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The Global Brain as a model of the future information society: An introduction to the special issue

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Abstract: The Global Brain can be defined as the distributed intelligence emerging from all human and technological agents as interacting via the Internet. It plays the role of a nervous system for the social superorganism. A brief history of this idea is sketched, with a focus on the developments leading to the creation of the Global Brain Group, and the Global Brain Institute (GBI) that emerged out of it. As directors of the GBI, the authors of this paper took the initiative of editing a special issue on the topic of "the Global Brain as a model of the future information society". We briefly sketch the contributions from the different papers in this issue. We conclude by reviewing some common dystopian misconceptions associated with the Global Brain paradigm, and by offering an optimistic outlook on how the "offer network" protocol inspired by this paradigm may lay the foundation for a much more synergetic and sustainable society.

Keywords: distributed intelligence; information society; global brain; utopia; dystopia; Internet

1. Introduction

Since it came to the fore in the late 1980's, information and communication technology (ICT) has drastically changed the organization and functioning of society, bringing us into a new regime that has been called *the information society*. The Internet in particular has taken over ever more social, economic and technological functions from other systems of communication and collaboration, and this at an absolutely staggering speed. At the same time, it has been opening up a seemingly infinite variety of new forms of interaction. It is being used for applications as diverse as ordering groceries, organizing political protests, financing new ventures, sharing commodities, discussing global problems, keeping in touch with friends, monitoring factories remotely, guiding traffic, publishing documents, keeping stock in warehouses, distributing calculations across thousands of independent computers, "crowdsourcing" tasks to anonymous workers, and remotely following courses.

This explosion in the number of actual and potential developments of the Internet is overwhelming (Heylighen, 2016a). The resulting confusion makes it very difficult to discern stable trends—except for a general growth in Internet use. Forecasting how these myriad competing advances will shape the future information society seems especially daunting. Still, there exists a paradigm that promises to bring some order to this tangle of volatile, uncertain, complex, and ambiguous (VUCA) developments: the *Global Brain* (Bernstein, Klein, & Malone, 2012; Goertzel, 2002; Heylighen, 2011; Mayer-Kress & Barczys, 1995; Russell, 1995)].

The Global Brain can be defined as the self-organizing, adaptive network formed by all people on this planet together with the information and communication technologies that connect them into a cohesive system. The idea is that global interactions have made the people on this planet interdependent to such a degree that together they form a single *superorganism* (Heylighen, 2007; Stock, 1993), i.e. an organism (global society) whose components are organisms themselves (individual people). As the Internet becomes faster, smarter, and more encompassing, it increasingly interconnects people and computers into a single information-processing network, which plays the role of a nervous system for this superorganism (Heylighen, 2011, 2002). The function of a nervous system is to coordinate the different activities taking place inside this organism, thus increasing their efficiency and coherence, while minimizing any friction or conflict. It moreover provides a repository of knowledge, which functions like a world memory (Wells, 1937) or global expert system (Skulimowski, 2013) that would be able to answer any questions. The knowledge function is supported by the emerging Semantic Web, a suite of protocols for representing knowledge in a machine-understandable way (Berners-Lee & Fischetti, 1999; Heylighen, 2016c). The communication with the superorganism's physical body is supported by the Internet of Things, another emerging technology for the integration of physical objects into the ICT network (Atzori, Iera, & Morabito, 2010; Rifkin, 2014)

While the Global Brain concept was initially formulated merely as a metaphor, globalization together with the explosive development of the Internet are turning it into an increasingly realistic model of the present information society (Heylighen & Bollen, 1996). Indeed, the network of social, communication, and economic links make individuals, organizations, machines and even ecosystems across the world ever more dependent on each other, and ever less capable of acting purely on their own without considering potentially faraway consequences. Moreover, the storage, exchange and propagation of information across this network provides it with a level of knowledge and capability for intelligence that far surpasses that of any individual or organization. An extrapolation of these accelerating technological developments suggests that we may be undergoing a "metasystem transition" or "singularity" within the next few decades (Heylighen, 2008, 2012, 2015). This is a radical shift to a level of intelligence that is as yet difficult to imagine, but that is likely to fundamentally alter the human condition.

