EPILOGUE

The Way Forward with Systems Intelligence

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Human instrumental reason and rational abilities are a power platform to control and to command, to direct and to regulate complex systemic wholes. Our human intellectual endowment and skills for converting ideas to productivity amount to a stunning success story.

That success story of instrumental reason, scientific method and of rationalism is however jeopardized by the cumulative effects they are creating for the world as a living organism. Instrumental reason has created techniques and technologies that are superbly efficient in increasing productivity, efficiency and well-being in separate segments of life. Taken together, they create a clear and present danger – a system of destruction – for living on planet earth.

The mindset of sustainably developing mankind will have features of Systems Thinking incorporated to its base.

Systems Thinking, as an outgrowth of the scientific orientation, objective modelling and rationalism, has in various forms made major contributions to what could be called the science of the wholes. Systems Thinking movement has developed powerful methods to represent and model the functioning of wholes and has provided instruments to conduct rational and scientifically sound analysis and discourse of such wholes. Philosophically, the movement has called for the necessity to develop the ethics of the whole and modes of being in the world that build on interdependency, relatedness and connectivity, as opposed to fragmentarism, separatism and isolationism. As Midgley (2003) observes in the introduction to the four-volume collection of key articles on Systems Thinking, "from the early days of systems thinking, its advocates have been concerned with *making a difference* in the world". Eager to make sense of complexity and hidden impact structures, Systems Thinking has searched mental models that would reach beyond the pitfalls of reductionism and linear cause-and-effect thinking. Whatever the details of the mindset of sustainably developing mankind, it will have features of Systems Thinking incorporated to its base.

Here Peter Senge's *The Fifth Discipline* (1990) is a breakthrough. Building on the systems dynamics (Forrester 1961 and subsequent works) but writing in a widely accessible, energizing mode with an emphasis on the "mental models" of individuals as well as their "personal mastery", Senge extended the scope of Systems Thinking to an unprecedented scale. With "the most popular book that has ever been written on systems thinking" (Jackson 2000, p. 147), Senge brought holism and

the theme of interdependency to the forefront of organizational concerns and to the focus of relatedness-intense applied thinking. Systems Thinking became a resonant force way beyond the borders of the scientifically oriented academic systems community. In subsequent works and also via the Society of Organizational Learning of which he is the founding chairperson, Senge has made a powerful plead for "collaborating for systemic change" in order to face the sustainability challenge (Senge et al. 2007).

While recognizing Systems Thinking as "the Fifth Discipline" (along with Mental Models, Personal Mastery, Team Learning and Shared Vision), necessary for "a learning organization" and consequently for the sustainable organization of living on earth, we feel Senge's insights could be pushed further still.

Our starting point, with Senge's work as a chief inspiration, started with the conviction that the human innate systems capabilities and endowments are far wider than had been recognized. It started to dwell on us that the whole of the Systems Thinking movement had operated with an unnecessarily narrow concept of the human systems *intelligence.*

Our systems endowment, the human systems intelligence we possess as human beings, was far more than ability to think about and know about systems, we felt. The systems endowment is not only about explicit, knowledge-like and propositional, symbol-intensive and analytic capabilities with systems, notwithstanding the merits of such a quintessentially human acumen. In addition to it, there is a systems endowment in us as part of our heideggerian "*being-in-the-world*" as "*acting-in-the-world*". To be human is to be systemic. The epistemic, rational, and objectifying dimensions of our cognitive acumen are only part of the human systems story.

To our knowledge the concept of *Systems Intelligence* – intelligence within systems as the context of a situated and unfolding life – is original with us.

Systems Intelligence, we suggested in 2004, is intelligent behaviour in the context of complex systems involving interaction and feedback. A subject acting with Systems Intelligence engages successfully and productively with the holistic feedback mechanisms of her environment. She perceives herself as part of a whole, the influence of the whole upon herself as well as her own influence upon the whole. By observing her own interdependence in the feedback intensive environment, she is able to act intelligently.

In this conceptualization, the focus that we believe is new is the emphasis of systems and action. We focus upon systems and action *at the same time*. Systems are considered as emerging and as taking place in a living presence. In a paradigmatic case, the systems that humans are intelligent in and with, are not "thing-like". Systems action is considered with respect to wholes while those wholes are still unfolding.

Thus the primary point is not to describe, explain or scientifically represent systems as they have already emerged. The idea is to approach systems as something *we live with* in a locality and context that is taking place in "the present moment" (Stern 2004) and on an axis of time that is unfolding.

