Digital for Life?

Blind Spots of AI and its Reframing for Desirable Futures

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***Abstract*—We question the current framing of Artificial Intelligence (AI) under a mechanistic framework and how this produces blind spots preventing digitalization and AI from developing their potential to address the most pressing challenges of humanity. Some ideas are proposed for a due reframing around a complexity framework.**

Keywords—epistemology, blind spots, reframing, futures

"Where is the wisdom we have lost in knowledge? Where is the knowledge we have lost in information?" (T.S. Eliot, 1888-1965)

I. The Promises of Digitalization and AI

Information and communication technologies have a long history, tracing back at the very least to the works of Charles Babbage and Ada Lovelace in the 1830s. While the first electronic computers were developed for military purposes around a century later, a tipping point was reached in the 1980s with the onset of "personal computing". From then on ICTs acquired an accelerating momentum, especially when the features of PCs started to be coupled with those of telephony into the modern "smart phones". Global production of mobile phones is getting close to 2 billion units per year, i.e. a figure equivalent to more than 25% of human population.

This is the material basis for the ubiquitous presence of ICTs in the human societies of today. Although unequally distributed across and inside countries, this phenomenon facilitates the "digitalization" of societal processes which has become in recent years the most publicized trend of the wider domain of technology and innovation. Whether or not we consider ICTs as the drivers of societal evolution, their impact cannot be denied and we devote to them a significant part of our time, attention and resources. Digital impetus is generally perceived as part of a wave of innovation which characterizes modern societies and cannot be stopped. It is deemed to produce "disruptive" transformations by introducing new products and services, altering existing processes, shaking markets and ultimately changing our lives.

Intelligence is many times invoked in our relationship with ICTs and digitalization. Intelligence is supposed to be the manner in which we humans deal with the information we get from ourselves and the environment in order to make the best possible choices of action. In this sense, since ICTs are basically ways of collecting, processing and exchanging data in massive quantities, it seems natural to consider their role in an improvement of our societal intelligence by expanding our capacities of processing information. But this association of ICTs and intelligence is built on a number of assumptions which deserve being made explicit:

(1.1) That a more systematic use of ICTs leads not only to more but to better information.

(1.2) That better information leads to better (more intelligent) decisions.

(1.3) That more intelligent decisions lead to better futures.

The recent successes of so-called "Artificial Intelligence" (AI) through the combination of massive data processing and "machine learning" algorithms for automated pattern recognition are producing a wide expansion of the domains to which this reasoning (ICTs for a better future) is systematically applied. But the validity of the three assumptions stated above should not be taken for granted. To the very least, they invoke a quality of "better" which pertains to the non technical domain of public debate, societal choices and historical contingencies. At a moment when the promises put forward by the community and industry involved in AI go way beyond its technical achievements, this kind of questioning is becoming more and more necessary, and it is the purpose of this paper to contribute to it. Metaphors such as "smart cities" have been used for decades by the ICT industry to frame its developments in positive ways. The label AI is in itself also a metaphor since we cannot pretend to know what intelligence precisely is. But anyway AI is now promising to fully automate many (all?) human tasks and by doing so to improve process productivity and efficiency at a massive scale, discover new knowledge up to now inaccessible to human means and help to address all pressing challenges that humanity faces. The promise is huge, as well as the means mobilized to deliver it, under the framing that digitalization and AI are parts of an unstoppable so-called 4th industrial revolution to which human societies should simply adapt, and that will be for the better [5].

Starting with the Cambridge Analytica scandal in 2018, new winds of questioning and criticism have been blowing on this optimistic landscape. Several issues are of particular concern. Starting with the capacity of AI for surveillance and massive manipulation of personal data in order to influence individual decisions and promote certain behaviors, in commercial as well as in political domains. Another big area of concern is the transformation of the economy towards a growing disposability of humans: a high % of existing jobs seems to be at risk of disappearing due to robotization and task automation accelerated by AI. The precedents of previous industrial revolutions do not necessarily give hope in how such a transition could happen: even if the deployment of digitalization will certainly create new jobs, the net effect on total employment is foreseen to be strongly negative [7] and as history of 19th and 20th centuries shows, the tensions provoked by industrialization can be extreme, with unexpected and possibly tragic outcomes. Another dimension of the implications of digitalization and AI lies in the geopolitical spectrum: ICTs have become (or have always been) the space of choice for the development of new ways of warfare and for the

exhibition of competitive rivalry between the great powers of 21st century, most notably China, the USA and Russia.

