Methodology and noology: amazing prospects for library and information science

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Important work for Information Science and Information Services has been done by two internationally renowned intellectuals, Edgar Morin and Michel Serres. Their relevance relates to the fact that they both accept the challenge of the complex reality of the world. They work out ways to deal with the dynamics of these issues in the most significant way possible. They both have special methods of including information as central to their work, despite their disciplinary backgrounds and engagements. This fact gave me the freedom to expect from their work, given their enthusiasm about the central place of information in society and life, to provide significant insights to us in our own situation. We encounter the problem that our standard, accepted methods cannot really help us here. These methods are still based on "a flat world assumption" as are our policies, strategies and skills – all of which are based on a deterministic approach and a cause-effect strategy. As such, it cannot give account of the words dynamic, restless and complex. This system is simply too movable and fluctuating. There are too many dimensions. We need more, even more than reason alone. We have to move beyond method, beyond mere rationality, in order to cope and get real access and develop understanding. We need to move into another dimension, and onto a totally new level, of reality and into a different dimension or mode of thought – into another domain, the domain of ideas rather than problems. We have to start thinking differently. What I am trying to sketch and that is referred to here, in line with Edgar Morin's suggestions, is noology, or "the science of the knowing mind" with its focus on the fullness and complexity of reality. The mode of thought that can effectively cope with this vast and complex challenge is what Michel Serres calls our "multiple, connective intellection" that can penetrate all the respective areas and establish links between them. If we are serious about these challenges and want to explore this "restless dynamic system" in its full complexity we can hardly do better than look in more detail at the work done by Edgar Morin and Michel Serres.

Keywords: Edgar Morin; methodology in library and information science; Michel Serres; noology; philosophy of research

1 Introduction and background

At the previous Prolissa Conference (2009) I discussed the notion of *beyond method*, indicating that method in the ordinary sense of the word is totally inadequate for Information Science research due to the complexity and the comprehensive scope of the issues that we encounter in our subject field. This statement was explored and motivated in terms of the work done by three information scientists, namely David Blair (2003: 2006) on language, Bernd Frohmann (1994; 2001; 2004) on the deflation of information, and Rainer Kuhlen (1986, 2004a; 2004b) on information ethics and knowledge ecology. I ended my paper in a very sketchy way with a few closing remarks on the relevance of the equally important work for Information Science and Information Services, by two internationally renowned intellectuals, Edgar Morin and Michel Serres, a sociologist and a philosopher of science respectively. See De Beer (2009) for the published version of this presentation. Their relevance relates to the fact that they both accept the challenge of the complexity of the world in which we live and all related issues. They work out ways to deal and cope with the dynamics of these issues in the most significant way possible. They both have special ways of including information as central to their work, despite their disciplinary backgrounds and engagements. This fact gave me the freedom to expect from their work, given their enthusiasm about the central place of information in society and life, to provide significant insights to us in our own situation. Immediately after that insight I started exploring these bodies of work for their possible benefit to us. This article is my effort to articulate in short their valuable contributions on behalf of our scientific and service activities.

This approach was justified and reinforced by the invitation to the *LIS Research Symposium of Unisa (2009)* with the formidable characterisation of our age and its societal dynamics in the following words: "The modern information society is a dynamic and restless system". If this is an accurate description, and I am convinced that it is, then we need to be extremely resourceful in our ways of dealing with such a reality. The terms that feature in a significant way are: dynamic, restless, system, society and information. All these terms and related new ways require special focus and attention and not the kind of attention that we are used to and what is normally given.

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The problem we encounter here is the following. Our standard, accepted methods cannot really help us here. These methods are still based on "a flat world assumption" as are our policies, strategies and skills – all of which are based on a deterministic, linear approach and a cause-effect strategy. As such it cannot give account of the words dynamic, restless, complex. This system is simply too movable and fluctuating. There are too many dimensions. We need more, even more than reason alone. We have to move beyond method, beyond mere rationality, in order to cope and get real access and develop understanding. We have to move into another dimension, and onto a totally new level of reality and into a different dimension or mode of thought – into another domain, the domain of ideas rather than problems. We have to start thinking differently. It seems as if we have to do with two worlds.

