteem. A generalization of rewards is to consider them all as different forms of money as payment and settlement mechanism, or more generally as an operating system protocol for threading and registering transactions among various forms and states of value creation.

As we're winding up this list of socially-oriented ICT capabilities, we'll do a quick nod to aesthetics and commerce. A key factor in social settings is atmosphere and style. The ICT environment is no different, and the web has brought forth a spectrum of **visual design.** This is automated to a degree in those applications that use visual themes called "skins". Aesthetic touches to technology are big business in their own right, as witness ring tones for mobile phones. Today's public versions of social applications tend to be plagued with the commercialism of **advertisements**, in the hopes that visitors will click through and make **purchases**.

A final consideration for the moment (not that this list is exhaustive) is **openness to integration.** This means that one of our criteria for evaluating any technology is how much it is able to be integrated into more complex applications via APIs, plug-ins, mashups, software services, or whatever you want to call them. It is through these interfaces, as well as advancing waves of standardization, that more and more integrated and richly functional social tools are coming into being. This is the result of a kind of wikinomics (Tapscott, 2006) process whereby an open community, including users or customers, can participate in design of the product or service they will consume.

All of these affordances are available in various combinations to help support the social aspects of enterprise. They supplement other forms of business communication.

All of this begs the questions: "Where do you go to hang out?" and "Where would you go to have a celebration?" In the physical world people can be observed congregating in certain places on a regular basis. Whether it is a coffee shop on the street, a bar, tavern or pub, a break room in the workplace, a cafeteria, the proverbial water cooler, people manage to find places to hang out. A lot of important things happen where people hang out. (Seely Brown, 2000)

From a sociable ICT perspective people hang out in chat rooms, where notoriously a lot of the hanging out has sexual content or overtones. They hang out in a very limited sense in interactive blogs that foster conversation through persistent comment streams. But they really hang out in virtual worlds. An answer to the second question about where to hold a

ceremony, one good answer is also virtual worlds. We will look more deeply into these questions in the next section.

Virtual Worlds

What do we mean when we say virtual worlds? This is a term in use in the market, and it is roughly equated to terms such as Metaverse, virtual environment, 3D Internet, etc. The term Metaverse (Stephenson, 1992) describes a kind of parallel universe where people engage as an extension of their physical lives. From a technological perspective virtual worlds grew out of the gaming technology called MMORPGs (massively multiplayer online role playing games). This describes a genre of online games that are played within a simulation platform that can support large numbers of players interacting with each other in fictional settings such as fantasy, war, historical episodes, and space missions. These games feature 3D virtual reality that provides a setting for players to interact with each other and with the playing environment through the use of so-called avatars.

A surprising development in the last couple of years has been the emerging usage of virtual worlds for pursuit of business and educational goals. In other words, there is serious use of technology that had been developed for entertainment. Some of the platforms involved in the serious use of VW include Second Life, Active Worlds, Forterra, Wonderland, Qwaq, Cobalt. The serious use is beginning to mirror the enterprise use of the Web with its own intraworlds to match intranets as private zones, extraworlds that match extranets as projections of enterprise content into the public, and fully public worlds that mirror the Internet itself. There is currently a lack of standards to allow worlds to interoperate, but many minds are working on that problem.

Virtual Worlds for Enterprising Sociality
Virtual worlds supply for the social enterprise some new places to hang out, and some new places to hold celebrations and other ceremonies.

The author draws on personal experience here, staring with a project that caused me to assume an avatar in Second Life. This project built the observation that people regularly rehearse complicated tasks and events, such as stage productions and sporting events. The insight was that there is also value in rehearsing complex team tasks in enterprise services, such as preparing for a client presentation or working on technical problems with teams that are widely distributed geographically. This notion of rehearsal services fostered some exploration of various collaborative technologies, and I was elected to do some due diligence on the appropriateness of Second Life, as representative of virtual spaces more generally. I was surprised at how compelling the social interactions turned out to be, based on the psychological suspension of disbelief about being co-present with colleagues in a virtual location. This rehearsal work is just one early experiment in using 3D technology to facilitate serious business interaction. As we will see, there are many ways of using the compelling immersive social presence of the virtual environment for enterprising purposes.