Stepping back a bit from these developments, an additional level of questioning comes into play: if intelligence is invoked, the acquisition and application of knowledge is part of the matter, and hence epistemology is relevant. To this date the social framing of digitalization and AI has ignored this issue. Two types of strategies have emerged to deal with AI. On one side, "adaptation" is based on the recognition of the inevitability of AI as a process exogenous to society at large (in line with mainstream economics): our best course of action would be to adapt to it as if it was a force of nature that we cannot control. In more recent times, "mitigation" strategies are increasingly part of the public debate, as ways to correct the undesirable effects of AI. F.i. by protecting personal data privacy through new regulations such as GDPR and also by adopting more proactive courses of action to prepare workers for the future to come. The need to develop national and supranational AI strategies in a harshly competitive world is also becoming more evident [20]. But both framings, adaptation and mitigation, share the same lack of questioning of the epistemological foundations of AI. Again, some assumptions are implicit in the kind of AI that has been successfully developed in the last decades. We can identify at least three of those:

(2.1) That the extraordinary growth in accessible data and computing infrastructures, combined with progress in data science and machine learning algorithmics, makes possible to infer meaningful correlations and patterns from existing data related to phenomena of interest.

(2.2) That these patterns can be useful to develop different levels of analysis of the observed phenomena: description (what happened?), diagnostics (why did it happen?), prediction (what will happen?) and even prescription (how to make happen what we want).

(2.3) That with the progress of AI the reliability in the mentioned levels of analysis makes or will make possible not only to automate repeatable tasks but to transfer the responsibility of taking decisions to AI artifacts, with no or very little human supervision (f.i. in autonomous vehicles).

Again, none of these assumptions should be taken for granted. In the way AI has been widely publicized in recent times, the underlying promise is even more ambitious: it is about generalizing AI both in the sense of developing some kind of "general purpose intelligence" (whatever this could mean) and in expanding its field of applications. In a not so distant future, the story-telling goes, we would able to create a "super-intelligence" *("something a billion times smarter than the smartest human"*, as Anthony Lewandosky puts it [9]). And then we could subcontract the solution of all our challenges to the robots, because even top-level decision-taking positions (such as the presidency of the USA) would be fulfilled better than by humans [11]. That is, the world would be better managed by AI artifacts because they will have better information and a better understanding of hidden causalities.

This of course is a wild extrapolation of what AI artifacts are able to do today, which would be better described as automated knowledge discovery. But it is influential in the framing of public awareness and debate about AI, in ways which increase the helplessness of the vast majority of citizens who are not directly involved in the digital industry. And even among the digitalists themselves, quite a number of prominent personalities are now claiming about the perils of an unbridled development of AI (Bill Gates and Elon Musk among others). In the following sections we propose to go beyond existing criticisms by pointing to epistemological flaws or "blind spots" of this dominant narrative of digitalization and AI. Which requires first to have a look at the currently dominant epistemology in society at large.

II. Our frameworks of Interpretation

In AI as with everything else, our actions are based on a certain interpretation of what we understand by "reality". The idea that through observation we can obtain an objective knowledge of reality is in itself an interpretation, derived from a particular paradigm of knowledge firmly established at the times of the Scientific Revolution of 17th and 18th centuries and mainly nurtured by the development of classical mechanics. The discipline of physics which gave birth to that paradigm has since then uncovered that reality and objectivity are much more complex matters and that we cannot skip the exercise of observing the observer if we want to obtain useful representations of whatever reality could be. Physics has developed many additional paradigms of knowledge in response to the limitations of previous epistemologies [6]. At the same time, in more ordinary matters and in particular in disciplines related to the behaviours of individuals and societies, we rely most of the time on the old paradigm of classical mechanics, by applying (even unconsciously) the following assumptions to interpret our experiences:

- Dualism and objectivity: mind and matter are separate, and the mind can be an effective observer of matter.