In view of the fact that science is a dynamic activity, it constantly reviews itself, asking questions about itself, and always looking for something new from various perspectives and by many people. Examples of such a critical, and concerned questioning approach are Bachelard (1934), Bohm and Peat (1989), Bourdieu (1991, 1996, 2001), Feyerabend (1977, 1985), Gibbons *et al.* (1994), Hacking (1981), Husserl (1970), Latour & Woolgar (1986), Nowotny *et al.* (2004), Stengers (1997, 2000, 2006), Stengers and Schlanger (1991) and many others. These questions, critiques and possible alternatives are in a very distinguished and convincing way explored by Edgar Morin and Michel Serres.

What I am trying to sketch and what is referred to here, in line with Edgar Morin's suggestions, is noology, or "the science of the knowing mind" with its focus on the fullness and complexity of reality. The mode of thought that can effectively cope with this vast and complex challenge is what Michel Serres calls our "multiple, connective intellection" that can penetrate all the respective areas and establish links between them. If we are serious about these challenges and want to explore this "restless dynamic system" in its full complexity and contribute to sensible responses to them we can hardly do better than looking in more detail at the work done by Edgar Morin and Michel Serres.

Under the general theme "The Method", Morin has published six books with the following focuses: nature, life, knowledge, ideas, humans, and ethics. They cover reality in its fullness. It can also be referred to as covering *phusis, bios, anthropos.* These themes demarcate the comprehensive dimensions of this system, this society, this world, and the knowledge we need to cope with within which the two suggested worlds fit in and that provides a context for understanding. This restless dynamic system is not only restless, but also and especially very complex. We must be careful not to confuse the direct and immediate context with the wider context, which mostly happens in our encounter with problems. A problem never, or hardly ever, appears in isolation; it always appears in a context and always in an even wider context as well. The immediate context is important; the wider context explored in his six volumes on The Method is even more important. It constitutes the ecology of our knowledge of the world. How to cope with these problematic settings requires special qualities. Morin adds two books to these six that are very helpful as significant introductions to the six volumes: *Introduction to complex thinking* and *Science and conscience*. Their titles speak for themselves. For the full picture these two should be read together with the six. He has suggested a special kind of thinking, namely complex thinking! This opens the door for Michel Serres.

Under the general theme "Hermes", Michel Serres published five books with the following titles: communication, interference, transduction, distribution, and North-West Passage. All five are very pertinent for our work as knowledge workers. Communication speaks for itself; interference can also be seen (according to Serres himself) as inter-reference; transduction is precisely what we have to do from day to day – translating information from one source to one or other destination; distribution is what should have happened to information as re-worked knowledge in order to get it to its appropriate needful, problem-ridden context and situation; passages between disciplines, sometimes almost undoable, in order to find the appropriate bit of applicable knowledge wherever it may be required: *from myth to philosophy, to science, to literature.* The core of his message he formulates as follows, very applicable to the knowledge worker, especially when facing the Unisa library (2 million books) which forces onto us such a massive overwhelming encounter. He says: What we encounter is massive, overwhelming, but "we must nevertheless try to see on a large scale; [to think big], to enjoy a multiple, and by times a connected intellection" (Serres 1980:24).

What both Morin and Serres are exploring and emphasising is the almost desperate call for a special kind of thinking, especially in times when we are inclined to neglect and underestimate the true importance of human thinking and of the human mind.

Let us start with Edgar Morin.

