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Christian Theological Views on Industrial Revolutions and Related Ethical Challenges: A Western (And a Global) Perspective

Krščanski teološki pogledi na industrijske revolucije in z njimi povezane etične izzive: zahodna (in globalna) perspektiva

Abstract: This article focuses on the development of science and technology as manifested in the four industrial revolutions in the modern era, highlighting their ethical implications and challenges against the background of the Christian, monotheistic (metanarrative) framework. It explores the relationship between Christian theology of creation, scientific development, and Western secularization, offering critical assessments about what the global world has come to call »Industrial Revolution 4.0« (IR 4.0, as of the 2010s) and the new ethical dilemmas that IR 4.0 presents to us. While the starting point of our reflection is Western intellectual tradition, authors hope to bring a global perspective on the issue with concrete impulses for further theological/ethical reflection and education.

Key words: industrial revolutions, ethics of technology, risks of IR 4.0, theology of creation, human dignity

Povzetek: Članek se posveča razvoju znanosti in tehnologije, kakor se kaže skozi štiri industrijske revolucije moderne dobe, pri tem pa izpostavlja njihove etične implikacije in izzive v luči krščanskega oziroma monoteističnega (metanarativnega) okvira. Raziskuje razmerje med krščansko teologijo stvarjenja, znanstvenim razvojem in zahodno sekularizacijo, temu pa pridružuje kritično ovrednotenje fenomena, ki ga globalni svet imenuje »industrijska revolucija 4.0« (IR 4.0, revolucija drugega desetletja 21. stoletja), in novih etičnih dilem, ki nam jih postavlja IR 4.0. Čeprav je izhodišče našega razmišljanja zahodno intelektualno izročilo, avtorji poskušamo predložiti globalen pogled na obravnavani fenomen s konkretnimi spodbudami za nadaljnjo teološko/etično refleksijo in ozaveščanje.

Ključne besede: industrijske revolucije, tehnološka etika, tveganja IR 4.0, teologija stvarjenja, človeško dostojanstvo

1. Introduction

The systematic philosophical and religious reflection on human action and its norms has been part of the European intellectual tradition from the time of Socrates, i.e. for almost 2500 years. Today, we learn to live with new scientific and technological discoveries which add to the complexity of our ethical reflection. This process has been expedited in the past 200 years as an effect of the industrial revolutions, resulting in an increased level of secularization of the European societies. The staggering advancements in science and technology far surpass our advancements in ethical and social discourse on new challenges brought to us by the new technologies that continue to influence the way humans conceive and evaluate their immediate environments as well as the larger world.

This article focuses on the development of science and technology in the modern era and some of its ethical implications and challenges against the background of the Christian, monotheistic (metanarrative) framework. The fast-paced development of science and technology that we have witnessed in the past 200 years entails new ethical challenges that must not be overlooked. Science and technology have influenced the way humans conceive and evaluate themselves, their relationships, immediate environments as well as the larger world – »and itself [technology] has been influenced by such evaluations.« (Mitcham and Briggle 2009, 1147) Thus, it is legitimate to closely examine the ethical (and social) implications and challenges that arise as a result of this development. We will explore the relationship between Christian theology of creation and scientific development and offer some critical ideas about what the global world has come to call ›Industrial Revolution 4.0‹ (IR 4.0, as of the 2010s) and the new ethical dilemmas that IR 4.0 presents to us. A concise survey of the history of western industrial revolutions in the next section will provide a basic historical and terminological background to the main part of the paper dealing with the promises and perils of IR 4.0. The last two parts of the paper (before the Conclusion) will wrestle with the task to find a competent ethical approach to dealing with modern technology, namely one rooted in a metanarrative framework that is open to transcendent sources of human flourishing. Our study does not have the ambition to provide a comprehensive guide to concrete ethical problems; rather, it aspires to reveal the cultural roots and complex ethical implications of technological development and to delineate certain indispensable elements/steps in the current theological-ethical discourse related to the stated challenges.

2. A survey of the history of industrial revolutions

Industrial revolutions are originally a Western phenomenon, starting in the eighteenth century, which has since spread globally, affecting everything from human self-perception to global ecosystems. The end of the eighteenth century witnessed the use of steam power to mechanize production when the power loom was introduced by Edmund Cartwright in England in 1784, a development in technology

we came to call the First Industrial Revolution (IR 1.0). The Second IR used electric power and assembly lines to enable mass production, beginning in the 1870s meat factories in Chicago and Cincinnati, USA. This mass production then became automated during the Third Industrial Revolution by employing electronics and information technology in the second half of the twentieth century, a development marked by the first programmable logic controller [PLC] engineered by Modicon, which entered industrial production in 1969 in the USA. What we have recently come to call the Fourth Industrial Revolution (or ›IR 4.0‹ – a term coined in the 2010s) is actually »building on the Third, the digital revolution that has been occurring since the middle of the last century. It is characterized by a fusion of technologies that is blurring the lines between the physical, digital, and biological spheres.« (Schwab 2016a) IR 4.0 builds on the synergic effect of the advances in science and technology in three complementary and mutually reinforcing fields: (1) artificial intelligence and information technologies; (2) physical sciences, especially nanotechnologies and quantum mechanics; and (3) biological sciences. Connectivity, automation (or smart automation) and speed are key words of IR 4.0. As Mildred Solomon rightly points out, these advances create breathtaking synergies – now recognized as the Fourth Industrial Revolution. (Solomon 2016)

