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Collective Intelligence and Collective Leadership: Twin Paths to Beyond Chaos

George Pór
University of Amsterdam, Netherlands

Abstract
By looking at collective intelligence (CI) through four distinct lenses, this paper draws on recent research in organizational design, evolutionary economics, cognitive sciences, knowledge ecology and political economy to built a twin path forward: collective intelligence and collective leadership. It lays out elements of a framework for building this twin path beyond chaos. It is our intent to invite conversations designed to engage questions surrounding this interdependent evolutionary path. How might we develop criteria for a design capable of supporting a large range of collective intelligence phenomena in an integrated way? Will the emergent socio-economic life forms be strong enough to balance the destructive power of our global crises if and when "the perfect storm" hits? When everything goes worse and worse, and better and better, at the same time, and they do it faster and faster, how do we deal with the ensuing chaos? In order to bring forth desirable futures, we must be ready to navigate through it, using a twin path of collective intelligence and collective leadership. This is our global challenge. This paper is the first in that will delve into the topic more deeply, expanding certain sections of this overall expose into separate albeit inter-related lines of inquiry.

Keywords: collective intelligence, collective leadership, collective wisdom, complexity, epistemological crisis, general intellect, information systems design, integral intelligence, knowledge ecology, meaning-making, microworlds, perfect storm, political economy, Theory U

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Introduction: bad news evoke good news

Hierarchy, as the dominant form of social organization, is buckling under the challenges of a tsunami of increasing complexity, interdependence and uncertainty. Every new turn of scientific and technological development propels larger and larger complexity waves washing the shores of our capacity to cope. Yet, there's no way to turn our back on them and run.

The bad news is that there are too many businesses and governments stuck in ways to relate with their employees/customers/constituencies, which is out-of-synch with society's growing demand for more transparency, accountability, and multi-stakeholder solutions.

The good news is that the increasing inadequacy of the ways inherited from the industrial era, is inspiring a profound renewal in every dimension of social life. The signs of new forms of organizing work, governance, learning, commerce, even our social networks, are everywhere. New socio-economic life-forms abound; call them "collaborative networked organizations" (Camarinha-Matos and Afsarmanesh (2004), "collaborative innovation networks" (Gloor, 2006), "communities of practice" (Wenger, 1998), "social entrepreneurship" (Nicholls, 2006), "virtual communities" (Rheingold 2000), or "wikinomics" (Tapscott and Williams, 2006). The common themes in all those phenomena are:

- They source new meaning-making frameworks.
- They tend to re-unite purposeful work with the passion of play.
- They are frequently used for meeting high-stake problems and opportunities.
- Their success is based on activating the collective intelligence of all stakeholders.

The potential of their combined evolutionary impact is as unpredictable as the combined devolutionary impact of the crisis of value, the environmental and climate crises, and all the other global threats.

Will the new life forms be strong enough to balance the destructive power of our global crises if and when "the perfect storm"[1] hits? That is truly not an academic question; so much depends on how future history will answer it. When everything goes worse and worse, and better and better, at the same time, and they do it faster and faster, that's a sure path to chaos.

[1] "The phrase perfect storm refers to the simultaneous occurrence of events which, taken individually, would be far less powerful than the result of their chance combination." Wikipedia, http://en.wikipedia.org/wiki/Perfect_storm

In this paper we use the term *chaos*, in a particular sense, as the individual and collective perception of generative complexity. "In situations of high generative complexity, we are dealing with possible futures which are still emerging, largely unknown, non-determined, and not yet enacted (non-obvious causality, different views, not- yet-defined alternatives)… the challenge in this kind of environment is how leaders can cope with problems that

a) have causes difficult to determine,

b) involve numerous players with different world views, and

c) are related to bringing forth emerging futures?" (Senge and Scharmer 2000)

As long as "the perfect storm" is looming on the horizon, any effort to bring forth desirable futures has to be ready to navigate a narrow but safe passage through chaos. Where is the entrance to it? We believe, it is in every act of social innovation, in which the fruits of collective intelligence and collective leadership are ripened and harvested. One of the motivations of this paper is to seed a collaborative inquiry into how to cultivate the arts and disciplines of collective intelligence and collective leadership, synergistically.

What is collective intelligence?

As the meme "collective intelligence" (CI) is spreading fast online and off-line, so is the range of significance associated with it. For some, it is the "wisdom of crowds," for others it is the inter-subjective field of energy that comes into being when people interact from a position beyond ego, just to name two of the popular branches of CI. In this paper, we will introduce some of its meaning in the cognitive, evolutionary, techno/computational and economic contexts. Each of them can be thought of as a particular lens, through which different meanings can be accessed and enhance each other.