2 The methodology of complexity of Edgar Morin: a noological situation beyond-method

What exactly is this noology? It is a play with ideas, a play of ideas; it is a matter of linking and connecting ideas and of allowing ideas to emerge, to appear, to become active. It is a move into the sphere of ideas, the noosphere, according to Morin. What needs to be mentioned is that this noosphere is not an abstract, totally inaccessible domain. No, it is close by; it is here, precisely here where we, all of us – LIS (Science) and LIS (Services) – are working and thinking. It links and

connects science and services in order to become a forceful energy in the transformation and informatisation of society! Without this strong connection both science and service come to nothing. We cannot avoid it; we cannot escape from it. I will explore it under the methodology of complexity of Morin who describes a noological situation beyond-method. Noology is the human thought capacity to come to terms with the two essential dimensions of the knowable, namely the measurable and the immeasurable (or even the measureless) (Bernardis & Hagene 1995). These two dimensions (or two worlds), and the necessity to keep them linked in an intricate way, are well articulated by a number of scientists from a diversity of so-called scientific disciplines: Atlan (1986), Ekeland (1988), Monod (1979), Serres & Latour (1995), Weizenbaum (1984), Wersig (1990). There are many more.

The *Introduction to complex thinking*, and Fortin's (2008) elaboration of Morin's methodology offer excellent orientation for The Method. The six books together cover the vast field of knowledge, from the physical to the biological to the human and the ethical fields. Books five and six orchestrate all the themes of the preceding books in a new synthesis, realising the synthesis of a life of reflection on humans and on the contemporary world. They constitute the achievement of the oeuvre of Morin that consists in confronting the challenge and the difficulty of thinking the complexity of the real in order to come to an understanding of this reality. The information and the knowledge that is the concern of Information Science in its efforts to understand, is knowledge of and information about this reality in its fullness.

Edgar Morin's guidance in this respect of a beyond-method, as worked out in the six volumes, is crucial. Note his main themes as made explicit in the sub-titles: science of science, knowledge of knowledge, the life of life, ethics, ideas, the humanity of humanity (about human identity). All these exciting themes are interconnected in various ways and are organised around the central notion of method, which makes them even more exciting and inspiring. He states firmly: "We are in need of a method of knowledge that translates the complexity of the real, recognises the existence of beings, and approaches the mystery of things ... The method of complexity demands the conceptualisation of the relationship between order/disorder/organisation; the refusal to reduce phenomena to their constitutive elements, nor to isolate them from their environments; the rejection of the dissociation of the problem of the knowledge of nature from the nature of knowledge" (Morin 1977: 3-4). This, he says, is "the voyage to the search for a mode of thought that would respect the multi-dimensionality, the richness, the mystery of the real and that would know that the cerebral, cultural, social and historical determinations that subject all thought co-determine the objects of knowledge. This is what I call complex thinking" (Morin 1980:10). It is according to him self-evident that a rejection of these 'a-methodical' approaches would lead to "a pathology of knowledge" that materialises in the increase of ignorance and in the mutilation of knowledge" (Morin 1986:13-14). Equally crucial is his work on paradigm, especially his focus on "the science of the knowing mind, or noology" that is capable of dealing with what he calls the paradigmatic knot as the space or place where "the multi-determined character of knowledge finds expression which has its determinations in the individual, anthropological, noological, socio-cultural and psychoanalytical structures of the knowing mind" (Morin 1983:11-12).

The six volumes form a whole, a complete work that covers the vast field of knowledge, from the physical and biological to the ethical fields. Volumes 5 and 6, in orchestrating all the themes of the preceding volumes in a new synthesis, realise the synthesis of a life of reflection on the human being and on the contemporary world. It constitutes the point of arrival of the great work of Morin which consists in confronting the challenge and the difficulty to think the complexity of the real. This magnificent oeuvre is typified at the start of the 21st century as "a new reform of understanding" analogous to the undertakings by Spinoza, Leibniz or Descartes three centuries ago (see Fortin 2008: 61). "Reform" always appears in a period of crisis which must clarify the steps of a humanity on its way, still powerless, though, to accomplish itself as humanity.

