The future (Industry 4.0) is closer than we think. Will it also be ethical?

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The Future (Industry 4.0) is Closer than We Think.Will it also be Ethical?

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Abstract: We live in an era when we are significantly confronted with new social trends which affect the living environment, sustainable life, migration processes, global social changes, and economic innovations, as well as new technologies and more efficient use of artificial intelligence. We perceive the future not only as a scientific and technological challenge, but also as an issue of ethical importance and potential ethical risks. Therefore the civilisation changes, such as the adaptation to the parameters of a new society under Industry 4.0, call for ethical caution and moral sensibility in order to reduce, or even eliminate, potential negative impacts on humans and their existential conditions. The use of robotics and artificial intelligence in various areas, such as in the field of law, education, construction of smart cities or public administration, gene technologies, housing, productivity, social services, industry, and the like also poses a new requirement. For example, the demand will grow for creative people, professionals having understanding for a human in a new environment, in everyday contact with artificial intelligence, new functioning of institutions, business transformation, and the entire social systems. They should be individuals able to response, in a creative manner, to specific situations and needs, new forms of self-realization. There will be a radical change in the area of personalisation, this including both the education and the personalised and individualised service, responses to individual requirements of a citizen, client, or consumer. Modern era was based on mass production and social revolutions. The social changes and shifts in values are mirrored by intellectual authorities, such as G. Lipovetsky who emphasises the necessity to adopt new ethical approach in relation to the new social paradigm. "Postmodern age is obsessed with information and self-expression" (Lipovetsky, 1998, p. 19). Individual ethics will gain its momentum, the ethics of other (third) type will be necessary, e.g. the ethics as presented by G. Lipovetsky: "Our era does not restore the rule of the "good old morality", it abandons it. In this sense, it is not possible to expect any changes of laws, any exploration of new moral values. Its ambition is to participate in solutions and changes, implement mechanisms of ethical prevalence, or the instruments of ethical supervision within social plans being prepared or already implemented.

Its mission is to enrich the dialogue in the area of new trends with ethical questions, to extend the interdisciplinary discourse, to enter the dialogue within innovative projects and be an active player in such dialogues. Each change affects human and human's integrity. Underestimation of professional opinions of ethical nature may generate an irreversible or dangerous situation which could put humans under threat. Solution of consequences without setting responsibilities, assessment of ethical risks may lead to serious social issues and delayed responses which would rather stem from searching of conscience.

What is more, it needs to be emphasised that new technologies are the outcome of scientific production, implementation of science, and are associated with the activities of research teams. And this is the aspect that is pointed out by the representatives of the Technology Assessment concept[1], the importance of applying ethical criteria to technology assessment. The significance and risks of contemporary science are also addressed by Ulrich Beck in his *Risk Society*. It is evident that the issue deserves wide interdisciplinary discourse across all areas aiming to overcome particularised approaches to understanding and solutions of dilemmas. In this interdisciplinary discourse, it is necessary to emphasise the ethical context and value and contextual parameters. Initiatives associated with the transformation to the new paradigm *Industry 4.0* start emerging also in Slovakia. The initiative originated at the Ministry of Economy and was approved by the Slovak Government in October 2018. Action Plan was prepared in cooperation with the representatives of individual departments, industry, associations, and the academic circles. This national concept perceives the process in conjunction with other social components and stakeholders. National strategies and conceptions tend to underestimate the ethical aspect, not taking it as an important part of innovative approaches, mitigation of risks, or prevention. We hold the opinion that Industry 4.0 constitutes a fundamental turning point that deserves ethical appreciation and solutions. The peculiarities of this paradigm should also be explored within ethics and enter, in a constructive manner, the discourse in the area of science and research, both within professional socialisation and within the area of institutionalisation of ethical instruments in order to minimise, to a maximum possible extent, the ethical risks and potential negative consequences of new technologies and use of digital data in relation to customers and partners.

Key Words: Future, Industry, Ethical aspect.

[1] *Technology assessment* is a scientific, interactive, and communicative process that aims to contribute to the formation of public and political opinion on societal aspects of science and technology. It is based on the conviction that new developments within, and discoveries by, the scientific community are relevant for the world at large rather than just for the scientific experts themselves, and that technological progress can never be free of ethical implications. As active participants in this dialogue and through coordination of ITAS Karlsruhe (Germany), significant events and specialised interdisciplinary discourses take place within international network.