Systems Intelligence is therefore more about intelligent action than about the intelligent explanation or modelling of such action. It is about the holistic and complex portfolio of sensitive, sentient and alertness-capable creatures that are able to operate here-and-now, rather than an account of their epistemically well-taken forms of world-relatedness vis-à-vis systems. It celebrates intelligence that gets it right in actual practical life by whatever ways it takes. It does not prioritize – much less idolize – the forms of intelligence the past 200 years of scientific and

industrial success has elicited to the status of the correct, adequate and "best" ways to think. Systems Intelligence celebrates human intelligence that is capable of demonstrating its worth in a living now. It does not dismiss pragmatic accomplishments and ingenuity of the everyday even if the emerging forms of success might seem strange, unexplainable, unpredictable or insignificant from the point of view of the accepted scientific paradigm.

Systems Intelligence is more about intelligent action than about the intelligent explanation of such action.

Clearly a mother is in some sense intelligent with her infant – with the baby as an idiosyncratic emerging system on the way to growth. Clearly strangers meeting demonstrate some intelligence if within a few seconds, a common ground is already established and constructed out of what seems like nothing. And clearly there is intelligence involved, if interaction with others is all you need in order to learn the enormously complex systems of a language.

Such intelligence as part of moment-to-moment human aliveness will connect with analytic and propositional knowledge where such is available. Some of the relevant systems are out there to be depicted, modelled, analysed and represented. Some others are not. Much of the time in actual practical life, objective propositional knowledge is either severely restricted or not available. Systems Intelligence reaches out to a productive interplay with systems irrespective of the epistemic status of those systems. This is because much of the time, life will not wait, and action will have to be instituted in spite of ignorance, unclarity, or lack of crucial facts. The specifics of the situation and uniqueness of the systemic set-up might render hitherto useful abstractions, algorithms, and principles useless. Struggling to make the best of whatever is available, the Systems Intelligent actor will rely on an interplay with the systems environment with her full human connectivity capabilities and relatedness-reservoirs. She is called to play her human hand and construct her actions in the presence of transient and fleeting, vaguely-defined and unnamed emergent systems. And the point is, it is such systems *with which we live most of our lives most of the time*.

It is good to know what a system is, preferably as identified in scientific and mathematically accurate terms. Many systems submit to such a treatment. Some do not. Some systems with which we conduct our lives are too transient, idiosyncratic and forward-coming to allow us the luxury of them being neatly conceptualized or perceived as objects. A system in the mode of becoming, contingent on what people might do next and on what the specific features of the given situation might turn out to be, there might be no telling exactly what the system is. And yet people can act intelligently with respect to and within such systems. This is Systems Intelligence.

The Context of Systems Intelligence Research

The Systems Intelligence approach links with several groundbreaking trends in the current multifaceted, multidisciplinary and increasingly intertwined research arena.

One research line highly relevant for us is emerging from "the unfolding story of 'the social brain'" (Brothers 1997) and the cognitive and neuroscientific investigation into the social aspects of the human mind (Lieberman 2007). What this research shows by solid scientific methods is that the human brain is more closely tuned to its environment and to other people than the Cartesian picture of an isolated mind and the philosophy of individualism have suggested.

The second line of research is one that is emerging from infant research and from what Daniel Stern (1985) calls "The interpersonal world of the infant". These investigations point to modes of

relatedness, connectivity, and mutuality that take place on a nonverbal, subsymbolic, and affective level. Bringing to the focus themes such as "mutual influence", "attunement", "the moment of meeting", and "the present moment" (Beebe et al. 2003; Daniel Stern 1985, 2004), the infant research sheds light on what we have approached from the Systems Intelligence perspective as the human "in-between". Particularly relevant and promising is the possibility to approach the nonverbal aspects of Systems Intelligence from this perspective. Emphasis on the nonverbal dimension marks a key point in Systems Intelligence approach and an extension beyond traditional Systems Thinking.

