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SOME ISSUES AND CONCERNS ABOUT IMPACT OF ADVANCED TECHNOLOGIES ON HUMAN BEINGS AND SOCIETY

Abstract: The most powerful modern technologies have strong impact on human beings and society, bringing them a lot of benefits and positive changes. However, some of their behavioral and societal implications are difficult or even impossible to predict. Even after becoming visible, it is not easy to determine are they, for the long term, beneficial for humanity or not. Therefore, it is of primary importance for science to investigate, and for society to discuss widely, what the new social realities created by technology mean for the humanity and where they lead to. A few examples which emphasize the importance of such a demand are given in the paper, as well as some questions and dilemmas which new and emerging technologies have already opened.

Key words: *advanced technologies, social implications, ethical issues*

INTRODUCTION

Biologically and physically, the human being is limited in space and time. So his need to invent, construct and use technological means, based on new knowledge, which expand distances at his reach and enable him to live better is natural. It is evident that humankind has been advancing in that direction at an accelerated pace through its history, and people in general live longer, healthier and better today than anytime in the past. With new knowledge and new technologies humans get more and more power to change their society and natural environment. They became masters of the planet Earth and made first steps outside of it. With new scientific breakthroughs they come close even to understanding of the very beginning of the Universe and the secret of life.

Advanced technologies are intended only for good, but they also have potential to make harms to nature and humans, either being intentionally used for wrongful intent or producing unanticipated and unwanted effects and consequences.

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Examples of misuse can be easily found today in information technologies, such as theft, forgery, fraud, child pornography, intercepting and disclosing private communication etc[1]. Serious environmental problems, such as air, water and land pollution, global warming and the Chernobyl accident are just a few of the many examples of unintended harmful consequences of modern technologies. Development and stockpiling of nuclear weapon, with its enormous destructive potential, is a permanent and terrifying threat to humanity.

1. ISSUES AND CONCERNS

The most powerful modern technologies have a strong impact on human beings and society, bringing them numerous benefits and positive changes. However, some of their behavioral and societal implications are difficult or impossible to know in advance. Even after becoming visible, it is not easy to determine are they, for the long term, beneficial for humanity or not. Therefore, in this time of unprecedentedly rapid advancement of knowledge and technology, it is of primary importance for science to investigate, and for society to discuss widely, what the new social realities created by technology mean for the humankind and where they lead to[2]. In the text which follows, a few examples which underline such a demand will be given.

In a short period of time, only three decades long, the Internet has brought dramatic changes to human society. But they are, evidently, yet only the beginning of a gigantic avalanche of changes heading towards our lives, behaviors, notions and cultures, which are coming from future advancement of information and communication technologies (ICT) and which we are not able to foresee or even to imagine[3].

The ICT, inter alia, enable today easy, fast and inexpensive virtual travel all over the world, in its present, past, or imaginative future, as well as connection and networking among individuals everywhere on Earth. Many people are involved in that way in various kinds of relationships, satisfying personal and sharing common interests, or trying to escape from loneliness and compensate for personal limitations. But it is questionable does this kind of social networking[4], which make them closer to distant and unknown people but farther from their families, relatives and neighbors, really improve their social skills and social development, or make them

[1] The full range of cybercrimes worldwide is estimated at $1 trillion annually [1].

[2] Some scientists argue that moral philosophers need to pay particular attention to emerging technologies and help influence the design of these technologies early on before they adversely affect moral change [2].

[3] "Over 2 billion Internet users, 6 + billion mobile phone subscriptions, and uncountable billions of hardware devices are intercommunicating in a vast real-time multi-network, supporting every facet of human activity… Humanity, the built environment, and ubiquitous computing are becoming a continuum of consciousness and technology… New forms of civilization will emerge from this convergence of minds, information, and technology worldwide" [1].

[4] Social networks link every day hundreds of millions of people into new kinds of "personal" relationships.

more socially isolated and even asocial. Does communication through the social media (Facebook, Twitter and so on) improve the strength and quality of the relationship among people? Is it such human behavior (many hours a day of communication with and via technology-driven media instead of direct interaction with other people) asocial, or should the term "social" be redefined in order to reflect the new social reality created by technology? Anyway, this change in behavior could have far reaching consequences for the human psyche and for society, which may lead to a new ethics of social behavior and therefore it should be carefully examined and better understood.

