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Digital Poland Foundation

KICEIT

A SHORT TALE OF SOCIETY 5.0

HOW TO LIVE AND FUNCTION
IN THE TIMES OF INDUSTRY 4.0
AND 5G NETWORK

The report entitled
**„A short tale of Society 5.0. How to live and function
in the times of Industry 4.0 and 5G network”**

is an important step towards enlargement of knowledge
and development of every citizen in our country.

We support this initiative, the postulates and recommendations
included in it.





A SHORT TALE OF SOCIETY 5.0, HOW TO LIVE AND FUNCTION IN THE TIMES OF INDUSTRY 4.0 AND 5G NETWORK

Issue	first, Warsaw, June 2019
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Publisher	Polish Economic Chamber of Electronics and Telecommunication, Digital Poland Foundation
DTP	Jarosław Witkowski
Print	Poligrafus

FROM AUTHORS

We give readers 'A Short Tale of Society 5.0. How to live and function in the times of Industry 4.0 and 5G network', written as a result of caring for the future of Poland and its next generations. We wrote it with the conviction that it is possible to change and refine a lot, and above all to improve the quality of our lives. Most of us work from morning to evening. Sometimes we are so busy that even when we rest, we think about work. Many wonder if this must be so. Is our economic system working well? Is my work worth something or is someone using me? Seeing those who are doing better, some are jealous, others become convinced that they are being robbed. We notice that some people live more comfortably because they were born well, but there are also those who enter things lightly. Lucky ones? Or maybe unique and brilliant? Germans work about 600 hours less a year from us (1), and earn almost three times as much. All geniuses? We think that they simply understand and see what we cannot see because we keep walking with our heads down. We're always looking at our feet and we are only interested in what happens tomorrow.

Most of us do not read the press and do not listen to public discussions, because they do not relate to the problems we face every day. Everybody stopped reading saying that we do not have time for this. And because we have not read for a long time, we even lost the ability to find appropriate reading and broaden our mental horizons. We mainly learn about the world and the environment from electronic media, including social media. Marketing and PR specialists – both for private companies and political parties – have noticed this a long time ago, so do not be surprised by the fact that they tell us only a part and in a way so we can take the bait and give them our vote. And there is nothing wrong with it. These are offers, and the offers do not praise the competitor's goods, or broaden mental horizons, or solve urgent problems of the country. A good seller will not say "go to another store" or "do not buy, just do it yourself, because it will be better, healthier and cheaper". In short, to improve their fate and make better choices, people must raise their heads and observe the world with their own eyes. There is no reason why we cannot live the same way as Germans, Finns or Danes.

That is why we decided to write "A Short Tale of Society 5.0. How to live and function in the times of Industry 4.0 and 5G network". We try to tell why in Poland there is a need to change the way of thinking. Back in 1989, Poles raised their heads and set goals that were unrealistic at the time. But they believed in themselves and that is why Poland became a country of economic miracle, admired in the world for continuous economic growth. When at the Polish People's Republic station arrived the "History" train with the "Capitalism, NATO and EU" wagons – we went on a 30-year journey to the EU-East Economy station. Today at this station there is a train with wagons called Industry 4.0, 5G network and Society 5.0. They leave for the EU Welfare station – West. A long journey awaits us, but without doubt it is calmer and more comfortable. Most of us think that the path we have taken is shorter than the one in front of us, but the map shows something different.¹

Economic miracles happen mainly during times of breakthroughs. That is why we have another chance. We have freed ourselves from the stagnation of backwardness, and now we have a chance to jump into modernity and prosperity. In 30 years, Poland may become one of the best settled and friendly places to live. And how it really going to be depends only on ourselves.

We hope that you will find some time to find out what we need to do together and which station to get to. We believe that after reading this report, you will think about what else you can improve to live a decent life thanks to liked job. Every day we see the ingenuity and entrepreneurship of Poles, which is why we believe that we will finally take on innovation and cooperation. We need modern, workaday fantasy, but also cooperation, because it is what characterizes economically advanced countries. By making the change together, we will stop being afraid of risk. If the courage to dream awakes in us, we will achieve success, the joint success of each and every one of us.

dr inż. Jarosław Tworóg – vice-president, Polish Economic Chamber of Electronics and Telecommunication
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¹ According to „Workforce View in Europe 2019”, edited by ADP

CONTENT

OD AUTORÓW	3
I. INTRODUCTION	7
II. VISION OF THE FUTURE IN NUMBERS	11
A) Science, Education, Training	12
B) Telecommunication, 5G network	13
C) Protection of climate and environment	15
D) Economy	15
E) Health service and healthcare	16
F) E-country	16
G) Cybersecurity	16
III. ECONOMY OF THE FUTURE	17
IV. SOCIETY 5.0	27
V. DEVELOPMENT BARRIERS	31
VI. HOW 5G WILL CHANGE OUR LIVES?	41
VII. WHAT WILL ACCELERATE THE DEVELOPMENT OF ACCESS 5G NETWORK?	47
VIII. SUMMARY	51
ATTACHMENTS	60



CHAPTER I

INTRODUCTION

GENESIS

In 2015, the Polish Chamber of Commerce for Electronics and Telecommunications (KIGEiT) developed the Digital Infrastructure and Industry Development Program (PR-CIP)². It defines the scope and method of monitoring the pace of innovative economic development. On the basis of this program, KIGEiT conducts consultations and periodic reviews of achievements and challenges carried by digitization and technical progress. This publication is one of the products of this program and expresses concern at the lack of decisive actions supporting digital innovations. We found ourselves as a society in a drift and at a particularly dangerous moment. After achieving the great goals defined thirty years ago, we do not set ourselves any new ones. We seem to be tired of changes. Meanwhile, the global economy entered a period of breakthrough initiated by the development of artificial intelligence. This marks the time of research and many socio-economic reforms. The lack of an active socio-economic policy adapting us to the new situation may slow our development down for decades. We are facing the threat of leaving the club of developed countries, and with unfavourable changes in the external environment, we can even again find ourselves in a group of undeveloped countries. To best describe the social aspects of this process, we have invited for cooperation the Digital Poland Foundation.

Phenomena of blocking technical and civilization development have social approval. We are increasingly neglecting the value of practical scientific knowledge. The public's vulnerability to misinformation and propaganda sabotage is growing. The negation of scientific and technical knowledge concurred the popularization of myths, including those about:

- cyber-threats – stories without basis on facts, having their source in politics,
- destructive influence of artificial intelligence (then referred to as „AI”) – thesis without support in reality,
- harmfulness of the electromagnetic field and cellular network – undermining the results of scientific research,
- ecological and climate conspiracy – theses contrary to knowledge about real climate change.

These are examples of myths that are beginning to have a real impact on politics, the economy and the law making process. This disease burns up all areas of social life. Such mythologies have a devastating effect on the culture of rational and logical thinking, the practical value of science and constitute economically harmful misinformation. They reduce human trust, which is the foundation of every cooperation. We have already noted the increase in the number of incidents for which the anti-vaccine movements are responsible. The efficiency of business models created by Flatlanders is amazing, in a way of enabling them to extort money. These phenomena signal the weakness of education, teaching and social communication systems. Social media have become as much a manifestation of the digitization of social life, as a tool for spreading myths and lies. That is why we have prepared a publication about the challenges of the modern economy. We propose that readers become familiar with the current opportunities of improving the well-being of everyday life. We express an optimistic conviction, because in the end it depends on them whether we will use these possibilities. Without their will and active support, they will not be employed.

Phenomena of blocking technological and civilization development have social approval. We are increasingly neglecting the value of practical scientific knowledge.

MAIN THESIS

Digitization has been the source of over 60% of all innovations for decades and is the technological essence of the third stage of industrial development. Its capstone is the preparation of technical means needed to commercialize achievements in the field of artificial intelligence. There is no doubt for the digital business that:

² The Program is being constantly updated.

- the essence of digitization will be networking and using AI algorithms to switch to Industry 4.0 (I4.0), which pace of development will determine the whole economy's competitiveness;
- without the 5G network, it is impossible to develop Industry 4.0, because maintaining the competitiveness of the Polish economy requires the involvement of Polish companies in global, digital production and service networks;
- access to the latest technologies, including 5G, is a condition necessary for fulfilling economic ambitions and social expectations, because we need health care, schools, social care, environmental protection and many other services that improve our lives.