Closely related with this is the line of research on adult treatment and psychotherapy. Investigations into the patient/therapist relationship and its qualitative and processual features has brought forward a number of concepts of intersubjectivity that are relevant from our point of view – concepts such as "implicit relational knowing" (Lyons-Ruth et al. 1998), "resonance" (Knoblauch 2000), "moving and being moved" (La Barre 2001), "intersubjective consciousness" (Stern 2004). Particularly closely related is the work of Beatrice Beebe and collaborators on "dyadic systems view". Stressing that "the origin of mind is dyadic and dialogic and that, further, adult intersubjectivity is built on infant intersubjectivity", Beebe et al. point out that "Intersubjectivity has no single, coherent meaning either in psychoanalysis or in infant research." As a result, they "recommend adoption of the concept of *forms of intersubjectivity*" (Beebe et al. 2003, p. 746). It is research into such "forms of intersubjectivity" – drawing from both adult treatment and infant research – that promises to yield deeper understanding of notions such as "systems comprehension", "systems perception", "systems reading", "systems attunement", "feel for the system", and "systems instinct", which are all critical from the point of view of Systems Intelligence. Research into Systems Intelligence is going to gain insight from the studies of the interpersonal preverbal and implicit as well as the verbal and explicit aspects of the human relatedness to be conducted in infant research and therapy. At the same time, the Systems Intelligence perspective can contribute to both those domains through its strengthened systems perspective and the emphasis of action as taking place via systems.

Another related line of research focuses upon the implicit aspects of the human experience (Donnel Stern 1997; Daniel N. Stern 2004; Boston Change Process Study Group 2002; Beebe et al. 2003; Beebe and Lachmann 2002; Preston 2007). Research into "implicit knowing", "unformulated experience" and "embodied knowing" links also with the intersubjective dimensions of experience. Particularly relevant and groundbreaking is the "post-Cartesian psychoanalytic psychology" of Stolorow, Atwood, and Orange (2002 and other works). Their work on "contextualist sensibility" (Orange et al. 1997) and more generally on what they call the "intersubjective systems view", emerging from therapeutic background and concerns, hits very much to the core of what we approach as Systems Intelligence. All this points to the finely-tuned aspects of the human interrelatedness and to the crucial question as to "how relationships interact to shape who we are" (Siegel 1999). Comprehending the interplay and living within influence-generating systems together with their contextualist underpinnings is vital for the understanding of Systems Intelligence.

In addition to these five different research traditions relevant for Systems Intelligence, the sixth explores themes such as "alertness", "sensemaking", "improvisation" (Weick 1995, 1998, 2006; Schwandt 2005; Maitlis and Lawrence 2007) and "mindfulness" (Langer 1989, 1995; Langer and Moldoveanu 2000). This research calls attention to modes of staying tuned to a changing situation in its context-bound and transient specifics. Systems Intelligence, in its emphasis on the present moment, on action and on opportunities often takes the form of alertness and improvisation making use of the human sensemaking and mindfulness capabilities. The Systems Intelligence perspective welcomes the insights of the sensemaking school on "a central theme in both

organizing and sensemaking" regarding how "people organize to make sense of equivocal inputs and enact this sense back into the world to make that world more orderly" (Weick et al. 2005, p. 410). Likewise, we welcome the emphasis of the mindfulness approach on "sensitivity to the novel and, therefore, unexpected (i.e. nonalgorithmic)" considered to be "one of the key components of mindfulness" (Langer and Moldoveanu 2000, p. 4).

For the seventh, the burgeoning interest in the "microfoundations" of the human condition is highly relevant from the point of Systems Intelligence. The relevant research here includes the work of Randall Collins (2004) with his account of "emotional energy" as the key concept of social phenomena and of "interaction ritual chains" as well as the research by Marcial Losada and his associates on the microbehavioural aspects of peak performing teams (Losada 1999; Losada and Heaphy 2004; Fredrickson and Losada 2005). Furthermore, and very much to the core of some of the thematizations of Systems Intelligence, the groundbreaking work of John Gottman on marital relationship success is of primary importance (Gottman 1993, 1999; Gottman et al. 2002; Gottman et al. 2006). With its emphasis on human possibilities and upon the idea of creating much with little, Systems Intelligence links closely with these studies on the microfoundations of the human condition.

Eight, the enormously important emerging field of "positive psychology" (Seligman and Csikszentmihalyi 2000; Snyder and Lopez 2002, 2007; Lyubomirsky et al. 2005) and "positive organizational scholarship" (Cameron et al. 2003) and more generally what could be called the science of the positive, is the natural context for Systems Intelligence. Likewise, the multidisciplinary field of "action research" (Reason and Bradbury 2001), together with its emphasis on "participative inquiry and practice" presents major openings for and parallels with the Systems Intelligence perspective.