It is of special concern how ICT influence and alter childhood. Instead of healthy and socializing outdoor play with other children from the neighborhood, children spend more and more time with the computers, video games and other modern gadgets[5]. In addition, the Internet and video games have also a strong and uncontrolled impact on a child's moral development, which overshades the influence of family and school.

Communication technologies are widely applied for military purpose, as in unmanned aerial vehicles – drones, which are more and more frequently used in war at a distance, for fighting terrorists. But this use of drones raises concern that it could lead to the change of our views on war. Physical and psychological distance between operators of Predators and Reapers, for example sitting in their offices in Nevada, and their human targets more than ten thousand kilometers away, in Afghanistan or Pakistan, together with digital pictures sent by robots which dehumanize the enemies and hide the horrors of war, make operators less emotionally involved in killing humans and give them a sense of virtuality, of playing video games [4, 5]. From this point to a social understanding of war as computer video games, with good guys and bad guys, is not a big step[6].

It is well known that the connection between science and technologies for military applications has a long history. In modern times it has provided tremendous capabilities to create weapons of mass destruction. An example of science which is nowadays threatened to become militarized to a great extent is neuroscience, the science which is at a level of development that promises in the near future revolutionary breakthroughs in penetrating the most profound secrets of the human being and existence. In the USA there is an obvious tendency of growing dependence of neuroscience's financing on Pentagon, so that even the National Research Council of the National Academies prepared and published in 2009 a 136-page report "Opportunities in Neuroscience for Future Army Applications" [6]. Similarly, it is known that the military is today a major force in nanotechnology research and development.

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[5] A representative nation wide research, conducted in 2005, has shawn that youngsters in the USA, 8–18 year old, spend an average of 8.33 hours per day with technology-driven media [3].

[6] General Robert E. Lee, famous American Civil War general, said it is well that war is so terrible, otherwise we would grow too fond of it.

Biotechnology also has a high potential for misuse in warfare, especially by terrorists and other malicious groups. It is frightening that in the not too distant future desktop molecular and pharmaceutical manufacturing could give single individuals the ability to make and deploy biological weapons of mass destruction [1].

New, revolutionary scientific advances in biology, as for instance the cloning of mammals from adult cells[7] and the sequencing of the human genome, give new powers to treat, prevent and cure disease, but at the same time the new developments in biotecnology and genetic engineering also arouse ethical and social issues and fears of the most fundamental kind. They are caused by a possibility of crossing boundaries between species[8] and eugenic and human cloning in the near future, which faces humanity with unprecedented uncertainties and dilemas about the future of humankind. Uncertainties because we are not able to predict and understand all possible long-term consequences of such applications, and dilemas because they can lead, in synergy with other advanced technologies which enable the enhancement of human physical and intelectual capacities, to transition to posthumanity. Simply we are not able today to answer with certainty and without great risks for the future of humanity to the questions which new developments in science and technology have already opened, such as: should it be alowed genetic designe of human babies, or cloning of humans, or recreation of extinct species, or creation of new life forms on Earth, or to let swarms of nanorobots in the environment, and so on. That is why some research, such as on human cloning and germline genetic engineering, are currently banned or severely restricted in many countries by legislation or funding.

But here some questions appear naturaly to me, and I will state them together with my short answers:

- Is it possible to limit scientific inquiry? History of civilization confirms that it is not.
- Is it possible, on the basis of common ethical principles and moral values, to keep under full control applications of the new and emerging technologies? I am not quite sure and rather belive that some rich people and stubborn or corruptive scientists could appear to breach such control in order to satisfy personal needs.
- Banning research, is it a productive way forward? Definitely it is not.
- Are the human values given once for ever? I believe they are not.
- Do the new and emerging technologies create new environments for humans which will dictate a new morality? In my opinion yes they do.

[7] Since 1996, when the first mammal – sheep Dolly was cloned from an adult cell, the same has been done with various other animal species. Today, there is even a market for commercial services offering to clone pets or breeding livestock [7].

[8] Synthetic biology is assembling DNA from different species in new combinations to improve characteristics of various products, but has capabilities to create in the future things which are beyond our imagination. A synthetic genome is already created, but an authoritative commission concluded that it was not yet the invention of "life" [1].