The main object of designing the functionality of the next generation electronic communication network (5G) was to meet the needs of manufacturing plants for electronic communication services that cannot be provided through current networks. A network was designed for industry and the Internet of Things, supporting the revolution through super-fast speeds and new opportunities for smart cities. After developing this new network concept, we are just beginning to understand how this can improve our daily lives.

TOPIC RANGE & PROBLEMS

After developing and implementing the necessary functionalities, practical tests and consultations were carried out. It turned out that 5G networks may have greater than expected socio-economic significance, as they will change the way work is done. We have already noticed that we are witnessing an industrial transformation which is the mainstream of a larger process, which we called the construction of the Industry 4.0. This economy requires scale, so it develops fastest in large economic areas – European, North American and Asian (EEA, NAFTA, China). Economic forecasts based on the expectations and technical capabilities of enterprises signal the need for significant changes in the organization of economic life and equally intense social reforms.

In Japan, there is a growing belief that we are in the process of an industrial and cultural revolution closed in the concepts of Society 5.0, Industry 4.0 and globalization. Appropriate use of this mega trend can lead to a significant improve of social state. In addition to changes in economic law, we

should prepare and implement the entire package of reforms in education, teaching, social communication, standardization and development planning. Most of the subjects we touch here are generally underestimated because the visible impact of AI implementation is still weak in all areas of human activity. The historical significance of our time can only be understood by referring to the past. We are at the moment when we invented something that will soon be more important for our lives than if we invented the steam engine, electric motor and computer at the same time.

We are at the moment when we invented something that will soon be more important for our lives than if we invented scripture, steam engine, electric motor, nuclear bomb and computer at the same time.

Without providing this knowledge to the citizens and without gaining the interest and support of the majority of the society – we will not be able to go smoothly through the beginning of the economic transformation process. Therefore, on the list of priorities the highest positions are held by education and informative programs which will be able to provide such support. Society, business, state and local government authorities should thoroughly understand how important this is for our future. We should immediately proceed to action based on a common set of ad hoc, short, medium and long-term goals. A clear description of what we are striving for in the perspective of the entire generation should be combined with an indication of the listed goals. Every conscious participant in this process should understand and see the compliance of activities with the vision of a better future. We should enter a state of social emotion in which the awareness of any barrier hindering or delaying the achievement of set goals should force us to act. Only this way can we count on active social support.

COMMUNICATIVENESS

The world is becoming more and more complicated and thus incomprehensible to most people. Along with the accelerating development of the knowledge society and the rising tide of industrial transformation – are created thousands of reports that try to accurately describe the changes taking place. They are tools for planning economic policies of countries, industries or companies. They are addressed to the world of narrowly specialized experts, officials and professionals, enclosed in their "silos". They contain a huge amount of knowledge in the form of numerical data, charts, tables and detailed information/recommendations. The already accumulated knowledge allows to understand the pace and scope of changes taking place. The scale of the problem has caused that we have come to a state in which experts in narrow areas are unable to combine the multitude of these complex "details" into an "understandable whole". Specialists also stop understanding each other, and this further strengthens the increasingly common distrust. Increasingly, we are convinced that if someone explains something for too long and in too complex manner, they probably play games. In order for information in the form of an "understandable whole" to reach the real decision-makers, like citizens-voters, the problem must be described in a comprehensive, simple way, without going into details. That is why we have undertaken a breakneck task – justifying the need for quick decisions opening the way to the construction of 5G networks and Industry 4.0 in a concise and understandable way.

ADDRESSEE

In conclusion, we would like to express the hope that readers of this study (scientists, engineers, economists, politicians, officials and experts from all other fields who have described and read the mentioned "nitty-gritties" in countless reports on 5G, Industry 4.0, artificial intelligence, production technologies, Society 5.0) want to accept this very simplified, but thanks to this "understandable whole" as an important specific that must reach people so that we as a society can move on to the next journey.

Bearing in mind Einstein's message that the way of describing the world should be simple, but not

simpler, sometimes we have to use "wise words", but we believe that we have not degraded the readability of the text, also for people who do not have much in common with technology and economy on everyday basis.

5G technology, Industry 4.0 etc. are facts. We treat them like a large screen with 8K resolution. We try to show a film about the future that is happening today. This "understandable whole" is this film, and the recipients can believe us without having to understand how the screen works. That is why they do not have to explore Maxwell's equations, circuit theory, solid state physics, quantum computers, etc., so we decided that there is no need to even mention them.

This is not the only "movie" that can be shown on this screen. We want to show this future as an optimistic one for Poland. To all pragmatists, we assure you that the civilizational reform we undertook in 1989 was much deeper and "less realistic to implement than today" than the one we are proposing for the next 30 years. However, it requires the same solidarity, wisdom and imagination that we had 30 years ago.



CHAPTER II

VISION OF THE FUTURE IN NUMBERS

The story of prosperous and secure Poland can only be realized if it is a chapter in the story of an idea for a prosperous Europe – i.e. an integrated European Union. Let's start with the answer to a simple question – who invented it and for whom? It is a product of the joint work of many scientists and experts who study the needs of citizens and the possibilities of meeting their daily expectations. It is obvious that the dreams of the inhabitants of different parts of Europe are different in details, but they have a common part. Describing this common part is the task of the European Commission – an institution which we have created to carry out such tasks together. At the end of 2018, the Commission presented us with the EU 2050 vision³.

From that moment on, every country, local government, and entrepreneur organization has the opportunity to shape its local visions, so that thanks to our joint action we could have a synergy effect, so that 2 + 2 would be much larger than four. The long-term strategy must include specific actions that must be taken immediately. Since digital industry companies have a leading role in creating the economy and society of the future, it is not surprising that they first translated this into specific objectives.

This is how the plan for the first stage was created (till 2025). Guided by it, entrepreneurs will develop technologies and invest⁴. All organizations of digital enterprises operating in Poland have signed up to this. Therefore, we have specific declarations of those who accept the goal and spend their money.

History has shown us that EU countries are implementing jointly adopted plans to the extent that their citizens accept them. Their implementation can be accelerated and improved by actively involving citizens in practical activities at the local level (villages, municipalities or cities).

We deliberately start with numbers so that every reader knows that the ideas have been thought out, arranged in a coherent whole. Quantitative goals are the result of agreeing on needs and options. The economic vision of 2050 is an economic opportunity to achieve social justice, which can be understood differently in each country. It is also a plan for us, defining the next thirty-year of the modernization of Poland. We have ordered it in such a way that each indicator describing the European goal has been detailed and armed with local activities until 2025 and proposals for actions for the next five years.

SCIENCE, EDUCATION, TRAINING

TILL 2025

- EU countries should spend a minimum of 3% of GDP for research, development and innovation (R & D & I).
- 10% of expenditure on R&D should be directed to ICT.
- 90% of people without formal digital education should become regular internet users; currently, 61% of less-educated EU residents use the Internet less often than once a week.
- 6% of working women should become specialists in electronics and information technology (ICT); Currently 1.4% of EU women work as ICT specialists.
- 52% of employees in need of upgrading qualifications should be given this opportunity; currently only 20% of EU employees receive such support.

POLISH PERSPECTIVE

- 2019 - establishment of a fund for the implementation of the National Strategy of AI in the amount of PLN 10 billion and establishment of AI one of the three main pillars of the development of society in Poland.
- Integrate and promote adult learning programs as Long Life Learning (LLL).
- By 2022, introduce a specification of the minimum technical requirements for student and school electronic equipment (smartphones, tablets, notebooks and networked desktop computers, AR/VR aids).
- By 2022, offer open and full access to e-textbooks for students and parents on the OSE platform on the basis of textbook applications.

³ https://ec.europa.eu/clima/policies/strategies/2050_pl

⁴ <https://www.digitaleurope.org/policies/strongerdigitaleurope/>

TILL 2025

- Stop the increase in staff shortages in the field of cyber security; according to current data, by 2022 in the EU there will be about 350,000 specialists in this field.
- 30% of employees should receive specialist ICT training from their employers; currently only 23% receive such training.

