Sustainable Innovation and the 'Learning Drive'

By Mark W. McElroy

Introduction

Historians of late-twentieth/early-twenty-first century management practices may very well record the failure of business process reengineering (BPR) as comprising the death knell for reductionist thinking in post-modern times. Indeed, the very idea that people operating in nonlinear social systems could be manipulated with precision like so many belts and pulleys in a grist mill seems, in retrospect, even to contemporary Taylorists, like mechanistic thinking run amuck. '*What could they possibly have been thinking*?', historians will ask, as they look back on the crash of reductionism and the rise of systems thinking in its wake. We are arguably on the threshold of a new paradigm in management theory and practice, the effects of which are now being felt in earnest on several important fronts. One of them is in the Knowledge and Innovation Management arena; another is in the related field of Organizational Learning (OL).

Despite its checkered reputation thus far, Knowledge Management (KM) is proving resistant to criticism while its practitioners are becoming increasingly more sophisticated, in the exchange. And why shouldn't KM exhibit that kind of resilience? After all, the proportion of economic value now attributed to so-called intangible or intellectual capital in business is higher than ever (75% of market values as reflected in the Dow Jones Industrial Average [DJIA] in 1997)[1]. By contrast, as recently as 1980, the same index reflected market values owing to intangible assets at nearly zero. In other words, the value of the DJIA in 1980 – only twenty-three years ago – was largely confined to traditional book values, or hard assets. Since then, the value of intellectual assets as a component of total *market values* has increased exponentially. No wonder, then, that a whole new breed of professionals has emerged in a field we now call *Knowledge Management*.

In my own efforts to characterize the conventional practice of Knowledge Management, I have found it useful to differentiate between what I call *supply-side* versus *demand-side KM*.[2] In general, supply-side thinking focuses on the *sharing* and *integration* of *existing* organizational knowledge, while demand-side thinking focuses on the *formulation* and *production* of *new* knowledge. Most of the KM thinking and hype in the marketplace to date has been firmly rooted in supply-side schemes. I call this supply-side-only orientation, *first-generation Knowledge Management*.[3]

More recently, however, a new breed of KM practitioners have embraced the challenge of knowledge production, and are beginning to think more in terms of whole knowledge lifecycles that include *both* knowledge production *and* integration. After all, valuable organizational knowledge must come from somewhere, a fact that supply-side thinkers conveniently overlook. I call the more balanced practice of supply- *and* demand-side thinking, *second-generation KM*[4] (see Figure 1).

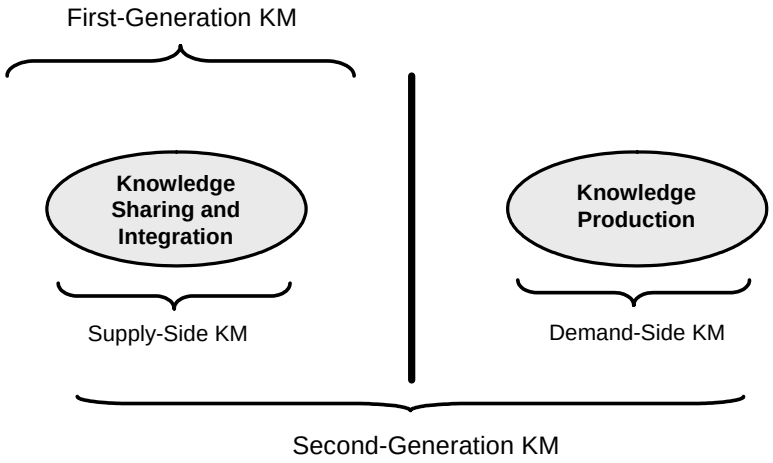

Figure 1 – The Two Generations of Knowledge Management

Given the prevalence of Taylorism even in recent times, it should come as no surprise to anyone that Knowledge Management initially took the supply-side form that it did. Classical economics encourages us to objectify knowledge so that we can capture, codify, and distribute it in discrete form. The 'suppliers' in these schemes are, of course, managers who are presumed to possess the wisdom needed to determine *who* should have *what* knowledge, and *when*. This is the inspiration that lies behind the familiar mantra in first-generation KM which asserts*: it's all about getting the right information to the right people at the right time*. The unspoken assumption, therefore, is that *the 'right information' already exists and that managers know what it is.*

Demand-side thinkers, on the other hand, have stopped to question where existing knowledge comes from in the first place, and how it is that some firms manage to have more of it than others? How is it, in fact, that some firms seem more capable of engaging in effective organizational learning such that they adapt faster than their competitors and are more nimble in the marketplace? In other words, how do firms learn and innovate?

I have been fortunate to count myself among those of a small group of demand-side thinkers who have been wrestling with the question of organizational knowledge production for several years now. This group, the Knowledge Management Consortium International (KMCI)[5], is a think tank that has declared its commitment to systems thinking as a foundation for practice in KM. As a result, KMCI has become the de facto center of thought for second-generation KM theory and practice. Indeed, in a reference to its views on complexity theory, KMCI was once described by *Knowledge Management*

magazine as, "the Santa Fe Institute for knowledge management."[6] KMCI's formulation of second-generation KM is worth noting because it signals the particular influence of systems thinking on a management domain of great contemporary importance: *organizational learning and business innovation*.