The intelligence of such a Global Brain is collective or *distributed*: it is not localized in any particular individual, organization or computer system. It rather emerges from the interactions between all these components. Such a distributed intelligence may be able to

tackle current and emerging global problems that have eluded more traditional approaches. Yet, at the same time it will create technological and social challenges that are still difficult to imagine, transforming our society in all aspects. The present special issue of the journal *Technological Forecasting and Social Change* is intended to survey some of these challenges to the information society, while using the Global Brain paradigm to better understand both opportunities and dangers.

But let us first review the different conceptual strands that together led to the Global Brain paradigm. (For a more in-depth historical analysis, see (Heylighen, 2011).) We will here focus in particular on the developments that preceded the creation of the *Global Brain Institute*, and the present special issue that grew out of its activities.

2. A brief history of the Global Brain vision

In the late 19th century, the founding fathers of sociology, Émile Durkheim and Herbert Spencer (1898), observed that society is in many aspects similar to an organism. However, they did not yet find any clear counterpart for a nervous system in this *social organism*. In the 1920s, the French paleontologist Teilhard de Chardin (1959) described the growth of the *noosphere*, the network of ideas and communications that envelops the planet, a concept he developed together with the Russian geologist Vladimir Vernadsky (1926).

Teilhard's rather abstract and mystical vision was complemented by the more pragmatic approach of the Belgian information scientist Paul Otlet, who envisaged a world-wide web-like interface that would allow accessing the whole of human knowledge as stored in an immense cross-linked repository (Otlet, 1935; Rayward, 1994). At the same time, the British author H. G. Wells (Wells, 1937) proposed the creation of a "World Brain", which he saw as a university-like global institution that would collect, organize and make available all that knowledge. For a concrete implementation of these visions, we had to wait for the concept of hypermedia further developed by the Americans Vannevar Bush (1945), Douglas Englebart (1988) and Ted Nelson (1983), and the emergence of the Internet in the 1970s. Internet and hypermedia were first integrated by the British computer scientist Tim Berners-Lee, who thus in 1991 created the *World-Wide Web*, an invention that would soon take over the world (Berners-Lee & Fischetti, 1999).

While the web, with its network of associative hyperlinks, was clearly inspired by the organization of the brain, the link with the social organism was still lacking. This link was clarified by a number of authors inspired by Teilhard's vision: the British physicist Peter Russell (1983), who coined the term "global brain" in 1982, the German complexity scientist Gottfried Mayer-Kress (1995), who connected Russell's idea with the Internet, the French futurist Joël de Rosnay, who discussed the "planetary brain" of the "global macro-organism" (De Rosnay, 1986, 2000), and the Russian computer scientist Valentin Turchin (1977). As one of the founding fathers of Artificial Intelligence in the Soviet Union in the 1960s, Turchin developed an

integrated theory of the evolution of cybernetic organization and intelligence, from primitive cells to the human brain, and beyond, to what he called the social "superbeing". His core innovation was the concept of *metasystem transition* (Heylighen, 1995; Turchin, 1977, 1995): the evolutionary emergence of a higher level of complexity through the integration of subsystems into a metasystem. The implication of his theory was that humanity is at present undergoing a metasystem transition to a level of collective intelligence that we as yet cannot imagine.

After moving to the USA, Turchin came in contact with the American cybernetician Cliff Joslyn, who proposed to collaboratively develop Turchin's ideas via the new tools of hypermedia and the Internet. To do this, in 1989 they founded the *Principia Cybernetica Project* (Heylighen, Joslyn, & Turchin, 1991). They were joined one year later by the Belgian cybernetician Francis Heylighen. Heylighen was quick to realize the importance of the newly created world-wide web to realize Joslyn's vision. He therefore created the Principia Cybernetica website in 1993 (Turchin, Joslyn, & Heylighen, 1993), as one of the first complex, collaborative websites in the world.

While working at the Free University of Brussels (VUB) with his then PhD student, the Belgian psychologist Johan Bollen (now at Indiana University), Heylighen further realized that the world-wide web could become much more intelligent by implementing the mechanisms of Hebbian learning and spreading activation that characterize the brain. Combining these insights with Turchin's theory led him to propose a first concrete model of the future, intelligent web, i.e. the global brain (Heylighen & Bollen, 1996).

