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## ON THE EDGE OF THE SINGULARITY

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### Abstract

The present paper touches some preliminary aspects, mandatory for any rigorous discourse over this so-intriguing concept of 'smarter-than-human intelligence', supposed to be the trigger of a future Technological Singularity. It tries to identify some aspects related with such phenomenon, in order to reveal its most probable appearance. It is shown that the solely process of development of a superior AI is not a good indicator for envisaging the world of tomorrow. In an epoch of rapid changes, technological exponential development and innovation, thinking on possible futures ceased to be a simple exercise of imagination. It became a necessity and both a collective and individual responsibility. It is a duty which makes us capable to take the prerequisite measures for a sustainable and safe development of human race toward Spiritual enhancement, and not only for material wellbeing a definite Humankind dead-end.

*Keywords:* technological development, artificial intelligence, singularity, self-consciousness

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*By far the greatest danger of Artificial Intelligence is that people conclude too early that they understand it.*  
(Eliezer Yudkowsky)

### 1. Introduction

In the Cognitive and Computing Sciences, Singularity represents the alleged moment when an/the Artificial Intelligence (AI) will surpass human(s) intelligence, and the technological progress will exponentially accelerate, making the future unpredictable. But the analysis of such hypothesis can't be made solely within the framework of Computer sciences, similar with the problem of intelligence that can't be understood only from a particular (psychological, computational, logical or no matter what other) perspective. The modern knowledge reveals that our UNiVerse is UNiitary, therefore the accurate understanding of a part or a dimension of it is inseparable by the understanding of the hole.

From a comprehensive perspective, Technological Singularity represents that moment when the cybernetic evolutive techno-human system, coalescing civilizations, technology, economy, juridical and cultural social structures – the Metaman [1] – will integrate and displace the biological evolutive system – Gaia

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[2]. Such perspective gains a proper understanding only within the slight distinction of ‘soft’ or ‘weak’ determinism. Depending on the place where the agency is placed, technological determinism can take several forms, which could be described as forming a continuous between ‘strong’ and ‘weak’ (‘hard’ and ‘soft’) limits [3]. In ‘strong’ or ‘hard’ technological determinism, the agency is equated with the power to produce changes, and it is ascribed even to the technology itself or to some of its qualities. ‘Weak’ or ‘soft’ view over technology doesn’t consider ‘technology’ *per se* as the *locus* of a historical agency, but as one factor of a complex economic, social, political, and cultural matrix. The defenders of ‘strong’ technological determinism claim the “imminent capacity of scientists and engineers, with the help of artificial intelligence, robotics, biogenetic technology, and artificial-life theory (or some combination thereof), to create a suprahumanly intelligent, self-directing, self-replicating agent, or ‘mind child’, whose existence will in effect render obsolete the traditional boundaries between the mechanical and the organic, between art and nature. This claim may be seen, in fact, as the current terminus of one popular tradition of technological determinism.” [4]

Following such reasoning it is said that, in the absence of any defeaters disaster or active prevention, the AI will be an accomplished technological achievement within years, soon afterwards (‘soon’ may be pessimistic, but 2035, they say is optimistic!), in some decades, AI+ will be achieved, and within centuries the AI++ will be the dominating form of intelligence.

- (1) There will be AI (before long, absent defeaters);
- (2) If there is AI, there will be AI+ (soon after, absent defeaters);
- (3) If there is AI+, there will be AI++ (soon after, absent defeaters);
- (4) There will be AI++ (before too long, absent defeaters). [5]

In other words, the development of AI [‘equivalence’ premise] (one about we could imagine few characteristics or structural traits!) will lead to a superior level of AI, AI+ [‘extension’ premise], with totally unforeseeable features, and the later it would create a superior one (AI++) [‘amplification’ premise], and so on. But “what may not be so obvious is that the singularity will not be a singular event. There will likely be multiple singularities, succeeding one another with accelerating rapidity. To use an analogy, it will be as if there are an infinite succession of black holes nested like babushka dolls inside of other black holes, each more wrenching and disruptive than the last. Superhuman artificial intelligence will be no more immune than human intelligence to the ensuing historical discontinuities.” [6]