3. Promises and perils of IR 4.0

There is no doubt that IR 4.0 brings along great hopes and promises for individuals, local societies as well as the global humanity. New diseases will be cured; the quality and longevity of human life might be increased; people and smart devices will be ever more connected, and their communication will become easier and more accessible (Rouse 2019). It is especially in biotechnologies and artificial intelligence where IR 4.0 has engendered innovation at an unforeseen scale. New discoveries are now prompting us to think about what it means to be human (Globokar 2019, 611–613) and what are, or should be, the boundaries of human knowledge and capabilities.

But this development also entails great risks and we would be foolish to ignore them (Sandner 2017). As Carl Mitcham and Adam Briggle (2009, 1147) prophetically observe in their study on the interaction between ethics and technology, »in their technologically advanced forms, human material cultures have become comparable to geological forces in their abilities to reshape the environment« but also to dramatically alter human lives, our own self-perception, and relationships (Tyurikov et al. 2018). In other words, »we live in an age of transformative scientific powers, capable of changing the very nature of the human species and radically remaking the planet itself« (Solomon 2016). Thus, there is an urgent need for a serious ethical reflection of the phenomenon of industrial revolutions. Sometimes we embrace a new technology enthusiastically, almost without a question and then we get haunted by its bitter consequences or side effects. The question that appears, therefore, is: How far should we go in our development and implementation of these new technologies?

3.1 The daunting ambiguities of biotechnologies and artificial intelligence

Particularly urgent are questions connected to the biological domain and the corresponding regulations and emerging social norms. Issues of privacy are debated, as ever more information is stored and shared between governmental and non-governmental agencies and companies (Dulebová and Štefančík 2017, 51–52), making it ever-more difficult to maintain »the right balance between innovation and productivity, on the one hand, and security and privacy on the other« (Sandner 2017). What should be the rights and responsibilities of individual human agents (the providers of their personal data) and the agencies/institutions collecting this data? What responsibilities do we have toward the future generations when it comes to tinkering with the genetic codes of organic species, including humans? (World Economic Forum 2017) Should we limit our scientific and technological advancement to only curing diseases or should we embark on the road of expediting human evolution trying to create better humans? The obvious danger here is that »if we accept the latter, we risk turning parenthood into an extension of the consumer society, in which case could our children become commoditized as made-to-order objects of our desire,« as Schwab warns us (Schwab 2016b, 100). We cannot even agree on what constitutes a »better human« – better in relation to what? Economic interests of the individual, or the society? Safety interests? Better in terms of being able to experience pleasures more intensively, while pushing pain into subconsciousness? And who is to decide which of these will be better (Žalec 2019b); which of these or other criteria/results will be conducive to a deeper, long-lasting happiness and inner peace? On the one hand, it is true that while sheltering ourselves from the negative effects of emerging biotechnologies on human experience, we need to identify the positive and enriching ones. While staying open to these new forms of engagement with technology, on the other hand, it will be prudent to stay vigilant regarding its ambiguities. (Pavlíková 2018)

Similar questions arise in the domain of artificial intelligence. Few people today consider the possibility of machines thinking ahead of us or even out-thinking us. Yet, this is precisely what is happening with some highly advanced, complex algorithms. Technological giants such as Amazon, Facebook, Alibaba, or Netflix already possess algorithms with highly predictive power when it comes to consumer habits and behavior, ranging from eating to clothing, dating, job placements, movies, or music. The question that emerges, however, is not only how much trust we should place in these kinds of algorithms. Rather, the big issue is whether our habits as consumers, guided by such algorithms, become so ›entrenched‹ in our lives and character that their predictive power will really become constrictive regarding our freedom to choose. (Ambrozy et al. 2017) »If our own behaviour in any situation becomes predictable, how much personal freedom would we have /…/ to deviate from the prediction? /…/ This also leads to a more philosophical question: How do we maintain our individuality, the source of diversity of our societies and conscious civic involvement, in the digital age?« (Schwab 2016b, 94)

These are the kind of issues that we are dealing with when it comes to implementing the latest advances in biotechnologies in the direction of human augmentation (Strahovnik 2019). The new movements of »Transhumanism« and »Posthumanism« seem to embrace this development much too eagerly (Klun 2019; Platovnjak and Svetelj 2019), trumpeting a new era of a »new human being« and a better world. Yet, issues of human subjectivity[1] as constitutive for genuine freedom (Máhrik 2018; Máhrik, Králik and Tavilla 2018) push us to reflect critically on how to preserve the kind of rational moral agent who will continue to be guided by social and environmental responsibility, and not just the most efficient algorithm. There are legitimate concerns that »the extension of our personalities (or even »our being«) by new technologies disrupts our life patterns and changes the way we perceive and experience reality.« (Do and Valčo 2018, 620)

3.2 Detrimental effects on social skills and human self-perception

It is somewhat ironic that despite increased communication capabilities and information flow, current studies show a negative trend in the development of social skills among people who use modern electronic devices for communication and entertainment. Above all, human capacity for empathy seems to be negatively affected, as is documented by recent surveys in the US. A 2010 study by the University of Michigan Institute for Social Research identified a 40% decline in empathy among college students compared with their peers 20 or 30 years earlier, with most of the decline occurring after the year 2000. (Schwab 2016b, 95) As face-to-face interaction declines due to excessive (and growing) online interaction, there is a legitimate concern that people will have difficulties to develop their listening skills, making eye contact, or reading body language accurately. This, in turn, decreases human capacity for empathy, causing human relationships to be shallow and unstable.