After coming into contact with the American artificial intelligence researcher Ben Goertzel, who had developed similar ideas (Goertzel, 2002), the two of them founded the international *Global Brain Group* in 1996. This brought together most of the researchers who had actively reflected about this issue, including Russell, Mayer-Kress, de Rosnay, Turchin, Joslyn, Bollen, and the futurologist Jerome Glenn, who had envisaged a merger between ICT and human consciousness (Glenn, 1989). The group organized a first international workshop on the global brain in 2001 (Heylighen, 2001) at the VUB. It has since maintained an active email discussion forum (GBRAIN-L) on the topic.

After a few years of more limited activity, the community was revived and expanded in 2012 with the foundation of the *Global Brain Institute* (GBI). This was made possible thanks to a grant from the Yuri Milner Foundation intended to stimulate research on the Global Brain. The institute, situated at the VUB, is presently led by the authors of this paper and editors of this special issue: Francis Heylighen, as scientific director, and Marta Lenartowicz, as managing director. Its scientific board includes the still active members of the Global Brain Group, as well as some newer recruits that have worked on related themes: the German sociologist and complexity scientist Dirk Helbing (Helbing, 2015; Helbing, Bishop, Conte, Lukowicz, & McCarthy, 2012), the American computer scientist and collective intelligence researcher Marko Rodriguez (Rodriguez, 2004, 2005; Rodriguez et al., 2007), and the Mexican complexity scientist Carlos Gershenson (Gershenson, 2004, 2008).

The GBI team consists of nearly a dozen researchers at pre-doc and post-doc levels from a variety of scientific and cultural backgrounds, ranging from the humanities to the social sciences, engineering, computer science and mathematics. It investigates the emergence of a distributed intelligence out of the Internet, by means of conceptual theory, mathematical models, computer simulations, surveys of social and technological developments, and the formulation of forecasts and scenarios.

The Global Brain Institute (GBI) is particularly interested in how developments in ICT will affect the future information society. Our fundamental objective is to better understand these on-going changes. This would help us to anticipate them and to direct them towards the most desirable outcomes—while as much as possible steering clear of dangers and negative side effects. By disseminating our insights, results and recommendations to scientists, decision-makers and the wider public, we hope to effectively influence these developments. In this way, the GBI intends to help the anticipated "Global Brain" organization of the world come about as smoothly as possible, maximizing its positive effects while minimizing any negative ones.

3. The content of this special issue

As part of our mission of surveying, discussing and disseminating these ideas, the GBI organized a symposium at the Summit of the *International Society for Information Studies* in Vienna in 2015, on the topic: "The Global Brain as a Model of the Future Information Society". From the abstracts submitted to our Call for Papers and the speakers we invited, 15 talks were selected for presentation at the symposium, resulting in many fruitful discussions. After the meeting, we more widely distributed a call for papers on the same topic for a special issue of the journal *Technological Forecasting and Social Change* (TFSC). The present collection of papers is the result of a final selection, based on the referee reports, of the submissions we received to that call.

The authors include both GBI members and scientists that were as yet unknown to the GBI community. They cover a broad range of backgrounds, perspectives and topics, thus illustrating the width and diversity of the emerging field of "Global Brain studies". Yet, they are united in their search for a new paradigm that would unify the disparate strands of theory that try to understand the future evolution of the information society, and in the inspiration they draw from biology and neuroscience for understanding how this society can evolve towards a more "organic" and "brainlike" organization. We will now briefly review the different contributions in the order in which they appear in the TFSC issue.

A first question is: why do we need a new conceptual model of the future society? As Christian Breyer, Sirkka Heinonen and Juho Ruotsalainen (2016) discuss, there is an urgent need to tackle the wicked problem of growing *unsustainability*. The authors advocate for a human world that is mentally and ethically aware of the fundamental limits to resource consumption, and which is able to live in harmony with the planet Earth. They express the moral imperative, a hope, and a plan, for humanity to be able to evolve towards a new consciousness—enabled by a

re-defined concept of growth and supported by a shift to the new solar energy technologies. Switching to a fully sustainable energy supply is certainly achievable within the 21st century. The ongoing megatrend towards renewable power sources favors solar photovoltaics and wind as key technologies.