Framing the Debate

Not too long ago, the *Wall Street Journal* ran a front-page article entitled, '*Self-Organization: The Next Big Thing?*'[7]. Therein appeared the following claims: "Today, self-organization is rapidly becoming a very hot idea, the essence of which is that top-down master plans aren't the only way to build something big and lasting. Unorganized assemblies of people can create everything from marketplaces to computer systems almost spontaneously, on the fly, from the bottom up." In other words, creativity in human social systems often flourishes despite the absence of centralized planning or control. From this perspective innovation is seen as an emergent social process, not a controlled administrative one.

KMCI's study of competing theories on how innovation 'happens' in human social systems quickly revealed the predominance of two distinct schools of thought. The first camp, the *reductionists*, view innovation as an administrative function managed by hierarchies. This approach to organizational innovation includes methodologies such as the so-called 'stage-gate' system, now commonly employed by mainstream R&D functions. Also featured in the reductionist school are techniques designed for individual use such as the TRIZ[8] method, which looks to conceptual patterns found in existing inventions for inspiration in the development of new ones. The reductionist camp invariably views the challenge of innovation as an utterly top-down, manageable affair. Even a cursory look at the manner in which product innovation is organized and carried out in most firms today offers ample evidence of the reductionist perspective at work. Its days, however, are clearly numbered.

The other prevailing school of thought in the innovation debate is the *adaptive systems* crowd – myself included. We begin by recognizing the fact that the current corporate form of business is a relatively new institution (only about a century old) and that management, the science, is even less mature. Moreover, we see that human social systems – indeed humanity, itself – have been producing new knowledge at impressive rates for *millennia*, and that they (we) have been doing so without the benefit of the kind of centralized planning and control schemes so prevalent in today's mainstream corporations.

According to the adaptive systems camp, human social systems survive by continuously adjusting, or *fitting*, themselves to their environments, which they do by engaging in real-time, non-stop learning. In fact, adaptive systems theory holds that innovations in the human domain are the products of *social systems*, not individuals. While individuals certainly invent, only whole social systems can innovate, because innovation, by definition, involves the widespread adoption of validated new knowledge into common use. And since there can be no widespread practice of new knowledge until, and unless, widespread *acceptance* of such knowledge has first occurred, innovation is clearly a social process, not an individual one. The same goes for innovations internal to an organization.

The reductionist side of the debate is unquestionably treading on thin ice right now. In discussing the so-called "problem of [modern corporate] innovation," authors William Miller and Langdon Morris, *Fourth Generation R&D*, put it this way: "Although commonly denied in public, it ['the problem of innovation'] is discussed at length and deeply lamented in private, where top managers know that their corporations are failing at innovation and particularly at making the substantial leaps that are required for discontinuous innovation."[9] They later add, " It is clear that there is a serious problem with the practice of innovation, and it would not be an exaggeration to say that most corporations are pushing a rope at it without success."[10] The title of the chapter in which these statements appear is, *Innovation In Crisis*.

The adaptive systems side of the debate sees the crisis of innovation as the result of a failure to recognize the fundamental nature of human organizations. Instead of turning to such reductionist stalwarts as Frederick Taylor for inspiration, the systems thinking camp has turned, instead, to the natural sciences for an understanding of how learning and innovation happen in living systems. Perhaps our richest source of insight has been the science of complexity. Complexity science focuses on the study of orderly behavior in decidedly *disorderly* systems. Of particular interest to some complexity scientists is the ontogeny of knowledge in living systems. The theory of how knowledge unfolds in such systems – according to complexity science – is embodied in *complex adaptive systems theory* (CAS theory). CAS theory is the special province of the Santa Fe Institute in New Mexico.

CAS theory, for the second-generation, systems thinking side of KM, has emerged as the most respected, most credible model for representing the complex dynamics of knowledge processing in human social systems. But to many of us involved in both the KM and Organizational Learning communities, it's not clear that CAS theory's relevance to management or to the conduct of human affairs has yet become fully appreciated – much less understood – by constituents of either group. From here, then, I will try to explain what, to me, is the most profound implication of CAS theory as applied to Organizational Learning, Knowledge Management, and business innovation.

Complexity Theory and OL

In the past, I have been mildly critical of the Organizational Learning (OL) community's failure to embrace complexity theory as a credible basis for describing and modeling the dynamics of social learning and innovation. Since I am a card-carrying member of that community, however, I see myself as no less responsible than others for this, a charge I now mean to confront by revealing the compelling facts of my own work in this area. What I have to offer, then, is a fresh perspective on the ontogeny of knowledge in human social systems, and a means by which related insights can be parlayed into useful practice for the improvement of organizational learning and performance.

CAS theory can be summarized as follows: *living systems continuously fit themselves to their environments by closing gaps between what they need to know in order to perform well, and what they already know*. In other words, they learn. This ability to close epistemic gaps begins with an ability to detect them. That is, they have the capacity to detect conditions in their environments; to detect problems or gaps in current versus target states; and to formulate behavioral strategies for themselves, in response. Once experienced in the form of practice, the relative merits of different strategies are then assessed, after which they are either repeated, discarded, or modified for future use,

depending on the kind of feedback received by the systems involved. The 'systems' in this case are living systems, which in a human context can either be individual humans, groups, or whole social systems. Families, communities, nations, societies, organizations, businesses, clubs, churches, and professional associations are all CASs operating at different levels of scale (see Figure 2).