This new reform represents a new vision as well. It opens up new epistemological perspectives. Two worlds, or rather two visions of the world, confront each other: the one inherited from modernity and of a classical vision of science; the other, a rupture from modernity and inseparable from new developments in science (thermodynamics, microphysics, astrophysics) (Morin 1977:95). The first is founded on the ideas of order, determinism, necessity, clarity, certainty and measurement; the second is founded on the unity of order and disorder, on the impossibility of eliminating uncertainty, ambiguity, chance and risk. Two related and interdependent visions of the world are united by a common trunk (the progress of science and the progress of thought), but incapable of letting emerge dialogue and communication between them. The Method is not an indictment against science, but is an effort on behalf of science, an open, non-reductive, reflexive, and self-critical, and even a-critical science. It is a road, a voyage which is the search for a way of thinking able to confront the complexity of the real, to recognize the wealth and the mystery of the real, and to respect the multidimensionality of physical, biological, social, cultural, cerebral determinations that all knowledge and all thought undergo. Of this we find ample demonstrations in library material and collections. Each volume can be read separately, but each of them contains constitutive dimensions of the total (Fortin 2008:54).

It is therefore really necessary to read the volumes on The Method as a totality, as a multi-link in a chain that, from articulation to articulation, searches to encourage and effect communication between the great spheres of knowledge: physics, bios, anthropos. Each volume is buckled to the following, which buckles itself to the previous ones. Unity of a work, unity of a thought which makes itself in walking, and which nourishes itself of itself, nourishing and nourishing itself from this which nourishes it. *The knowledge of knowledge* is at the heart of all these buckles. One can effectively read The Method by a coupled reading of the six volumes:

Volume 1 & 2: The idea of complexity (and thus of organization) applied to the physical, living and social organization. First buckle is the physic-bio-anthropo-sociological and the recognition of the complexity at the quadruple niveau of physical, biological, human and social.

Volumes 3 & 4: The idea of complexity (and thus of organization) applied to knowledge and to ideas. The epistemological buckle returning in feed-back to the preceding buckle. The recognition of the complexity of knowledge and of the omplexity of ideas (noological niveau).

Volume 5 & 6: The idea of complexity (and thus of organization) applied to the human being, to society and to ethics. Anthropo-socio-politico- ethical buckle returning in feed-back to the preceding buckles. Recognition of complexity at the quadruple niveau of the human, the social, the political, the ethical.

If we search for a method in the sense of a totality of rules or a programme commanding action (like the *Discourse on method* of Descartes), and as a support for our own quasi-methods, we will not find it. What we are going to find in The Method is a totality of ideas or principles (these principles of complexity) that Morin applies to different objects covering the vast field of knowledge, from the physical and the cosmological to the ethical fields. The whole of The Method (the whole work) rests in the first place on the sentiment of complexity of which the positive basis is the universal recognition of complexity. Phusis is complex. Society is complex. Thought (and knowledge) is complex. Politics is complex. Ethics is complex. Everything is complex.

The Method is a kind of a spiral movement which crosses and explores different territories in crossing and exploring different knowledges in order to make communicate what does not communicate, but must communicate: phusis, bios, anthropos. They are, all of them, connected. This calls for a re-organization in the chain of knowledge, which calls for a constant combat and a struggle against all modes of disjunctive, reductive, and simplifying thought. The first enemy of complexity is simplification: reductive, idealist, atomizing, totalizing, systemic, cybernetic. It is this enemy that Morin, through the whole of The Method, tries to track down in assuring the betting for the "transformation of his conviction about complexity into a method of complexity"(Morin 1980:457). And this method, if it can formulate itself, can only formulate itself at the end, because method is road, a road not traced in advance, as we do as a matter of habit, but a road which makes itself or is made, in the process of marching or walking.(Fortin 2008:88-89)

Two additional books, already mentioned, can help one to unlock the dense and comprehensive six volumes of The Method, namely *Science et conscience* (1993) and *Introduction à la pensée complexe* (1990). It is all in all either a matter of understanding that can take us forward, or, a rather fatal lack of understanding. The Introduction is a small book constituted by a regrouping of a number of texts, which offers six well structured chapters that serve as an introduction to the problem of complexity: "If the complex is not the key of the world, but the challenge to be confronted, complex thinking is not that which avoid or suppress the challenge, but this which aids to relieve it and by times even enables one to overcome it" (Morin 1990: 11). As pedagogical text, information well put together, *Introduction à la pensée complexe* can be a way to penetrate The Method without going straight away through the main gate, but to enter nevertheless, that is to familiarize oneself with the notions and problematic of complexity, which is not only the challenge Morin faces, but which is the challenge posed to each and everyone (Cf chs 4 and 5) Effectively it is a small text that will age well.