Another reason for developing a new model of society is conceptual, as formulated by Viktoras Veitas and David Weinbaum (2016). They point out that the established ways of thinking about social reality are no longer valid. Therefore, we are trying to operate within inadequately conceptualized social structures. If we want our societies not only to cope with the current situation, but to actually thrive in it, we need a new framework, which the authors call the "*living cognitive society*". Such a framework must accommodate the elements of disorder, integration and disintegration. It should also start from processes, such as the becoming and dissolving of individuals and organizations, rather than assuming their static existence. Contemporary society is characterized by *reflexivity*, *hyper-connectivity* and *accelerated change*, all of which are boosted by ICT. This results in information overload: for any cognitive subsystem of a social system the overall complexity becomes ever more difficult to grasp. On the other hand, ICT enables a number of features deemed desirable for an eventual Global Brain regime: 1) interactivity: the nature of the interaction between subsystems becomes more important than their individual properties; 2) increasing diversity of the agents; 3) empowerment of individuals.

One of the fundamental and increasingly dominating features of social systems described by Veitas and Weinbaum is reflexivity, the self-referential loop going from individuals to the social systems they form and back. This is investigated in more detail by Evo Busseniers (2016), who writes about the essential process of *interplay*: "elements form and influence a structure, but this structure in turn influences the elements". Busseniers tracks this interplay in several domains, noting how through the self-organization of interactions between individual agents a coordinating structure or "mediator" emerges. This mediator typically supports the individual agents, but it can also unnecessarily restrict their freedom, or even exploit them for its own benefit. Busseniers illustrates this problem by means of a computer simulation in which interactions initially lead to a power law distribution, where some individuals receive much more than the others (the "rich getting richer" effect). But then an oppositional mechanism is introduced that redistributes the benefits accumulated at the top of the hierarchy. The simulation illustrates that such a constant opposition to prevailing dynamics helps to offset the rigid structure that would otherwise emerge in the social system. Busseniers argues that such "oppositional" dynamics must be included in the dynamics of the developing Global Brain, so as to make sure that its emergent power will remain beneficial and open to new developments.

This reflexive view of society with its two cognitive poles, individuals and the coordinating system that governs their interactions, is elaborated in the next paper by Marta Lenartowicz (2016). It argues that society already includes more agents than in the common sense view. Indeed, symbolically constituted social systems, as analyzed by the sociologist Niklas Luhmann (Luhmann, 1995), act in some important respects like cognizing, intelligent agents. A conceptual delineation of these autonomous social agencies brings Lenartowicz to the surprising conclusion that they—and not individual humans—can be conceived as the most

advanced intelligences on Earth, and this since their emergence some ten thousand years ago. Since existing forms of intelligence exert selective pressures on newly emerging ones, the future Global Brain will be, naturally, shaped by them. We should not a priori assume that the main source of such pressures is located in human individuals: symbolic organizations, such as nations, corporations, religions, cultures, discourses and scientific disciplines, all described by Lenartowicz as evolving, individuating "creatures of the semiosphere", may well have a much stronger and more constraining influence on the evolution of the information society, and the processes of increasing socio-technological interconnectivity leading to global superintelligence.

This polarization is further elaborated in the next three papers, which discuss some of the political and economic aspects of the Global Brain. Forrest Rosenblum (2016) starts from the observation that after the emergence of social organizations humanity already resembles to some degree a multicellular organism, with individuals in the role of cells. He foresees that the next transition, towards the Global Brain, will turn us into one global organism. This human superorganism has been built and organized through the exchange of symbolic information. However, the communication pathways that direct these cultural flows can be—and often are—manipulated by those in power. He proposes that the emerging theory of the Global Brain should be elaborated and applied so as to ensure that the Global Brain develops in a democratic, sustainable manner.

Cadell Last (2016) delves deeper into the social, economic and political implications of the future information society. He warns that the broad introduction of technologies such as Artificial Intelligence, robotics and the Internet of Things is likely to bring about widespread unemployment, and thus ever growing inequalities. Tackling this problem requires a drastic shift to a "post-capitalist", "post-nation state" world society. Last sees this shift as a metasystem transition to a Global Brain regime based on distributed intelligence. This cognitive shift must be accompanied by a socio-economic shift to a "Commons" regime, which is based on shared, open access to common resources, which are democratically managed by the people rather than by the State or by corporations. After reviewing the shortcomings of traditional communist and community-based methods of managing the commons, Last proposes to use the powers of automation and coordination provided by the Global Brain to create a "Global Commons" that would support bottom-up self-organization, and thus eventually dissolve hierarchical, centralized organizations.