In addition, the perspective of Computing science doesn’t include the actual obstacles of various natures: *structural* (limits in intelligence space, failure of take-off, the law of diminishing returns), *correlational* (e.g. the self-amplifying cognitive capacity doesn’t correlated with any capacity we’re interested in) or *manifestation obstacles* (motivational of lack of interest, active prevention of creating AI+ or situational warfare, global catastrophe, resource limitations, etc.) [5]. A comprehensive analysis of technological future would reveal there are little chances to have a Singularity as the result of a

manufactured superior AI. But, maybe paradoxically, the Technological Singularity could better be understood as a part of *Life* evolution in Universe [7].

## **2. Technological evolution of mind**

In the debates over Technological Singularity we could recognize the same old ‘Enlightenment’ materialism. “Whereas the Enlightenment philosophers might have thought of humans in terms of gear mechanisms and fluid flows, contemporary materialists think of humans in terms of neurological systems and computational devices. The idiom has been updated, but the underlying impulse to reduce mind to matter remains unchanged.” [8] ‘Man-the-Machine’ prototype holds that motions and changes of matter are enough to account for all human experiences. But in the problem of (human) consciousness, the quandary remains the same as 150 years ago. We are unable to explain how can technicolor phenomenology arises from muggy grey matter. “How it is that anything as remarkable as a state of consciousness comes about as a result of irritating nerve tissue, is just as unaccountable as any other ultimate fact of nature.” [9] The technological and epistemological level of scientific development can only scratches the surface of practical aspects of consciousness.

The human brain is more than a neural network and the self is boosted by its non-cognitive, emotional and volitional elements. From informational perspective, the conscious state is less than twentieth millionth bandwidth of brain activity [10]. The bulk of our self-representational conceptual framework and synaptic configuration are shaped by the postnatal experience of the real world. Our self-understanding and self-perception are gradually learned, and are contingent for their content upon the culture in which one is raised. The human consciousness is shaped (*a posteriori*) from the outward to inward on a given (*a priori*) structure of potential courses of structural development. The social constructed personality is a cultural outcome on the top of our organic foundation we share with entire living world. The humans can do more than computing data and information and use reasoning for gaining, knowledge, they are also proficient to understand, evaluate their own understanding and the final achievements could be only partially accomplished by an algorithmic structured state [11].

Of course, we can take into account an agency of such technological systems without understanding and self-awareness, but is doubtful that such an undeveloped form of organization that could be autonomous. Such ungrouping and non-institutionalized reality as technological assembly, even operating in a swarm intelligence-form [12], has little chances to represent a peril for human self-conduct. It is possible that an ideal-seeking dimension to be mandatory for constructing a self-sufficient and enduring institutional order. Errorless observations and omniscience in scientific system, *perpetuum mobile* in engineering are examples of such ideals. “The capability of seeking ideals may well be a characteristic that distinguishes man from anything he can make,

including computers.” [13] From this perspective, any living system is a purposive system that attains life preservation through different goals and we can understand the planetary ecosystem as an ideal-seeking collective system which aims consciousness accomplishment too. The unavoidable Protagorean hubris of individual reason as ‘the measure of all things’ occults the mandatory precondition for its own existence, which is the collective being has nurtured it.

This presumed collective entity, although initially lacks of consciousness (albeit we couldn’t know) which fosters the individual, gains advantage from global interconnectedness of billions of consciousnesses, thanks to technological system, and starts to become reality.