CI through the "cognitive" lens

A definition from the MIT Center for CI: "Collective intelligence – Groups of individuals doing things collectively that seem intelligent." (Malone, 2007)

Pierre Lévy, Canada Research Chair on CI, wrote: "The expression 'collective intelligence' relates to an extensive body of knowledge and thoughts concerned with several objects that have been diversely labeled: distributed cognition, distributed knowledge systems, global brain, super-brain, global mind, group mind, ecology of mind, hive mind, learning organization, connected intelligence, networked intelligence, augmented intelligence, hyper-cortex, symbiotic man, etc. Notwithstanding their diversity, these several rich philosophical and scientific contemporary trends have one feature in common: they

describe human communities, organizations and cultures exhibiting 'mind-like' properties, such as learning, perceiving, acting, thinking, problem-solving, and so on."

“Intelligence refers to the main cognitive powers: perception, action planning and coordination, memory, imagination and hypothesis generation, inquisitiveness and learning abilities. The expression 'collective intelligence' designates the cognitive powers of a group." (Lévy, 2003a)

The emphasis on CI's cognitive dimension is strong in the work of Pierre Lévy but he also acknowledges: "[E]mphasis on cognition does not intend to diminish the essential roles of emotions, bodies, medias, sign systems, social relations, technologies, biological environment or physical support in collective intelligence processes. The study of collective intelligence (abbreviated as CI) constitutes an inter-discipline aspiring as much to a dialogue between human and social sciences as with the technical, artistic and spiritual traditions. Its goal is to understand and improve collective learning and the creative process." (Lévy, 2003b)

CI through the "evolutionary" lens

While CI can be perceived as value-neutral through the lens of cognitive sciences, it is losing that quality when looked at through the lens of its role in humankind's social evolution. Building on the foundation that cognitive sciences laid for CI, we can ask, what is its role in the unfolding of the subsequent chapters of our history, present, and future?

Holding that question, we are rewarded with further insights from the notes of a late friend, Finn Voldtofte: "The capability of a collective/social system to hold questions and language too complex for any individual intelligence to hold, and to work out strategies, visions, goals, and images of a desired future, etc" (Voldtofte, F. 1997)

Voldtofte inspired our current definition of "collective intelligence": **the capacity of human communities to evolve towards higher order complexity and harmony, through such innovation mechanisms as differentiation and integration, competition and collaboration**.

The CI that is seen and practiced through the evolutionary lens, is gaining directionality, historical concreteness, and embodiment compared with the CI seen and practiced through the cognitive lens alone. Adding lenses adds contexts from which we experience the same phenomena.

CI through the "political economy" lens

The evolutionary context of CI may get powered up, in terms of its "social innovation" potential, when it is enhanced by a "political economy" context. It is a goal of this paper to pave the way for such an enhancement.

What was "collective intelligence" in the cognitive and evolutionary contexts, becomes "general intellect," in the language of political economy. The difference is not only semantic. The general intellect embodied in the collective knowing of the society, embedded in all the ways of its knowing, has always been a force that shaped the creative capacities and daily life of people and organizations.

"Marx suggested that at a certain point in the development of capital... the crucial factor in production will become the 'development of the general powers of the human head'; 'general social knowledge'; social intellect; or, in a striking metaphor, the 'general productive forces of the social brain'." (Dyer-Witheford, 1999)

A more attentive reading of Marx' *Grundrisse*, his notes for *Das Kapital* that were published after his death, reveals that there is more than the social *intellect*, more than the gifts of the social *brain* that flow into our general intellect.

"General Intellect consists in a number of competences that are inscribed in the social environment organized by capitalist machinery, and hence available freely to its participants, by virtue of their existence as 'social individuals'. These competences can be cognitive, as in technical or scientific knowledge, but they are also social and affective..." (Arvidsson, 2006)

Diving into the far-reaching implications of Arvidsson's statement is food for future thought. For now, we share a few quotes from *Empire*, which may illuminate the portent of this issue. "The danger of discourse of general intellect is that it risks remaining entirely on the same plan of thought, as if the new powers of labor were only intellectual and not also corporeal… As we saw earlier, new forces and new positions of affective labor characterize labor power as much as intellectual labor does." (Negri and Hardt, 2001)

Avoiding the danger of conceiving "general intellect" as something only intellectual is what Arvidsson and Lazzarato did (Lazzarato, 1996), by strengthening their analysis with a few relevant passages of the *Grundrisse*. A key component of Lazzarato's concept of "immaterial labour" is what he, Negri and other

authors of the Italian-French "autonomist" school of thought described in *Multitudes* magazine.[2] They refer to it as "affective labour."[3] That distinction opened a whole new domain of inquiry where political economy and social psychology overlap.