The following paper, which further explores the theme of the commons and how its functioning can be automated through Global Brain technologies, was produced by a unique collaboration of three generations of scientists: Ben (father), Ted (grandfather) and Zar (son) Goertzel (2016). After briefly reviewing Marx's utopian vision, the Goertzels propose a number of distributed ICT systems that may help realize this vision without relying on central management of the economy by the State. Open collaboration networks help people that are physically dispersed to work together more effectively. Open production networks make complex economic chains more transparent, and thus allow consumers to take into account ethical factors when deciding what to buy. Offer networks facilitate non-monetary exchanges and coordination between people with complementary abilities. Blockchain technologies can support more transparent currencies. Such technologies mediate directly between individuals. This gives them the potential of cutting out

impersonal, hierarchically structured corporate or governmental organizations, thus making economic transactions more human again.

4. Utopia or dystopia?

The idea that society would be directed by a Global Brain is controversial. It calls up rather obvious associations with totalitarian forms of government, where society is kept in check by a central controller, which can be a brutal dictator, an immense computer system, or some nameless collective. This controller restricts individual freedom, suppresses diversity and expression of opinion, and constantly monitors ever person's behavior so as to make sure that they conform to rigid values and rules (Brooks, 2000; Goertzel, 2002; Rayward, 1999).

The Global Brain concept we wish to advance is about the exact opposite of this Orwellian vision. Its driving principle is the emergence of a collective intelligence much greater than the intelligence of any individual in the collective (Heylighen, 1999; Malone, Laubacher, & Dellarocas, 2010). Research has established that maximizing such collective intelligence requires maximizing the autonomy of individuals and the diversity of their perspectives, while decentralizing the way they gather information (Surowiecki, 2005). Such a distributed form of information processing and decision making (Rodriguez et al., 2007) would reduce the power of governments, corporations and political leaders, thus rendering top-down, hierarchical control obsolete, while dissolving the symbolic constraints forged by the "creatures of the semiosphere" (Lenartowicz, 2016). Instead, the Global Brain would empower individuals and promote bottom-up self-organization, by giving everyone free access to the most advanced information, knowledge and tools for communication, organization and action.

The Orwellian interpretation of the Global Brain can be understood as a form of *anthropomorphism*: ascribing human properties, such as the desire for power and control, to abstract entities, such as the Global Brain. Most people tend to think of the mind as some human-like agent located inside the brain that monitors and controls the body. This naïve view is known as the *homunculus fallacy* (Kenny, 1971). In reality, there is no central controller in the brain: the brain is merely a self-organizing network of communicating neurons where decision making is fully distributed, with myriads of processes going in parallel, sometimes supporting each other, sometimes competing to become the (temporary) focus of attention, but constantly adapting, exploring and changing direction. This indeed seems like an apt metaphor for the information society. In fact, a society of collaborating agents is in turn a much better metaphor for understanding the mind than a homunculus-style central controller (Minsky, 1988).

On the other hand, as repeatedly pointed out in this issue (Busseniers 2016, Lenartowicz 2016, Last 2016), self-organizing networks of communication, which are the fabric of all social structures, *do* have a potential of settling into overly constraining, rigid forms. This is currently one of the most fundamental points of debate within the Global Brain community and also one of the arguments in favor of a more active and normative approach. It is not enough to passively

observe, describe and anticipate the emergence of a Global Brain, as earlier theorists have tended to do (e.g. Mayer-Kress & Barczys, 1995; Russell, 1995; Teilhard de Chardin, 1959). We need to ensure that the fundamental diversity in perspectives and constant exploration, presented by Weinbaum and Veitas (2015) as a "world of views", indeed becomes its operating principle. Therefore, we must actively engage in the conceptual, social and technological development of the Global Brain, and try to make sure that it is not hijacked by special interests, conformity pressures, or processes of homogenization. As Helbing (2016) puts it, in designing the future information society, "we should engage in systemic pluralism and should be much more experimental", thus constantly expanding and renewing diversity.