It doesn’t matter how this reality is conceived: like Metaman [1], Noosphere [14], Super-Organism [15], Super-Being [16], or Global Brain [17-19]. These imaginary models of the futures reveal that understanding the problem of Technological Mind Singularity requires a complex trans-generational perspective equally mathematical, engineering, bio-physical, psychological, socio-political, and cultural. The Singularity is not limited to isolated AI engineering evolution. Technical evolution implies “always secondary effects which had not been anticipated which in the primary stage of the technical progress in question could not *in principle* have been anticipated. This unpredictability arises from the fact that predictability implies complete possibility of experimenting in *every* sphere, an inconceivable state of affairs.” [20]

If human species didn’t evolve in direction of developing (mass) telepathic and instant remote communications abilities, it develops technological tools instead. The ‘Übermensch’ of our species is about to rise even if we seen it from an organicist perspective - as a planetary living organism, encyclopaedic - as the future universal knowledge network or emergentist one - as the evolution of a next superhuman level of consciousness [21].

Above all these conceptions, the evolutionary cybernetic perspective depicts, from a sociological outlook, most convincing what the Singularity threshold represents, i.e. a metasystem transition: the moment of “self-organization of individual components into a positive-sum system that functions at a higher level of intelligence and consciousness” [21]. This perspective sheds a new light on the so hard to comprise non-biological living system as technological Metaman or cultural self-replicating systems (*meme-complex* or *memeplex*), which are incomprehensible as long as we keep only the organic representation of biological life. But if the primary form of life is no other thing than „an automatic and continually creative evolutionary process of adapting to changing environments”, i.e. life is a supple adaptation, then “being alive is a matter of degree” [22]. Life is more related with the formal process of preserving and evolving than with its form and content. In these conditions, the living propriety of Metaman system, build on top of Gaia’s evolution, the cybernetic superorganism comprising humanity with its technology becomes comprehensible. (AI is defined in the major books in an evolutive manner as the

capacity to perceive (percepts) environment and to take actions which maximize its chances of success (performance measure). [23])

The evolutionary cybernetic scenario comprises both the formalism of biological evolution and the cybernetic technologism. Biological evolution carries the intrinsic sources of conflict and how evolving synergetic systems and control mechanisms against free riders overcomes them. It brings also, the natural collective learning machine functioning on five principles: *conformity enforcers*, *diversity generators*, *inner-judges*, *resources shifters*, and *intergroup tournaments* [24]. Cybernetic technologism brings the knowledge and communication processes mechanisms that sustain the multilevel structure of systems and control, and also the continuity between the principles of original biological system and growing capabilities of new evolutive cybernetic system. The Global Brain awakes, it diminish its dependence on natural inflexible supplies and begin to redesign humans themselves (with artificial parts and genetic manipulations) and Humanity by anticipating, acting on and shaping the future according to its forming own will. We have entered already in Anthropocene where human activities alter profoundly the geologically and ecologically significant conditions and processes which were critical for prior forms of life and move fast toward Cybercene where the global cybernetic system will be the (solely) new evolutionary self-directed path.

### **3. The nature of Singularity**

The Technological Singularity is not a pure and plain concept thereof it is not easy to be comprehended. In the first place, it is a totally genuine imaginary reality, hard to be conceived other than anthropomorphically, for example as an a cybernetic super-organism that incorporates humans as its ‘cells’, communities as its ‘tissues’ and technology as its ‘tools’ and makes them to work out *communalness*. (Term credited to Robert A. Freitas Jr., it describes a complex organization of numerous individuals which on a higher level is tightly connected to each other and supposedly entails a broader mode of thinking than just normal consciousness.) Secondly, the alleged moment when technological intelligence will surpass the human understanding sends to a corresponding technological super-intellect. The emergence and existence of such technological consciousness needs a material support, definitely more complex than a plastic or metallic replication of the human brain. It requires an entire cybernetic evolutive system employed for manufacturing and, after this, for supporting it. Third, the understanding of such reality seems impossible. In the hypothesis of *progressive Singularity* the AI far surpasses the human intellect and become impossible to be comprehended by such inferior human intelligence. In the hypothesis of *regressive Singularity* the cognitive development and abilities of human species will be so much altered by technological environment that our understanding will dramatically decline, and also wouldn’t be able to understand it. Singularity represents, in this sense, the collapse of human understanding, enslaved to the manmade technologies of “living into immediateness and for

self-preservation” [25], unable to judge its own creations and actions in a holistic and integrative manner, i.e. “into mystery and for revelation.” [26]