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INTRODUCTION

We live in an era when we are significantly confronted with new social trends which affect the living environment, sustainable life, migration processes, global social changes, and economic innovations, as well as new technologies (Bendíková, 2017) and more efficient use of artificial intelligence. We perceive the future not only as a scientific and technological challenge, but also as an issue of ethical importance and potential ethical risks. Therefore the civilisation changes, such as the adaptation to the parameters of a new society under Industry 4.0, call for ethical caution and moral sensibility in order to reduce, or even eliminate, potential negative impacts on humans and their existential conditions. Discussions about future are vigorous and it's positive that optimistic outlooks and expectations prevail. Representatives of positive and optimistic view of the future also include, for example, the visionary Peter Diamendis who develops initiatives to change sci-fi to reality supporting 20 organisations focusing on future and space colonization, or his cooperation with Elon Musk, Larry Page (Google). Similar attention deserve their existing projects, such as launching the SpaceX Falcon Heavy rocket test or implementation of the intelligent tunnel initiated by E. Musk to be opened in Los Angeles at the end of 2018. This indicates that we are already confronted with future, are going through a thoroughly new experience, and a world of new values.

Industry 4.0 as a New Civilisation and Value Paradigm

It is necessary to emphasise that humans are truly experiencing a new situation and will be (and already is) confronted with these changes and new visions on a daily basis. The adaptation of humans to these changes calls for ethical reflection, ethical preparedness, dispositions to be able to assess social and ethical risks, development of preventive mechanisms to eliminate these risks. The ethical side should not be underestimated when it comes to such changes. On the contrary, it should be beneficial in the context of these changes.

The use of robotics and artificial intelligence in various areas, such as in the field of law, education, construction of smart cities or public administration, gene technologies, housing, productivity, social services, industry, and the like also poses a new requirement. For example, the demand will grow for creative people, professionals having understanding for a human in a new environment, in everyday contact with artificial intelligence, new functioning of institutions, business transformation, and the entire social systems. They should be individuals able to response, in a creative manner, to specific situations and needs, new forms of self-realization. There will be a radical change in the area of personalisation, this including both the education and the personalised and individualised service, responses to individual requirements of a citizen, client, or consumer. Modern era was based on mass production and social revolutions. The social changes and shifts in values are mirrored by intellectual authorities, such as G. Lipovetsky who emphasises the necessity to adopt new ethical approach in relation to the new social paradigm. "Postmodern age is obsessed with information and self-expression" (Lipovetsky, 1998, p. 19). Individual ethics will gain its momentum, the ethics of other (third) type will be necessary, e.g. the ethics as presented by G. Lipovetsky: "Our era does not restore the rule of the "good old morality", it abandons it. In this sense, it is not possible to expect any changes of laws, any exploration of new moral values. They have basically remained the same for centuries and millennia. However, this long-lasting continuity should not wipe away the new relationship to values, new methods of regulation of morality which are so unfamiliar that they represent a totally new period in the history of modern ethics". (Lipovetsky, 1999, p.13)

If we continue to prefer humanity in the new civilisation paradigm, then the question of accessibility and exploitation of technical achievements should remain the same, stemming from imaginative sympathy. This is why it is possible to also agree with the views of P. Staněk and P. Ivanová that the fourth industrial revolution is based "particularly on cognitivity, communicative ability, creativity, humanity, and adaptability. If we take these parameters as qualitative parameters, the humanity itself and also in relation to the human history, neurological system, etc. implicates solidarity, empathy, self-knowledge, individuality, and collectivity." (Staněk, Ivanová, 2017, p.135)

In spite of many positive features of digital society which is described as a society of abundance and better life (P. Daimondis, Michio Kaku), we also need to realise other risks which may gain momentum and have a negative impact on the quality of life. Experts believe that in the new, digitalised community we will be confronted with, for example, a loss of natural ability to interact, with cyber addiction, cyber stress, digital depression, digital insomnia, manipulation or even a massive suicide wave affecting young people (Japan), monitoring of messages by artificial intelligence (Huawey affair), etc. Also the danger of anonymity on social media networks, and blogs will grow, not forgetting the risk of loss of identity. It is probable that they will transform to digital forms of bullying,

cyber harassment, and the like. Therefore we take the initiatives of the European Union to adopt legislative measures in this area as a positive step. Even the ethical attitude to the issue of Industry 4.0 leads us toward adopting an opinion that the "crucial step to making this dream come true lies in the inevitable transformation of ourselves". (Staněk, Ivanová, 2017, p.167)