Since my initial introduction to virtual worlds (VW) I have had many adventures in the virtual environment, including helping to organize conferences where all the attendees

are avatars meeting in a virtual space. I have gotten involved with the arts and education communities, with an emphasis on the work in virtual libraries. This has led to speaking engagements, travel, and leadership positions in groups that I otherwise would have never gotten involved with. This all supports a perception that a virtual environment is a rich communication channel that can support serious pursuits in a uniquely immersive way.

Virtual World Functional Architecture
This section provides a rudimentary taxonomy of how people can use, and are using, virtual spaces. The terms "manner of use" and "focus of use" form a high-level category differentiation between the ways the technology is used (manner) and the purpose of use, or what it is being used for (focus).

Manner of use: Manner of use speaks to the way people are using the virtual world technology. The fundamental distinction in manner of use is between animated and non-animated uses. Non-animated usage is about artifacts and objects, whereas animated usage involves activities and behavior.

–Non-animated (artifactual) There are some beautiful artifacts being produced by people using virtual worlds (e.g. archaeological replicas of ancient Rome, etc.). A three-dimensional matrix can be constructed along the following dimensions, which helps to analyze the basic dimensions of what VW artifacts represent:

Utilitarian objects or aesthetic creations

Past, present or future objects as illustrative of history or projection and prediction

Real world renderings or fanciful creations

–Animated The animated dimension of virtual worlds includes all types of human activity as represented or conveyed through the VW medium. This is interesting to people who are focused on performance. These people are often thinking of doing collaborative work in virtual spaces

Simulation of activities under programmed or robotic control

Person-driven performance, in the sense that the activity is based on avatars being controlled in real time by various people. A performance may be done for an audience, and has constrained collaboration.

Collaboration among people who are working together toward a common goal. This can take the form of:

- Simple meetings or conferences where the collaboration is primarily communication of information

- Joint development, where people meet in a virtual space to create intellectual content

Focus of use: The focus of use tries to articulate what enterprises are using VW for, in the sense of support for business or other purposes.

–Mode of engagement

- *Enterprise that **uses** VW* – Virtual worlds are used in conjunction with other activities. IBM's promotion of Sam Palmisano's announcement from Beijing was an example of using VW in the course of conducting business, but not actually conducting business within the virtual space.

- *Enterprise that is **within** VW* – The virtual world is the place to conduct business. IBM has experimented with a virtual Business Center in public Second Life. This has provided experience with conducting business in a virtual space, with real employees available through avatars.

- *Enterprise that is **about** VW* – This occurs when virtual space itself is the business opportunity. An example is IBM's business relationship with Hoplon Infotainment to provide mainframe servers to run their gaming engine. In cases like this the business opportunity is *about* VW technology and supplying the technology *is* the opportunity.

–Issues addressed – This list is probably not inclusive, but indicates some of the kinds of business opportunities people are pursuing using virtual spaces

- Technology – Hardware, software, and hosting for VW. This is an obvious opportunity for ICT companies to supply hardware, software, connectivity, and hosting for virtual worlds

- Physical world simulations – Power plants, refineries, etc. This tends to be both artifactual and active, but not social in the sense of people communicating within virtual spaces

- Marketing -- A lot of companies are using virtual spaces for a kind of coolness factor. This can include branding, both in the sense of displays of marketing material and interactive events, such as live music in Second Life.

- Market research - There is also the expectation that because virtual worlds can track avatar movements and attention that virtual spaces can be used for interesting forms of market research

- Product sales – This is about using a virtual world as channel for real-world products. Some people think virtual spaces may become a strong channel for real-world product sales, but so far that potential has not been realized to any great extent.