But there is another sense of Technological Singularity. Based on technological progress, the individual consciousnesses gradually integrate in a global collective consciousness and the intelligence of human species become individualized and enhance exponentially. Thus the human species and individuals would gain the power to knowingly affect their own evolution. Contrary to classic conception, the Singularity will not be the moment when the human being(s) will *lose* the understanding of its own evolution, but when the evolution of collective being of the human species will *gain* the understanding about its existence and start to dictate its evolutionary path. In epistemological sense, it will remain a Singularity because, for present level of understanding of so congratulated, individual rational perspective, it is incomprehensible (even for the scientific reason that is supposed to makes it possible in the future).

#### **4. What Physical Singularity can tell us about Technological Singularity?**

The most troublesome problem with Technological Singularity is its contingent future. Despite fierce debates over the future of technological development, the formation of Singularity can't be predicted solely on the base of a merging AI with nano- and bio-technologies. The question is if we are at the edge of a Technological Singularity or all these debates are only ‘blowin’ in the wind’? The believers of trans-human species preach the forming of Singularity in this very moment, while the ecological pessimists deplore the direction of present trend. Both speak and interpret the present state of affaire as obvious evidence for the following Technological Singularity although with opposite consequences. But the meaning of term Singularity seems to forbid such simplistic approach. In informational terms the question is if we'll be able to noticed that mankind head right into a Technological Singularity at due time? I think that in this matter the decades old debates over celestial Singularities from venerable Physics could be helpful once again.

As conceptual intuitive entity the Physical Singularity is bivalent. From the perspective of General Relativity Laws' the black-holes are cosmological gravitational objects so massive that no nearby matter or radiation, and hence no information, can escape from its gravitational field. This range of space surrounding black-hole forms the ‘event horizon’ of Physical Singularity. It represents an ontological and epistemological discontinuity specific to black-holes. Inside of gravitational singularity the quantities like density or space-time curvature become meaningless and, as consequences, all well-established physical laws are inapplicable. These Physical Singularities are surrounded by an ‘event horizon’ which is a boundary in space-time beyond which events can't have an effect on an outside observer. Because the strength of gravitational force or the escaping speed for a particle is equal with the speed of light, even the light emitted from inside the event horizon can't ever get out.

The science-fiction researchers used that informational concept of Singularity to describe an ‘event horizon’ in the future established at the limit of first creation of AI beyond which we can’t make any prediction about what will be after or to affect somehow the further course of events. The leap to super-human intelligence is conveyed through the black-hole metaphor, because any quantitative measures or evaluations would be meaningless. The Super-human AI will be completely different from what we could imagine in the present so, from intellectual perspective, the future biotechnological Singularity represents a cognitive ‘event horizon’ that cannot be modelled or comprehended by nowadays humans.

How could be useful for our topic this formal-intuitive debate from theoretical Physics? The mathematical concepts of ‘accelerated growth’ and ‘discontinuity’, in their concrete forms as physical phenomena, like black-holes, inspired the use of Singularity in depicting the future state of the world driven by Artificial Super-humanly intelligences. The advances in understanding the concept of Physical Singularities can consequently help us to become more sensitive and aware to any sign that could possibly indicate that we are at the edge of a Technological Singularity’s ‘event horizon’. The last years brought new interpretations on this issue in Physics.

In the last decades, the classical conception on the Physical Singularity was stuck in a theoretical dilemma raised by the effort to imagine what would happen to a person if he or she falls into a black-hole. According to General Relativity scenario, the person would experience no strange effect and simply floats through the ‘event horizon’ with ‘no drama’ in a finite amount of time. The ‘event horizon’ is just a hypothetical location that marks the point of no return. He or she will not realize what happens until him/her will be suddenly pulled apart and crushed by gravitational forces. Neither the infalling observer, nor the external observer will notice anything unusual at the event horizon. For the latter the things will seem to slow down and freeze in time, under a sort of gravitational illusion and as time elapses the person image becomes more and more red-shifted.