- Rationalism: the conscious processes we label as "reason" are the main source of knowledge and justification in our analyses and actions.

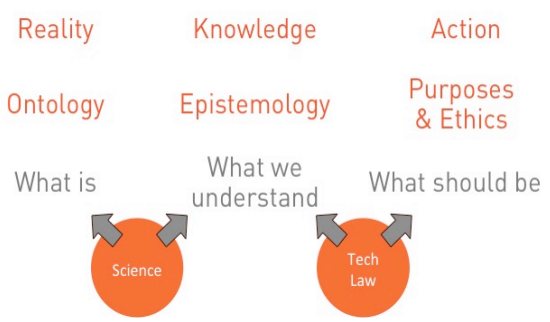
- Separation of scales and contexts: reality can be observed at different scales (in space and time) and in different contexts, and separating them facilitates our analyses without significant loss of capacity to explain the observed phenomena.

- Reductionism: reality can be decomposed into smaller constituents, and the behaviour of the whole can be deduced from the analysis of the parts, while their connections and interdependencies generally play a secondary role.

- Linearity and static equilibria: as a valid approximation, changes in outcomes are proportional to changes in inputs. More generally, we can effectively translate our intentions for changes into linear planning, through which a conscious sequence of actions can lead us from present state A to the desired state B. And in our framing of reality we give much importance to the situations of stable equilibrium where forces are balanced in a way that the time factor would disappear.

- Determinism: through our objective access to reality we can identify regularities strong enough to function as "laws" of nature and determine the future behaviour of observed phenomena. With enough information the future can become predictable, at least in statistical terms.

Figure 1: the multilayered approach of mechanicism



In the last three centuries this set of assumptions has been framing the ways through which we define our access to reality, we make sense of it, we set the course of our actions and we validate what is "good" or "bad". Consciously or not, we are driven to think along the above assumptions. In particular we make an extensive use of the mechanism of separation, also when we categorize the different aspects of reality and our approach to it. F.i. we distinguish:

- Ontology, addressing reality as what truly is,

- Epistemology, addressing our understanding of reality through knowledge,

- Ethics and purposes, addressing the courses of our actions and what should be.

The idea that these dimensions can be separated has been foundational of our modern civilizations and has framed as well the separate roles of social domains (see fig 1): science is considered as the ideal mediator between ontology and epistemology, the tool through which we, as external observers, improve our understanding of the essence of reality. On the other hand the mediation between epistemology and ethics is assigned to two domains mostly disconnected from each other. On one hand, law and the design and development of social institutions is supposed to embody the values and principles for a society combining individual aspirations and the common good. On the other, technology and innovation have become a key instrument in our attempts to transform reality, supposedly also for the better. It is interesting to notice that to a large extent art and religion are excluded from this scheme. Again, separation is at work: intuitions of the unknowable, the construction of our social emotions and the access to aesthetics are considered to be matters separate from the rationalistic arena where the main action takes place. Actually, art and religion have been not only separated from science, technology and law but also increasingly confined to private spheres.

We make the hypothesis that this multilayered scheme has been a fundamental element of how modern societies emerging from the Scientific and Industrial Revolutions have been thinking about themselves, and hence acting. The world we know today is built on the (implicit and most of times unconscious) assumption that this scheme works fine for both individual and collective wellbeing.