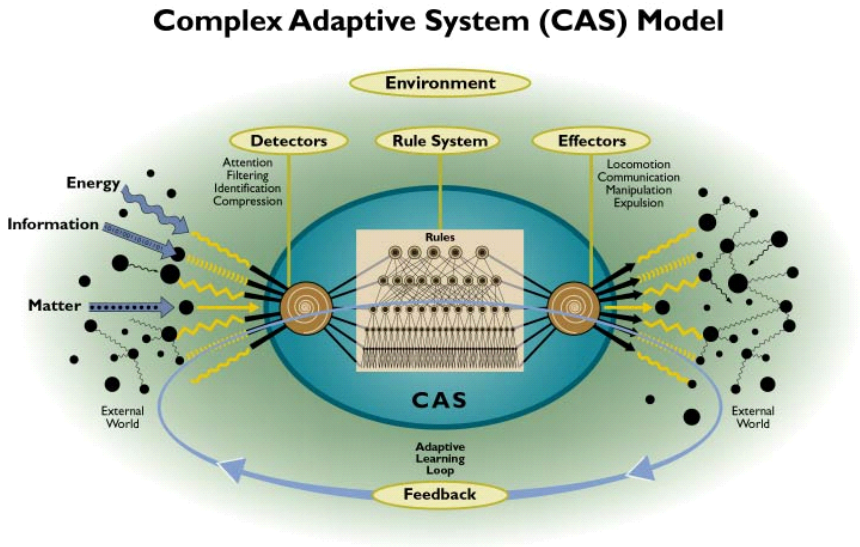

Figure 2 – Complex Adaptive Systems

Of particular additional interest in human social systems is their capacity to engage in learning-like behaviors *in the aggregate,* as though social systems, themselves, are conscious living beings with *minds* of their own. Maturana and Varela in their 1972 classic, *Autopoiesis and Cognition*, hypothesized that, in fact, a brain is not necessary for a mind to exist: "*Living systems are cognitive systems, and living as a process is a process of cognition.*" [11] Brains are merely structures through which the process of cognition (and life) operates, and the same processes can unfold in other kinds of structures, including collectives. Gregory Bateson, in particular, believed that mind is manifested in not only organisms, but in social systems and ecosystems, as well.[12]

What we need in the fields of Knowledge and Innovation Management are theories like this that can provide us with a basis for practice. In other words, we need a compelling theory of how the *thing* of interest to us functions (a 'theory of system'), so that we can formulate corresponding methods for how to have impact on it (a 'theory of practice'). Unfortunately, the field of OL has been long on the latter but short on the former. Thus, it has been criticized by many as being devoid of theory on how organizations actually learn – that is, the field of OL is, ironically, weak in terms of its epistemology. Where OL

theory has left off, then, CAS theory has picked up. In their combined form, the elegance and simplicity of the vision they jointly evoke is disarming. And so here it is.

The 'Learning Drive'

As every student of organizational learning knows, all knowledge in business – shared or otherwise – begins in the minds of individuals. Individual learning is, therefore, a necessary antecedent to organizational, learning. But it takes more than individual learning to get things started. It takes *independent* individual learning. There's a big difference between learning about things *I* want to know because of *my* interests, versus learning about things I'm told or compelled to know *by others*. Here I point to the difference between learning and training. Learning in its purest form is a voluntary, self-directed act that follows from intrinsic motivation to solve problems or close gaps (epistemic gaps). Training is something we often endure in response to other people's views on what *they think* we should know (extrinsic motivation).

In human social systems, people who learn and who hold knowledge about things that interest them deeply and personally sometimes co-attract one another on the basis of their shared interests. This is not a managed process; rather, it's a natural one in the sense that its occurrence is self-organizing and emergent. No one forced me to join the Society for Organizational Learning, or KMCI. I joined both voluntarily because of my desire to interact with kindred spirits of a like-minded sort, who apparently share my passions and interests about the power of learning. This is how communities form. Real communities, if you will, are self-organizing in origin. They are not legislated into existence; they spring forth from the mutual desires of independently operating individuals to affiliate with one another on the basis of their shared passions and interests, and their shared desires to close epistemic gaps in common.

Once formed, communities then act as the developmental breeding ground for new ideas, new knowledge, and potential innovations. Inside communities, we share our individual ideas and subject them to peer review, as even now I am doing in the production and publication of this paper. Through dialogue and discussion in group contexts, ideas hatched in the minds of individuals become exposed to those of others, and are gradually refined, expanded, and changed as they come into contact with group-level scrutiny and criticism. Through this process, many ideas, too, are invalidated and discarded in favor of more credible ones. In these ways, ideas or *knowledge claims* born in the minds of individuals are further developed in communities and are subjected therein to testing and evaluation. Ideas that survive this process are what we call *knowledge*.

Communities, therefore, are of fundamental importance to the development of shared organizational knowledge. Without them, knowledge moves too quickly from the minds of individuals into the realm of organizational practice, a too-hasty leap that frequently precedes failure, such as the demise of authoritarian dictatorships throughout history, not to mention the likes of Enron, WorldCom, Tyco, and the other more recent cases of corporate misconduct. There's simply no denying the value of knowledge claim testing and evaluation as performed by open and diverse communities in human social systems.