The Quantum mechanics theoretical framework leads to a different plot, because in this scenario there is no absolutely empty space. The particles are vibration in space, which is itself also a “constant turmoil, with pairs of particles and their corresponding antiparticles continually popping into existence before rapidly recombining and vanishing” [27]. The emptiness is a holistic property of zero sum-total of these vibrations. Accidentally, because of high gravitational forces of the black-holes one of the paired particles could fall inward and the other will be banished outside. The outgoing particle will subtract some energy from the black-hole in the form of Hawking radiation. In this scenario, the ‘event horizon’ is actually a highly energetic region, a real firewall that will burn the infalling observer right from the beginning. For the infalling observer, space still looks like a vacuum, but for the outgoing observer it looks like a swarm of particles flying off in every direction and the vibrations no longer cancel out. This scenario is consistent only in Quantum physics where the fields are

fundamental and the existence of particles is only a matter of perspective [G. Musser, *When You Fall Into a Black Hole, How Long Have You Got?*, December 14, 2012, <http://blogs.scientificamerican.com/critical-opalescence/when-you-fall-into-a-black-hole-how-long-have-you-got/>, accessed 20 February 2016]. What we can notice when we are caught in the stream of a Singularity is the shared question for Physical and Technological Singularity.

And if debates are still undecided among Technological Singularity analysts, the physicists come up, once again, with an empirically supported interpretation beyond the singularitarian bounded imagination. After more than four decades of theoretical unrests, the physicists' ingenuity breaks any absolute or universal self-imposed limit and decree: "There are no black holes, more like grey holes!" [S.W. Hawking, *Information Preservation and Weather Forecasting for Black Holes*, 2014, preprint at <http://arxiv.org/abs/1401.57612014>]. There is no plain boundary surface because space-time fluctuates too wildly around the black hole. It could be only an 'apparent horizon' along which outgoing light rays are suspended. This horizon is identic with the 'event horizon' for an unchanging black hole from General relativity, but diverges as more matter gets swallowed by the black hole and its event horizon swells and grows bigger than the apparent horizon [M. Kramer and S. Writer, *Stephen Hawking's New Black Hole Theory: Scientists Remain Unconvinced*, January 28, 2014, <http://www.space.com/24454-stephen-hawking-black-hole-theory.html>, 20 February 2016]. The information about the matter although highly scrambled could escape from a black-hole as radiation causing its evaporation in time. The most mysterious and impressive object of the Universe from Theoretical Physics proves more open to knowledge. Analogous, "metaphorically, perhaps, the impending biointelligence explosion represents an intellectual 'event horizon' beyond which archaic humans cannot model or understand the future. Events beyond the Biosingularity will be stranger than science-fiction: too weird for unenhanced human minds (...) to predict or understand." [28] But this progress of Theoretical Physics shade a new light on debate over Technological Singularity. It shows that the gnoseological censorship and ontological autism on a coming Technological Singularity are groundless. There is no intellectual 'event horizon' beyond which the human comprehension is totally forbidden to access. "Nature are neither black nor white, rather shades of grey throughout, it is not inconceivable that humankind could survive while becoming more machine-like, all the while machines become more human-like — these two extremely complex systems neither merging nor dominating, as much as coexisting." [29] The earlier transcendent singularities alongside the Universe's evolution from galaxies, stars and planet formation, the emergence of primitive life-forms on the hostile Earth, to the evolutionary co-adaptation of complex plants and animals didn't lead to the supremacy of latter form, but rather to a coexistence. Similarly, the evolution toward such cultural state should be accompanied by noticeable signs and symptoms, that should be obvious for a sentient and resourceful mind, open for self-reflexivity. But for the unreflective "infalling" observer the transition period

toward Technological Singularity's event horizon will pass without noticing any subjective change in his/her consciousness, while for the reflexive external observer will be different feelings even if they were in ways that present human conceptual thinking can't express and make clear conceivable or /and he or she can do nothing to prevent the ongoing event.