3 The a-critical anti-method of Michel Serres: multiple connective intellection

In order to deal with the complexity of the real in an exhaustive way we need to complement and amplify the work of Edgar Morin on noology with the work of Michel Serres on multiple, connective intellection.

The connecting of ideas, the connecting of items in the restless, dynamic, complex system, as emphasised by Morin, is a thoughtful activity, but thoughtful then far beyond mere rationality. Morin makes it explicit in his views on complex thinking. Michel Serres adds to this his view on thinking called "connective intellection", or, "multiple intellection". Intellection does not only mean to act intelligently, or with our intellect, but also to be intelligent, or to be intellectual. Both the action and the being – of intelligence – are necessary for intelligence to excel. Intelligence is the translation of the Greek term *nous*, meaning mind or spirit, from where comes the terms noology and noosphere used by Morin.

The principles of multiple connective intellection are developed by Michel Serres in his five volumes on Hermes, the messenger of the gods, or to put it in a more worldly fashion "the information messenger and interpreter" – the representative of each one of us as knowledge workers. Each principle, forming the subtitle of each volume in the

Hermes series, is developed in the following separate books: Communication (in the sense of con-vers-ation), Interference (also inter-reference), Transduction (or translation), Distribution (also dissemination), Passage (in the sense of nodular roads or pathways between the sciences, literature and philosophy).

The thought experiences implied by these five principles assume a "mutation of the cogito" (Crahay 1988), that is a mutation of our ability to know and to think only along the lines of traditional conceptions of knowing and thinking towards new and different ways. The core issues that are relevant for this article are cleverly and concisely summarised by Jean Ladrière (1988). This other cogito, this ability to know and to think differently, should be cultivated and put to work by all of us working in the knowledge field and living in the so-called information or knowledge society. This is the best, the only primary, equipment we have. All else are of secondary importance, not to say for one moment that they are not of great importance in their own way and domains of application. But what is of decisive importance is that we focus here on our special mental, spiritual, thinking capacities that respond to a multi-dimensional conception of knowledge. These views will be elaborated under the theme of the thoughtful methodology of Michel Serres as an a-critical anti-method consisting in multiple, connective intellection or thought.

Both these thinkers are adamant about the shortcomings of the traditional methodological approaches. Serres (1997:136) writes: "We have at our disposal tools, notions, and efficacy, in great number; we lack on the other hand, an intellectual sphere free of all relations of dominance. Many truths, very little goodness. A thousand certainties, rare moments of invention". Compare in this regard also his remarks on method when he states that repeating a method is profoundly boring and nothing but a kind of laziness. He writes: "Who is more profoundly boring than the repetitive reasoner who copies or seems to construct by constantly repositioning the same cube? Ruminating on the past – what a system? Repeating a method – what laziness! Method seeks but does not find." (Op. cit.:100). His views on method are summarised by Harari and Bell (1983:xxxvi) in the following appropriate way: "The term method itself is problematic because it suggests the notion of repetition and predictability – a method that anyone can apply. Method implies also mastery and closure both of which are detrimental to invention. On the contrary Serres's method invents: it is thus an anti-method." The application of the five principles is the condition for the two options. Method means literally to be on the road, a made road, with the implication that we can see only what is visible from the road and nothing else. In order to see more we have to leave the road and move away – "off the beaten track". The real exciting places are often to be found there.