- Services seem to provide about the best opportunity for enterprises to use virtual spaces, since they are intrinsically about people doing things together.

  - Public services by jurisdictions, non-profit, NGOs

  - Business services, such as accounting, law, consulting, and technical services

  - Personal services, including medical, fashion, personal shopping

  - Education – Academic institutions and corporate education

- Travel-cost offset –This is starting to gain a high profile as more and more people experience meetings and conferences in-world, and realize companies

can save a lot of money by reducing both commuting and long-distance travel costs.

These specific business purposes crosscut the other dimensions of this taxonomy. In other words, we could look inside any business using virtual space, and potentially see examples of various aspects of the focus and manner of use as described above. Based on the specific business functions being supported, there may be an emphasis on activity over artifact or vice versa. These all become design decisions on the part of business architects of these various enterprises.

Functional Architecture of Virtual Worlds
The following is a set of functional capabilities that are common to virtual worlds as they are emerging today.

- Programming and scripting languages

- Creation and inventory of virtual objects

- Physics simulation and movement, including walking and running, flying, riding virtual vehicles, and teleporting

- Virtual territory, including land formations, sharding and land controls

- Avatar management, including avatar animation, avatar appearance and customization (shapes, clothing, etc.), and avatar name space

- Communications, local and long (virtual) distance, and including text chat, instant messaging (IM), voice, and streaming audio and video

- Social groups, including formal groups with roles and powers for members, as well as informal schisming

- Virtual world economy, sometimes penetrating into real world national economies, which requires a monetary scheme, object ownership, the ability to sell and buy objects, real estate transactions and property tax

- Application serving inside a VW, which is the key to doing real collaboration around content

STRUCTURAL COUPLING

Enterprises and technologies are rapidly co-evolving, driven by the ecosystem of globally integrated enterprises and enabled by such technologies as Web 2.0 and virtual worlds. The generation coming into the working community is conversant with these technologies, and is expecting to use similar technical affordances in the context of their jobs. In this section we will bring these views together to explore the structural coupling that occurs and can occur between the organizational and technological domains.

We are operating from these definitions: "Structural coupling is the term for structure-determined (and structure-determining) engagement of a given unity with either its environment or another unity. The process of engagement which effects a ...history or recurrent interactions leading to the structural congruence between two (or more)

systems". (Maturana, 1987) It is "...a historical process leading to the spatio-temporal coincidence between the changes of state" (Maturana, 1975) in the participants. As such, structural coupling has connotations of both coordination and co-evolution. (Thellefsen, on-line) Niklas Luhmann has repurposed Maturana's concept specifically for social systems theory. Luhmann described structurally coupled systems as being in a state of mutual irritation and resonance. "Structural coupling is a state in which two systems shape the environment of the other in such a way that both depend on the other for continuing their autopoiesis and increasing their structural complexity." (Moeller, 2006)

In this case, of course, we are talking about coupling between the domains of enterprise and of technology. As we have noted, technology is not an inert enabler, but through an ecosystem of technological specialists is itself composed of an accountable set of human enterprises. The essence of this particular coupling is that ICT expands the range of communications and meaning processing available to the enterprise. As we discussed earlier, data processing in the form of accounting has produced efficiencies in the management of enterprise, and other applications have made it possible to handle complex operations more effectively. The Web made it possible for enterprises to extend their brands and operations beyond previous geographic barriers. What we are seeing now is that new forms of ICT are becoming available that promise to capitalize on the social aspect of human social systems. These technologies are coupled to the functions of enterprise that project the self of individuals and organizations into a globally open market of services and collaboration.

We have been at great pains to provide summarized architectural frameworks for both the enterprise and ICT domains, with a focus on the social aspects of both. The question that remains is how best to use these architectural constructs to explore the important process of coupling, within which forces of coevolution are operating at a rapid rate.