3.3 The continuing challenge to bridge the inequality gap

Besides this »How far should we go« challenge, there is another dimension of the problem with serious ethical implications: A secure and fair distribution of the benefits of IR 4.0. Schwab critically observes that the IR 4.0 benefit distribution has so far been far from safe and fair. Not everyone has the skills and/or can afford these new technologies. In cases of low-skill labor, for example, IR 4.0 technologies (i.e. automation and artificial intelligence etc.) threaten people's livelihoods by displacing them from the workforce.

> »To date, those who have gained the most from it have been consumers able to afford and access the digital world … Inequality represents the greatest societal concern associated with the Fourth Industrial Revolution.

[1] We refer to subjectivity here along with Sharon (2014, 241) »as an effect of power relations, not as something that stands in contrast to or outside of them. Freedom is thus not about escaping the structures of power, the technological mediations, that underlie subject constitution, but about engaging in an active relationship with them in order to modify their impact in desirable ways.« This, however, is extremely difficult to do on the personal level, let alone on the social level.

> The largest beneficiaries of innovation tend to be the providers of intellectual and physical capital—the innovators, shareholders, and investors—which explains the rising gap in wealth between those dependent on capital versus labor.« (Schwab 2016a)

Therefore, the second big question that will need to be dealt with is: How do we bridge the ever-rising inequality gap?

In contrast to what was originally expected, IR 4.0 has expedited local and global inequalities. Here are some startling facts from the World Economic Forum's 2017 analysis: The world is getting richer, and less equal. In 2017, the richest 1% of the planet owned more than half of the world's household wealth, according to a report published by the bank Credit Suisse. In Switzerland, nearly 9% of the population was made up of US-dollar millionaires, according to the report, while 92% of the adults in India had a net worth of less than $10,000. Even within developed countries, wealth inequality can be striking; in the US, the top 1% of incomes rose 31.4% between 2009 and 2012, while the bottom 99% of incomes rose just 0.4%, according to research published by a University of California, Berkeley economist in 2013. (World Economic Forum 2017; Schwab 2016b, 87) Anger and frustration over the rising inequality destabilizes not only the domestic political scenes but also the global world order. The recent election successes by right-wing extremists and populists in the UK, USA, and Europe serves as an indication of this trend.

4. Towards a viable ethical approach to technology

According to Mildred Z. Solomon, a global leader in bioethics and the President of the Hastings Center, who works closely with the World Economic Forum and who lectures on the issues of ethical challenges of the Fourth Industrial Revolution (also at Harvard University), there are four big ethical questions that will need to be addressed by our generation (Solomon, 2016):

1. *Should* the technology be developed in the first place?
2. If a technology is going to proceed, to *what ends* should it be deployed?
3. If the technology is to go forward, *how* should it proceed?
4. Once norms have been set, how will the field be *monitored* to ensure adherence?

Scientists and scholars across disciplines are not united in their attitudes and answers to these important questions. In the European tradition of modern thought (19th and 20th centuries), three main approaches or schools may be identified when dealing with the question of ethical reflection on technology. (1) The first one can be labeled as »Socio-critical Approach/School.« It has its roots in the rationalist continental (European) tradition and it encompasses thinkers from diverse philosophical traditions: Karl Marx, Robert Owen, Adam Smith, Max Horkheimer, Theodor Adorno, Herbert Marcuse, Jurgen Habermas, Max Weber, Frederick Hayek, Robert Nozick, John Dewey and others. Though these intellectuals would certainly differ on many

questions, what connects them is a common interest in reforming existing economic and political structures which they find severely lacking and oppressive. They look at technology as a tool with potential or good or evil, depending on who wields its power and benefits. Their concern is the promotion of social peace and an ideal of human freedom. (2) The second approach/school is »Historico-cultural«. This school, too, has its roots in continental rationalism but the main concern of its proponents shifts more towards the personal and existential dimension of human individuals. Thinkers associated with this school – Soren Kierkegaard, Friedrich Nietzsche, Edmund Husserl, Max Scheler, Martin Heidegger, Lewis Mumford, Jacques Ellul, Albert Borgmann, Leon Kass, Donna Haraway and others – prefer to focus on questions related to the meaning of life. They represent various strands of existentialism and phenomenology. (3) The third school/approach can be labeled »Analytic«. Originating in the 20th century, it is the youngest of the three. This approach has its roots in the empirical rather than rational tradition of thought and includes thinkers from the broad school of analytic philosophy, such as: Bertrand Russel, G.E. Anscombe, Ludwig Wittgenstein, Earl Winkler, Jerrold Coombs, Stephen Toulmin, Paul Durbin, Adam Briggle, Daniel Callahan, David Rothman, Robert Dahl, and others. Rather than focusing on history or the individual's existential situation, proponents of the Analytic School limit their critical scrutiny to specific, well-defined problems. They strive to achieve clarity in argumentation and conceptualization. Their main concern is thus methodology and logic, along with linguistics. The polarized discussion of the first decades of the 20th century turned into a more integrated »conversation« towards the end of the 20th century, the result of which is a philosophical convergence of the three schools. (Mitcham – Briggle 2009, 1154–1155)