What happens when we apply the "general intellect" lens to realize a fuller meaning of "collective intelligence?" It gives us access to CI in the long view, the broad sweeps of social evolution, past and future included.

Visualizing that long view as the vertical plane, we can add "collective intelligence" as the horizontal axis. In that sense, CI is the ensemble of capabilities, knowledge, and tools available to a collective entity, in the given stage of its evolution, for creating its desired future.

The spiral that is expanding from the point where the vertical and horizontal planes intersect, is driven by the co-evolutionary dynamics that plays in the macro/micro and global/local scales of CI.

CI through the "ICT" lens

The level of CI in any collective entity can rise or sink over time. One of the change factors is how well and fast knowledge and successful practices travel between the global and local scales, back and forth. Communities and organizations can optimize that flow only by designing and cultivating an infrastructure for collaboration, which scales well and connects various instances of CI.

Given the complexity of the environment, in which any CI has to perform, the enabling infrastructure is a condition *sine qua non*. Our brief overview of the lenses through which we can explore and practice CI would not be complete if we did not look through the ICT lens. Wisse explains one of the reasons why:

"Often to the dismay of its proponents, a particular vision's credibility, if not outright proof, ultimately depends largely on most practical, mundane engineering. Can it be made to actually work? Is the information infrastructure feasible at all to reliably, readily implement it?" (Wisse, 2007)

The Web and Web 2.0 are the first steps to create infrastructure for CI at increasing scales. Most of those technologies themselves are products of CI in the vast, loosely coupled knowledge networks of the Web. It is not by accident that CI became an up-and-coming buzzword in the language of industry analysts.

[2] http://multitudes.samizdat.net/
[3] http://en.wikipedia.org/wiki/Affective_labor

"The Gartner Group identified the technologies it believes will have the greatest impact on businesses over the next 10 years, naming such hot areas as social-network analysis, collective intelligence, location-aware applications and event-driven architectures… Collective intelligence was rated as potentially transformational to businesses… Collective intelligence was defined as an approach to developing intellectual content, such as code and documents, through individuals working together with no centralized authority..." (Gonsalves, 2006)

CI can, indeed, be transformational to businesses (and any other organizations) to the extent in which they can make themselves available to the creative power of "individuals working together with no centralized authority." That is not an easy job for "old school" managers, which gives an edge to the digital natives who are also the pioneers of the Internet's original, collaborative culture.

"The main contribution of machinery and technology, was thus that it unleashed a genuinely social productive force in the form of new and more efficient forms of cooperation. Today the transmission belts of Marx' steam-driven factories have become the Internet. But the principle is the same. New information and communications technology increases productivity primarily because it enables new forms of cooperation." (Arvidsson, 2007)

The new forms of cooperation enabled by the Internet include user-driven innovation, the open source movements and other forms of peer production. Organizations that open their business models to embrace them, tend to thrive. ICT can play a significant role in that opening, by providing support for widening and deepening the pool of CI, as well as, easing access to it, from anywhere and any time. Whether ICT can fulfill the potential depends mostly, on the emergence of wiser and collective leadership, which leads to the questions: How do leaders learn and how does ICT influence the pace of that learning?

"[P]eople learn effectively when they have transitional objects to play with in order to develop their understanding (or refine their mental models) of a particular subject or issue. The combination of transitional objects, learner and learning process is what Papert calls a microworld. In an executives' microworld the transitional objects are maps of their knowledge - diagrams, words, models, graphs and simulations. 'Play' is the interaction of maps and mental models… The effectiveness of the learning cycle in turn depends on the variety of ideas that can be built into the maps, the time it takes to reconfigure maps, the clarity of the maps and the skill with which they are injected into debate and discussion." (Morecroft, 1988)

We wish to add two points to Morecroft's astute observation. 1. Twenty years after his discovery, the effectiveness of the learning cycle depends as much on how well my learning *with others* is supported by transitional objects of our shared microworlds. 2. What used to be "executive learning" has by now become "everybody's learning" who is linked up with our networked brain. Both points are essential to understand the multifaceted relationship of CI with ICT.

More lenses for examining CI can be derived from what some consider as a "CI source document" (Atlee and Pór, 2006), and the set of CI definitions and varieties collected and organized by Tom Atlee (Atlee, 2004a).