Just as people tend to collaborate and compete with one another for validation and acceptance of their ideas in communities, so do communities, themselves, collaborate

and compete with each other for validation in the *communities of communities* we call organizations. The same principles that apply *within* communities are also at work *between* them. The influence of adaptive system dynamics merely shifts in scale: from the individual to the community; to the community *of* communities; and so on. Even in the most rigidly managed command-and-control style organizations, ideas begin in the minds of individuals (in response to the detection of epistemic gaps), migrate into communities (which may only take the form of ephemeral groups), and therein vie for favor and acceptance in the struggle for organizational adoption. In strict authoritarian environments, there are simply fewer opportunities for individuals to participate in self-organizing communities, and fewer communities to draw from as sources of organizational knowledge. The adaptive capacity of organizations operating under such conditions suffers, accordingly.

Now, here's the jaw-dropping insight gleaned from years of study by complexity scientists poring over the research on how knowledge 'happens' in living systems. Their conclusions? It self-organizes! And the form it takes as it does so expresses itself in precisely the same pattern of social processes I have sketched out above. Here it is again in succinct form: *individual and group learning in response to the detection of problems or gaps during knowledge use, followed by knowledge claim formulation, testing, and evaluation, followed by organizational knowledge integration and use* (see Figure 3). That's the endogenous pattern of knowledge processing found in all human social systems, and the beauty of it is that it's utterly emergent, self-organizing, self-propelled, and completely free of the deterministic hand of management – a product of what complexity scientist Stuart Kauffman calls, "order for free."[13]

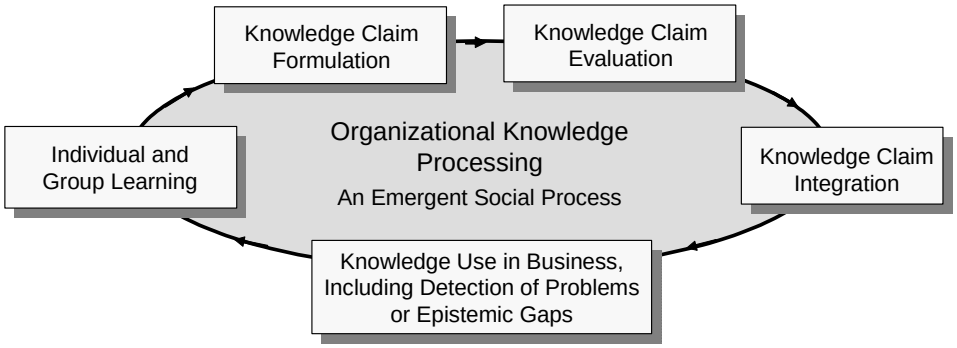

Figure 3 – Cycle of Organizational Knowledge Processing (The Knowledge Life Cycle[14])

Burn that pattern indelibly into your mind's eye and then re-read Thomas Kuhn's *Structure of Scientific Revolutions*[15]. What you'll see is that Kuhn repeatedly invokes the same pattern as he skips across the centuries in his historical account of scientific innovation. First, the obvious role of *independent individual learning* by such luminaries as Galileo, Newton, Copernicus, Einstein and many others looms large. Next, and just as conspicuous, are the many *self-organized communities* prominently featured within the revolutionary 'structure' that Kuhn spoke of. In his own words, "Communities of this sort are the units that this book has presented as the producers and validators of scientific knowledge."[16] And finally, in a separate reference to what I refer to as *organizational integration* – the culmination of the competition between communities for standing – Kuhn wrote, "Competition between segments of the scientific community is the only historical process that ever actually results in the rejection of one previously accepted theory or in the adoption of another."[17]

These are very strong words, which on the basis of Kuhn's study of the manner in which scientific knowledge has evolved over the centuries, testifies to the irrepressible nature of self-organizing knowledge processing patterns in human social systems. This recurring pattern – *individual and group learning in response to the detection of problems or gaps during knowledge use, followed by knowledge claim formulation, testing, and evaluation, followed by organizational knowledge integration and use* – undeniably unfolds under its own steam in human domains at all levels of scale. It is as naturally present in the social milieu of organizational life as the sex drive is for individuals in the propagation of species. In this case, however, we're talking about the existence and influence of a *learning drive* and its role in the propagation of knowledge. Both are emergent and self-organizing in their ontogeny, and both are undeniably at play in the conduct of human affairs.

That the *learning drive* exists, and that it expresses itself in the characteristic pattern I have described, are claims that I and others have made and which practically support themselves now on the basis of prima facie evidence alone. Once understood, the pattern can be seen everywhere in practice, expressing itself in self-organized forms, usually in the complete absence of management interventions. Here, then, is a clear and compelling view of how learning happens in organizations, and why it happens. It happens in response to the detection of epistemic gaps, and it happens in the form of the self-organizing pattern I have described. The motivation to learn, or to close epistemic gaps, is precisely the drive I speak of here. It fundamentally underlies our capacity to function from one moment to the next, and to adjust our behaviors when faced with new conditions or circumstances. It accounts for how we adapt.

This is just the kind of 'theory of system' needed in OL as a foundation for practice. Think of it this way: the organizational learning movement now has a more rigorous theory of system to work with; one which offers a more detailed description of the dynamics of *collective learning* in human social systems. Armed with such a plausible model of *how* learning happens in organizations, practitioners now have something they can see, touch, and feel as a concrete basis for action. The anatomy of the patient has finally come into focus!