We have to accept the fact that both the robotics and artificial intelligence are, on one hand, a positive trend and irreversible process of social transformation and, on the other hand, they generate new risks related to new mechanisms of their operation. What is more, the state-of-the-art smart technologies may be used both for good and evil ends; information and technology can be easily misused. This is evident with the use of drones or military technology, protection of information and confidential data. This is also why, besides other important questions, ethical question of security, setting (formulation and control) of ethical limits at development and use of new technologies are one of the key topics in discussions about artificial intelligence. These questions should constitute a prevention algorithm of behaviour of entities.

In this regard, the initiative of Stephen Hawking and Elon Musk, who proposed and implemented 23 principles in association with the development and use of artificial intelligence, principles 6 - 18 directly relating to ethics and values, may be taken as ethically positive. Preferred are such requirements as e.g. security, responsibility, non-subversion, and adherence to human values and needs. The discussions concerning the presentation of Sophia, personalised artificial intelligence, also opened the ethical question of human rights, gender role of robots, or their cultural identity.

It is positive that the ethical side of robots and their integration into various social areas attracts permanent attention. It is also evidenced by e.g. the opinion of James Hughes, Executive Director of the Institute for Ethics and Emerging Technologies who pointed out three most important threshold values in ethics which are purely social and troublesome when talking about robots. For the time being, robots are not able to simulate and show, individually, such human attributes as the ability to perceive pain, they don't have any conscience, or an ability to be a responsible moral actors.[2]

Ethical Risks in the New Civilisation Paradigm

From its very beginnings, ethics headed towards practical direction and has managed to hold until present the ambition to support and address actual problems, play an active role in ethically disputable ideas, point out unethical behaviour, and ethically troublesome solutions. Its ambition is to participate in solutions and changes, implement mechanisms of ethical prevalence, or the instruments of ethical supervision within social plans being prepared or already implemented.

Its mission is to enrich the dialogue in the area of new trends with ethical questions, to extend the interdisciplinary discourse, to enter the dialogue within innovative projects and be an active player in such dialogues. Each change affects human and human's integrity. Underestimation of professional opinions of ethical nature may generate an irreversible or dangerous situation which could put humans under threat. Solution of consequences without setting responsibilities, assessment of ethical risks may lead to serious social issues and delayed responses which would rather stem from searching of conscience.

What is more, it needs to be emphasised that new technologies are the outcome of scientific production, implementation of science, and are associated with the activities of research teams. And this is the aspect that is pointed out by the representatives of the Technology Assessment concept[3], the importance of applying ethical criteria to technology assessment. The significance and risks of contemporary science are also addressed by Ulrich Beck in his *Risk Society*. As a renowned diagnostician of the contemporary era, he emphasised the fact that sciences play a central role in the process of modernization and innovation. Unlike in the first modernity, sciences in the risk society (that U. Beck also refers to as "second modernity") are confronted with their own products, results, and deficiencies. Science has thus become the cause of risks and should now assume new responsibility, the

[2] Refer to SHOULD WE GIVE AIS THE SAME RIGHTS AS HUMANS? OUR DEFINITION OF "PERSONHOOD" WILL DEFINE FUTURE CIVILIZATION. Available on the Internet on 10/12/ 2018: https://futurism.com/should-we-give-ais-the-same-rights-as-humans

[3] *Technology assessment* is a scientific, interactive, and communicative process that aims to contribute to the formation of public and political opinion on societal aspects of science and technology. It is based on the conviction that new developments within, and discoveries by, the scientific community are relevant for the world at large rather than just for the scientific experts themselves, and that technological progress can never be free of ethical implications. As active participants in this dialogue and through coordination of ITAS Karlsruhe (Germany), significant events and specialised interdisciplinary discourses take place within international network.

responsibility for finding solutions to these risks. While he designates the first wave as "simple scientisation", the second one should go hand in hand with "reflexive scientisation", critical thinking, and ability to identify, critically assess, and address complex issues. The issue of modernisation must be perceived in new relations, within "hyper-complexity", and the risks should be taken as poly-causal phenomena. Therefore our moral mission in science is to overcome resortism, narrow specialisation, and address risks in a wider context. Otherwise, we remain within the boundaries of previous scientific production and generation of more and more risks. An isolated way of thinking remains as important as ever, but it is not able to respond to the adequate risks of modernity anymore. These risks need to be accepted within production of new technologies, we have to realise their impact both on the nature and the humanity.