It is also relevant to notice that in the way they have been framed in the last decades digitalization and AI, disruptive as they may be of many social processes and entire industries, are not at all an element of transformation of this scheme. On the contrary, they are in a way accelerators of this framework of interpretation. At the reality layer, massive amounts of data are extracted from existing processes, in a decontextualized way designed to provide quantitative inputs to be easily processed. At the knowledge layer, those data are searched for meaningful patterns who could be taken as explanatory elements of behaviors. And at the action layer, predictions and prescriptions are produced based on the patterns identified, so as to provide decision-making capabilities autonomous from humans. The way we conceive AI today is not significantly different from the way we have been conceiving other industrial and technological developments in the last centuries. In particular, this feeds the idea shared by many that AI, as previous technologies, is fundamentally neutral, that it is only a tool and the responsibility of using it for good or bad purposes relies entirely in the hands of human users, not in the process by which it has been conceived, designed and brought to society.

III. The Blind Spots of AI

Since the world of digitalization and AI is full of metaphors, let us bring another one: we have "blind spots" in our observation of the world and ourselves, which prevent us from seeing what is just in front of us. Possibly the first and crucial blind spot is to think that we do not have them, that our access to reality, even if imperfect and incomplete, is nonetheless objective and continuously improving. This is built in the approach of mechanicism described above. On the contrary, we make the strong hypothesis that there are big gaps between what we call reality and the knowledge we can obtain about it. And it is not clear that we are overall reducing those gaps and much less that technology helps us in that task. It could very well be that technology framed according to certain blind spots actually makes them bigger. Reality certainly feeds our perceptions, both the natural provided by our bodies (most of them unconscious) and the additional ones provided by our instruments of observation. But we do not give coherence and meaning to these perceptions without using, consciously or not, certain frameworks of interpretation. Actually, we look for coherence in our interpretations of reality while this is a blind spot in itself: the hypothesis that reality has to be coherent according to what we consciously consider as coherent has been strongly challenged by the developments of physics in the 20th and 21st centuries. Also, we only recognize the status of knowledge to what we can consciously and explicitly express through the languages we have created ourselves in historical processes full of contingencies, while *"the world is richer than it is possible to express in any single language"* (Ilya Prigogine dixit). In our limited way of knowing we can only address reality through the words we have, but is it not a blind spot to believe that we have words for everything? [13]

Regarding so-called AI in its modern form based on machine learning, some blind spots are intrinsic to the underlying techniques, others are related to the extrapolation of actual achievements to create promises influencing public debates. F.i., while nothing real happens out of context, AI is based on the processing of massive quantities of decontextualized data. It is reductionistic by construction, looking for patterns by discarding the whole set of interdependencies not captured into data, and most of the data themselves. This is not a criticism per se: all phenomena of interest have infinite dimensionality (or even

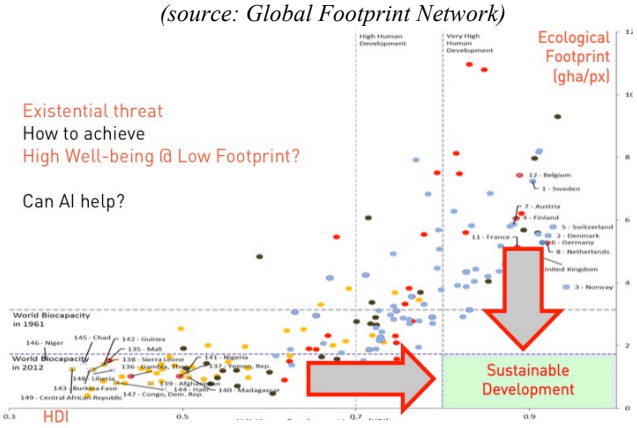
lay beyond the concept of dimensionality) and, most probably, every human or artificial action to obtain explicit understanding of an observed phenomenon requires the reduction of dimensionality of its representation to a practical size. AI may facilitate dealing with higher dimensionalities but we should not imply that reduction has no price: it may be useful to obtain a local controllability of the phenomenon, but *"the map is not the territory"* (Alfred Korzybski dixit). Also, AI is probabilistic by nature, it provides statistical regularities but not a reasoning nor an explanation of why the regularities exist. It operates as a "black box", which is a challenge when explanability of results is required, and it makes transfer of responsibility from humans to AI artifacts especially sensitive. Since AI predictions and prescriptions are grounded on the extrapolation of identified patterns, their reliability depends on the stability of those patterns and hence we can expect better results when AI is applied to deterministic phenomena (or close to). But this is a pretty stringent requirement if one pretends to use AI for every aspect of life and aspire that it can make the world more controllable. Life as a whole is non deterministic, its patterns are changing all the time and constant interactions between cognitive agents (humans and non-humans) produce new, unexpected and unpredictable phenomena. This is the mark of complexity, which classical mechanics does not apprehend, and the addition of AI-based artifacts as new cognitive agents does not reduce complexity, it actually increases it by adding new layers of interactions. Hence AI will not help in controlling the world at large: it may be useful for controllability in local contexts and scales but overall it increases complexity and reduces predictability.