A Framework For Action

Unlike the reductionist approach to managing anything, systems thinkers – and now the CAS-inspired OL crowd – understand that the behavior of complex systems can be traced to their structures. Thomas Kuhn knew this, and now we know this. What I have described above, then, is the *structure of organizational learning, or knowledge processing* – knowledge production and integration – in human social systems. Listen to it again: *individual and group learning in response to the detection of problems or gaps during knowledge use, followed by knowledge claim formulation, testing, and evaluation, followed by organizational knowledge integration and use.* Individuals engage in self-directed learning. They then co-attract one another and collectively form communities of learning. Knowledge claims are then formed, tested and evaluated inside these communities. Individuals, communities and their claims then compete with one another in their larger social milieu, and eventually the surviving claims are adopted by the organization which *integrates* them into the wider field of shared knowledge. When this happens, episodes of organizational learning can be said to have occurred.

But since all of this is self-organizing in its ontogeny, who needs management? We don't command social systems to engage in knowledge-making any more than we order plants to grow; they are both already predisposed to function in their own endemic ways without the need for any management at all. But do all organizations learn equally well? Does my company experience these processes in the same way yours does? Probably not. In fact, most firms could be accused of actually *inhibiting* these processes, which after countless generations of human evolution unquestionably account for how we got here and the growth of knowledge in general. God forbid we should get out of their way and let these social patterns of learning and innovation fulfill their purpose in the conduct of human affairs: *to help us adapt*! Indeed, it may very well be true that the best way to enhance organizational learning is to get out if its way. Better yet, we should offer aid and support to its characteristic expression in human social systems. I will now try to explain how.

Reductionist dogma is predicated on the belief that people operating in human social systems can be manipulated and managed into following certain prescribed patterns of behavior. By designing related behaviors and managing people ever more efficiently, practitioners of reductionist thinking believe they can create human operating systems whose behaviors comply with their designs. This is vintage BPR and classic first-generation KM thinking. Interesting, but misguided. Reductionist thinking completely overlooks the fact that certain business-related behaviors are already present in human social systems, and simply can't be ignored or wished away as if they were not. It's the proverbial herding of cats problem. Cats will simply not be herded any more than people operating in human social systems will knowingly disavow their tendencies toward *individual and group learning in response to the detection of problems or gaps during knowledge use, followed by knowledge claim formulation, testing, and evaluation, followed by organizational knowledge integration and use.* Any attempt to ignore these patterns or to replace them with artificially prescribed forms of learning and innovation only run afoul of them in the long run and are, therefore, unsustainable. These patterns will simply not be denied, nor will they conveniently go away.

And why would we want them to? If it's enhanced organizational learning and business innovation we're after, we should embrace these patterns, roll out the red carpet, and grant them the keys to the kingdom. That, then, is the key to enhancing organizational learning and business innovation as inspired by complex adaptive systems theory. Since people in organizations are already *behaviorally predisposed* to detect and solve problems, learn, and innovate, our intervention strategies as Knowledge Managers should be to create and maintain the conditions required for them to do so. And chief among the tools we use to pursue strategies of this kind should be *organizational policies related to learning and innovation* that have the effect of encouraging, supporting, strengthening, and reinforcing precisely the same set of behavioral predispositions.

The kind of policies needed to encourage and support learning and innovation, however, are polices of a strikingly unconventional type. Unlike the conventional practice of management in which policies are deterministically used to direct prescribed behaviors, wisdom in the practice of systems thinking suggests exactly the opposite. The policies we need, in the case of reinforcing self-organizing systems, are ones that should be *determined by behaviors*, not the other way around, because the behaviors of interest to us already exist. Thus, on the one hand, we should go out of our way to avoid policies that either conflict with or inhibit the expression of these emergent behaviors, while on the other hand we should aggressively seek to enact policies that will support, strengthen and reinforce them. In this regard, when it comes to enhancing organizational learning and business innovation, the controlling orientation of conventional management is wholly inappropriate and self-defeating. What's required, instead, is a deferential approach, not a prescriptive one. Management policies, in this case, should follow from behaviors, not the reverse!

If the pattern of interest is *individual and group learning in response to the detection of problems or gaps during knowledge use, followed by knowledge claim formulation, testing, and evaluation, followed by organizational knowledge integration and use*, then the kinds of interventions we should be considering are those that make the full realization and expression of these behaviors possible. The rest will naturally follow.

Policy/Program Areas

I find it useful to think of policies and programs related to enhancing organizational learning and innovation (Knowledge Processing) as occurring in three areas. Here they are along with their individual policy/program categories, which practitioners can use as a framework for devising and carrying out related interventions[18]:

- **Background Conditions**

    1. Human Characteristics
    2. Density and Distribution of Connectedness
    3. Criticalist Attitude in Knowledge Processing
    4. Knowledge Entitlement
        a. Attitudes
        b. Behaviors

- **Knowledge Production**

    1. Problem Claim Formulation (including Problem Recognition)
    2. Individual Learning (including Community Formation)
    3. Group Learning (including Community Formation)
    4. Information Acquisition
    5. Knowledge Claim Formulation
    6. Knowledge Claim Evaluation

- **Knowledge Integration**

    1. Broadcasting
    2. Searching/Retrieving
    3. Teaching
    4. Sharing

Brief definitions of each policy/program category follow below.

- Background Conditions

    1. Human Characteristics: Consists of policies and programs that have impact on levels of trust in the organization, as well as the degree of diversity in attitudes and values, or what we call *ethodiversity*[19] (diversity in ethos).
    2. Density and Distribution of Connectedness: Consists of policies and programs that have impact on social and technological rules and infrastructures for interpersonal interaction in organizations.
    3. Criticalist Attitude in Knowledge Processing: Consists of policies and programs that have impact on the degree to which people in organizations are motivated to question organizational knowledge and to participate on an enterprise-wide basis in problem-solving and innovation (i.e., to engage in rigorous *Knowledge Claim Evaluation*).
    4. Knowledge Entitlement (Attitudes): Consists of policies and programs that have impact on how people in organizations feel about ownership of knowledge and whether or not intellectual property, for example, should belong to the organization versus being shared with employees who help create it.
    5. Knowledge Entitlement (Behaviors): Consists of policies and programs that have impact on actual individual and organizational behaviors related to the distribution of ownership and benefits of knowledge created in business settings.