Another controversy originates from the observation that because of the explosive advances in technology the Global Brain seems to be developing superhuman capabilities similar to the classic attributes of God: *omniscience*, *omnipresence* and *omnipotence* (Fleissner & Hofkirchner, 1998; Heylighen, 2015; Otlet, 1935). Indeed, the Internet becomes ever more ubiquitous, all-knowing and powerful in the way it affects our activities. The fact that we tend to write the name in capital letters moreover may suggest the image of a new technological God being constructed. But the Global Brain is not an external agent that can impose its will on us, human beings: it is constituted by our own thoughts and actions, with ICT merely functioning to enhance their effectiveness and coordination.

As Veitas and Weinbaum (2016) conclude their paper: "No matter what kind of technologies will be enablers of the distributed social governance, it will be based *not* on the design of optimal institutions, but rather on the *processes*". The Global Brain should not be thought of as a static agent, or even as an institution, but as a *type of process*: a process that explores creative possibilities, connects unconnected dots, and (re)cognizes and exploits potential synergies by bringing into contact the most diverse ideas, people and resources. A better metaphor for this phenomenon than the monotheistic God might be the Tao. The Tao is not an agent, but a "way", a "path", a principle of (self-)organization. Such mode of existence positions it below, not above, all other things and this is why "myriad things return to it but it does not rule over them" (Lao-tzu, 2006). In such a holistic, process-based perspective, there is no strict separation between body, mind and world (Heylighen & Beigi, 2016), and therefore no homunculus acting as a central controller. There is merely an endless, encompassing stream of interactions being intelligently coordinated via distributed self-organization.

Yet, we still need to take the deification criticism seriously. It would be easy to say that the Global Brain should not be viewed as a God, but we know that in the socially constructed reality the way new ideas are interpreted is vastly more complicated, and typically divergent, from the intentions of their initiators. If some interpretation sticks to a concept, because it is simpler, more emotionally charged, or more coherent with existing preconceptions, then that interpretation is likely to spread further and attract ever more followers, until it becomes the "standard" interpretation. Therefore, we are on an ongoing quest to find terms and metaphors for speaking about these phenomena of distributed, Internet-supported intelligence that will not evoke the picture of an omnipotent central governor.

Finally, some controversies arise simply because scenarios for the future that diverge strongly from the world we know tend to be scary, as radical change implies losing some of the institutions we are most familiar with. The resulting fear is reinforced by the fact that the future most commonly depicted in novels and movies is dystopian—in part because the plot becomes more captivating when the forces opposing the protagonists are both evil and powerful, in part because typical plots build on people's anxieties about contemporary issues, such as environmental problems, computer hacking, or loss of privacy.

The presently most fashionable dystopia, which is fed by fears about runaway ICT development, is the "takeover by the robots" scenario. In this scenario, as illustrated by popular movies such as "The Matrix" or the "Terminator" series, humanity would become enslaved or exterminated by superintelligent machines. Unfortunately, this scenario is lent credence by a number of distinguished academics, such as Stephen Hawking, who take the recent advances in artificial intelligence (AI) a little too seriously by extrapolating them to a "Singularity" in which AI agents could autonomously boost their intelligence so much beyond the human level that they would effectively get out of control (Bostrom, 2014; Eden, Raker, Moor, & Steinhart, 2013).

The Global Brain theory comes to a very different conclusion (Heylighen, 2012, 2015), as it sees AI programs as merely components of the encompassing distributed intelligence formed by the Global Brain. As such, they are dependent on the larger whole for both the information they use and the actions they take, and this even more than human agents, who after all have a sophisticated body designed for acting in the real world. Because of synergy, cooperation between such intelligent programs and humans is beneficial to both. Therefore, there is no reason for either party to suppress or exterminate the other.

Thus, the Global Brain scenario is rather utopian than dystopian—although it is realistic enough to take into account some underestimated perils of present socio-economic and technological development (Heylighen, 2015). We do not wallow in a "how to protect ourselves" state of fear that envisages instating a moratorium on AI research (Bostrom, 2014), building underground bunkers, or sending rockets out in space just to make sure that some humans may survive the coming catastrophe. Instead, we envision an essentially hopeful future—albeit with the necessary caveats.