POLISH PERSPECTIVE

- By 2024, intensify the universal lifelong learning system for one month (approx. 120 hours of workshop and training classes).
- By 2024, develop a plan for the implementation of diversified activation programs profiled for the natural disposition of students.
- By 2025, finish works on programs activating cooperative and social attitudes, and allow their use in practice.
- By 2025, start implementing a descriptive assessment system for primary education along with pupils' descriptive assessment for graduating from primary school.
- By 2030, introduce free programs of professional activation and liquidation of unemployment, together with the obligation to participate in professional activation training for persons applying for unemployment benefits.
- By 2030, start the process of implementing descriptive assessments in secondary education.
- By 2034, start the process of implementing descriptive assessments in higher education.

TELECOMMUNICATION, 5G NETWORK

TILL 2025

- 100% of households should have access to the LTE network; currently, 10% of households in the EU do not have access to the LTE network.
- 70% of households should have internet access above 100 Mbps.
- 40% of employees should be within 5G network coverage.
- 70% of industrial areas should be within 5G network coverage.
- 80% of main communication routes should be within 5G network coverage.
- National Broadband Plans should be part of the implementation of the 5G network.
- Women should become specialists in electronics and information technologies (ICT); Currently 1.4% of EU women work as ICT specialists.

POLISH PERSPECTIVE

- By 2020, harmonization of PEM with standards recommended by WHO.
- By 2022, automating the process of assessing the impact of PEM on the environment by simulating calculations in SI2PEM and in case of exceedances' absence - automatic submission of reports to the relevant authorities with automatic consent.
- By 2022, simplify the construction process for small BTS and microcells, with a maximum process duration of 3 months.
- By 2023, opening of all pilots related to autonomous vehicles and transport communications on the Łódź-Warsaw highway.
- By 2025, launch of 5G on major communication routes.

TELECOMMUNICATION, 5G NETWORK

TILL 2025

- 52% of employees in need of upgrading should be given this opportunity; currently only 20% of EU employees receive such support.
- Less than 10% of people should be afraid of shopping online; Currently, 19% of users do not shop online because they fear of cyber theft
- Stop the increase in staff shortages in the field of cyber security; according to current data, by 2022 in the EU there will be about 350,000 specialists in this field.

POLISH PERSPECTIVE

- By 2028, full using of 5G communication for emergency and uniformed services (PPDR) - migration from current solutions of TETRA.
- By 2030, pull optical fiber along all power lines, roads, streets, and tracks.
- By 2035, min. 80% of rural households and 100% of urban households should be equipped with optical fiber. It is less ambitious than the electrification of 1950-1967 and infinitely cheaper.
- By 2040, 5G infrastructure should be available along all roads and streets, allowing autonomic car use.

PROTECTION OF CLIMATE AND ENVIRONMENT

TILL 2025

- The EU should reduce CO2 emissions by 26 billion tonnes by digitizing the sectors that are the main emitters.
- 15% of all materials used in the economy should be recovered and reused.

POLISH PERSPECTIVE

ENERGY PRODUCTION

- By 2020, open the market for private and prosumer investments in renewable energy, energy storage and distributed micro network management systems.
- By 2024, cover the country with LTE 450 MHz.
- By 2025, join all electricity measuring points to the universal telecommunications network and provide these links on-line to citizens, also to provide off-meter, non-numerical services.
- By 2025, a ban on the construction of emission sources of electricity should be introduced.
- By 2030, modernize the national electricity management system to connect all private and prosumer investments.
- By 2035, withdraw coal as a fuel for central heating.
- From 2035, introduce an obligation to supply central heating with heat pumps.
- By 2045, switch the power market to feed from energy storage.
- By 2050, shut down all heating plants, combined heating and power plant and coal (coal/lignite) power plants.

CITIES

- By 2021, introduction to the Polish legal order of tasks for public institutions related to the implementation of smart cities.
- By 2024, construction of a central platform for Smart City and standardization of API for cities with exposure for companies and citizens.

PROTECTION OF CLIMATE AND ENVIRONMENT

TILL 2025	POLISH PERSPECTIVE
	<ul style="list-style-type: none"> – By 2023, specify the minimum technical specifications for road traffic for autonomous vehicles and autonomous agricultural machinery. – By 2025, designate areas for driving autonomous vehicles, including taxis, in the main 5 cities of Poland. – By 2025, implement parking space management applications in two voivodship cities. – By 2027, install fast charging stations for electric vehicles along the main routes connecting Polish cities. – By 2040, ban the use of emission vehicles in cities. – By 2040 public transport should be switched to autonomous electric vehicles as part of Smart City with a capacity in between 2 and 40 people.

ECONOMY

TILL 2025	POLISH PERSPECTIVE
<ul style="list-style-type: none"> – Above 15% of small and medium-sized enterprises should be exporters, currently only 8.5% of SMEs sell abroad. – 30% of EU manufacturing companies should benefit from Big Data processing. – 25% of global business gazelles should come from the EU, in 2017 the EU with the scores of 11.6% was far behind the US and China. 	<ul style="list-style-type: none"> – 2019 - establishment of one institute responsible for AI and implementation of the strategy's aims, as well as effective monitoring. – 2019 - establishment of one institute responsible for data, its management and setting standards. – 2019 – kick-off of the Polish Future Platform Foundation program. – By 2022, launch of pilot SME clusters for Industry 4.0. – By 2022, launching pilot farms in each voivodship, where the latest ICT solutions in the field of agricultural automation are tested. – By 2022, launch of the first trusted data sources (Data trust) for storage and exchange of data between business entities. – By 2024, implementation of the program and plan at the NCBR and NCN in the amount of PLN 5 billion. – By 2024, launching assistants (bots) in all relations with the citizen (helpline, chat, mailing). – By 2025, Poland should aim for finishing EU's work on technical specifications and law for cooperation between production/service facilities within Industry 4.0. – By 2025, introduce field monitoring in terms of used fertilizers and to control EU subsidies using drones. – By 2025, launch of a pilot farm/orchard with, for example, apple harvesting machines. – By 2027, launch of facial recognition and voice biometry systems in the main channels of contact with government administration. – By 2027, launching a country's hydration control system based on a sensor network to support proper drainage. – By 2030, introduce a robotics program for mechanical devices such as autonomous tractors for farms.

HEALTH SERVICE AND HEALTHCARE

TILL 2025	POLISH PERSPECTIVE
<ul style="list-style-type: none"> – 30% of EU citizens should benefit from medical care and online medical services; currently around 18% of the EU use this type of services. 	<ul style="list-style-type: none"> – By 2022, development of principles for data access and anonymization in key sectors of the economy, such as health (medical data). – By 2023, implementation in selected hospitals computer medical assistants who transcribe the doctor's words into a computer text, which will shorten queues. – By 2024, launching a pilot version of health monitoring for 50,000 patients. – By 2030, introduce free electronic health monitoring.

E-COUNTRY

TILL 2025	POLISH PERSPECTIVE
<ul style="list-style-type: none"> – 70% of EU citizens use e-country. Currently, around 18% of the EU use this type of service. 	<ul style="list-style-type: none"> – By 2022, providing a common computing platform and public cloud for administration. – By 2022, building one competence center for IT procurement and standardizing public procurement templates for modern solutions for local governments such as chatbots. – By 2022, providing conditions for Digital Identity from 4 sectors of the economy: Banking, Postal Services, Telecommunications, e-Commerce. – By 2023, implement the Central Registry of Proxy and Representation. By 2024, implementation of e-payments in the entire public administration. – By 2026, launch of a distributed integration brace for IT systems and state registers based on the Estonian x-road along with launching access to them via API. – By 2027, transfer of major state activities to the cloud and resignation from over 200 data centers, consolidation to 4 main ones.