## **5. Preparing for the coming Singularity**

The present attitude, with the lack of an accurate understanding of AI in particular, and technological evolution in general, do not predict any cheer future of humanity. Paradoxically, the segregation of professions, of public and private sphere, of emotions and reasoning and multiplication of technological procedures designed to increase efficiency in work, relationships and knowledge, are simply diminishing our capacity to understand the world.

The Technological Singularity seems to be rather a dire than a bright prospect. There is an existential bet on who will evolve first: the humanly global brain with the help of the mass technology or the technological intelligence will prevail on the prejudice of the humans. We could assist to a brutal intrusion, up to the level of damaging critical life-sustaining systems, or to harmonious controlled extension of Metaman enhancement over Darwinian random evolution. The development of social and cultural systems, as complementary driving devices of human evolution, makes human decision a key factor in managing our collective future. But the solely awareness of individual and small groups of cultural and political elites or scientists from particular domain about the critical aspect of this process is not enough. It must be transferred to the (collective) common mind(s). Awareness must become collective, a shared cultural feature, and not a secluded one. The common moral consciousness should pass the level of forbidding bad to the level of doing good deeds [30]. The prerequisite factors for a conscious and sustainable development of our global future in respect with technological evolution are as a minimum: a correct diagnosis and an effort to achieve a genuine consciousness of the problem; mercilessly demolishing the «myth» of Technique, and teaching man to employ Techniques with a certain detachment and, even, humour; elevating a real life and general philosophy liberated from purely academic technique with a hermetically sealed vocabulary; and the “almost superhuman task” of engaging a dialog with technicians [20].

We have to bridge our individual and planetary science with an appropriate cultural consciousness. Our rationality should meet (self-)awareness. For this task is necessary, in the first place, the cultivation among the scholars and researchers from both natural and social sciences, of the *epistemological subjectivity awareness* with its two components: *ontological positioning awareness* and *self-inclusion awareness* [31]. The natural intelligence is not strict formal; it depends on bio-socio-cultural determinations of tri-unitary nature of human being and any ‘objective’ understanding falls under the law of self-referentiality: “the ultimate reference for any description is the observer himself”

[32]. The accurate understanding is made through the objective collective knowledge re-enacted in individual minds. The Metaman is emerging in this very moment. Technology is neither alien, nor distinct from human beings. We were epiphlogenetically nurtured by technological practices [33] and every complex enough society is technologically regulated. As in Jacques Ellul definition from above, the laws codes, behavioural conduct, public regulations, moral prescriptions and so on are “socio-cultural technologies”, namely methods and procedures *rationaly arrived at having absolute efficiency* for a given stage of development in *every* field of human activity. The scientific paradigm with its super-goal of objective knowledge is not an exception. It is anything but a technology of thinking which dominates mass educational system, mass-media and public discourse and, hence, rules the mass mind. The greatest danger comes from that the possibility that academics and researchers, the cultural elite, to become just „technicians of the reasoning”. Their belief in the objectivity of their ritualized procedures of understanding of the specialize domain, could make them as obtuse as the religious fundamentalist. (The difference is that in the former form of believing the subjects consider themselves lucid (?) and not believers.) The dialogues with and between such enlighten elite would became an almost superhuman task as well. Consequently, in respect with Technological Singularity there are two alternatives. Either we assume, as a mature conscious species, the responsibility for our own future or we let the inherent techno-evolution to lead us wherever it would lead us. Either we begin to build the planetary consciousness human species with the mean of technological achievements or we wait childishly to construct the superior technological mind (AI) and ask it to tell us what to do. In both cases the future of human species, is linked with the evolution of technology. The difference is that, in first case, we were the ones who choose how it would be in the other we only imagine an upgraded ‘human, all too human’ primitive belief in superhuman creature(s) and wait to provide us with guidance and mercy.

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