4.1 The need for an »open«, »transcendent« humanism

The rich variety (in terms of one's philosophical outlook as well as worldview) among the proponents of each of the three ethical schools of thoughts reveals that the challenge goes deeper than solving concrete ethical dilemmas we might be confronted with. The challenge reaches the realm of epistemology, which is rooted in our fundamental presuppositions about reality, our metanarrative renderings of who we are and where we find ourselves – hence the question of religion and/or the place of transcendence in our modern, technologically advanced, increasingly secular world. (Žalec 2019a, 411–413)

The Western scientific community and political elites seem to have been moving away from notions of transcendence (in an ontologically strong sense) ever since the tragedies of the religious-denominational violence and the gradual emancipation of sciences in the 17th – 18th centuries. Secularization has since been celebrated as the only viable solution for a pluralist world operating on empirical and rational principles of science[2] and disinterested law. The gaping divide existing between what is considered sacred and secular seems to prevent any meaningful interaction, thus

[2] In fact, as Stegu warns us, »in its most extreme form, transhumanism presents itself as a substitute for everything that one seeks in various forms of religiosity,« (Stegu 2019, 683) exemplifying thus a form of secular religiosity.

contributing to further alienation. (Valčo 2019, 49) Moreover, Christian intellectuals point out the natural affinity between Biblical doctrine of creation (including theological anthropology) and the emergence of sciences and technology in the West. They also claim that this religious tradition provides resources for building a robust moral imaginary, i.e. an intellectual context conducive to competent and complex reflections on the current ethical-technological conundrum.[3]

Vietnam and Russia struggle with the same set of questions. While the Russian socio-political climate shows signs of a calculated convergence of traditional religious culture (the Eastern-Orthodox branch of Christianity) with the official policies of the state[4] (Marakova et al. 2019; Oborsky et al. 2018), Vietnam is learning to navigate in the new environment of rapid technological development and global economics by keeping a balance between opening itself up to the world and keeping some of its traditional values and rituals intact. (Nguyen and Le 2019; Truong 2019) Due to a high level of corruption, however, the society is looking for new sources to cultivate the moral imagination of the people, including philosophical and religious sources, such as Confucianism and Christianity (Cao 2020). It is not surprising, therefore, that the recent »[m]arket reforms and newfound prosperity in Vietnam have been accompanied by ritual revival and an attention to the moral dimensions of political-economic transition« (Jellema 2006, 231), re-evaluating even the traditional transcendent/spiritual sources of human flourishing. This leads some scholars to argue, therefore, that the 150-year-long history of Christianity, along with a much longer history of Buddhism and Confucianism in Vietnam, (Nguyen et al. 2019) constitutes a fertile environment for spiritual and moral renewal that will serve as a starting point or even an ideational framework for coping with the challenges of IR 4.0 technologies.

5. Christian monotheism as a conducive environment for the development of science and technology

The advance of natural science in Western countries in the past 250 years can be traced (to a significant extent) to a positive attitude of the mainstream Judeo-Christian intellectual heritage to physical creation.[5] The following points can be argued from a historical-theological perspective:

1) Natural sciences have found an excellent intellectual, cultural, and religious breeding ground precisely in the Judeo-Christian tradition of the Western world, which could be seen most clearly in the era of the birth of modern science (17th century). The Biblical theology of creation encourages humans to explore the cre-

[3] See Section 5 below.

[4] In a recent study on this topic, Makarova (et al. 2019, 97) argues that »the divergences in the value orientations of the two modern global civilizations trace their origins to the contradictions of the Orthodoxy and Protestantism. It is found that in recent decades, the universal supreme values of the Western world have been undergoing a significant transformation due to the influence of postmodern ideas, while in the Russian world the traditional values continue to prevail.«

[5] This section builds upon Michal Valčo's previously published study focused on the ethical aspects of GMO from Christian and secular perspectives (Valčo 2011, 179–180).

ated world to be able to care for it and shape it for the benefit of people and all living things. This monotheistic doctrine of creation constitutes a positive theological affirmation of the material and physical world, which was created by God and has ever since been sustained by the same Creator.

The Biblical accounts of creation (mainly in Gn 1 and Gn 2) are placed in contrast with the religious ideas and worldviews of the surrounding nations, especially those in Mesopotamia. What we mostly see in the ancient cults and mythologies of the time is the deification of nature.[6] Deified nature must be worshiped because, in its essence, it represents divine beings. Such mythological approach to nature means that humans are not allowed to explore it freely because such action would be blasphemous toward the indwelling deities. The freedom from fear of the deified nature; freedom from holding the creation (as a physical reality) in contempt;[7] the freedom and mandate to explore nature and to develop the surrounding environment by guarding and taking care of nature's beauty and complexity – all of these found a fertile ground in the Judeo-Christian culture of the West.