CYBERSECURITY

TILL 2025	POLISH PERSPECTIVE
<ul style="list-style-type: none"> – All large EU enterprises should have clear strategies implemented, and small and medium-sized enterprises should receive the necessary support. 	<ul style="list-style-type: none"> – Development of a national IoT certification scheme along with an accreditation scheme for national certification entities that would be compliant with Common Criteria and the mechanism of accredited codes of conduct. Different certification thresholds should be introduced, depending on the life expectancy and application of IoT solutions. – Implementation of a national certification center for telecommunications equipment and building competence in the CEE region.



CHAPTER III

ECONOMY OF THE FUTURE

ABOUT ECONOMY

The economy is a social system, which is a set of rules for cooperation with the framework set out in law. It is based on written and unwritten rules of conduct, organization of coexistence and culture. It is an agreement where people work and cooperate together to ensure the best living conditions. Economic intelligence is a part of social intelligence whose essence is the ability to fully understand reality and predict future events. All citizens are active participants in economic life, because they make economic decisions every day. Good organization of the economy means enabling them to make the most of all the opportunities they have so that they can improve their quality of life. Until the 18th century, the economy was growing so slowly that its growth was close to the population growth, and thus prevented a significant improvement in the quality of life.

Only the transition to the industrial economy (18th century) changed the situation. This is the beginning of conscious, accelerated improvement of work tools/machines, but above all the social contract, which is the economy. Thanks to this, we entered the path of development, where we can do our work better every year. At present, the pace of growth of our well-being depends on how well we can use the resources we have – and how effectively we use our working time.

Simply put, making good use of all accessible resources is a good understanding of your current needs and predicting future, and then being well prepared to meet them and make the most of them. Highly developed and rapidly developing societies are those that have prepared themselves well in the past to take advantage of current opportunities because they foresaw them well. Because reality is constantly changing, we must constantly observe and predict the future. Based on anticipation, we are reforming the economy to adapt it to future operations. Unfortunately, contrary to the dreams of the majority, you cannot be well organized once and for all. It is an illusion to believe that companies need unchanging laws for many years. Entrepreneurs by "stable managing conditions" understand constant conditions within a given technological reality, because this means that the investment risk will be lower. However, when new technology appears, we usually need a new law.

The great problem of modern times is that we have entered the era of even faster technological changes. We need a faster system for drafting and passing laws, because the current one is too slow, so it hinders development. Moreover, contemporary economic systems are becoming larger, more complex. Their change requires more work to adjust reforms responding to the predicted changes.

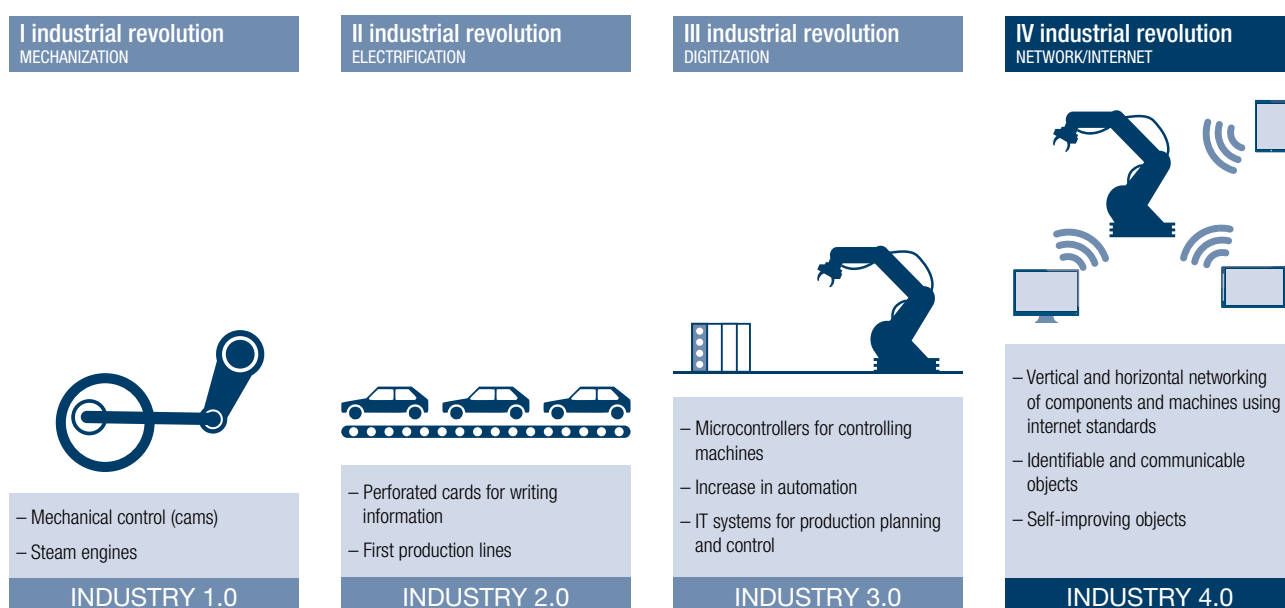


Fig. 1. Dominant inventions of subsequent stages of industrial economy development

This increasing time distance between the action and its effect means that the actions taken are at greater risk of error, and for the societies which are less educated and less aware of their reality, it is more difficult to accept decisions that require effort, especially when we feel the expected effects in many years. It is even more difficult because the ending third stage of the industrial age (the digitization stage) has wean us away off patience. It has accustomed us to the small distance between action and its effect.

We know from experience that each stage had its dominant invention. In the first stage, the invention was a heat machine. First it was a steam engine, then an internal combustion engine. The essence was the burning of fossil fuels for energy, which replaced the muscle strength of animals and humans. The second stage was opened by the invention of the engine and the electricity grid. This resulted in a significant reduction in the cost of transporting even the smallest amounts of energy over long distances to any place. This accelerated the automation of production lines. The third stage is the time of using the computer and computer networks. This is our experience and outgoing reality, so we understand well what it is about.

For several years, the economy has been in the next, fourth stage, which will be under the influence of the development of the next great invention – artificial intelligence (AI). In the entire history of the economy so far, the only intelligent element of the economy was man. He used his intelligence to improve machines, tools and technologies, but none of them worked in an intelligent way, which means unpredictable and similar in its operation to a human-controlled machine. AI is an invention that changes the whole way of working and organizing the economy. We first observed these changes in business, e-commerce or social media, and the advantage of "machine" over man in selected games such as chess, and more recently GO.

Currently, under the influence of AI, we are observing changes in industry, which is why so much is talked about Industry 4.0. We can already see that they will be much deeper. We will develop artificial intelligence to facilitate work in administration and in all services, including health care, transport, science, education and healthcare.

Even the artistic practices will change (selling a pic-

ture painted by AI for \$ 432K in one of the great auction houses). That is why we increasingly understand the concept of building Industry 4.0 within Industry 4.0. Just as for the development of green energy, power plants and electrical equipment, the key infrastructure is intelligent power grids (called Smart Grids), so for the development of industrial equipment and universal use equipped with AI, there will be next-generation electronic communication networks, called 5G networks.

However, before we talk about how the industry and future economy networks will look like and what changes are waiting for us, we need to take a moment to understand the importance of anticipation skills, i.e. forecasting and planning activities based on a developed vision of the future.

ABOUT PREDICTING, PLANNING AND DOING

According to current knowledge, we live in a world where the future is sealed. This means that no matter how deep knowledge we have, we are not able to predict the future precisely. However, the more complete the knowledge we have, the better we can predict what will happen. Prediction of the events in the near future is the easiest and obviously the further into the future, the harder it is. The concepts of near and distant future should always be related to a specific phenomenon that we analyze. Generally, it can be said that phenomena on a huge scale usually take place slowly in relation to our life expectancy and we can predict their course even in the perspective of 100 years. Local, individual and small-scale phenomena can be effectively predicted in the perspective of several years, a year or just months. Interestingly, the direction of changes is more precisely predictable, while it is much more difficult to determine the speed of these changes. The world we live in is very diverse, and the interactions between regions are very dynamic, so the assessment of the speed of change must be less precise. If we correctly assess the type of changes which is the subject of the forecast, we are able to assess its credibility. The professional forecasts always concern specific time laps. The pace of changes in each analyzed process depends on the state we are in and the speed of changes in other areas that affect the process for which we are developing a description of the future. Forecasting

has become an interdisciplinary field of science, and the ability to use it in practice requires the most advanced competences. Smarter societies are those that have better developed systemic forecasting skills.