Blindness is even easier to spot if one looks at the metaphors being used as propaganda of AI. "Smarter than humans" is a meaningless concept, intelligence is infinitely complex, not one-dimensional and simply cannot be measured in a quantitative manner (notwithstanding our obsession to quantify which is well alive, as part of the mechanistic approach). Also, it is very difficult to imagine how such an abstract idea as "general purpose intelligence" could be materialized since we know nothing of that kind: we do not have ourselves general purpose minds, living beings are fully context-dependent and we have not developed many types of intelligence that we can identify in other animals, not to talk about the ones we are not even able to perceive [14]. And of course the idea that some sort of superintelligence would be able to solve most of our problems is based on an extremely naive perspective of reality, a completely static one in which an omniscient observer is able to capture all information in a way such that it can predict behaviours and "optimize" the course of things. This vision is more of a religious than scientific kind, invoking a belief that we could call "technolitarism" in which technology would be able to control all living systems. This is a fantasy which ignores what we already know about complexity, and it is also a nightmare, the accomplishment of a anti-human obsession of complete surveillance and control [19] [22]. The idea that AI helps in controlling and managing the world is unfortunately becoming ubiquitous but for all these reasons and others we should be very cautious about it and especially about the consequences of the decisions we could take based on that idea. That hypothesis can be made true in specific contexts and scales and for specific purposes, but when universally extrapolated it becomes false. Which brings to the fore a key question: how do all these limitations of AI, and the blind spots derived from them, relate to the blind spots of our civilization(s) and the societal challenges derived from them?

IV. The Blind Spot of Human Civilization(s)

As stated above (and this is a metaphor, not a scientific statement), we have gaps in our cognition processes from which blind spots are derived. And in our view this is as true at the societal level as it is for individuals. Inquiring into different categories and examples of blind spots is not the purpose of this paper, we will address only one, but so huge that it may have fatal consequences. Humanity faces a self-inflicted existential threat, that which makes sustainable development an oxymoron. This is manifest in many ways, among them climate change as one of the most pressing disruptions of our living conditions. Overall, in human societies as of today, a small ecological footprint implies a low level of human development and high levels of wellbeing imply large footprints. If we define sustainable development as the combination of high levels of human wellbeing with low levels of ecological footprint, no country is achieving that goal (see fig 2).

Figure 2: sustainable development as an oxymoron. Human Development Index (HDI) vs Ecological Footprint (source: Global Footprint Network)



When somebody destroys the material conditions of their own existence, we qualify that as suicidal behaviour. And this is exactly what we are doing at the scale of the species. In the process we are also harming many other living forms, but overall we are not going to kill life, nor the planet, just ourselves. And in this respect we are in a form of denial or blind spot, since we have already a lot of reliable information to be aware of what is in front of us. Thirty years after the canonical definition of sustainable development was crafted, we are coming to realize that we face an epistemological gap: *"The human ability to do has vastly outstripped the ability to understand. (...) As a result, civilization is faced with a perfect storm, (...) a global society infected by the irrational belief that physical economies can grow forever."* [4]