This vision is not so much a prediction of what precisely will happen in some remote future, but rather a program for action here and now. What can we do so as to make the most beneficial scenarios come about? How do we assure the positive, empowering, liberating outcomes of the increasing interconnectedness, while taking into account the risks, both real and imagined, that we are being warned about? This is what occupies us at this moment, and this is the set of questions we invite you to join us reflecting about. Breyer, Heinonen and Ruotsalainen (2016) put it well: "It remains unclear and from today's perspective even improbable whether humankind is able to go for that evolutionary transition in the future. However, nearly all other options might end in a collapse scenario in the dimension of geological history."

That is why, in the Global Brain Institute at the Free University in Brussels (VUB), we are developing a research program aimed at finding a way to shift our trajectory towards a more

creative and sustainable one, by fully exploiting the synergies promised by intelligent ICT. We thus want to facilitate the actual emergence of a Global Brain—in contrast to merely forecasting its likely properties. As political, economic and ecological turmoil spreads across the globe, our society is approaching a transition towards a fundamentally new social and technological regime. We believe that the time is ripe for promoting a rational, feasible, and genuinely optimistic vision of the future of humanity, in which an increasingly intelligent Internet mediates human and machine interactions towards the common good.

Our present strategy to achieve that goal is introduced in the final paper of this issue, by Francis Heylighen (2016b). The paper interprets the intelligence of the emerging Global Brain in terms of its power of coordination between the actions of countless human and technological agents. Coordination and the resulting synergy are achieved when the demands of certain agents are satisfied by the offers of other agents, alone or in combination. Such synergy can be discovered by letting all agents advertise their demands (what they would like to have), their offers (what they are ready to provide), and their potential conditions (I am willing to offer X on the condition of getting Y) on the Internet. These offers and needs can be expressed as "condition-action rules", a formalism used in AI to model intelligent reasoning. All condition-action rules of all agents together form an "offer network", a concept originally proposed by GBI board member Ben Goertzel (Goertzel, 2015), and briefly discussed in his contribution to this issue (Goertzel, Goertzel & Goertzel, 2016). Intelligent algorithms can then search through the offer network to find the best matches between offers and demands by determining complex loops and subnetworks in which every demand of one agent is satisfied by the offers of one or more other agents. While this matching of offers and needs may resemble the law of supply and demand and price mechanism that governs the market, the process allows much more complex forms of organization, while being able to run even without the use of money to determine exchange value. As such, it seems able to bypass the core problems of our present capitalist economy, such as growing inequality, financial crises, unsustainable use of resources, lack of resilience, and the neglect of externalities and values (such as happiness or peace) that cannot be expressed in monetary terms.

At present, the GBI team, in collaboration with others, has started to design a general protocol for building offer networks (Heylighen, 2016c). This protocol should be able to run on any Internet-connected device, and be truly open, public and non-proprietary, so that anyone can use it. If we manage to convince others of the usefulness of such a protocol, its use may eventually spread globally, just like the HTML/URL protocol that defined the World-Wide Web (Berners-Lee & Fischetti, 1999). The coordination enabled by such a protocol would be the foundation on which an increasingly intelligent Global Brain could be erected, step-by-step incorporating related technologies, such as the Internet of Things and the Semantic Web. The resulting synergies would drastically reduce friction and waste, ensure abundance and unrestricted sustainability, while empowering even the poorest and weakest groups in society to satisfy their needs and to actualize their potentials by constructively contributing to the collective enterprise of humanity.

While this vision may seem overly idealistic, we have started preparing a pragmatic roadmap towards realizing it (Heylighen, 2016c). We invite readers inspired by this vision to join this endeavor by collaborating with our growing community of Global Brain researchers.

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Marta Lenartowicz is a Polish philologist and social scientist from the University of Krakow, where she defended her PhD in Humanistic management in 2014. She has experience managing both a university department and some private companies. She now works as a PostDoc researcher and managing director at the Global Brain Institute at the Vrije Universiteit Brussel of GBI. Her main interest is in how social systems become self-perpetuating entities that exploit individuals for their own benefit, as inspired by Luhmann's theory of social systems.