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Cyber threats and opportunities embedded in the Fourth Industrial Revolution

by Oleksandr Tsaruk

"The more we think about how to harness the technology revolution, the more we will examine ourselves and the underlying social models that these technologies embody and enable, and the more we will have an opportunity to shape the revolution in a manner that improves the state of the world."

— Klaus Schwab (2017), The Fourth Industrial Revolution

Nowadays, we are facing new phenomena in social and economic life the fourth industrial revolution (or Industry 4.0/X.0) that began in the XXI century by the development of digital uprising. Underlining the cyber (IT, digital, data etc) megatrends, which move the further social and economic development is the key element for defining future challenges and opportunities.

The founder of the World Economic Forum, Klaus Schwab (2016), underlines that "The fourth industrial revolution is not just about smart and connected machines and systems: its scope is much wider. Waves of further breakthroughs are occurring simultaneously in areas ranging from gene sequencing to nanotechnology, from renewables to quantum computing. It is the fusion of these technologies — and their interaction across the physical, digital and biological domains — that make this revolution fundamentally different from its predecessors."

On the current stage of development, this phenomenon has two limiting factors that may constrain its potential and further expansion: the leadership and the knowledge of Industry 4.0.'s benefits and threads. The world just discovered and started to recognise the basics of Industry 4.0., therefore the understanding of the future as in public or private sector is low. Institutional frameworks of corporate and public governance are to be reinvented to diminish the disruption of future business and social challenges on a national and global scale.

Rapid implementations of innovations require the adequate response in governance. However, the third industrial revolution caused the serious structural changes in wealth and income distribution. This systematic change forced the

development of inequality in the society. Moreover, the solution to this is not invented yet.

Prospect of jobs in various sectors has been impacted and almost become extinct due to the blazing advancement in computer technology. Its consequences can be felt from enhanced industrial robotics to automated translation services. Every sector in a global economy are derivatives of these new and powerful technologies.

No one knows the impact of these tech innovations better than the people who worked in automotive manufacturing or travel agencies. Their jobs have been replaced by automation, robotics and the software powering these innovations. Skill upgrade and behaviour alteration are the new demands of the disruptive technological environment.

More jobs are getting destroyed then new jobs are being created by the new disruptive technology and its repercussions are felt deep on the job sector, and in the same time growth and median income have almost frozen.

There are no any doubts among business leaders about the future disruption of their business models, products and services and the main question the answer they want to receive is when the industry 4.0 will disrupt their business. WEF recently suggested for discussion three main categories of "megatrends" which will change the way of life and business by 2025:

- "physical megatrends" (self-driving cars. 3D printing, human argumentation and robotics),
- "digital megatrends" (as an Internet of Things and digital platforms)
- "biological megatrends" (as gen modification etc.).

The recent survey made by Accenture, shows that the privet sector needs to take responsibility for developing policies for the better governance of emerging digital industries and ethical challenges (Accenture, 2018).