In general for the era of sociality, we need to look beyond the org chart and operational procedures to achieve effective design and technology introduction. Close attention to cultural and power architectures is necessary to perform interventions that result in healthy viability of organizations, and achievement of the desires that people seek in the context of enterprise. A long-standing problem is that lack of attention to these factors causes many business and technology improvement efforts to go astray. The new emphasis on social factors should bring renewed attention to a situation that has existed for as long as people have been applying ICT in the enterprise. Examples abound. The challenge of the U.S. intelligence services, before and after the creation of the Department of Homeland Security can be seen as a cultural challenge as much as a technical information access problem. The uneasy marriage known as Daimler-Chrysler was a clash of cultures that is not uncommon in mergers and acquisitions of business enterprises. The aftermath of the IBM acquisition of PriceWaterhouseCoopers Consulting is a classic example of "right vs. right" (Moulton-Reger, 2007) ways of addressing enterprise efforts. Disparate ways of working (practices and cultural factors) often jeopardize the most well intended of joint projects, even when each competing set of cultural practices has proven successful (right) within its own realm.

The next two sections consist of examples of structural coupling in relative detail, though still at a level that would probably not be adequate for serious real world business commitments. Based on the coevolutionary nature of structural coupling, we can predict with confidence that this technological "irritation" in these enterprises will whet the appetite for more fully functional affordances. On the other hand, there is always the chance that some irritation (in the form of ICT) will strike a countercultural nerve, and be rejected by the community of potential users.

Example 1 – Enterprise Awakening to Sociality (TTST)

The first example is a hypothetical company that provides after market technical support for some complex electronic products. This company, which we will call TeleTechie Support Team (TTST), can be seen as a high-function technical help desk, where knowledge of problems and their remedies is at a premium.

Salient Business Architecture
Organization structures are central to TTST. Technicians are organized around product support areas, and there is a hierarchical, command and control management structure. The idea of communities of practice is a recent insight for this company. A limited form of decision-making architecture is included in TTST's problem and fix database, which helps direct problems to the appropriate technician.

The institutional architecture is fairly simple for TTST. It is a privately held corporation that provides transactional services on a pay per use basis. The company is opening up the evaluation arena to peer review and reputation management to supplement simple call volume metrics.

In these early stages of deliberate enterprise sociality TTST does not have a strong focus on cultural aspects of their business architecture. TTST is starting to understand the importance of community boundaries and boundary objects, so this architectural viewpoint is just beginning to emerge. Direct support for individual and group branding is also beginning to emerge, but only informally.

Salient Sociable Technology Architecture
TTST needs persistence support, in the form of database storage and retrieval for the problem and fix history. Search and limited tagging are provided, but not ontologies, or advanced text analytics. Limited graphical capability in the form of still images is provided as part of the new profile application. Versioning is also important for problem history and threaded comments on fix records.

TTST is beginning to see the value ofsome form of reputation management capability based on the supporting functions of opinion, rating, ranking, and rewards. This has not been explicitly documented in their enterprise architecture yet.

The TTST ICT architecture has some openness to integration, but the application suite is homegrown and not standards-based beyond the basic functionality of web technology. TTST is not very far along in their thinking about possible use of virtual worlds (VW) technology.

Structural Coupling

TTST has a well-developed database of problems and known fixes, which is updated and used continuously by the professional technicians. They decided to introduce a simple social application of ICT to supplement the problem database. The idea was to add product unit bulletin boards and a photo and comment profile page, with links to a basic instant messaging (IM) system. The profile information was meant to personalize the projection of self of each technician, and IM was intended to allow technicians to reach out to each other in the course of resolving problems. The idea was that teaming within product lines would support faster and better problem resolution. This also led to big debate about whether there should be partitioning of IM access by group, including maybe real-time group IM chat.

A disaster threatened to occur because the design and deployment had overlooked the rough-hewn, locker room oriented aspect of the culture. Comments that had been limited to the lunchrooms and e-mail became public on profiles and bulletin boards. Old-fashioned flame wars broke out and some people took offense at the harsh barbs that erupted. Management considered scrapping the system in the face of bitter employee complaints, but instead did some belated but effective cultural redesign. They made it clear that the company wanted to foster a culture of technical excellence and reputation, but that workplace discrimination and harassment standards applied in the arena of sociable ICT.