The weakness of modern forecasting methods is the lack of a mathematically verifiable method to assess the probability of a future phenomenon when we cannot use past experience. For the same reason, quantitative forecasts are much less effective than qualitative ones. The above information is a simplified justification for the thesis that professional predictions regarding the main directions of economic development are quite precise, while forecasts regarding pace and quantitative data are more misleading.

Let's return to intelligence now. The essence and good way of assessing the level of human intelligence is its ability to accumulate knowledge and use it to predict. The more intelligent it is, the better and longer it predicts. This ability can be called passive intelligence. Active intelligence is a separate skill. It is the ability to adapt, consisting of actions avoiding or eliminating threats and using all anticipated opportunities for its benefit. We also know that intelligence is not only assigned to man. Animals also have it. The great discovery was that intelligences understood in this way have entire communities, as well as herds or swarms of animals. However, the most amazing thing is that collective intelligence can be greater than the intelligence of any single individual. This means that entire communities of people and animals undertake activities that are the result of collective knowledge about reality and the resulting ability to predict the future, even if none of the individual members of the community has the relevant knowledge and intelligence. The manifestation and personification of the intelligence of a given community is its culture.

It is worth mentioning that passive intelligence is not the same as active intelligence. Nowadays society copes better with predicting than with effective planning and realisation of reforms.

In other words, our predictions are more successful than practical reactions to predicted changes of the future. That is why, increasing active intelligence will probably be the current of social development deciding which communities will achieve competitive advantage and will increase the level of prosperity

the fastest – thanks to a fuller use of the increase in productivity, which will be in the fourth stage of the industrial age.

Professional centers that predict the future of the economy, invest mainly in forecasting development directions of industry and infrastructure. Enterprises buy these forecasts to avoid misguided investments. Therefore, there is no doubt that Industry 4.0 and 5G networks are the main currents of economic development in the next 30 years. The technology is ready and investments have already begun. Unfortunately, the awareness of the enormity of business benefits that can be obtained from the fact that dominance can be achieved (thanks to the earlier achievement of certain goals) prompts political and economic decision-makers who have an impact on the global economy to take measures to slow down the pace of development in countries considered to be significant competitors in the economic race. Fairly sophisticated policies are pursued, supported by propaganda and disinformation campaigns, the main goal of which is to stop the efforts to start reforms and the necessary investments. Misinforming activities are undertaken in the field of health (e.g. vaccines), electromagnetic field, 5G, robotization and work automation.

ESSENCE OF INDUSTRY 4.0

The digital transformation, which we call the construction of Industry 4.0, consists in the parallel development and digital change of many parallel processes that take place in industrial plants. Some of them occur in the physical reality that surrounds us and ultimately lead to full automation of production, and thus to a rapid increase in productivity. The second part happens in virtual space and involves the construction of so-called digital twins of industrial plants. Digital twins are two identical copies, mimicking the functionalities of for instance, mechanism of aircraft, car or digger engine, or their electronic systems. It allows the prediction of a specific moment of failure, which in turn enables pre-action for i.e. crash repair.

The pace of discussed changes is so fast that in highly developed countries, including those in the EU, till 2025 a specific law and financial conditions (called ecosystems) must be created to ensure smooth passage into fully digital manufacturing.

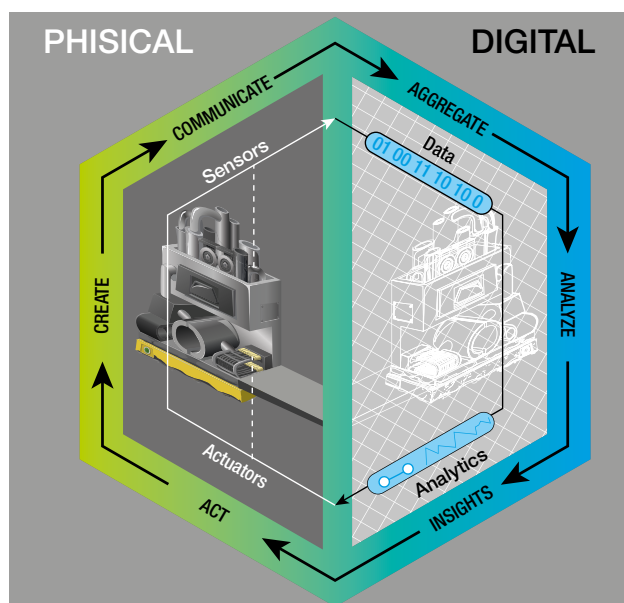


Fig. 2. The cyber-physical nature of factories and their twins in the economy 4.0.

In a technical sense, this means that the management and operation of industrial plants will be based on three types of digital twins:

- digital product twins,
- digital manufacturing plants twins,
- digital twins of production processes.

For the functioning of these twins, it is necessary

to create digital platforms, which are their natural environment in which they will be able to function. The technique of making a full virtual copy – simulation of cyber-physical space, which is an industrial plant, has been created. Thanks to this, it becomes possible to monitor the productivity of the plant. Any changes in the product, production technology, its organization, etc. can be developed and checked in virtual space, and only then transferred to physical space. Physical and virtual spaces become just as real – together they form a new reality. In order for the digital production system to reveal all its efficiency, most of the factories operating in a large market must be entirely in a network known as the industrial Internet of Things.

Requirements set for networks by IIoT are much higher than those required by the Consumer Internet of Things (IoT), operating on the market of universal use. IIoT technology needs a higher quality electronic communication network, i.e. 5G network. Only a new network class will allow the collection of real-time data from measuring devices, sensors and production machines.

It is worth noting that a lot of devices and machines are in motion while working. To be able to put their intelligence in use, they must be able to communicate with other machines. This commu-

INDUSTRIAL INTERNET OF THINGS

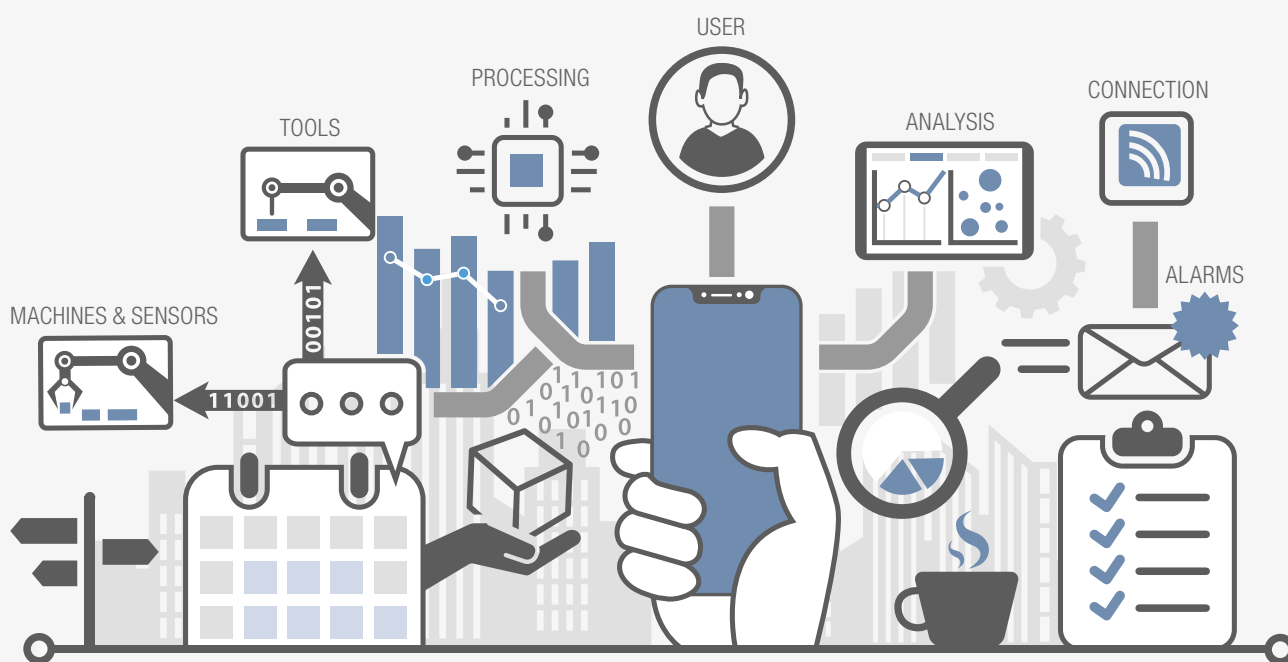


Fig. 3. The industrial internet of things connects machines, production lines, employees and service systems

nication must be reliable and of adequate quality. Only then will we avoid failures and mistakes. When machines are to perform complex operations, they must collect large amounts of data (e.g. images) from their surroundings, which they must share with other machines. Therefore, industrial and professional communication networks must have similar rates for wireless and wired (fiber) communication. Systems need interference-free networks that will control all production processes, including failure prediction and prevention. Switching to the engineer's language – a plant where all machines, devices and software cooperate and work within one factory data transmission network – we call a vertically integrated plant. We say then that the factory becomes a Cyber Physical System (CPS). Prediction obviously requires extensive use of artificial intelligence technology whose data-based economy is the natural environment for birth and development.