– Are we able to adapt to emerging technologies timely and in a way to benefit the new possibilities and avoid their adverse effects? In my opinion we are not.
– Finally, does the banning of research and technology resolve the matter or we are buying time, slowing the progress and postponing the problem solution until we understand it better and prepare ourselves for accepting the future that disturbs our minds and imagination today? I believe that the second option is the right one.

Let us consider shortly the issue of "cyborgization". At a first glance the idea of humans as cyborgs looks frightening, and against all ethical and human values. But, in fact, the process of cyborgization has already been taking place. Started far back in the past with first prosthesis on the human body, it is ongoing nowadays at an accelerated pace, with medical praxis of implanting artificial limbs, prosthetic joints, pacemakers, artificial hearth [8] etc[9]. And all that is ongoing without ethical objections, and the same will be certainly with application of future robotic prosthetics which mimic what the human body does naturally. Contrary to the general opinion from, let us say, the beginning of the last century, human beings are now obviously psychologically adapted to the new technological possibilities of improving the quality of life and of extending it. That is why I believe that, with the advance of information and nano technologies, many gadgets which improve our physical, sensory and communication capacities will become so minuscule and inexpensive in the near future that it will be only a matter of time when we shall be intellectually and emotionally prepared for implanting them beneath the skin without serious ethical controversies. But what about the certain future, when brain implants which improve human cognitive capacities will become a technological reality? Would they be rejected with indignation due to now ruling ethical views, or a crawling cyborgization and implementation of new technologies will in mean time change our world, our understanding of this issue and our expectations, and impose new ethics which will welcome those implants as an advance in human well-being? And then, after intervening in human brains with various implants, are we still the human specie or some posthuman symbiosis of human being and technology?

With respect to all big issues, open questions and controversies about the impact of new and emerging technologies on the future of humankind, a few of which I tried to present here shortly, it was surprising for me to see that none of these have found their place among the top ten crucial questions which should set research priorities for social sciences for the decades to come, according to a group of leading scholars in the field [9]. But then, with great personal satisfaction, I discovered that the USA National Science Foundation, in order to outline strategies and prior-

[9] Prototypes of implantable artificial kidney and artificial skin are ready for further examination, and the growth of human organs from skin stem cells in laboratory is in experimental phases – the first fully functional kidney, the size of few milimeters, was recently produced. Future forms of 3D printers with stem cells as "ink" are being considered for manufacturing personalized organs and limbs.

ities to foster research in the social, behavioral and economic sciences, invited 252 scientists from concerned research communities to submit their ideas about big issues that were likely to drive the next generation of research in these sciences, and, within the wealth of ideas received, it has identified four major topic areas and the technology, new media, and social networks is one of them [10].

Many natural scientists are of the opinion that social scientists slow down scientific research by raising questions about research ethics and the potential negative impacts on the public good [11]. On the contrary, I believe that just due to the many ethical controversies that follow new and emerging technologies, natural sciences, social sciences and humanities have to advance in a stronger relationship and through multidisciplinary research, as it is the case with the Ethical, Legal and Social Implications Research Program, which was established as an integral part of the Human Genome Project to foster basic and applied research on the ethical, legal and social implications of genetic and genomic research for individuals, families and communities.

CONCLUSION

I would say that nowadays we are for the first time in the history of civilization faced with such discrepancy between the pace of scientific knowledge and technological advancement, on one side, and the possibilities of the humankind to understand them, respond properly and adapt to the changes they impose onto the society, on the other side, that we are very uncertain about the future consequences for humans resulting from such a development.

Therefore, what to do in such a situation? In my opinion[10], starting from the premise that science and technology should to serve society and human dignity, whenever we face the emerging technology which implies ethical controversies that we are not able to resolve and consequences whose risks for humanity is not possible to predict, it is wise to slow down and buy the time until we reach a level of collective wisdom, based on knowledge, at which the issue could be resolved in a way beneficial to humanity.

I am going to finish this paper with a quote of Isaac Asimov from 1983, which gains in relevance with the passing of time: "It is change, continuing change, inevitable change, that is the dominant factor in society today. No sensible decision can be made any longer without taking into account not only the world as it is, but the world as it will be."

[10] Similar opinion on this issue was expressed by the prominent Indian physicist and academician M. G. K. Menon [12].

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