Why we need CI -- the epistemological crisis

CI is as old humankind itself. What is new is that CI has now moved into the center of value creation. Thus any barrier to its evolution becomes a barrier to the development of humankind's creative potential. Yet, information relevant to any particular profession is produced much faster than the capacity of that field's professionals to make full sense of it. It's not about information and knowledge growing too fast. It's about an outdated mode of the social organization of meaning[4]. In hierarchy-ridden social institutions, such as education, government, business, the meaning making function is attributed to the top. Times of exponential expansion of knowledge and complexity call for a new, more capable mode of the social organization of meaning. When this happens, we won't be drowning in information while longing for wisdom.

What good is it to have a potential solution to a problem if the parts of that solution are scattered in the knowledge, faculties, and experience of a large number of players, with no way to integrate them? In that question lies a shorthand summary of today's epistemological crisis. It is not simply *one* of our numerous global crises, but *the* horizontal crisis that cuts across many of the others and is causal to their deepening. A computational CI researcher, Francis Heylighen, vividly describes it as follows:

"[I]ndividuals are forced to consider more information and opportunities than they can effectively process. This information overload is made worse by 'data smog,' the proliferation of low quality information allowed by easy publication. It leads to anxiety, stress, alienation, and potentially

[4] The "mode of the social organization of meaning" distinction was inspired by an email conversation with Adam Arvidsson about the construction of community as the social organization of information.

dangerous errors of judgment. Moreover, it holds back overall economic productivity." (Heylighen, 2002)

Data smog becomes even denser when it is combined with one or both aspects of cognitive complexity, the "differential and integrative complexity." We are facing varieties of complexity…"the dimensions or scales against which one tries to evaluate a stimulus (differential complexity), or consider in producing an output (integrative complexity.)" (Cashman, and Stroll, 1986) Computer minds can take into account more factors, as long as they are properly digitized, but lack the intuitive and sense-making capacities of the human minds. That calls for an alliance of the two. However, even successful man-machine symbioses are not capable of solving our fundamental epistemological crises. Organizations and social systems must provide more of their members and constituents with access to their central meaning-making activities, not only the few in the official "decision-making" roles.

That requirement stems from Ashby's Law of social cybernetics. "Ashby's law of requisite variety states that the complexity and speed of an actor's response have to increase with the complexity and speed of change in the environment." (Huizing, Maes, and Thijssen, 2005) We, as individuals, cannot increase the complexity and speed of our responses. Human beings were not designed to keep up with the increasing acceleration of "internet time" that is causing a capability gap both at the individual and collective levels. It calls for new frameworks, methods, tools, and practices for upgrading our current collective intelligence to CI 2.0.

To make better sense out of the fast-changing, kaleidoscopic pictures of our technical and knowledge landscapes we have to dramatically enhance our meaning-making strategies by learning from one another's. The problem is that we are so used to our own mental frames and models of what is meaningful that exploring in-depth someone else's is a rare exception. Yet, it is exactly what we need to do if we hope to become skillful at and supported by the right ICT tools, many of which are not yet developed. The currency of effective technical and social innovation lies in our capacity to recognize and honor what others have to offer in order to realize our shared visions and projects.

We are suffering an epistemological crisis. It is rooted in our difficulty to give up the illusion of our separate, island-like existence, and recognize that in our times of complexity multiplied by uncertainty and urgency, the gravitational center of cognition is shifting from the individual to the community. The streams that make up our *global problematique* grew increasingly interdependent, but our ways of knowing remained fragmented. One can observe the same phenomenon at the organizational level, as

well. The gap between the demand of its environment and the organization's response to it grows proportionately with the depth of knowledge silos, a hallmark of hierarchy-based organizing.

Exposed to increasing cognitive and generative complexity, there are two ways an organization can experience a robust yet nimble strategy capable to perform under highly variable circumstances: (1) strengthen its nervous system (its network of connected conversations that matter), and (2) connect its CI with the CI of neighboring players in its surrounding ecosystem. To achieve that, organizations must intentionally cultivate CI, building on the mutual reliance between individual and collective intelligence, as well as the dynamic interplay between local and global scales of CI.

Cultivating collective intelligence

Cultivating collective intelligence is a dimension of leadership work. If we neglect our collective intelligence, we risk severe system failures.

Future-responsive leaders will:

1. Develop principles and practices of collective leadership;
2. Awaken and engage the power of integral intelligence;
3. Guide the development of collective sensing organs.

Develop principles and practices of collective leadership

Sitting in the meeting of the senior management team of a major Canadian financial organization, we heard the leader telling his staff, "I feel really vulnerable when I have to make a major decision without having the possibility to consult you, due to the urgency of the situation." Looking at the expression on the face of the participants at that meeting, we knew that they knew it to be true; those words were not just a polite gesture.