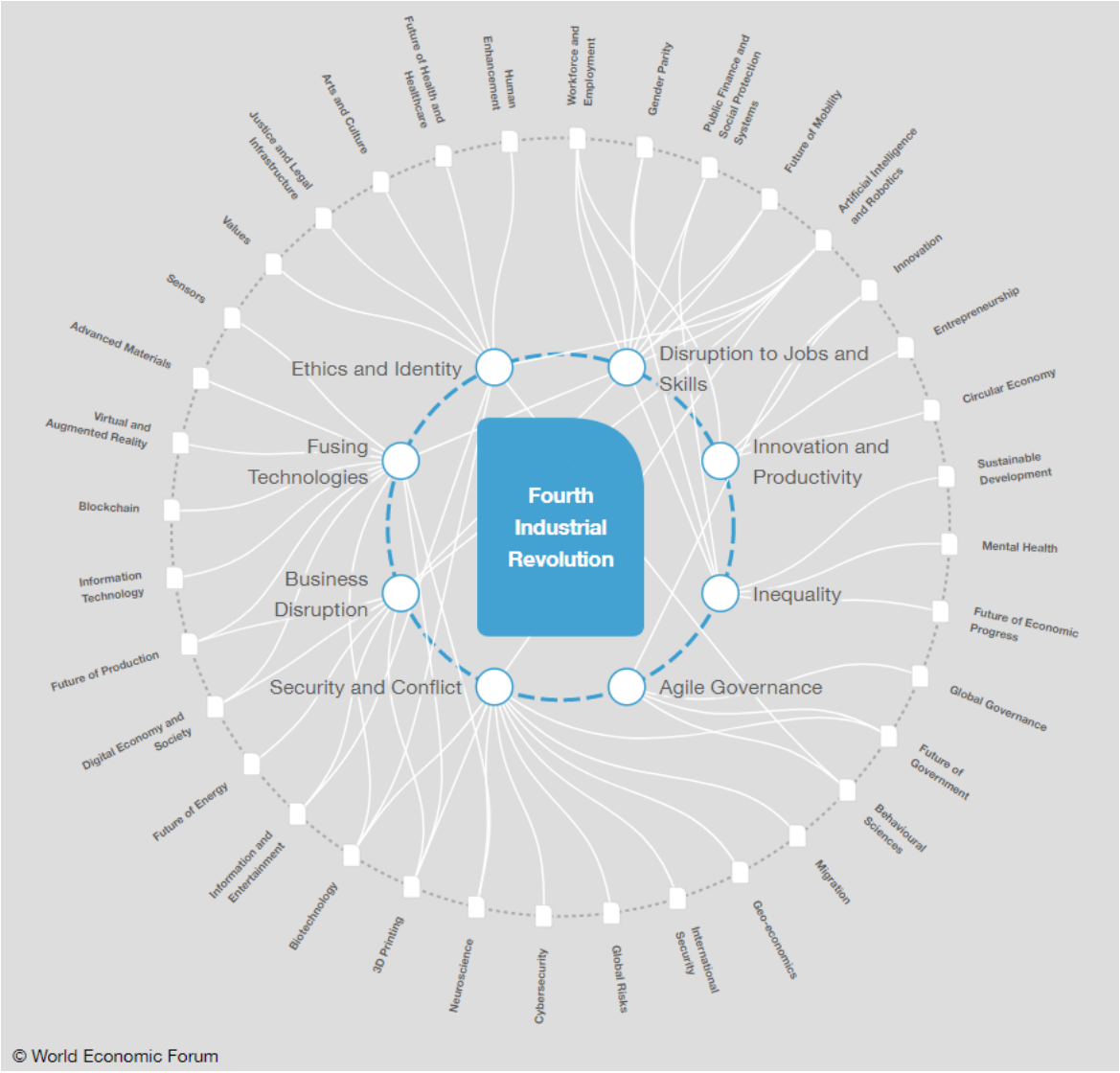
The forecast of Accenture also gives us another perspective of understanding of the future:

- It says that in less than 5 years, for all business will be as a must to have a mature digital strategy to operate across industries as Tesla does today. For the companies which will follow this approach, the industrial limitations will be wiped out.

- by 2020, business will operate in smart contracts ecosystems. Moreover, the new way of business will be wholly governed by self-managed and self-executed smart contracts.

- we will witness the uprising of numerous new smart examples of autonomous industrial and global governance.

As the 4th Industrial Revolution denote a complete makeover of our individual lifestyle, jobs we do and the way we relate to others. This proves that we are facing the new episode in human history. We already showed that numerous innovations are being melted in the physical, digital and biological dimensions which created megatrends of potential danger and huge promises at the same time. On the figure below show the basic issues related to uprising mega-changes of Industry 4.0.: Disruption of Jobs and Skills, Innovation and Productivity, Inequality, Agile Governance, Security and Conflict, Business Disruption, Fusing Technologies, Ethics and Identity. We will also underline the core related insights to each one.



According to WEF TopLink (2018**), Disruption of Jobs and Skills** has related insights on Gender Uniformity, Social Security Systems, labour and its employment, Future of Agility, Public Finance, Artificial Intelligence and Robotics. Most of these aspects we already described and it is obvious that a shift in business models change employment landscape.

Innovation and Productivity drove by insights of new forms of entrepreneurship, sustainability and circular economy with shape new goods and services which have not been measured yet and are non-rival. They would be also repeated again and again on circular basis without extra costs and pollution. Use of digital platforms will diminish margins and prices in highly competitive industries. This requires new types of statistics, as traditional productivity statistics may fail. Industry 4.0 will also call for new forms of management with new sets of skills and mindset in society.