Systems Intelligence can also be a property of a group of people or an organization. Such an application for the concept is indeed in growing demand in the highly interconnected and interdependent global society. Here fruitful openings are provided by the work on "collective intelligence". Reflecting breakthroughs on the internet and the modes of acting natural in that collective arena, research on collective intelligence has recently gained momentum. Several different definitions of collective intelligence have been proposed in this diverse and stimulating field of research. For an example of early thoughts on the concept see Lévy (1997). More recent efforts include "the Handbook of Collective Intelligence"[1] which is a web-site hosted by the MIT Center for Collective Intelligence[2]. We see systems intelligence to be a critical basic element in a collectively intelligent body or organization. We look forward to research on systems intelligent organizations. Work on the diverse forms of collective and other network-based interconnected modes of intelligence is likely to provide major steps forward in our understanding of the systems intelligent endowment of us as human subjects and as interconnected agents.

Dialogue, conflict resolution, negotiation, and facilitation research are yet other fields that link closely with the Systems Intelligence approach (Moffitt and Bordone 2005; Isaacs 1999; Schuman 2005; Slotte 2006). Like coaching and pedagogy, pragmatically motivated areas of relatedness-in-action provide a natural field of application for the Systems Intelligence perspective.

Yet the key concept for us is that of a system. An outgrowth of the Systems Thinking movement, the holistic emphasis is one of the driving forces of Systems Intelligence. Systems Intelligence

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[1] http://www.eu.socialtext.net/mit-cci-hci/ (accessed 4 June 2007).

[2] http://cci.mit.edu/ (accessed 4 June 2007).

joins forces with the call for "Creative Holism" which Michael C. Jackson brought forcefully to focus with his recent authoritative book on Systems Thinking (Jackson 2003). The Systems Intelligence approach is a creative, holistic, and integrative enterprise with strong constructivistic (Berger and Luckmann 1966; Gergen 1999; Shotter 1993) and vitalistic, "feeling-in-touch-with-life" overtones (Alexander 2002 and subsequent works).

From Representing Systems to Living with Them

The Systems Intelligence approach is not a substitute of Systems Thinking but an amendment to it.

There is nothing wrong with developing formally sound, mathematically expressed systems representations. Indeed, such representations are desperately needed for the benefit of sustainability studies among others. And yet *more* is needed. When all the systems diagrams for the world's food-chains, environmental impact-chains and climate-effecting causal loops are there for all to ponder, there will be the question – *what are we to do?* This question Systems Intelligence does not want to lose sight of. It concerns itself with intelligent human action within complex environments with an emergent nature and in the presence of uncertainty.

We find the concept of a "system" to be highly intuitive. It is a chief asset. The communicative possibilities of the key word have not been made full use of, however, as indeed pointed out by Russell L. Ackoff recently in his outspoken article entitled "Why Few Organizations Adopt Systems Thinking" (2006). We believe the error in the systems movement Ackoff highlights reflects an undue bias that the Systems Intelligence approach seeks to counterbalance. The undue bias stems from the fact that paradigmatically the Systems Thinking movement has approached systems from the primary perspective of objectivistic scientific discourse and as objects of study – as opposed to part of the human experience and the human condition.

Stephen Toulmin, in *Cosmopolis* (1990) and *Return to Reason* (2001), has analyzed powerfully the dominance of "formal rationalism" as part of the outlook of the modern. The domain of human reason, and of human intellect, is wider than that of "formal rationalism", Toulmin however argues. We endorse this view, and point out to key aspects of Systems Intelligence that call for human sensibilities, capabilities to act through inarticulate implicit knowing, adaptability-on-the-fly, opportunity-mindfulness, attunement to others' aspirations, and improvisation skills. The emphasis is upon the features of the human endowment that constitute our abilities to act within systemic wholes in an intelligent manner even when the systems are not adequately graspable with the instruments of formal rationalism and when the subject/system interface might involve nonalgorithmic features.

In the human world, wherever there is a system, there is the possibility to do something about that system.

A system is a whole with a structure and with relationships that connect parts of that whole with other parts, often giving rise to properties not reducible to those of the parts. There is a generative, productive, even coercive dimension to a system, typically seemingly at the expense of individual parts within the system. Yet subjects often do have a say – if they are human.

In the human world, wherever there is a system, there is the possibility to do something about that system. Maybe you can re-interpret the system, maybe you can help to reconstruct the system, maybe you can introduce a surprise opening and bring about a slight variation that plants a seed. Maybe that intervention, seemingly small and inconsequential, still happens to open the

door, hits the right button not only in yourself but perhaps in a number of others who secretly share your dream of a jump forward. You implement a small change and maybe you shake the system. Maybe a butterfly effect is on the way within the walls of an established order.