Collective leadership starts where leaders realize the truth of the old adage, "none of is as smart as all of us," but it doesn't stop there. There are levels to collective leadership. It's not just a matter of getting input from subordinates to make certain decisions. Collective leadership, just like collective intelligence, exists at different stages of the development of values in the life of the collective entities involved.

For example, borrowing the terms of the developmental spiral research (Beck, 2000), the story from the staff meeting above exemplifies the egalitarian, consensus-seeking HumanBond stage, one characteristic principle of which is that every voice has to be heard. In the preceding turn of the spiral, labeled

StriveDrive, collective leadership is more like the old boy network, where belonging signifies status and power. When the spiral turns above HumanBond, in enters the FlexFlow stage of values development, where collective leadership grows out from the needs of those who facilitate systemic, evolutionary transformations, and realize that they cannot do that job alone. FlexFlow may characterize multi-sector groups that include business, government and civil society, which are tackling global challenges, such as ELIAS (Emerging Leaders for Innovations Across Systems)[5]. FlexFlow, just as the other stages on the spiral of adult development, may manifest in groups of any size and scale. However, if the FlexFlow values of thriving on change and chaos and learning from complex living system, are not what guide leadership in *international* business and government, and other *large organizations*, then those leaders cannot perform in a way adequate to the complexity of their environment. The root of our global crises, more frequently than not, is a crisis of leadership.

"A system has 'collective leadership' when people are attuned to each other so well that, even when separate, they naturally act in harmony with each other and the goals of the common enterprise. Most leadership teams, including those at senior levels, are far from fulfilling their potential. They meet as individuals, squeezing time from their more urgent work, debating from their individual perspectives and concentrating on their individual domains of authority. Their actions, and the actions of those who report to them, consequently take place at cross-purposes, and they often seem trapped in cycles of opposition and breakdown." (Isaacs, 2005)

The leaders described above seem to be living in the StriveDrive zone but we observed the same thing happening in HumanBond, too. Why? One of the reasons may be that on the path to become a leader, one had to develop strong debating skills, while equally strong "quiet mind skills" (Levey, 1999) such as generative listening, contemplation, emphatic attention, and deep self-reflection, were not necessarily required.

It is a safe assertion to make that practicing those skills can give rise to higher levels of CI and collective leadership. That's because practitioners can initiate and host better "conversations that matter" (Brown and Isaacs, 2005) which is a core competence for boosting both CI and collective leadership. There is an emerging "art of hosting"[6] such conversations, with a growing, worldwide body of practitioners. We participate in and follow the evolution of that practice's self-reflection, particularly since it gave birth to

[5] http://www.wie.org/bios/otto-scharmer.asp
[6] http://www.artofhosting.org/theart/

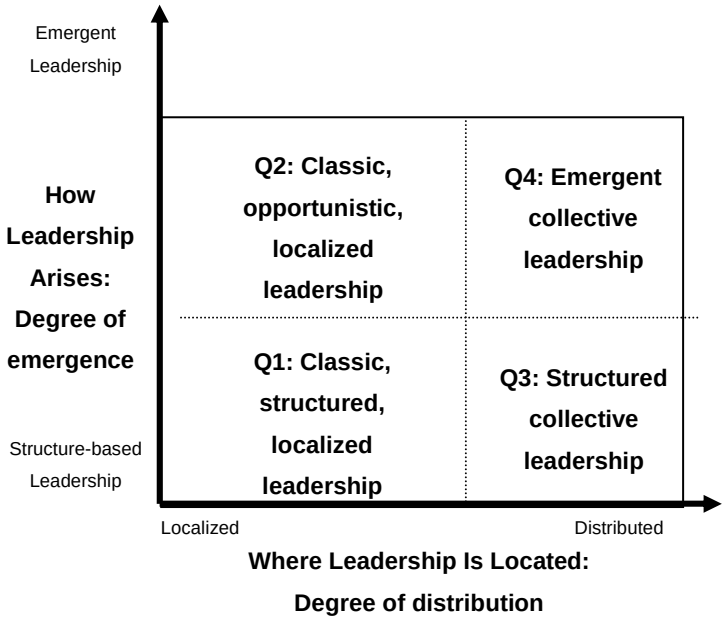
the "art of harvesting" (Nissén and Corrigan, 2007) that we consider in the broader context of knowledge ecology, a core discipline of CI.