Thanks to the full implementation of digital production technology (that is, vertical integration of production plants), it is possible to introduce more complex and deeper cooperation between plants. It involves cooperation between machines and technological lines operating in various plants. It is possible to entrust individual machines or production lines with the task of concluding transactions, the essence of which will be to make better use of the available production capacities of machines, people and warehouse resources. This is a new reality that was not possible without artificial intelligence. A group of plants in which machines from different factories cooperate with each other, turning them into something that should be called a production network, we say that they have been

horizontally integrated or that they work based on the technique of Industry 4.0.

This type of cooperation between machines/systems located in different factories is already used inside multi-plant companies. This is how modern factories scattered around the world and managed within modern corporations work together. In the case of independent plants, such cooperation is more difficult, because it can take place only on the basis of previously agreed and contractually agreed conditions of joint production.

In the electronics industry, vertical and horizontal integration have led to the creation of factory systems that already produce more than 50% of global electronic production. Similar integration began in the automotive industry. Thus, the accelerated development of Industry 4.0 is a priority for Germany's industrial policy.

A whole decade has been dedicated to state clearly that this is inevitable direction of the whole industry's development. It is also predicted that till 2024 the average pace of I4.0 development should maintain the level of 15%. This means that the necessary condition to stay in the mainstream of industrial development is to immediately start the construction of 5G network.

Note that a fully automated and digital factory (vertically integrated), controlled by robots, computers and artificial intelligence, can be completely maintenance-free today. We call this production fully digital. However, the essence of the Industry 4.0 factory is that machines from different factories communicate with each other, thus making full use

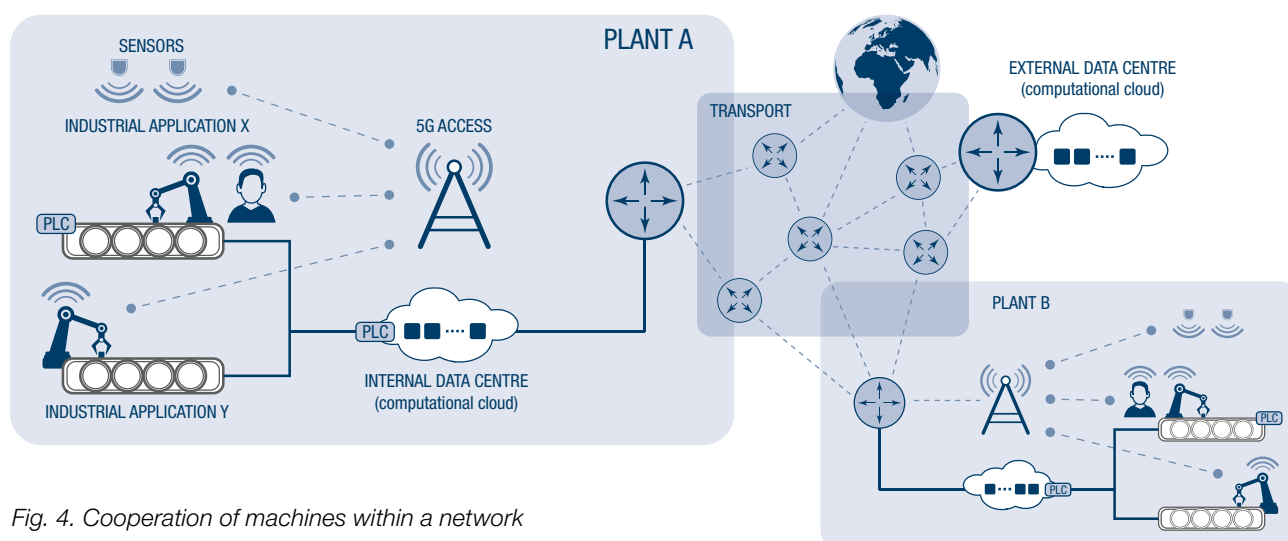


Fig. 4. Cooperation of machines within a network

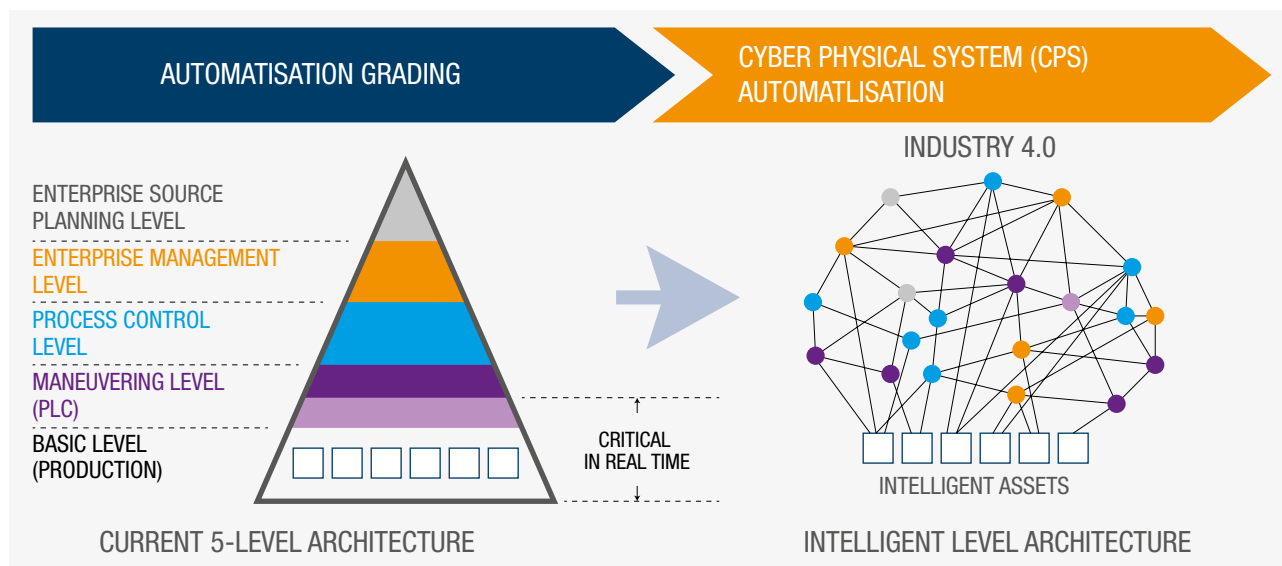


Fig. 5. The difference in the organization of a fully automated factory and a factory 4.0 lies in networking and opening up the possibility of direct communication between the network nodes of various factories.

of their production capabilities, skills, warehouse resources, employed people, etc. Industry 4.0 factory can be maintenance-free (i.e. fully digital and no employees in production), but it can also employ a lot of people. This is the easiest way to explain the difference between digital manufacturing and production within Industry 4.0.