2) The area of IR 4.0 technologies, including bio-engineering and artificial intelligence, could be a legitimate expression of human intellectual abilities and creative potential and it could be viewed as a concrete realization of God's invitation to partnership in His creative work – providing that the development and implementation of such technologies are conducted in a healthy moral context. Even though the long-term consequences of using these technologies are often ambivalent, one cannot and must not ignore their positive potential entirely.

3) In order to ›fully‹ develop the positive potential of IR 4.0 technologies, all factions involved in the debate must learn to communicate clearly and respect each other. This seems to be the only way to minimize the risks and to create a »productive tension« out of the destructive strain that can be felt everywhere. This approach can help us see the new technologies in a broader perspective and their relational complexity, encourage us to ask unpleasant and inconvenient questions, answers to which we fear to hear, and set proper boundaries to these new technologies, harnessing them to the benefit of humanity which understands itself as an integral part of the biosphere (not as its antipode) with its communal implications (not as autonomous, individualistic consumers blinded by limitless pragmatism). (Žalec and Pavlíková 2019) It is neither necessary nor viable to dream about a wide consensus on all ethical issues. Scientists and religious thinkers, liberals or conservatives, we all should rather strive towards an »informed disagreement« on issues where consensus cannot be reached; an informed disagreement which will be built upon a solid understanding of the motives and arguments of all parties in the debate, as well as on the mutual respect for the proponents.

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[6] The Mesopotamian myths that represent the Babylonian a Persian way of thinking, some of which date back to 1900 BC.

[7] Such was the case of Gnosticism, Platonism, Neoplatonism, etc. – traditions of thinking that had infiltrated Christianity very early on and had left their subtle influence ever since. See: (Tavilla, Kralik and Roubalova 2019; Tavilla 2017; Binetti and Pavlikova 2019; Tavilla, Kralik and Martin 2018).

4) Wider questions of values (ethical reflection) and meaning (immanent and transcendent purposes, interconnectedness, etc.) are indispensable in the wider public discourse as well as our educational efforts concerning the ambiguities of IR 4.0. Education should thus stay critically open to secular as well as religious accounts of reality and the corresponding ethical narratives.

The ethical ambivalence of much of the recent scientific research engenders a divide between the »conservatives« and the »progressives« as to how far scientists and technological innovators should go in their basic and applied research endeavors. The answer to this question will be conditioned to some degree by the respective worldviews of the interlocutors involved. Many Christian religious thinkers tend to view some of the recent IR 4.0 technologies (e.g. genetic manipulation) as an illegitimate tampering of the human creative genius in the marvelous and ›essentially (genetically) complete‹ work of the Creator; most of the secular scientists, on the other hand, consider their Christian counterparts as ›seriously uninformed‹ at best, or ›superstitiously conservative‹ at worse, with no ability or desire to contribute to the progress of human society. Their respective prejudices are often expressed in an atmosphere of suspicion and contempt for the other, thus confusing the minds of the general public. The differences in reasoning between these two camps, however, can become a creative tension that will enhance authentic search for meaning (i.e. sustainable ethical values and goals of human endeavor) and truth (including the economic and social prospects of the new discoveries) if the alienated factions learn to communicate and respect each other. Drawing from the rich resource of the doctrine of creation, Christian religious thinkers could perceive the fields of biotechnologies and artificial intelligence (among others) as legitimate expressions of human intellectual capabilities and creative potential and as specific realizations of God's invitation to partnership in His creative work within the *creatio continua*. The latter can be maintained, however, only if scientific research goes hand in hand with research of the ethical implications of such endeavors in their complexity – including the sociological, environmental, economic, medical, and other aspects. To ensure this, an open, honest, and competent public discussion of these issues is necessary. (Pavlíková and Žalec 2019)

The boundaries for what can be done in the sphere of human life and human biological processes are stricter because, as Christians believe, we are dealing with the axiom of human dignity, freedom, and intrinsic value which are anchored outside of man and even outside of nature itself! It is important to note here that the uniqueness of the human being among other living creatures on Earth does not rest in the fact that humans were created from a higher, better, or more spiritual substance (material) than anyone else. On the contrary, humans were created out of the dust of the earth (1Cor 15:47) as finite beings, limited by their biological needs and the time-space reality of this world with its concrete history. The uniqueness of humans rather rests in the fact that they, as personal beings, were created in the »image of God« (Gn 1:26-27), as free persons endowed with conscience and able to make moral decisions and, above all, as a creatures who are invited into a relationship with their Creator – able to love, trust, and seek what

is good. (Valčo 2011, 180; Pöhlmann 2002, 176–178) Besides a »structural aspect« of the *imago Dei* in humans, Christian theology distinguishes a »functional aspect« or a functional implication of the doctrine of *imago Dei*. It is precisely the functional aspect that resonates most clearly in the text from Genesis 1:26-27. Readers find it in the mandate given to man by God to »rule« that is, to take care of God's creation as a good steward; to protect it and develop it by creative work. In the very creative work of man the creation was supposed to grow in the unity with its Creator. The purpose of the human was to submit himself and the whole creation to the will of the Creator, thus fulfilling the good, creative intentions of God. Humans were to realize their freedom and autonomy (of their personhood) in a paradoxical way – by aligning their will to the will of their Creator.