What conceptual framework could integrate them as to guide the work of the practitioners of both CI and collective leadership? If the framework should scale well up and down, be relevant to groups of any size, including large social system, and give access to a methodology, as we believe it should, then one of the most suitable frameworks is Theory U. It says: "When a group learns to operate from a real future possibility that is seeking to emerge, they begin to tap into a different social field that manifests through an altered quality of thinking, conversing and collective action. When that shift happens, people can connect with a deeper source of creativity and knowing… Collectively seeing our field structure of attention—that is: collectively becoming aware of our inner places from where we operate in real time --- may well be the single most important leverage point for shifting the social field." (Scharmer, 2007) Learning to operate jointly from a "future possibility that is seeking to emerge" is not an easy task. Individuals who cultivate quiet mind skills are certainly better poised to meet it.

The Distributed Leadership Model[7] (DLM) is another essential framework that illuminates the intersection of CI and collective leadership. Talking about "contemporary disasters," a student of DLM noted, "One person, one team, one organization is usually not enough to manage all the issues related to such calamities." (MIT, 2005) The same is true for relief not only from natural disasters but from sizable man-made ones, too, such as the wholesale wasting of opportunity for a meaningful work life in organizations, where employees are not treated as members worth to include in the meaning-making processes.

Yet another useful model is illustrated in the matrix below, developed by Norman Johnson, complexity scientist and CI researcher. His work led him to two conclusions: "1) leadership should include all processes that lead to higher performance – specifically CI, and 2) CI is the best framework to understand distributed leadership." (Johnson, 2007)

[7] http://sloanleadership.mit.edu/r-dlm.php



A Leadership Landscape with CI included (right column)
Source: (Johnson, 2007)

Discovering the principles and practices of collective leadership is one of the most influential ways to cultivate CI, and vice versa. Members in the various types communities of practice (Pór, 2005) have much to contribute to those discoveries through the observation and articulation of what works well and why. A key enabler of such observations is their integral intelligence.

Integral intelligence and first-person science

A group's collective intelligence co-evolves with the maturation of what we can call "integral intelligence" in its members. It is integral in the sense that it embraces and draws on the harmony and co-inspiration across intelligences that include the cognitive as well as the emotional and physical.

The more the members are integrally intelligent, the more energized and active the integral intelligence of the collective will become. At the heart of cultivating CI in any group or organization that we belong to, is the cultivation of our own integral intelligence. By choosing an integral life path, a path of intentional cultivation of the four intelligences, individuals are able to raise the level of CI, and vice versa. It is a

double helix of co-arising spirals; the individual and collective intelligences ride on each other's spin. That metaphor reveals the plausibility of our hypothesis-in-formation:

Management teams, musical ensembles, academic research teams, or any group with shared objectives will get better collective results if their members tend their own integral intelligence. An example of such tending is how we "check in" with its four component intelligences before making decisions related to complex systems, and complex social systems in particular. For instance, observing before-decision moments in our own life, we discovered how paying attention to the conversation between our feelings and thoughts can lead to better-grounded decisions.

There are researchers, such as the late Francisco Varela who attribute to that type of observations to the methodologies of "first person science," in which observers examine their conscious experience using scientifically verifiable methods. “I hope I have seduced the reader to consider that we have in front of us the possibility of an open-ended quest for resonant passages between human experience and cognitive science. The price however is to take first-person accounts seriously as valid domain of phenomena. And beyond that, to build a sustained tradition of phenomenological examination that is almost entirely nonexistent today in our western science and culture at large.” (Varela, 1996)

Since his pioneering work, the field started maturing and today we can notice a growing body of literature related to first person science, with a concentration of research reflected on the pages of the *Journal of Phenomenology and the Cognitive Sciences*.

Goethe was one of the forerunners of first person science (Bortoft, 1996). In his scientific writings, "Goethe thought that what one was working with and attempting to come to was not a perfect model, but an insight. The moment of discovery, where one perceives the hidden coherence in nature, is the longed-for objective in science, as opposed to a model that somehow represents that insight in terms of a mathematical or mechanical system." (Zajonc, 2003)

Goethe wrote, "every object well-contemplated creates an organ of perception in us" (quoted by Zajonc, 2003) Here, the metaphor goes beyond its usual function of conveying the unknown by the known. It also mobilizes our imagination, leading to a new and very key question: How do *communities* grow collective sensory organs?

Guide the development of collective sensing organs

The neural networks in living (biological or social) systems are not the source but the enablers of their collective intelligence. "The nervous system of the global super-organism has a potential to enable the emergence of a collective intelligence, the same way as organic nervous systems enable the emergence of intelligence in living systems." (Pór, 2001)

The concept of a distributed, "electrified nervous system" as the infrastructure for CI in organizations was first introduced in *The Quest for Collective Intelligence* that described its functions as follows:

• To facilitate the exchange and flow of information among the subsystems of the organism and with its environment.
• To effectively coordinate the harmonious action of the subsystems and the whole.
• To store, organize, and recall information as needed by the organism.
• To guide and support the development of new competences and effective behaviors. (Pór, 1995).