It is evident that the issue deserves wide interdisciplinary discourse across all areas aiming to overcome particularised approaches to understanding and solutions of dilemmas. In this interdisciplinary discourse, it is necessary to emphasise the ethical context and value and contextual parameters. The application of ethics, its professional and appropriate institutionalisation is a precondition for elimination and minimisation of ethical risks. The implementation of the strategy of smart technologies may be characterised by various dynamics, as well as by social or ecological consequences. Penetration of foreign investors, globalisation in information technologies, application of economic and technological standards in the EU, strengthening of social communication and value environment, implementation of common research projects, and application of new model of companies and institutions indicate that the issues are taking an in-debt form and deserve compatibility of policies and strategies, participatory efforts of stakeholders in these changes, and specific application efforts which allow for the particularities of individual cultures and environments.

From the perspective of ethics, research calls for an analysis of relations between technical, social, and ethical aspects of this process laying emphasis on the specific value and cultural contexts of our society. These qualitative changes will significantly affect humans, their life style, changes at work, but also the communications, health-care and education systems, science and business. Therefore it is important for the research to focus on the assessment of ethical limits of such social changes and propose solutions to eliminate potential risks.

The integration of ethical, value and cultural aspects, and implementation strategies create a prerequisite for a long-lasting responsibility going hand in hand with the idea of responsible innovation which, as a regulatory idea, should accompany production technologies, operation of information networks, economic and social effects. This issue is perceived at an interdisciplinary level and the discourse should take the form of permanent efforts at mastering the complexity of the area.

National Strategy of Smart Industry as an Ethical Challenge?

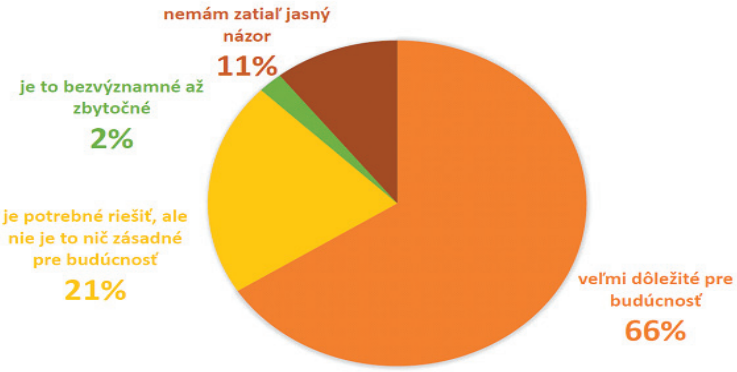
Initiatives associated with the transformation to the new paradigm *Industry 4.0* start emerging also in Slovakia. The initiative originated at the Ministry of Economy and was approved by the Slovak Government in October 2018. The action plan of Smart Industry of the Slovak Republic[4] introduces a set of 35 measures which should be taken until the end of 2020.

The action plan aims at supporting industrial undertakings, undertakings providing services and trading businesses irrespective of their size focusing on creating better conditions for implementation of digital solutions, innovative solutions, and improving competitiveness by reducing administrative burden, adaptation of legislation, defining standards, change of education programmes and the labour market, by co-funding the research, and the like. It is positive that the Action Plan was prepared in cooperation with the representatives of individual departments, industry, associations, and the academic circles. This national concept perceives the process in conjunction with other social components and stakeholders.

In order to attain these strategic objectives, it set up certain priority areas, research, development and innovations, basic principles of IT security of smart industry implementation, labour market and education, reference architecture, standardisation and development of technical standards, framework European and national legal conditions, including information and propagation.