- Knowledge Production

    1. Problem Claim Formulation (including problem/gap detection): Consists of policies and programs that have impact on the extent to which employees in organizations actively participate in problem recognition and the articulation of related claims, versus relying only on managers or designated staff to do so.
    2. Individual Learning (including community formation): Consists of policies and programs that have impact on how individuals in organizations learn, including the extent to which they are free to pursue learning agendas of their own choosing.
    3. Group Learning (including community formation): Consists of policies and programs that have impact on the extent to which like-minded individuals in

organizations are free to form groups or learning communities, and to engage in group learning with full organizational support.
4. Information Acquisition: Consists of policies and programs that have impact on the extent to which people in organizations are afforded access to external sources of information as resources in support of problem-solving and learning.
5. Knowledge Claim Formulation: Consists of policies and programs that have impact on how individuals and groups in organizations generate new ideas in response to problems/gaps, and the extent to which employees at large are permitted to participate in the formal knowledge processing affairs of the organization.
6. Knowledge Claim Evaluation: Consists of policies and programs that have impact on how new ideas are tested and evaluated in an organization, and how transparent and inclusive related processes are.

- Knowledge Integration

1. Broadcasting: Consists of policies and programs that have impact on how broadcasting tools and methods are used for distributing organizational knowledge.
2. Searching/Retrieving: Consists of policies and programs that have impact on how searching and retrieving tools and methods are used for distributing organizational knowledge.
3. Teaching: Consists of policies and programs that have impact on how teaching and training programs are used for distributing organizational knowledge.
4. Sharing: Consists of policies and programs that have impact on how sharing strategies are used for distributing organizational knowledge.

By carefully selecting and managing policies and programs in each of the areas defined above, Knowledge Managers can literally shape and cultivate the organizational environment in which individual and collective learning occur. And while some of these actions will be determinative of outcomes, most will not. Organizational learning is a self-organizing process; the best we can do in our attempts to enhance it is to create an environment in which it can evolve and flourish in its own endemic ways. Indeed, this is arguably the best and most sustainable way to enhance learning and innovation in business. Thus, by synchronizing policies and programs in each of the three areas described above with the known complexion of emergent knowledge processing in human social systems, managers can willfully enhance both the rate and quality of learning and innovation in a firm (see Figure 4).

It is because of this deliberate intent to synchronize policy statements and programs with the self-organizing nature of knowledge processing in human social systems that I call the methodology described here, the *Policy Synchronization Method*[20]. As such, it is the only method I know of that, 1) predicates its interventions on the assertion that people in organizations tend to self-organize around the production and integration of knowledge in response to problem/gap detection, and 2) claims that the most effective approach to improving organizational learning and innovation is one which affirmatively – and *deferentially* – embraces policies and programs designed to strengthen and reinforce such (predispositional) behaviors.