4.0 LEGAL ECOSYSTEM

As part of large companies controlling dozens and sometimes hundreds of factories, Industry 4.0 and digital production are developing very dynamically. For most small and medium-sized enterprises (SMEs) on which the economies of Poland and EU countries are based, this is

the future. In order for the SME sector to take advantage of the described technical possibilities, legal, technical and digital conditions should be created so that independent companies can cooperate as factories belonging to one owner. There are many obstacles. Here is an example. The law protecting competition, and thus ensuring, among other things, that consumers have as low prices as possible, prohibits establishments belonging to different owners to exchange information on supply prices, production costs, conclude price agreements, etc. Therefore, SMEs cannot directly (i.e. without concluding properly prepared cooperation agreements) participate in cooperation networks of factories of Industry 4.0. That is why EU must create

a law favourable to SME innovative development as soon as possible.

SMEs need technical specifications, that is rules for cooperation between machines, sanctioning the "languages" with which they will "talk" (API), a digital communication system open to all SMEs. They need friendly law and space (access to a large market) in which they will operate, pay taxes and develop. Creating an ecosystem 4.0 for the economy of a small country has more or less the sense of building a computer that will add two numbers once a day. The construction of factories 4.0 only makes

Technics and technology have already reached such a level of development that all people could live prosperously, comfortably, safely and healthily. However, whether we use our capabilities depends no longer on the intelligence of machines, but on the intelligence of decision-makers and the intelligence of societies that give these people the opportunity to make decisions.

sense if they can work together on a market at least as large as the European Union market. Small and medium-sized countries that fail to enter economic areas such as the EU will grow more slowly. This means that further integration and globalization of the economy, at least the European one, is inevitable. This issue may become particularly important in the event of the EU's return to Europe announced. In order for European companies to withstand the increasing cost pressure of global markets, automation and digitization should be quickly facilitated.

Formally speaking, we need the law and standards for automatic cooperation between network-integrated plants. Only then will the transformation discussed above be able to result in a radical increase in the productivity of plants operating within the network. Poland urgently needs access to a unified EU ecosystem. Thanks to this, machines, production lines, technological processes and all other resources will be able to be used in an incomparably more efficient way than at present.

EXPECTED BENEFITS

In factories that are on the path of transition to "digital production" – technological productivity increases by an average of 5% per year. It should be expected that within 20-30 years most of the production will be able to be carried out 24 hours a day, 7 days

a week. This leads directly to a radical increase in the efficiency of machines, systems and resources, as well as production management, production development, planning technological changes, etc.

The benefits we can get from the transition to Industry 4.0 can be greater than just the possibility of many times cheaper and better quality production (industrial and agricultural). The development of Industry 4.0 will increase the demand for cheaper transport of goods between industrial plants than currently. The pressure of industry on the development of cheaper freight transport will increase, which will consequently reinforce the pressure on the development of autonomous (traveling without driver) electric trucks. Pilot operation of such trucks in real road conditions has already begun in Europe, Japan and the USA. This, in turn, will require acceleration of the construction of the 5G network capable of managing the movement of autonomous cars. And again it must be emphasized that without artificial intelligence, neither autonomous cars nor 5G networks can operate. The first autonomous agricultural machines are coming into use.

Their effectiveness also requires a 5G network so that everything can be coordinated and managed. Hence the conclusion that artificial intelligence directly drives the development of all sectors of the economy, and the development of one field entails the development of others. This great wheel of pro-

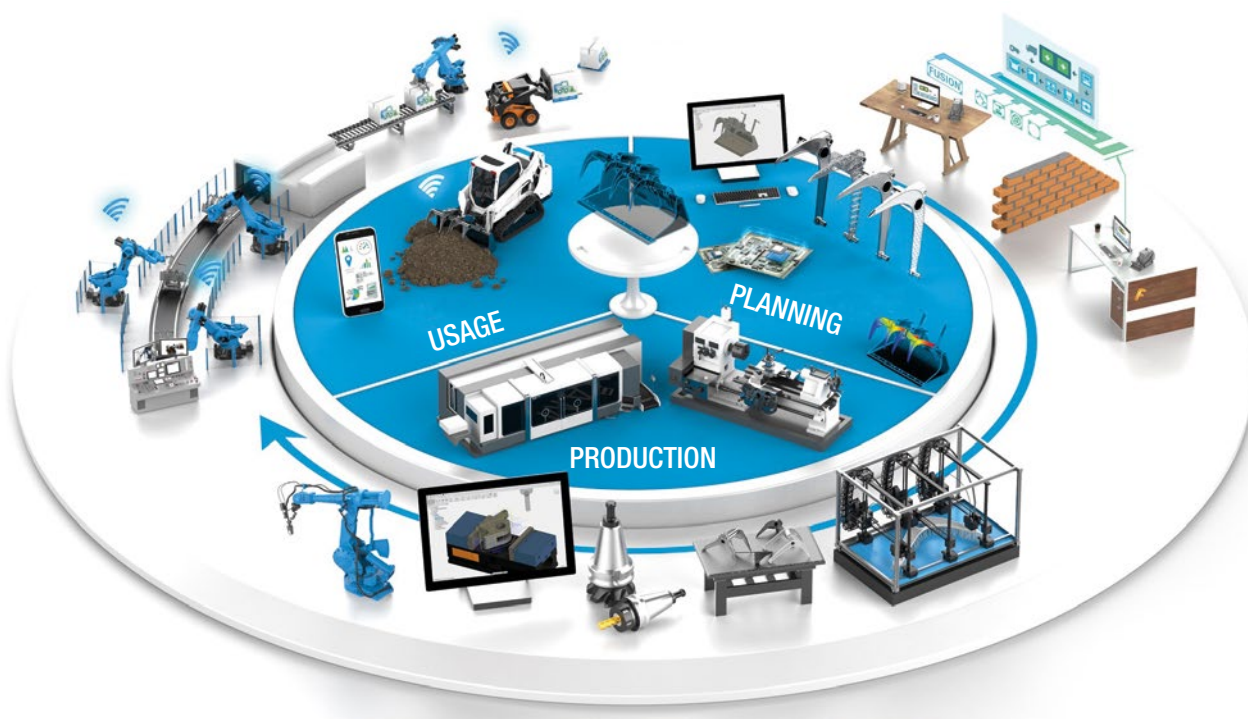


Fig. 6. Fully automatized cycle of development of industry-service production

gress has already started and will accelerate. There is no reason to change direction. Countries that do not join this 'race' are condemning themselves to long-term economic slowdown.

We have the opportunity to introduce reforms as a result of which children born after 2010 will work in the Industry 4.0. Most future jobs will need human feelings, thinking, imagination and empathy. There are none rational premises that one day the machines would take over the position of humans, because they are not and never will be ones. However, it is true that it will be possible to free people from boring and tiring work, taking us time that we can use in a more human and satisfying way.

Within the scope of current technical possibilities, there is already a transition to the so-called circular economy. We have technical capabilities to produce virtually unlimited amounts of energy from renewable sources. We have IT technology that allows us to manage all "used" materials. So we can recover and reuse any material. This is real and can be profitable, which means that as a result of

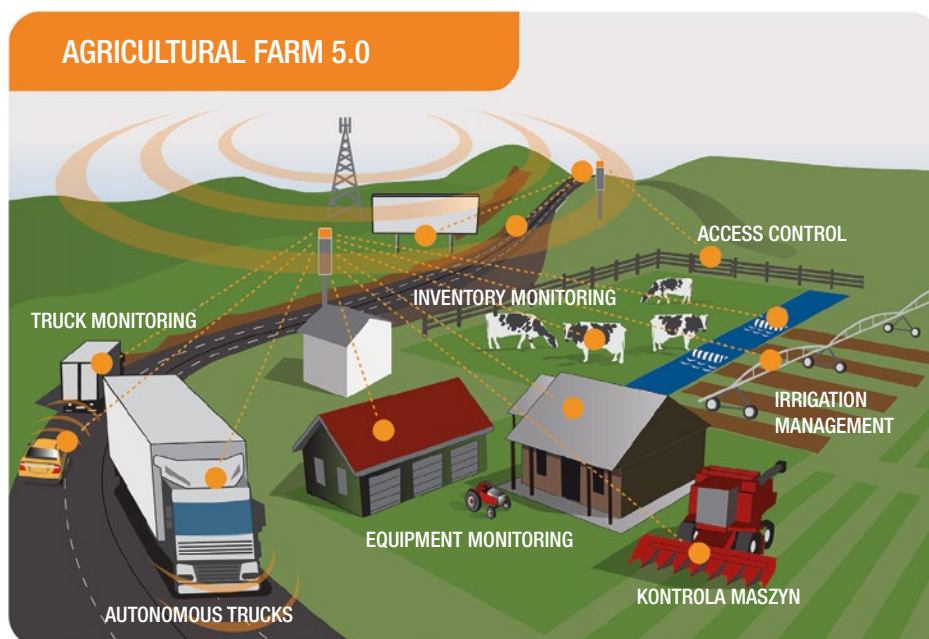


Fig. 7. Industrial Internet of Things in agriculture

the development of science and technology for the first time in history, just like nature, we will be able to constantly use the same resources. If the number of people does not exceed the ecological capacity of the Earth, we have the opportunity to ensure universal well-being.