6. Conclusion

Advanced technologies brought to us by IR 4.0 can take us far in many ways; but they can also take us off-course, failing to provide deep, existential fulfilment and secure sustainable development of human communities. False promises and »Promethean« visions that see humanity as a mere link in the evolutionary chain of consciousness (typical for the ideology of posthumanism) further cloud our self-perception and project unrealistic or even blasphemous goals for humankind. On the other hand, recent scientific discoveries and their technological implementations prompt humanity to pause and reflect: phenomena in the realm of quantum mechanics keep us in a humble awe before the mysteries of the very fabric of our reality, while the predicted as well as documented detrimental effects of IR 4.0 remind us of the fragility of our being in the world. What our societies must beware of above all, are covert and overt dehumanizing tendencies linked to the development and actual use of new technologies.

To counter the forces of depersonalization and dehumanization that ran rampant in the course of the past decades, Christian theology will have to reflect critically on how to articulate what it believes are established foundations for protecting human dignity. Perceived traditionally as central to theological anthropology, the concept of humans being created in God's image (*imago Dei / eikon tou Theou*) currently faces new challenges posed by the recent advances in biotechnologies and the movements of transhumanism and posthumanism which build on these technologies. While the development and implementation of IR 4.0 technologies may be conceived of as representing the innate human desire to excel, to develop one's faculties and abilities to become better adapted to face adversities of the outside environment (thus fulfilling the functional aspect *imago Dei* in humans), they can also represent potentially proud attempts to become more independent, invulnerable, and even immortal.

In facing this dangerous temptation, Christians can draw from the 2002 Vatican International Theological Commission statement entitled *Communion and Stewardship: Human Persons Created in the Image of God*. The statement reminds us that

it is erroneous and dangerous to think that »man has full right of disposal over his own biological nature,« which is why »changing the genetic identity of man as a human person through the production of an infrahuman being is radically immoral.« This theological document further argues that true improvement of humans and their shared human condition can come only through a religious experience of renewal effected by God, i.e. by »realizing more fully the image of God« in us. In their reflections on what it means to be created in the image of God, Christians are prompted to emphasize the relational and participatory aspect as constitutive not only to who humans are as persons (endowed with intrinsic dignity) but also to who humans are called to be as God's creative ambassadors in his »Garden of creation.« Christians believe that such relational, participatory agapeic love is capable of creating a real and enduring community of persons, one in which the individual takes moral responsibility for himself and others, including the natural world. Human scientific endeavors that are severed from the constitutive force of love (kenotic agape) are incapable of cultivating this kind of moral responsibility because they ultimately promote the opposite of love, which is egoism. To live as bearers of *imago Dei* is to be transformed by the Love incarnate whom Christians call Christ, the embodied Logos of God, whose Spirit pulls us into participating in the fellowship of love between the Father and the Son. To live as bearers of imago Dei is to learn to recognize one's limitations, deficiencies and brokenness, as well as the deficiencies and brokenness of the neighbor (religious and secular) and to embrace them humbly as we receive and share the selfless love of the One who has emptied himself (therefore kenotic) for our sake freely and unreservedly, (therefore agape).

Educators are especially important in this process (Nguyen and Vo 2019), as they are the ones with the privilege of shaping the characters and the minds of the next generations. They have the opportunity to speak critically and yet hopefully about the challenges of IR 4.0, helping the students take responsibility for the future development of IR 4.0 and our world. To do this, however, educators themselves will need to develop and adopt a comprehensive view of how technology is affecting our lives and impacting our environments. Instilling proper attitudes and values will be the key. Values are the basis of personal and collective judgments about what is important in life - influenced by culture, religion, and laws. They are factors in our decision-making on social, environmental and political matters, and on the best uses of our time, money, and valuable materials. If we fail to put a proper emphasis on this in our school curricula, we may wake up into a bleak future of a dehumanized world in which ›robotized‹ humanity will have lost its soul. (Schwab 2016a). As educators, we must help our students to stay informed and critically involved (as citizens, politicians, scientists, business innovators, educators, parents etc.) as they develop and use new technologies.[8]

[8] The acuteness of the need for a reform in our education efforts can clearly be seen against the background of the results of an international research conducted by Microsoft and McKinsey & Company (2018), »The Class of 2030 and Life-Ready Learning: The Technology Imperative.« The survey (Microsoft, 2018)

References

Ambrozy, Marian, Roman Kralik and Jose Garcia Martin. 2017. Determinism vs freedom: Some ethics-social implications. *XLinguae* 10, no. 4:48–57. https://doi.org/10.18355/xl.2017.10.04.05

Bernačiak, Juraj. 2018. Dôstojnosť človeka, ako subjektu, pre realizáciu spravodlivosti a lásky, vo svetle vyjadrení niektorých teológov a sociológov v XX. storočí a na začiatku XXI. Storočia. *Theologos* 20, no. 1:25–51.