Serres's a-critical approach of "multiple, collective intellection" is developed in a rich oeuvre of more than 40 books, dealing with themes like science, knowledge, humans, information, ecology, foundations, and so-on. But for our purposes I wish to concentrate on his five mentioned books on the philosophy of information, organised around the theme of the wing-footed messenger-god of the Greeks, namely Hermes. These publications have specific relevance for information and our thinking about information and knowledge, information messages and communication, and information work with strong suggestions about the research endeavours related to these themes and sub-themes. Let us never forget that methodology, despite the fact that it relates to the work of research is always, without any exception, also a work of thought. That is why "intellection" is such a central theme. It helps us to move beyond and away from the exclusivity and rigidities of traditional method and the blind spots created by it towards a more comprehensive approach. This will hopefully become clear when one attends to these publications.

The role of the knowledge worker is not to conquer a territory, but to attempt "to see at a large scale, to be in full possession of a multiple and sometimes connected intellection" (Serres 1980:24). This remark calls for an explanation. "To see at a large scale" implies a notion of space, and specifically in our case the space(s) of knowledge – not only single books but the whole of the library! There are at least two different views of space. The one is that science has convinced us that in the classification of the spaces of knowledge the local was included in the global and that a path always existed between the two. This assumption implied a homogeneous space of knowledge ruled by a single scientific or universal truth that guaranteed the validity of the passage. There is, however, a qualitatively different perspective on space, namely that a more complex space can be envisaged. In such a space the passage from one local singularity to another would always require an arduous effort. "Rather than a universal truth, in the more complex case one would have a kind of truth that functions only in pockets, a truth that is always local, distributed haphazardly in a plurality of spaces. The space of knowledge ... would not be homogeneous or rigidly bound together, it would be "in tatters" (Harari & Bell 1983:xiii)). Serres (1980: 23-24) writes: "No, the real is not cut up into regular patterns, it is sporadic, spaces and times with straits and passes ... Therefore I assume there are fluctuating tatters; I am looking for the passage among these complicated cuttings. I believe, I see that the state of things consists of islands sown in archipelagoes on the noisy, poorly-understood disorder of the sea ... the emergence of sporadic rationalities that are not evidently or easily linked. Passages exist, I know, I have drawn some of them in certain works using certain operators ..."

From this point of view it is clear: the truth is that the universality of a model is not possible. "What is evident on the contrary is the cohabitation of different systems of thought (hence of multiple models and truths) which form any number of unique discourses, each justified by a set of chosen coordinates and by underlying presuppositions." (Harari & Bell, 1983:xiv). Rigour and coherence are regional. Universality and the global can for this very reason only be conceived in a mode that recognizes the predominance of regionality and the local. Serres (1972:31-32) writes: "Each domain in its own systematicity, circulates an autonomous type of truth; each domain has a philosophy of the relations of its truth to its system and of the circulation along these relations. In addition, it exhibits unique types of openings onto other domains that make it a regional epistemology of the system of science. ... One must resolutely open a new epistemological spectrum and read the colours that our prejudices had previously erased. Logic contains one theory of science (or several), but mathematics surely contains another one, and most likely several. Information theory is consciously developing one also... In this coherent but open world, each province is a world and has a world, so that epistemology ...becomes pluralised and relativised within the system."

To see on a large scale, etc *means* to understand that the foundation of knowledge presupposes neither one philosophical discourse, nor one scientific discourse, but only regional epistemologies. The connection and connectivity between the epistemologies become important. To see on a large scale, i.e. to see in terms of multiplication, regionalization, localization, *means* also to attempt to travel through as much space as possible, searching for passages between the different spaces. The notion of seeing brings us in contact with the word "theory" which can also in an etymological sense be linked to seeing. The word "intellection" means also to see with the mind's eye, that is, it is an intellectual, thoughtful activity – the knowledge worker as thinker in this way is always able to see new things, new solutions to problems, new options, that means that they are those people able to invent.