How does this relate to technology and in particular to digitalization and AI? Does not we expect technological innovation to deliver the solutions to this huge challenge of humanity? First of all, it is interesting to notice that the works of the Brundtland Commission happened shortly after the launch of personal computing (the first IBM PCs were released in 1981). It is no surprise then that technology was actually present since the very beginning in the definition of

sustainable development, namely: *"Development that meets the needs of the present without compromising the ability of future generations to meet their own needs. (....) It contains two key concepts: the concept of 'needs', in particular, the essential needs of the world's poor, to which overriding priority should be given; and the idea of limitations imposed by the state of technology and social organization on the environment's ability to meet present and future needs."* [21]. This is clearly expressed in a mechanistic framing as discussed above: the environment is there as something external to us whose "ability" is to meet our needs. And technology is one of the instruments we use to realize that ability: since it is still limited, the way forward is to develop more and better technology to ensure sustainable development. Moreover, the role to play by ICTs in the materialization of sustainable development has been always highlighted [16]. In particular, expectations were strong *"that the ICT revolution can have a tremendous positive impact as an instrument of sustainable development"* [12]. A number of initiatives to make real this potential have been developed over time by multilateral agencies, the OECD among them, and by private actors such as the Global eSustainability Initiative (GeSI) promoted by the telecommunications industry [8]. But thirty years after the Brundtland Commission, the question remains if human societies have been effectively using digitalization to address the challenge of sustainable development [1] [10]. And if this challenge has been properly formulated.

To be more explicit: first, to what extent our self-inflicted existential threat is a consequence not only of the unbridled exploitation of natural resources but, in a deeper way, of the conceptual frameworks through which we think and create meaning to act? And if so, if we develop digitalization and AI under the same frameworks, how can we expect them to solve the consequences of what has created them in their present form? Detailed answers to both questions would require more development than we can offer here, but we make the hypothesis that unless a reframing of digitalization and AI is performed, they will not significantly contribute to avoid socio-ecological collapse. While human processes are made of time, energy and information, we mainly use digitalization to compress time, instead of reducing our insatiable consumption of energy and other material resources. This in turn is a result of how ICTs and innovation in general are presently conceived and framed, in a way that actually inhibits their potential for human progress in harmony with the environment. What we propose in the next sections is an outline of elements of a conceptual framework addressing some of the limitations of the mechanistic epistemology and a suggestion for a program of research on how this could be applied in the context of digitalization and AI.

V. A Complexity Framework

At the highest level of leverage points as places to intervene in complex systems, Donella Meadows identified *"the power to transcend paradigms"* [17]. Which implies not only that a system´s behavior depends critically on the underlying paradigm from which the system arises, but that our understanding of a system can never be complete: paradigms are just contingent expressions of our levels of understanding at a certain moment and hence of limited applicability. As said, the limitations of the mechanistic framework have been challenged by the evolution of physics since the 19th century. In a process starting simultaneously across a number of different disciplines in the second half of 20th century, new paradigms of knowledge have been created to address complexity. They have in common to consider that what characterizes living systems is the flow of non trivial interdependencies between large numbers of autonomous elements (cells, living beings, organizations,...), from which myriads of networks, structures and forms can emerge in self-organized ways. Contexts and scales are not separated, they are fully connected and the connections, instead of being secondary, can make the difference, especially at critical points where the behaviour of a system can shift completely. This approach is substantially different from the mechanistic one: it builds on holistic perspectives rather than reductionism. Instead of separation as fundamental tool of analysis, it recognizes that interdependencies are at the core. Which requires replacing determinism by essential uncertainty, and questioning dualism and objectivity by recognizing the need to observe the observer and the mental frameworks in use. Last but not least, this approach also questions rationalism in that cognition processes are themselves complex: maybe reality is simply inaccessible to our conscious understanding, we just have glimpses of it. The issue is to know if we are humble enough to recognize our limitations: instead of aspiring to "crack the code" of a system of systems of which we are part, let us assume that complexity and uncertainty are foundations for the emergence of life and that the creation of knowledge does not bring certainty nor predictability except at local levels. Also, that living systems are most probably impredicative, we cannot define life without referring to life itself, which makes it non computable nor controllable [18]. Adopting such a perspective would mean a fundamental shift in our relationship with ourselves and the world, since among other things it implies that ontology, epistemology and ethics can no longer be separated between them and from us as external observers [15]. We are actually immersed in a constant process of mutual learning in interaction with the ecosystem of which we are part (starting with the zillions of bacteria living in our body without which we cannot live).