The good functioning of the collective entity's nervous system requires periodical cleansing of its doors of perception. That happen can happen by collaborative deliberations on attenuating or amplifying complexity, using collaborative filtering or tagging, as needed. "Collective sensing mechanisms use the power of shared seeing and dialogue to tap an unused resource of collective sense-making and thinking together." (Scharmer, 2007)

When cultivating CI by guiding the development of our collective sensing mechanisms, we are also enabling new content to accumulate for "a dynamic, living 'ecosystem' for individual and collective learning, in which emergent patterns of meaning, coordination flows, insights, and inspiration interact, cross-fertilize, feed upon, and grow on each other." (Pór, 1995) Such knowledge ecosystems (Pór, 2000) are the foundation to collaborative meaning-making at all scales of human groups, which is in turn, a key condition to adapt, survive, and thrive as organizations in these times. The term *meaning-making* refers here to the sense of recognizing relevance in patterns of relationships between ideas, information, and inspirations.

Given the above, growing healthy and vibrant community/organizational knowledge ecosystems is more urgent today than ever. What can leaders do for that? What should leadership teams committed to boost the CI of their organization do? There's no recipe book that could give us the answers, but two tasks appear to be certain. 1. Create conditions for collective presencing: "Leaders need to create these spaces

where people can reflect, sense, and then prototype and implement." (Scharmer, 2007) 2. Shape the organizational culture and structure as to make them more available to benefit from the CI-enhancing potential of such Web 2.0 tools as blogs, wikis, forums, tags, and social networking mash-ups.

That is easier said than done because CI goes far beyond new technologies. The bulk of strategic gains from the new forms of collaboration and coordination enabled by the new technologies can be obtained only in new type of social relations of production between self-organizing free agents. Those new relations are characterized by transparency, trust and partnering; they are not hampered by fear and hierarchy. Command-and-control leadership is replaced by cultivate-and-coordinate. They can be observed in the peer-to-peer learning and production communities of open source and open innovation.

Collective intelligence and collective wisdom

Wisdom and collective wisdom

An intelligent person is not necessarily a wise one. A team or a community with a high collective IQ is not necessarily a wise community. One form of CI tends to be wiser, more evolved than another if an authentic, collective *self*, rather than a collective *ego* drives it. What does that mean?

Tom Atlee, one of the founders of the CI field, has tackled this distinction. "One of the most intriguing aspects of collective intelligence is its relative independence from individual intelligence. It is clear to most students of the field that a group of intelligent people will not necessarily manifest group intelligence. Nor will a coalition of intelligent groups necessarily add up to an intelligent coalition. Nor will making all organizations intelligent, by itself, produce a collectively intelligent society." (Atlee, 2004b) He proposes, "Wisdom characterizes any factor that facilitates greater positive engagement with more of the whole."

Atlee's insight suggests that systemic wisdom is present when a group is capable to sense and think from, and act on the largest patterns of meaning, which they can perceive together. It is present when the group is capable of continually and simultaneously increasing its value to all members and external stakeholders.

A key function of that wisdom is to guide the group's CI and its capacity to evolve towards higher order complexity and harmony, through such innovation mechanisms as differentiation and integration, competition and collaboration. It is a very complex capacity, comprised of many tributaries flowing into

it; too many even for listing them here. That capacity can be defeated if there is not enough wisdom in the system to guide it when on treacherous waters.

Augmenting CI from within

CI is not a "thing" that we have or do not have, but a collective faculty, evolving and changing over the life of the group. Where does one start to upgrade a group's CI from its current level to CI 2.0? That question becomes important when the strategic challenge or opportunity that the group is facing dictates a sense of urgency.

Regardless the specific circumstances, the highest-leverage place to start augmenting CI is within oneself. CI is embedded in us, in two ways:

1. As social beings, we are products of many millennia of social evolution. We could not have language, tools, not even our most intimate thoughts and feelings, without the long journey of CI throughout history.

2. Connected through various networks, on-line and off-line, we are the nerve endings of a distributed nervous system, the network of conversations that constitutes it.

Seeing oneself as a CI connector, one may ask, how many productive conversations, and collaborative projects can I participate in before becoming spread too thin, thus reducing both the value contributed and received from them? Just how many "friends" one can have on Facebook or the other social networks before emptying the concept of "friends' of any value? A better way to expand CI would be to focus on the part of the group's CI that one individual can embrace, on a small number of conversations that inspires her or him. This would echo the analogy of how memory, a condition of learning, is formed in the brain.