Example 2 – Deeply Social Enterprise (CPSSN)

The second example is a hypothetical community-based problem-solving services network. In fact, that is its name, abbreviated (CPSSN). It is a thoroughly dot-com kind of company, based on Web 2.0 and other ICT from top to bottom. The business is based on the idea that people, through their knowledge and their relationships, constitute an intrinsic form of value that is often not fully recognized or appropriately rewarded. The stated purpose of CPSSN is to make social relationships and capabilities manifest in a way that captures and monetizes them. CPSSN harnesses social networks in support of any kind of problem-solving mission, where "problem" is broadly defined as any deviation between the current situation and some desired state. The communities may be contained within existing organizations (project teams within corporations, or collaborative learning design and practice within a consortium of higher education institutions). Communities join the network and stand up a value-recognizing structure of simple contracts that creates a motivational and monetizing environment for services practitioners operating as inductees to communities where they can contribute. Problems can range from a large effort to remediate an environmental problem to the creative performance of a technologically saturated artistic event.

Salient Business Architecture

In CPSSN's business architecture there is minimal emphasis on formal organization structures. CPSSN itself is a Limited Liability Company (LLC), so the partnership model is pretty simple. There are basic corporate functions, but they are mostly outsourced, inside or outside the community network. Similarly, procedural processes are not a main focus, aside from things mostly outsourced. There is a procedural protocol associated

with the community functions of induction and managing assets, and there is deep process in the core competency of sweeping and calculating community value.

On the other hand, the architectural viewpoint of "practices" is the focal point for CPSSN. The company exists in order to support communities of practice, so an emerging knowledge base about practices is key to future success. Networks within networks comprise the basic structure of the communities of practice, so there is a need for strong support of social networks and role and accountability structures

There is a complex institutional architecture for CPSSN. As mentioned, it is an LLC with aspects of a franchise model. There is an emphasis on intellectual property and contracts, and many property issues come into play (title, equity, investment). CPSSN actually creates a market and supports transactions and payments. All forms of evaluation (ratings, peer review, reputation) are integral to CPSSN's business architecture. Practice analytics form a necessary set of research protocols. And there is a strong emphasis on aesthetics in branding and creation of collaborative working environments. Brand architecture is key, since success of individuals and communities within the network consists of projecting self and the ability to form relationships within and across networks.

Salient Sociable Technology Architecture
CPSSN clearly needs lots of persistence support, for managing large amounts of content for problem-solving communities. This includes database storage and retrieval, as well as file service and document sharing. All types of content need to be supported, including textual, graphical, and audio, and behavioral as well as still images. Textual affordances such as search, tagging, ontologies, and text analytics are key to the ability for CPSSN to manage vast amounts of community-generated content, as well as the ability to find and match problem-solvers to problems. Versioning is also important in a heavily collaborative environment.

CPSSN plays across the spaces of intranet, extranet and the Internet. It is a heavily user of access control in support of groups and individuals. Those groups provide significant linkage to their members and associates. There is not much need for true broadcast to the public at large, but CPSSN narrowcast, pointcast, and publish and subscribe methods of content access. There is talk of going peer-to-peer, and even possibly grid processing, but there is also hesitancy based on difficulties of managing IP issues in this mode.

Some of the commerce-oriented affordances, such as advertising and purchases, enabled by more basic functions like hits, click-throughs and cookies, is being repurposed by CPSSN for use in a services marketplace. Basic business functions, such as calendaring and project management are provided to communities from 3rd-party suppliers via app sharing.

A key affordance for CPSSN is support for both real-time and asynchronous threaded collaboration, often with multiple participants across a community. A significant part of CPSSN's business model is based on the reputation management capability that repurposes vendor reputation systems like eBay's for a service network of individuals working through communities. This is based on the supporting functions of opinion,

rating, ranking, and rewards.