Binetti, Maria, and Martina Pavlíková. 2019. Kierkegaard on the reconciliation of conscience. *XLinguae* 12, no. 3:192–200. https://doi.org/10.18355/xl.2019.12.03.14

Cao, Thu Hang. 2020. Corruption and the Building of a Developmental Government in Vietnam Today: Social and Philosophical-Ethical Considerations. *European Journal of Science and Theology* 16, no. 1:51–68.

Do, Thi Kim Hoa, and Michal Valčo. 2018. The philosophy of human rights and the 'political man': Engaging the intellectual legacy of Ho Chi Minh in a technological era. *XLinguae* 11, no. 2:608–624. https://doi.org/10.18355/xl.2018.11.02.49

Dulebová, Irina, and Radoslav Štefančík. 2017. Securitization theory of the Copenhagen school from the perspective of discourse analysis and political linguistics. *XLinguae* 10, no. 2:51–62. https://doi.org/10.18355/xl.2017.10.02.05

Globokar, Roman. 2019. Normativnost človeške narave v času biotehnološkega izpopolnjevanja človeka. *Bogoslovni Vestnik* 79, no. 3:611–628. https://doi.org/10.34291/bv2019/03/globokar

Jellema, Kate. 2006. Making Good on Debt: The Remoralisation of Wealth in Post-Revolutionary Vietnam. *The Asia Pacific Journal of Anthropology* 6, no. 3:321–248. https://doi.org/10.1080/14442210500339579

Klun, Branko. 2019. Transhumanizem in transcendenca človeka. *Bogoslovni Vestnik* 79, no. 3:589–600. https://doi.org/10.34291/bv2019/03/klun

Máhrik, Tibor. 2018. Truth as the key metaethical category in Kierkegaard. *XLinguae* 11, no. 1:40–48. https://doi.org/10.18355/xl.2018.11.01.04

Makarova, Elena V., Nina I. Kryukova, Zhanna M. Sizova, Aleksandr V. Grinenko, Maria A. Erofeeva and Liudmila A. Bukalerova. 2019. Divergence of supreme values of Russian world and Western civilization social and philosophical analysis. *European Journal of Science and Theology* 15, no. 3:97–107.

Microsoft. 2018. The Class of 2030 and Life-Ready Learning: The Technology Imperative. A Summary Report. https://education.minecraft.net/wp-content/uploads/13679_EDU_Thought_Leadership_Summary_revisions_5.10.18.pdf (Accessed December 12, 2019).

Mitcham, Carl, and Adam Briggle. 2019. The Interaction of Ethics and Technology in Historical Perspective. In: Anthonie Meijers, ed. *Philosophy of Technology and Engineering Sciences*, 1147–1191. Amsterdam: Elsevier. https://doi.org/10.1016/b978-0-444-51667-1.50045-8

Nguyen, Hung Quang, Nikolay N. Kosarenko, Elmira R. Khairullina and Olga V. Popova. 2019. The Relationship between the State and the Catholic Church in Postcolonial Vietnam: The Case of Christian Village of Phung Khoang. *Bogoslovni Vestnik* 79, no. 2:521–533. https://doi.org/10.34291/bv2019/02/nguyen

Nguyen, Thi Tho, and Cong Su Le. 2019. Nguyen Trai's thought on philosophical ethics and its value for the Vietnamese society today. *XLinguae* 12, no. 1:125–138. https://doi.org/10.18355/xl.2019.12.01.10

Nguyen, Thu Nghia, and Vo Ngoc Quan. 2019. A Critical Reflection on Jean Jacques Rousseau's Conception of Education. *Theologos* 21, no. 2:166–178.

Oborsky, Alexey Yu., Alexey A. Chistyakov, Alexey I. Prokopyev, Stanislav V. Nikolyukin, Kirill A. Chistyakov and Larisa I. Tararina. 2018. The national mentality in the history of philosophy. *XLinguae* 11, no. 3: 158–165.

Pavlíková, Martina. 2018. The power of modern technologies in the fiction of Don DeLillo. *Communications - Scientific Letters of the University of Zilina* 20, no. 1a:57–60.

Pavlíková, Martina, and Bojan Žalec. 2019. Boj za človekov jaz in pristnost: Kierkegaardova kritika javnosti, uveljavljenega reda, medijev in lažnega krščanstva. *Bogoslovni Vestnik* 79, no. 4:1015–1026. https://doi.org/10.34291/bv2019/04/pavlikova

Platovnjak, Ivan, and Tone Svetelj. 2019. To Live a Life in Christ's Way: the Answer to a Truncated View of Transhumanism on Human Life. *Bogoslovni Vestnik* 79, no. 3:669–682. https://doi.org/10.34291/bv2019/03/platovnjak

Pöhlmann, Horst Georg. 2002. *Abriss der Dogmatik: Ein Kompendium*. Gütersloh: Kaiser, Gütersloher Verlagshaus.

Quantified Self Institute. 2016. What is Quantified Self?. https://qsinstitute.com/about/what-is-quantified-self/ (Accessed January 8, 2020).