"The more often a particular pattern is stimulated, the more sensitive and permanent are the connections between the neurons in the pattern. This process of memory formation is summarized by the phrase 'neurons that fire together, wire together'." (Cohen, 2005)

This may tell us a lot about how we can boost CI from within. As a node in the neural net of our global brain, we are contributing (firing), in a small way, to the learning capacity of the planetary society, by sustaining our shared attention (wiring) to conversations that truly matter to members of any collective entity.

Concluding remarks and questions to unfold

As we "fire" and "wire" together, we grow our collective intelligence. Our final assumption is that whatever becomes an attractor of a group's shared attention, has the potential to be a seed crystal for a new growth of CI. Let's test it.

Academic papers have two kinds of potential networks associated with them:
1. The network of citations, all the names mentioned in the paper
2. The network of readers who may have more or less resonance with certain sections

Either of those networks rarely turns from potential to actual, thus does not let us testing the assumption above, without an enabling infrastructure dedicated to that possibility. To create a simple infrastructure, we intend to publish a wikified version of this paper, featuring content that will continually evolve through dialogue with interested parties. That interactive edition will be announced in the Blog of Collective intelligence, in February, 2008. Below is a list of research questions waiting for further unfolding, which will be posted on the Collective Intelligence and Collective Leadership pages. Some of them were inspired by Collective Intelligence and Governance, a Copenhagen-based research group. The list is left intentionally incomplete and unpolished. May its next version become the fruit of collaboration among those who feel called to work on them together.

• What is the potential of CI in addressing pressing concerns, such as sustainability, global warming, managing diversity, redistribution of wealth, and existential alienation, when established political institutions seem unable to process them?

• How can systems of governance sustain and empower the processes of collective intelligence?

• What makes a self-organizing, community knowledge ecosystem sustainable?

• How can ICT infrastructure be designed and optimized for dynamically co-evolving with CI in innovation networks, communities of practice, professional learning communities, and other emerging forms of organizing work and learning?

• Who are working, and with what results, on combining semantic and social networks with powerful topology and process visualizations tools and environments?

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Collective Intelligence and Collective Leadership: Twin Paths to Beyond Chaos

Abstract: By looking at collective intelligence (CI) through four distinct lenses, this paper draws on recent research in organizational design, evolutionary economics, cognitive sciences, knowledge ecology and political economy to built a twin path forward: collective intelligence and collective leadership. It lays out elements of a framework for building this twin path beyond chaos.

It is our intent to invite conversations designed to engage questions surrounding this interdependent evolutionary path. How might we develop criteria for a design capable of supporting a large range of collective intelligence phenomena in an integrated way? Will the emergent socio-economic life forms be strong enough to balance the destructive power of our global crises if and when "the perfect storm" hits? When everything goes worse and worse, and better and better, at the same time, and they do it faster and faster, how do we deal with the ensuing chaos? In order to bring forth desirable futures, we must be ready to navigate through it, using a twin path of collective intelligence and collective leadership. This is our global challenge.

This paper is the first in that will delve into the topic more deeply, expanding certain sections of this overall exposé into separate albeit inter-related lines of inquiry.

Keywords: collective intelligence, collective leadership, collective wisdom, complexity, epistemological crisis, general intellect, information systems design, integral intelligence, knowledge ecology, meaning-making, microworlds, perfect storm, political economy, Theory U

About the author: George Pór is an adviser to leaders in business and government, the founder and president of CommunityIntelligence Ltd, an organizational transformation agency. He has been involved with research on various forms of collective intelligence since the late 1970's. George holds a sociology degree from l'Université de Paris. His Masters thesis was published in the prestigious journal, *Les Temps Modernes*. He is a former Senior Research Fellow of the Center for Advanced Learning technologies at INSEAD, a Research Fellow at the London School of Economics, and currently, PrimaVera Research Fellow in Collective Intelligence at Universiteit van Amsterdam.

George serves on the Advisory Board of the *Journal for Knowledge Management*, and is publisher of the Blog of Collective Intelligence: *http://www.community-intelligence.com/blogs/public*. His consulting clients include: British Petroleum, EDS, Ericsson, European Commission, European Foundation for Management Development, European Investment Bank, Ford Motor Co., Hewlett Packard, Intel, Siemens, Sun Microsystems, Swiss Re, and Unilever. He can be reached at George(at)Community-Intelligence(dot)com.

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Office:
Sprouts
University of Amsterdam
Roetersstraat 11, Room E 2.74
1018 WB Amsterdam, Netherlands
Email: admin@sprouts.aisnet.org

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