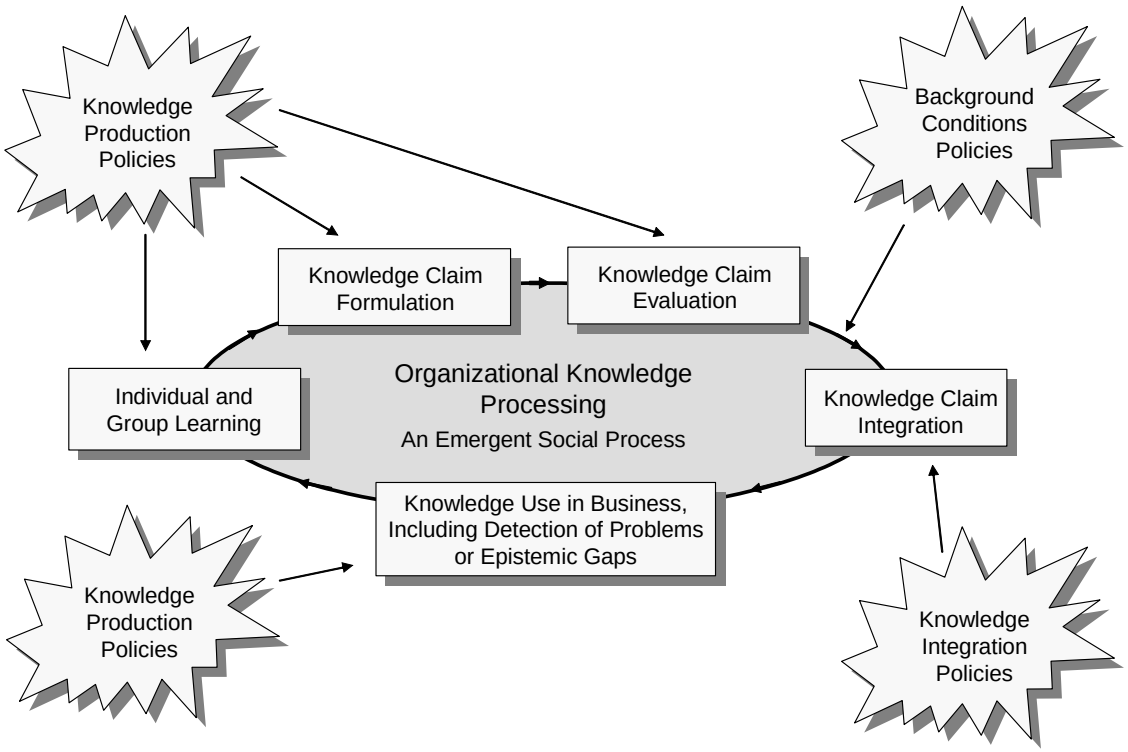

Figure 4 – The Policy Synchronization Method

Conclusion

Complexity science has made it possible for us to 'see' patterns of social processes involved in the production, integration, and use of organizational knowledge. This pattern is algorithmic in the sense that it manifests itself in a regular form, both within and across human social systems and at multiple levels of scale in the following way: *individual and group learning in response to the detection of problems or gaps during knowledge use, followed by knowledge claim formulation, testing, and evaluation, followed by organizational knowledge integration and use.* By all accounts, this pattern of behavior has been deeply involved in the evolution of human knowledge since time immemorial, and is, itself, a product of evolution.

Managers in business who wish to improve their firms' performance in learning and innovation would do well to start by recognizing the fact that human social systems are already endowed with self-organizing patterns of related behaviors. Management in this arena, then, has a great deal less to do with the design of *new* business processes than it does with the support, strengthening and reinforcement of *existing* ones. This can be achieved using a *Policy Synchronization Method*, which advocates the adoption of organizational policies and programs in three critical areas: 1) Background Conditions, 2) Knowledge Production, and 3) Knowledge Integration.

The use of the *Policy Synchronization Method (PSM)* for improving organizational learning and innovation offers the following key benefits:

1. Administrative and cultural barriers to individual and organizational learning are systematically broken down by focusing on related policies and programs in the three areas encompassed by the method. Both the rate and quality of adaptive learning and organizational innovation improve under such conditions.
2. The tendency of people and groups in organizations to self-organize around their own passions and interests is supported and strengthened by embracing knowledge-related policies and programs which encourage and reinforce related behaviors. Peoples' best efforts and ideas thereby become more prolific, higher in quality, and more accessible to the organization as a whole.
3. The PSM method turns learning and knowledge-making into a distributed enterprise-wide affair by formally embracing the learning and innovation interests of individuals and communities in all precincts. As a result, the creativity of *whole social systems*, not just their administratively anointed specialists or management teams, can be tapped for competitive and adaptive advantage. While the vast majority of most firms' populations are effectively marginalized by overly-centralized, formal innovation programs, under the PSM method the totality of an organization's stakeholders become fully engaged in learning, knowledge production, and problem-solving.
4. Because the policies advocated under a PSM approach are explicitly synchronized with endogenous patterns of self-organizing learning and innovation in human social systems, the rate and quality of organizational learning and innovation not only improve, but *remain* improved at sustainable levels. This leads to the notion of *sustainable innovation*[21]. Knowledge-related policies that are *not* synchronized with self-organizing patterns of learning and innovation in human social systems inevitably conflict with those patterns, and are eventually undermined by them. Artificial programs of this kind are therefore unsustainable. In contrast, policies and programs designed to explicitly support those patterns become locked in embrace *with* them in a mutually-reinforcing dance of self-sustaining innovation. In the jargon of system dynamics, this is known as a 'virtuous reinforcing cycle' (see Figure 5). Organizational learning and innovation flourish under such conditions.
5. The PSM method is bottom-up, not top-down, in its orientation. It explicitly disavows the contention that the learning of people operating in a social milieu can be manipulated by prescriptive management edicts, which seek only to command and control. By embracing the distributed learning capacity of whole social systems, the PSM method constitutes a radical departure from classical management dogma, according to which only a minority of a firm's individuals are seen as capable of engaging in worthwhile problem detection, learning, and innovation.
6. Because the PSM method relies so heavily on transparency and inclusiveness in knowledge processing, its effects not only have impact on learning and innovation, but on levels of corporate integrity and accountability, as well. From this perspective, all types of behavior in business, good and bad, can be seen as nothing more than personal or shared knowledge in use. By opening up knowledge processing to whole populations of stakeholders, including the power often held by managers to control and restrict learning, dubious ideas are far less likely to survive the journey from creation to practice. When subjected to the bright light of stakeholder review, as is the case in *open enterprises*[22] , bad ideas tend to wither and die before they get too far – as all bad ideas should. Thus, the PSM also makes a very important contribution to risk management.