This journey of Serres through multiple times, spaces, and cultural formations suggests the contours of *a general programme* that Harari & Bell (1983) outline for us. Serres' personal itinerary takes us through many thinkers and disciplines so that we may conclude: his itinerary is encyclopedic, covering the three great modes of knowledge (spaces): the philosophic, the scientific, and the mythic (or literary). His encyclopedic concerns (for our purposes since many books have been published by him after this period) are expressed in the five volumes of the Hermes series already mentioned. In addition *The Parasite* (2007) deals with the conditions for an epistemology of human relations which we can hardly stay without. In the Hermes series Serres indicates and demonstrates the connections, the multiplicity, the intellection, the passages between science, philosophy and myth (fiction) that can be achieved when a Hermes style of knowledge work can be pursued. A pursuit of this style and nature will be much more fruitful than the standard approaches we play around with and which imply not much more than a vague hope that we may have success in finding something.

In this regard the little book by Crahay (1988) on Serres will be especially significant as well as a most significant preface to this book by Jean Ladrière (1988:9-15). "A new space of understanding" is opened up for us by the meditations of Michel Serres, he writes (Ladriere 1988:15). The thought of Michel Serres is a thought of multiple entries (p 14). We ourselves can explore other roads, opening in front of us ... possible spaces. Every text of Serres in their inter-crossings with the others become revelatory for all the others and in the process they tell us of the circulation of meaning. It is therefore only by a reading operating in several registers at the same time, attentive at every instance to the references, the relations, to the connections, to the correspondents, to the convergences, to the effect of mutual symbolization, to the outbursts and the polymorphy of significations, that one can truly enter into their mode of significance. It is a call for a mode of reading that Serres himself via Bruno Latour would recommend: an a-critical reading. He articulates the multiple and contrasting voices of our strange culture. He allows us [perhaps even invites us] to follow multiple roads (ondulary roads). He opens the way to "a true poematics of nature. We are thus on a way (achemine) to such a point that the thought of form and of morphogenesis become the thought of meaning, of the verb, of freedom, and at the end of the event" (Ladrière 1988:15). Note the important focus on form and morphogenesis, the creation of form, so immensely relevant in the context of information work as the work of form – giving, the spiritual partner of meaning-giving.

We find in Serres understanding of the knowing mind "a mutation of the cogito" and this mutation needs to be carefully articulated, especially because of its implication for our understanding of thinking (multiple, connective intellection). This means the end of a philosophy of representation and the beginning of "a pluralist logic". This reinterpretation of the cogito rests on "a thought of forms" that exchanges representation for interference (cf Serres 1972). We find in Serres all the familiar philosophical terms like cogito, subject, etc. as well, but displaced in a subtle way so that the new philosophy gradually emerges that signifies by way of interferences and not by way of projection or of representation. For example: "The COGITO becomes a fragmented, intermittent, erring, and contingent cogito; the subject is no longer a fixed point, it is nothing but circulation; the object escapes representation; thinking is no longer representation but pure movement; logos becomes a pluralist logos; being is no longer substance but made up of appearances, of events, of encounters, of relations, of qualities of meaning; the infinite remains undetermined; the

ontological reality remains undifferentiated chaos, mixed multiplicities; and philosophy is the tacit place of welcome where all roads come together, get mixed and melt into one another like the centre of a star and method is only the story of voyages" (Ladriére 1988:13-14).

We are looking for an image of a thinking that does not represent. Outside the fixedness of representation thinking is to move from one structure of representation to another, to a flow that connects different structures, and different spaces. To think is to connect and to disconnect circulations, to cross in all senses the transcendental space of communication, to intercept and exchange forms and structures in this space – each structure operates a crossing and exchanges. The subject, the ego of the cogito, is no longer a fixed point; it is nothing but circulation; being circulation." (Crahay 1988:73-74)