Consider the collapse of the Soviet Union. "None of us predicted these events, and all of us could explain why they were inevitable" (as Timothy Garton Ash in his 1997 Tanner lectures quotes an American scholar as saying). Systems Intelligence wants to be there when something happens, as opposed to joining the rationalizing concept-artists that afterwards come to analyze whatever is left.

One reason for our enthusiasm for the Systems Intelligence concept is due to the leaning-forward aspect that is part and parcel of it. Instead of getting taken aback because of uncertainty, instead of becoming mesmerized when facing the complexities of a system, the call of Systems Intelligence is a soft but confident battle-cry for action.

That call for action comes with the optimism of a subject who believes she can improve her actions on the fly, think on her feet, and adjust her reactions creatively to whatever might turn up. The system might be dense and perhaps impenetrable in epistemic terms. It might be on its way towards me from the future with all the uncertainties and transient idiosyncrasies that necessarily accompany the next moment. But I might still feel confident to act with the system *no matter what it turns out to be*. The system might now be unfolding as a complex web of interplaying forces with twists and turns nobody can predict. And still I might act, and act intelligently. I might still manage to find a fit with the system there and then, resonate with it, tune in to it, sense it, I might have a feel for it as it is emerging. I might succeed in igniting a wave of similar optimism and attunement in others who in turn might mirror back emotional energy to encourage me further. We might share a significant moment together, we might find a sudden opening to a higher level of acting and being, get uplifted together and mutually inspire one another to resonate and achieve a magnificent common good.

Such is the space of action for a Systems Intelligent agent, with key words shining through – words such as agency, choice, mutual influence, emergence, future, the living presence, the human in-between, resonance, inspiration, improvisation, creativity-on-the-spot, unpredictability, situation, connectedness, interconnectivity, unfolding whole, social construction, symbols, intervention, change, process, aliveness, spiral upward, local conditions, experience, mindfulness, details, hope, affects, subjectivity, effects.

Quite clearly, behind Systems Intelligence, there is faith in life that point beyond what brute facts alone will depict. There is "flexible optimism" in the sense of Martin Seligman (1990). Indeed, we believe faith in life in that sense is part of the human constitution, just like we believe Systems Intelligence is part of our human endowment as an urge to act with regard to a whole even in the presence of epistemic ignorance regarding that whole.

The Way Forward

There are two chief motivations for our emphasis on Systems Intelligence.

One is that we believe the world will be a better place if more people become mindful of their systemic endowment and start to make more use of what they've got. Indeed we believe more holistically and context-relevantly oriented actions are desperately called for from the point of view of our immediate everyday lives as well as from the point of view of the collective life of mankind in the face of challenges of sustainable development.

Secondly, we believe an adequate intellectual account of the human condition will have to cope with the phenomena of intelligence-as-part-of-our-actions as those actions emerge in the present mode. That will call for investigations of a kind largely neglected by the mainstream of the academia. In spite of promising openings in fields such as those indicated above, *the present moment as the arena of action and shared experience* remains unduly disregarded and neglected intellectually. The Systems Intelligence approach wishes to contribute to the energizing of that vital field of study.

Our efforts on Systems Intelligence at Helsinki University of Technology in the past five years have stemmed from certain unorthodox ideas as to how to conduct a productive higher educational project on a new thematic. One inspiration has been "an open code methodology and pedagogy", suggested by the stunningly successful and systems intelligent project that Linus Torvalds initiated and facilitated and which resulted in the emergence of Linux, the new operating system for computers (Torvalds and Diamond 2001; Raymond 1999).

Thus we have invited and keep on inviting researchers and students with diverse backgrounds to come and explore Systems Intelligence from their own point of view of their own, disciplinary background and experience. Nobody is imposing a One Truth authoritative interpretation and a disciplinary matrix concerning what Systems Intelligence "really" is. There is no secret source code in Systems Intelligence investigations. The concept is sufficiently intuitive, we think, to lead intelligent people to the right direction even in the absence of an externally-imposed disciplinary structure.

In the current volume this approach is demonstrated by a number of writings that from a variety of perspectives approach Systems Intelligence and Systems Intelligent Leadership. We hope the articles will prove inspiring and suggestive for readers and researchers interested to stimulate their thinking and in bringing about more fitting, productive, sustainable, and uplifting actions in the contexts of their practical lives.

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