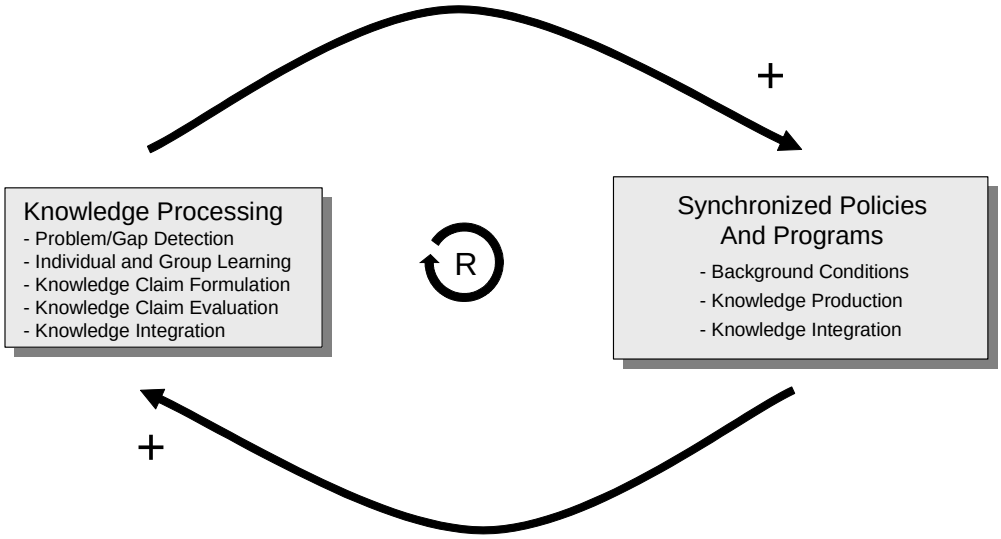

Figure 5 – The 'Learning Drive' in a Virtuous Reinforcing Loop

Strong anecdotal evidence exists in support of the kinds of policy interventions advocated by the PSM method. The so-called 'fifteen-percent rule' at 3M, according to which employees there can spend up to fifteen-percent of their time engaged in self-determined, self-managed *independent individual learning*, is widely seen as a major factor in what accounts for that company's industry-leading levels of innovation. Elsewhere at Deere and Company in Moline, IL, management there has been working for several years on the deployment of policies, programs, and infrastructures aimed at encouraging and supporting *self-organized communities* of practice. As in the case of 3M, Deere is also taking steps to alter its policies for learning, so that decision makers and managers there can have improved access to promising new (community-made) knowledge produced by employees throughout the company.

While these and other examples offer strong testimony to the effects that pieces and parts of the PSM method can have on organizational learning and innovation, I know of no firms that have taken the whole step of transforming policies in all three areas. This, to me, represents a significant opportunity for practitioners involved in learning, knowledge, and innovation management, who may all 'get' the vision thing but who lack a concrete strategy or method for *how to get there from here*. By focusing on the development and implementation of specific knowledge-related policies and programs in each of the three areas described above, the rate and quality of organizational learning and innovation can be markedly improved *on a sustainable basis*. Remember the pattern: *individual and group learning in response to the detection of problems or gaps during knowledge use, followed by knowledge claim formulation, testing, and evaluation,*

followed by organizational knowledge integration and use. Nurture the 'learning drive' and sustainable innovation will follow!

Notes and References:

1. Data from Value Line Publishing, Inc.
2. McElroy, M. (1999), "The Second-Generation of Knowledge Management," *Knowledge Management Magazine*, October, pp. 86-88.
3. Ibid.
4. Ibid.
5. The Knowledge Management Consortium International's website is www.kmci.org
6. Mantelman, Lee (1999), *Knowledge Management Magazine.*
7. Wysocki, B., Jr. (2000), *"Self-Organization: The Next Big Thing?"*, *Wall Street Journal*, July 10, p. 1.
8. The TRIZ method (pronounced "trees") is an invention production technique created by a Russian patent-office worker, Henry Altshuller, in the former Soviet Union in 1947. TRIZ is a Russian acronym that stems from a phrase pertaining to the solution of inventive problems.
9. Miller, W. and Morris, L. (1999), *Fourth Generation R&D*, John Wiley and Sons, New York, NY, p. ix.
10. Ibid, p. x.
11. Maturana, H. and Varela, F (1980), *Autopoiesis and Cognition*, D. Reidel, Dordrecht, Holland.
12. Bateson, Gregory (1979), *Mind and Nature: A Necessary Unity*, Dutton, New York, NY.
13. Kauffman, S. (1995), *At Home in the Universe*, Oxford University Press, New York, NY, Chapter 4.
14. This representation of the Knowledge Life Cycle (KLC) is based on work done by members of the Knowledge Management Consortium International on related concepts. A more complete and granular articulation of the KLC can be found at the following URL: http://www.macroinnovation.com/images/KnowledgeLife8.01.03.pdf
15. Kuhn, T. (1962), *The Structure of Scientific Revolutions*, University of Chicago Press, Chicago, IL.
16. Ibid, p. 178.
17. Ibid, p. 8.
18. This framework was developed in support of the 'Policy Synchronization Method' (PSM) by myself, Steven A. Cavaleri and Joseph M. Firestone, the latter two of which are close colleagues of mine from KMCI and the Center for the Open Enterprise. See note # 20 below for more background on the PSM.
19. *Ethodiversity* is a term I coined. It's a reference *not* to the ethnic diversity of an organization, but to its ethos diversity. I define this as *the distribution of underlying assumptions, worldviews, philosophies, politics, and predispositions of a population of individuals in an organization*.
20. The 'Policy Synchronization Method' is the subject of a U.S. patent application filed with the Patent and Trademark Office in September, 2000 by Macroinnovation Associates, LLC of Windsor, VT (www.macroinnovation.com). It currently holds patent-pending status.
21. McElroy, M. (2000), "The Principle of Sustainable Innovation," Posted at the following Internet URL: http://www.macroinnovation.com/images/Principleof.pdf

22. Firestone, J. and McElroy, M. (2003), *The Open Enterprise -- Building Business Architectures for Openness and Sustainable Innovation* (Excerpt #1), KMCI Online Press: www.kmci.org.

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