Inequality challenges are determined by gender parties, values distribution systems, sustainable economic and human development.

Agile Governance will transform and recreate new forms of global and regional governance and this is closely related also to behavioural sciences innovations but not only digital as e-governance. Industry 4.0 can let governments be more efficient and agile, more accessible transparent and better-tracked society. Nevertheless, technological innovations and open data/open governance initiatives will require a new social contract between government and constituency.

Being more agile should not be the final goal for governance for continuous progression for policymaking in conditions of uncertainty. Future will require more agile policy-making procedures in the resilient environment to social, economic and technological changes. The way of governance with also influence on the macro factor of competitiveness. The multi-stakeholder model applied nowadays in internet governance might be applied in more dimensions of social and business life.

Security and Conflicts will be caused by insights from migration, new forms of government, international security cooperation, global risks, threats of cybersecurity, and neuroscience, AI and robotics and bioengineering.

The character and scale of conflict will be nullified by Industry 4.0. Future will erode peculiarities peace and conflict and new technologies will make the globe as a possible battlefield in physical and cyber dimension as some groups can recruit fighters globally, mostly through social media. Current conflicts already got hybrid in nature with a combination of conventional battlefield methods with elements of informational and cyber warfare driven by on government actors. Non-military and

non-governmental systems now are as the target for cyber warfare where there is no visible and defined enemy. In physical dimension, unmanned warfare all robots will play a transitional role in future battles in the land, air but on the sea and in the space. Development of neuro-technologies can open a new "Pandora box" when a computer could take control over human consciousness and used convert it to bionic bot.

Business Disruption will be determined by such insights as for future mobility, new forms of entertainment and information sharing, energy sources, digital society and economy, AI, 3D printing robotics.

Fusing Technologies are the benefits of the synergy of AI and Robotics, neuroscience, IT, digital society and economy, VR and AR, 3D printing, advanced materials, IoT biotechnology etc. This is a terra incognita of unknown and undiscovered possibilities for business.

Ethics and Identity will be affected by such insights as new justice and legal infrastructure, new arts and culture on new entertainment space, future of health and healthcare, behavioural sciences, biotechnology and human enhancement. Innovations today raise the question of what it means to be human.

Data privacy now today already the fully occupied time of media and policymaker and world is seeking an answer to the question what personal data about health, for example, should be shared. Do we have any right on changing our genetic code of future and past generations? Should we deal with AI machines, which have some kind of human abilities or does AI has right to make life-or-death decisions during battle? Related to data privacy, cybersecurity and online identity issues are becoming more and more vital for policymakers, civil society and companies.

Modern society is also facing dependency of interpersonal relationships with technology, which has negatively affected on our social skills, and ability to empathize as an example. Some researchers explain this phenomenon by decreasing face-to-face conversation and development of online interaction (Paul, 2010). As the consequence millennial will need to develop abilities to read body language, to make eye contact or to listen. To overcome these challenges for human nature Industry 4.0 might help raise some tools for social cohesions instead of developing individualism and help with sharing ideas of humanity.

The trends for the next decade

Applying of Innovations in AI and machine/deep learning etc. remain a factor of the need to be monitored by all stakeholders - business, academia, government and

civil society. AI can be applied in supervision cases over human, automated workforces, safeguarding legal and regulatory decisions, and even carrying out HR functionalities.

Machines empowered by AI run with enormous datasets and patterns programmed into them. This creates an opportunity to apply a sophisticated tech into various industrial applications with which humans cannot compete. A robot as coordinator or machine operator is the next reality as soon as AI adopts to thinking patterns of the human brain.

In the same time, the methods of the machine's accountability and human control of the AI-driven cyber-physical system are the real challenge for all kinds of governance, and the cybersafety of the Industry 4.0. is the real matter to convert cyber threads to the opportunities. Therefore, the cybersecurity solutions and governance are wider space for innovation and applying new ideas which go far beyond the existing scope of IT solution to human and machines interaction.

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Short version For Blogs and quotes

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The trends for the next decade and conclusion are available in full version.