Regarding the connection between the mechanistic framework and the self-inflicted existential threat in which we are now, it is rather obvious: we have been systematically ignoring that we live in ecosystems and that our actions to transform and exploit them to our benefit have consequences beyond the immediate outcomes we were looking for. If we take a complexity approach this is no surprise: nothing happens in isolation and interdependencies and interactions are at the core of complex systems. More often than not, interactions take the form of long and complex feedback loops which ultimately go back to us [2]. Climate change is an excellent example: while solar energy was already engineered by the 1850s, humanity decided to go for fossil fuels without caring much about the consequences. A century and a half later we have exhausted to a large extent the natural reserves of fossil fuels and we are facing the phenomenon of global and dramatic climate change due to CO2 and other greenhouse gases emissions at a gigantic scale. Under the mechanistic framework climate change is deeemed a "collateral effect", which calls for its minimization but is actually misleading because it does not recognize the cybernetic nature of reality: feedbacks are not

collateral, they are an integral part of how systems learn and change, for the good or bad as far as humanity is concerned.

VI. Digital for Life: Exploring Desirable Futures

Digitalization and AI are deemed to have a transformative capacity of human societies. Up to recently most of people would have said it would be for the better, now some are saying it could be for the worse. In this paper we have tried to inquire about the relationships between our ways of thinking and the role technology plays in transforming society. There are chances that the futures AI brings in would not be the ones we would like to get. Although there are many differing perspectives, we take for granted that for most of humanity desirable futures would be those in which all humans achieve a satisfactory level of wellbeing in an harmonious relationship with the biosphere. Again, this means different things depending on the framework we use: in a mechanistic context we address mainly the progress in human wellbeing through material means and only then we consider the effects of our negative impacts on the biosphere and on rising social inequalities. In a complexity framework the formulation "high wellbeing at low footprint" does not address separately wellbeing and footprint. Our wellbeing is necessarily embedded in the interdependencies through which we relate to the ecosystems around us. In that sense, individual, community and biosphere levels are fully connected. Going back to the strategies in response to how digitalization and AI are being carried forward today, we know the limitations of "adaptation" and "mitigation": they do not address the epistemological gaps underlying the concept of technology under the mechanistic framework. We cannot expect them to be of much use as far as correcting the consequences of that framework are concerned, on the contrary they could be accelerators of those consequences. Hence we need a third type of strategy for framing digitalization and AI, one of "transformation", if we want to avoid wide-scale collapse and also technolitarian futures in which the survival of the species depends on our submission to non human superintelligence. As a first guess, the reframing for transformation has to be based on a complexity framework, simply because it reflects better than the mechanistic one how life works. To a very large extent this requires going back to the roots of the discipline of cybernetics, which was not in its origins about designing computers but rather about recognizing the importance of feedback loops, as an explicit manifestation of complexity. Which in turn means questioning the present expressions of concepts such as information and communication. They seem to be self-evident but what we have implemented in our digital artifacts may be only one of different options. Are we sure that what we call today information is really *"the difference that makes a difference"* (Gregory Bateson dixit)? Is communication in its digital form the best we can get for processes of mutual learning? Is "big data" taking care of complexity if it is based on massive volumes of decontextualized quantitative data? Should not we explore other approaches such as "warm data", a methodology designed to explore the *"transcontextual information about the interrelationships that integrate a complex system"*? [3]. To the best of our knowledge these hints for a very different way of conceiving digitalization and AI have been barely explored. The potential reward of contributing to avoid self-inflicted collapse and open the space of possibilities for desirable futures seems good enough to give them a try.

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