Along with heavy use of web-based visual design, CPSSN is a leader in the serious use of virtual worlds (VW) technology. There are several ways that problem-solving communities can collaborate, but one of the most popular modes is in virtual "studios" where community members are represented by avatars that interact with each other and share applications for cooperative manipulation of intellectual content.

CPSSN's ICT architecture is based on openness to integration. Many of the affordances mentioned above are provided by 3rd parties in a mashup mode. In actuality, CPSSN has developed a secondary marketplace (to complement its market in the form of network of problem-solving communities) for ICT providers who support community collaboration and other business functions. This is a complex form of wikinomics, where CPSSN has developed a standard business protocol around which a community of developers has assembled, who in turn use the community structure to support their own operations.

Structural Coupling
It is clear from this hypothetical example that emerging businesses based on enterprising sociality can push the envelope on integrating supporting technologies. In this case, a strong need for societally relevant problem solving is being served, as well as a desire for new wealth-creating opportunities for communities of service providers. New forms of ICT are being created as a result of this community desire. Communities are adopting the new ICT and creating innovative new social practices as a result. These in turn spawn new technical innovations, in a virtuous cycle of coevolution.

CONCLUSION

We have covered a lot of territory here, from global socio-economic forces shaping the nature of enterprise, to architectural views of the social nature of enterprise and socially supportive ICT, to a brief and limited discussion of how these architectural views can be used to understand and design socio-technical systems that have desired properties and successful adaptations to the marketplace.

We have tried to convey a sense of the dynamic nature of the ongoing coevolution of social enterprise and technology. We can also observe the impact on enterprising social structures through the introduction of technologies. This clearly highlights the complex accountability assumed by the inventor, the designer, the creator, the acquirer, the installer the maintainer, and the user of the ICT components of the enterprise. This calls forth a need to assume responsibility for those results as they impact the individuals and organizations involved in enterprise.

We see that trends of complex global problems, the Synergy phase of it ICT long wave economic cycle, and an increased emphasis on the services paradigm for enterprise are converging, and that the importance and complexity of this domain will lead to significant opportunities for innovative employment arrangements and wealth creation.

REFERENCES

Aaker, D. (2004). *Brand Portfolio Strategy: Creating Relevance, Differentiation, Energy, Leverage, and Clarity*, Free Press, N.Y.

Ackerman, M. and Halverson, C. (1998). "Organizational Memory: Processes, Boundary Objects, and Trajectories," *Proceedings of the Thirty-second Annual Hawaii International Conference on System Sciences*, IEEE

Beer, S., (1985). Diagnosing the System for Organizations, Wiley, N.Y.

von Bertalanffy (1968). *General system theory; foundations, development, applications*, Braziller, N.Y

Chrisman, N. (on-line). "Trading Zones or Boundary Objects: Understanding Incomplete Translations of Technical Expertise, "http://faculty.washington.edu/chrisman/Present/4S99.pdf

Drucker, P. and Maciariello, J. (2004). *The Daily Drucker: 366 Days of Insight and Motivation for Getting the Right Things Done*, Harper Collins, N.Y.

Friedman, T. (2005). *The World is Flat*, Farrar, Straus and Giroux, N.Y.

Gerstner, L. (2002). *Who Says Elephants Can't Dance? Inside IBM's Historic Turnaround,* HarperBusiness, N.Y.

Goffman, E. (1959). *The Presentation of Self in Everyday Life.*, Doubleday, Garden City, N.Y.

Granovetter, M. (1973) The Strength of Weak Ties, American Journal of Sociology, 78(6):1360- 1380.