Finally, four book-length studies on four authors, each in his own way a system builder and in whose work scientific thought plays an important role, offer an acute illustration of what Serres has in mind with the idea of multiple connective intellection: Leibniz (1968), Jules Verne (1974), Zola (1975), and Lucretius (1978), although the main focus of their work is the humanities. Serres made a study of these authors simply to illustrate his idea of "seeing on a grand scale, multiple and sometimes connective intellection" since this is what is really relevant for us today and this is exactly what these authors have been doing. Be on the lookout in these works for terms like multiplicity, connection and connectivity, seeing on a grand scale, in other words, crossing spaces and following passages form the sciences to myth and back again. The important thing in these studies is that they show us to what extent these authors establish links between the sciences and fiction or myth and at the same time combine and stitch together these efforts in a qualitative way by making use of very thoughtful philosophical inputs, inputs that is unavoidable despite our anxious efforts to deny its importance and efforts to avoid it altogether. Because we are human we cannot help but think. Since we have to think in any case, let us try and make the best of it by starting to think inventively. It will be useful to read Harari and Bell (1983:xv-xxx) for a fuller understanding of the contribution of these authors and how they are following passages from the sciences to myth and back again.

In order for us to be solid knowledge workers and sound researchers in our field, it will be important, I think, to follow Morin and Serres on their exciting journeys through the fullness of reality and the knowledges of reality with the help of a special kind of thinking adequate for this purpose of getting real access to this fullness. Let us think along the lines suggested by these two giants. We will not be mistaken by following this route, nor will our clients be disappointed.

4 Conclusion

The brief discussion of each of them gave us a feeling for the thoughtful activity, beyond mere rationality and its one-dimensional thinking, that is required from us if we want to come to terms and explore fully "the information society as a dynamic and restless system", or, the domains of complexity sketched by Morin. Unless we cultivate our capacity of intellection we will forever linger on the edges of this society, called the knowledge society, without really gaining access to its richness, wealth and excitements. We will never share in the adventures it offers and the solutions it promises. When we say that we need more than reason alone we mean that we need full human intelligence, human spirituality, to be brought into the picture, and by implication wisdom – going far beyond calculation as the computer scientist, Weizenbaum (1984), suggested long ago. In this respect we should take heed of the urgent message of a figure like George Steiner (1998) with his "barbarism of ignorance" together with the possibility that developments in our times are stripping us of knowledge and bring about, despite our cleverness, a stupidity and an ignorance that may eventually destroy us if we take Isabelle Stengers (2009) seriously with her analyses of the time of catastrophe and barbarism that may be forthcoming.

These are articulations of the challenges we have to face and that will be more than demanding and require immense inputs from us to save ourselves and the generations to come. In case these challenges are really of such immense proportions as people predict we will need very special abilities to cope. Mere skills will be totally inadequate. Only the best humans can offer in terms of multiple intellection, noological finesse and emotional, moral and spiritual capacity will be good enough for us to cope – hopefully.

The notions of re-enchantment of spirituality (Griffiths 1988a), re-enchantment of science (Griffiths 1988b), the re-enchantment of the world (Stengers 2000, Stiegler *et al.* 2006), and the re-invention of spirituality (Stiegler *et al.* 2006) are brought forward as urgent appeals directed to us from various sources and directions to come to terms with the dreadful spirit of our times, that affect our scientific work, our managerial practices, our research endeavours, our strategies, visions and policies that we develop, if we want to survive and not collapse into a state of barbarism and catastrophe. These re-enchantments are stitched together and if engaged in wholeheartedly, which can only happen through multiple, connective intellection, will represent our ability to establish new links and connections. All new

connections bring forward new things, dispositions, strategies, plans because it is all the time driven and guided by new ideas. This is our guarantee, the only guarantee of inventing a liveable future for the human race.

Information scientists and information workers are the best situated to pursue these comprehensive challenges in terms of sound informatisation endeavours. We are connected in a special way to the pool of knowledge, insight and wisdom. The most fateful thing that can happen is that "we may get into the position of losing knowledge" (Naccache 2010) unless we comply wholeheartedly with these challenges. This also would be our only effective resistance against the possible advent of an immensely threatening barbarism (Stengers 2009).

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