[4] The entire draft is presented on the official web site of the Slovak Government. Refer to: http://www.rokovania.sk/Rokovanie.aspx/BodRokovaniaDetail?idMaterial=27835

In 2018, a survey was conducted to establish how much has the *Industry 4.0* penetrated into the Slovak undertakings. The survey shows that the proportion of businesses which apply the *Industry 4.0* initiative is growing. However, businesses have not managed to build the organisational and personnel structure for innovation management and implementation of changes. The philosophy of transformation is gradually penetrating also into the corporate culture of businesses and a majority of them takes transformation as an important aspect. On their way, they will also be supported by the action plan of smart industry approved by the Government.
The poll surveying how businesses look at the application of Industry 4.0:



SOURCE: http://www.quark.sk/industry-4-0-na-slovensku/

Legend: *No opinion yet 11%; It is not important and useless 2%, It needs to be addressed, but it's not essential for the future 21%, Very important for the future 66%*

Two thirds of businesses realise the significance of Industry 4.0 applications for their future development. However, a relatively large part of respondents considers the Industry 4.0 applications to be less significant for the future of the company. The Industry 4.0 is still subject to myths and doubts coming from all sides, which also bring attitudes that its importance and impact is not very big for businesses. This is related to the understanding and interpretation of the concept itself, as well as to the failure to capture trends, and to the interpretations in the media and superficial presentations of the topic.

14% of businesses in Slovakia started applying the Industry 4.0 elements. However, more businesses have declared the need for changes. Their proportion changed from the last year's 15% to 31% in this year. This category covers particularly businesses with the Slovak capital. On the contrary, the number of businesses which have not started with the application yet dropped to a half and their proportion changed from 25% in 2017 to 11% in this year. Based on the survey, one third of businesses already have the Industry 4.0 strategy in place; however, the businesses with foreign capital prevail in this category. Businesses are implementing the strategy using predominantly their own resources without external cooperation (60%), only 11% cooperate with external suppliers.[5]

According to the Slovak experts at Industry4UM *"Industry 4.0 is a topic for a majority of businesses, but the stage of its implementation varies. All in all, we may say that businesses gradually start entering the first phases of Industry 4.0 application. Majority of businesses is rather in the phase of implementation of isolated measures focusing on individual optimisation objectives without a more complex strategy."*[6] The survey showed that, on one side, implementation has a progressive trend but, on the other hand, small and medium businesses continue to feel quite uncertain about what the Industry 4.0 implementation truly requires and how to approach it.

National strategies and conceptions tend to underestimate the ethical aspect, not taking it as an important part of innovative approaches, mitigation of risks, or prevention. So far, ethical competence is not perceived as a component part of education, research, implementation processes of smart industry or smart cities.

[5] In: PODIEL SLOVENSKÝCH FIRIEM APLIKUJÚCICH INDUSTRY 4.0 RASTIE, ZAVEDENIE FINANČNE PODPORÍ AJ VLÁDA (*SLOVAK BUSINESSES APPLYING INDUSTRY 4.0 STILL GROWING, GOVERNMENT TO PROVIDE FINANCIAL SUPPORT FOR IMPLEMENTATION*). Analytik Industry 4 UM Martin Morháč., Available ont he Internet on 10/12/2018: http://dennikpolitika.sk/archiv/46339
[6] Ibid.

Ethically appropriate could also be, for example, professional cooperation between the private and the academic sectors in research, development and innovations oriented to the Industry 4.0 parameters. It should include assessment and addressing of ethical risks, adoption of ethical standards or formulation of ethical limits (trainings by way of case studies and solution of potential moral dilemmas, searching for and adoption of best practices models based on experience of businesses which were confronted with dilemmas, implementation of ethical prevention and ethical audit, application of ethical instruments in foreign or cutting-edge smart businesses - operation of codes of ethics, commission, methods of human resources activities at selection and adaptation of workers, etc.).

CONCLUSION

We hold the opinion that Industry 4.0 constitutes a fundamental turning point that deserves ethical appreciation and solutions. The peculiarities of this paradigm should also be explored within ethics and enter, in a constructive manner, the discourse in the area of science and research, both within professional socialisation and within the area of institutionalisation of ethical instruments in order to minimise, to a maximum possible extent, the ethical risks and potential negative consequences of new technologies and use of digital data in relation to customers and partners. New ethical responsibility will have to be defined in relation to employees, stakeholders, and the environment. In order to implement these plans, it will be necessary to develop and form new dispositions and new approaches. Our approaches must be innovative, coherent, and appropriate in the context. The participatory role of the applied ethics, ethical consulting, and ethical expertise should be compatible with such unusual requirements and new mission.

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