Haeckel, S. (2008). Designing Organizations as Role and Accountability Systems, forthcoming

Hildreth P. and Kimble C. (1999). "Communities of Practice in the International Environment," Second Workshop on Understanding Work and Designing Artefacts: Design for Collaboration, King's Manor, University of York

Korzybski, A. (1926). *Science and Sanity: An Introduction to Non-Aristotelian Systems and General Semantics*, Institute of General Semantics; 5th edition, 1995

Lave, J. and Wenger, E (1991). *Situated Learning: Legitimate Peripheral Participation.* Cambridge University Press: Cambridge, UK

Maturana Romesin, H. (draft). Autopoiesis, Structural Coupling And Cognition, http://www.isss.org/maturana.htm

Maturana, H. (1975). The Organization of the Living: A Theory of the Living Organization, *International Journal of Man-Machine Studies*, 7(3):313-332

Maturana, H. and Varela, F. (1987). *The Tree of Knowledge: The Biological Roots of Human Understanding*, Shambhala, Boston

Maturana Romesin, H. and Bunnell, P. (1998). Biosphere, Homosphere, and Robosphere: what has that to do with Business?, *SOL On-line*, Society for Organizational Learning http://www.solonline.org/res/wp/maturana/index.html

McDavid, D. (1996). Business language analysis for object-oriented information systems, *IBM Systems Journal*, 35(2):128-150

McDavid, D. (1999). A Model for Living Enterprise Information Systems, *ISSS Annual Conference*, Asilomar, California.

McDavid, D. (1999a). A standard for business architecture description, *IBM Systems Journal*, 38(1):12-31

Mobley, L. and McKeown, K. (1989), *Beyond IBM,* McGraw-Hill, N.Y.

Moeller, H. (2006). *Luhmann Explained*, Open Court, Chicago

Moulton-Reger, S (2007). *Can Two Rights Make a Wrong?: Insights from IBM's Tangible Culture Approach*, IBM Press, N.Y.

New Media Consortium and the EDUCAUSE Learning Initiative (2008). The Horizon Report, NMC, the New Media Consortium, Austin, Texas

Nieman, A. (2002) "Boundary negotiations in popular culture: 'intermediate dependent entities' and the ideological context of science policy," http://www.adamnieman.co.uk/writing/boundaries&policypreprint.pdf

Norman, D. (1988). *The Psychology of Everyday Things*, Basic books, N.Y.

North, D. (2005). *Understanding the Process of Economic Change*, Princeton University Press, Princeton, N.J

Palmisano, S. (2004). Leading Change When Business is Good, Samuel J. Palmisano interviewed by Paul Hemp and Thomas A. Stewart, *Harvard Business Review,* 82(12):60-70

Palmisano, S. (2006). The Globally Integrated Enterprise, *Foreign Affairs,* 85(3):127-136.

Perez C. (2002), *Technological Revolutions and Financial Capital*, Elgar, Cheltenham, UK.

Rich, F. (2008). One Historic Night, Two Americas. *The New York Times*, June 8, sec. Opinion.

Spohrer, J. (2003). History, Definitions, Projections, Disruptions, Advances, Challenges in Symposium on the Coevolution of Technology-Business Innovations, http://www.almaden.ibm.com/coevolution/pdf/spohrer.pdf

Stephenson, N. (1992). *Snow Crash*, Bantam, N.Y.

Seely Brown, J. and Duguid, P. (2001). *The Social Life of Information*, Harvard University Press, Boston

Star, L. and Griesemer, J. (1989). Institutional Ecology, Translations and Boundary Objects: Amateurs and Professionals in Berkeley's Museum of Vertebrate Zoology, 1907-39, *Social Studies of Science*, 19(3):387-420

Tapscott, D., and Williams, A. (2006). *Wikinomics: How Mass Collaboration Changes Everything*, Portfolio, N.Y.

Thellefsen, M. and T., eds., (o-line), Cybernetics & Human Knowing - Thesaurus pilot project http://www.imprint.co.uk/thesaurus/structural_coupling.htm

Vargo , S, and Lusch, R. (2004). Evolving to a New Dominant Logic for Marketing, *Journal of Marketing*, 68(1), 1–17