Rouse, Margaret. 2019. Internet of Things (IoT). https://internetofthingsagenda.techtarget.com/definition/Internet-of-Things-IoT (Accessed January 4, 2020).

Sandner, Philipp. 2017. Chances and Risks of Industry 4.0. 11 July. https://blog.normagroup.com/en/chances-and-risks-of-industry-4-0/ (Accessed January 6, 2020).

Schwab, Klaus. 2016a. The Fourth Industrial Revolution: what it means, how to respond. 14 January. https://www.weforum.org/agenda/2016/01/the-fourth-industrial-revolution-what-it-means-and-how-to-respond/ (Accessed January 20, 2020).

– – –. 2016b. *The Fourth Industrial Revolution*. Geneva: World Economic Forum.

Sharon, Tamar. 2014. *Human nature in an age of biotechnology: The case for mediated posthumanism*. Philosophy of engineering and technology 14. Dodrecht; New York: Springer Science & Business Media.

Solomon, Mildred. 2016. The 4 big ethical questions of the Fourth Industrial Revolution. 10 October. https://www.weforum.org/agenda/2016/10/how-can-we-enjoy-the-benefits-of-the-fourth-industrial-revolution-while-minimizing-its-risks/ (Accessed January 25, 2020).

Stegu, Tadej. 2019. Transhumanizem in krščanska antropologija. *Bogoslovni Vestnik* 79, no. 3:683–692. https://doi.org/10.34291/bv2019/03/stegu

Strahovnik, Vojko. 2019. Vrline in transhumanistična nadgradnja človeka. *Bogoslovni Vestnik* 79, no. 3:601–610. https://doi.org/10.34291/bv2019/03/strahovnik

Šoltés, Radovan. 2018. Vzdelanie a výchova k sociálnemu cíteniu ako neustály zápas medzi hľadaním spravodlivosti a konfrontáciou sa s ľudskou hriešnosťou podľa sociálnej náuky Cirkvi. *Theologos* 20, no. 1:81–90.

Taylor, Charles. 1989. *Sources of the Self: The Making of the Modern Identity.* Cambridge, MA: Harvard University Press.

– – –. 2007. *A Secular Age.* Cambridge, MA; London, UK: Harvard University Press.

Tavilla, Igor. 2017. Despair as eternal damnation of the self: A Biblical anthropology in outline. *European Journal of Science and Theology* 13, no. 3:163–173.

Tavilla, Igor, Roman Králik and José García Martín. 2018. La testimonianza di Kierkegaard nel quinto centenario della Riforma. *XLinguae* 11, no. 1:354–361. https://doi.org/10.18355/xl.2018.11.01.30

Tavilla, Igor, Roman Králik and Marie Roubalová. 2019. Abraham and the tortoise: Eleatic variations on Fear and Trembling. *XLinguae* 12, no. 4:219–228. https://doi.org/10.18355/xl.2019.12.04.19

Truong, Thi Thanh Quy. 2019. The importance of personality in the context of human education: global experience and Vietnamese philosophical perspectives. *XLinguae* 12, no. 4:192–211. https://doi.org/10.18355/xl.2019.12.04.17

Tyurikov, Aleksandr G., Nikolay N. Kosarenko, Tatiana B. Gvozdeva, Marianna V. Voronina, Elena Ye. Grishnova and Natalya A. Solovyeva. 2018. New social reality in the context of information and communication technologies. *XLinguae* 11, no. 3:37–75. https://doi.org/10.18355/xl.2018.11.03.06

Valčo, Michal. 2011. GMO and Christian faith: theological and ethical aspects. In: Dana Hanesová, ed. *Biblia a etika: etické dimenzie správania; zborník z medzinárodnej teologickej vedeckej konferencie organizovanej dňa 1. marca 2011 v Banskej Bystrici*, 178–188. Banská bystrica: Pedagogická fakulta-Univerzita Mateja Bela. https://doi.org/10.15584/di.2016.11.12

Valčo, Michal. 2019. Living the faith in a secular world: Lessons from Charles Taylor. In: Robert Petkovšek and Bojan Žalec eds. *Religion as a Factor of Intercultural Dialogue*, 49–57. Vienna; Zurich: LitVerlag.

World Economic Forum. 2017. Ethics and Identity: Innovations are redefining what it means to be human; Fourth Industrial Revolution – Summary. https://toplink.weforum.org/knowledge/insight/a1Gb0000001RIhBEAW/explore/dimension/a1Gb00000027vYwEAI/summary (Accessed January 22, 2020).

Žalec, Bojan. 2019a. Between Secularity and Post-Secularity: Critical Appraisal of Charles Taylor's Account. *Bogoslovni Vestnik* 79, no. 2:411–423. https://doi.org/10.34291/bv2019/02/zalec

– – –. 2019b. Liberalna evgenika kot uničevalka temeljev morale: Habermasova Kritika. *Bogoslovni Vestnik* 79, no. 3:629–641. https://doi.org/10.34291/bv2019/03/zalec

Žalec, Bojan, and, Martina Pavliková. 2019. Religious tolerance and intolerance. *European Journal of Science and Theology* 15, no 5:39–48.