The benefits described are within the reach of the generation that is coming into being, if it is able to use the existing opportunities for its own good. One thing is certain – technology and technology have already reached such a level of development that all people could live prosperously, comfortably, safely and healthily. However, whether we use our capabilities depends no longer on the intelligence of machines, but on the intelligence of decision-makers and the intelligence of societies that give these people the opportunity to make decisions.

SOCIAL EFFECTS OF INDUSTRY 4.0 DEVELOPMENT

For society to actively support the further development of industry, it must understand it. People need to know that this is the path leading to the growth and improvement of quality of average person's life. Most people do not have access to information about what a modern industrial plant looks like, because there are practically no people in it today. In this situation, the story of uninhabited factory must raise people's fear of their jobs

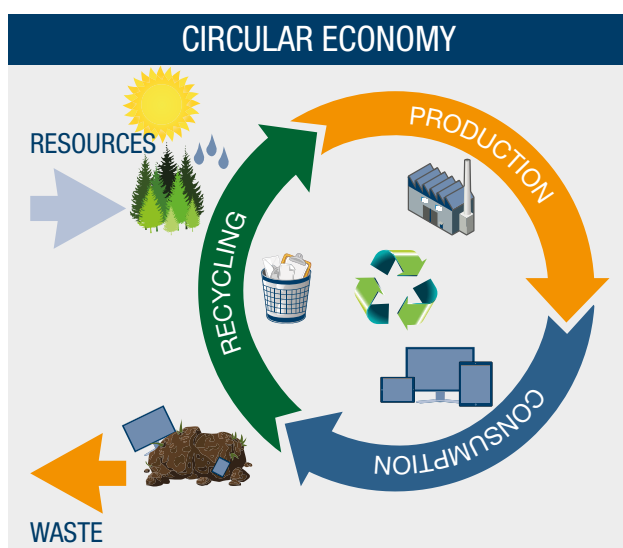


Fig. 8. The use of solar energy allows the transition to a closed-loop economy of materials and raw materials.

and reluctance to see such progress. It is much more difficult to explain that it poses no threat. Only a few know that as farming and production increases, employment in this sector decreases, but unemployment decreases as well. This is because when society has material existence, natural human creativity and fantasy awakens, which generates an unlimited number of services (new jobs) that we can provide to each other. It is worth noting that over the past 50 years we have increased the productivity of machinery dozens of times and not only did not run out of work, but we work longer and more intensively. Let's look at Poland. In 1950, about 58% of people worked in Polish agriculture, 19% in industry, and 23% in services and administration. Thirty years later (1980) 30% are employees in agriculture, 30% in industry and 40% in services. After another 35 years (2015), only 12% is working in agriculture, 30% in industry and 58% in services. During this time, we have improved our lives many times, and most people work in services. Despite this, the productivity of agriculture and industry is too low for us to provide adequate employment, for example in health care, social care, in schools, in the provision of education, etc. We already realize the need to employ over 90% of people in services and significant increasing their performance. Thus, with a properly reformed socio-economic system, even the most "depopulated" agriculture and industry will not be a source of unemployment.

In Germany – a more developed country than Poland – only about 2% works in agriculture, 30% in industry and 68% in services.

Despite the greater number of people working in services, there is still a lack of workers in health care, social care, education, etc. Therefore, it is very likely that in 2050 in highly developed countries, to ensure the abundance of food and material goods, the work of a few percent of employees is enough. In contrast, over 90% of jobs will be in services and we will continue to feel severe shortages, which in turn will drive the development of digitization of services. This means that not only should we not be afraid of unemployment, but in the perspective of 30 years we cannot count on reducing, for example, daily work time and saving more time for rest. Only widespread implementation of artificial intelligence in the service sector can allow for a gradual reduction of human working time.



CHAPTER IV

SOCIETY 5.0

STRUCTURE PROBLEMS OF POLAND

The Polish economy, especially the Polish society, faces a number of structural and long-term challenges and problems. The most important of them include:

- growing demand for energy due to increased production, consumption, development of the circular economy and the desire to improve the quality of life,
- growing demand for healthy food of proper quality and socially accepted prices,
- longer life expectancy and aging society on the one hand and migration on the other: Poland together with the region of Central-Eastern Europe belongs to the most depopulating regions in the world,
- lack of employees to perform work and fill the jobs reported by the economy,
- growing international competition making it difficult to build national champions in selected branches of the economy,
- climate change.

None of the above-mentioned problems can be effectively solved while maintaining the current standard of living and without the use of modern techniques and technologies. Many think that current societies have already reached their limit

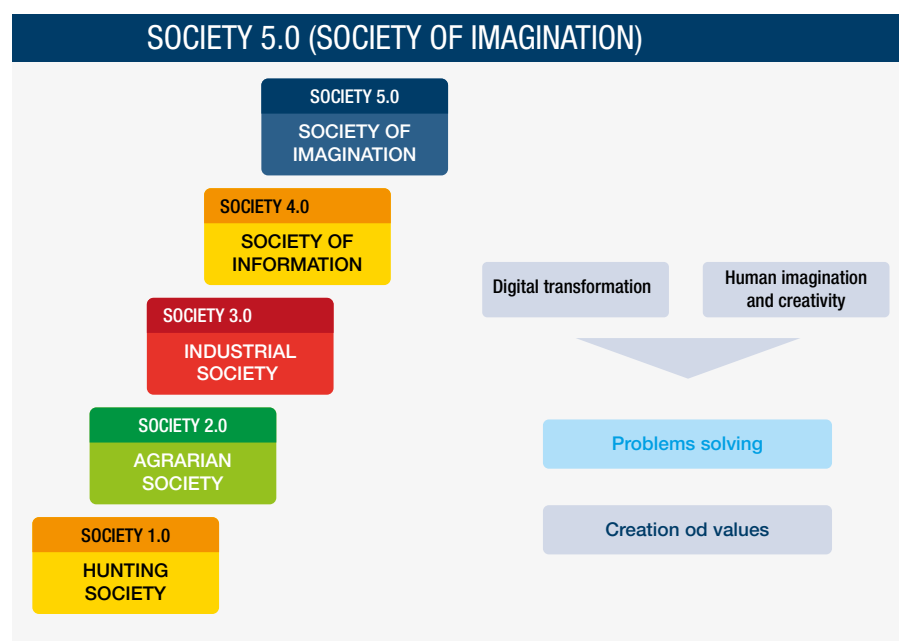
for development. What is needed, is a particular social reform, whose initiators are the Japanese who have developed and put into practice a new model of social relations that increases the sense of security. They called it Society 5.0.

SOCIETY 5.0

The Japanese define Society 5.0 as a human-centric society model. He uses economic progress to solve social problems using a system and technologies that strongly integrate cyberspace with physical and real space. So we are talking about a society that is characterized by a higher level of integration, the transition of both realities – digital and real – facilitating the embedding of cyberspace in the real world. Such a society can also be called a super-intelligent society or a creative society. This is another society, after hunting, agrarian, industrial or, finally, information society that we have now.

The Japanese government has carried out analyzes and on this basis developed the Fifth Basic Plan of Science and Technology, which was adopted in January 2016⁵. The plan assumes the transition from Industry 4.0 to Society 5.0, in which all aspects of society, including work in industry, they shape the latest techniques and technologies. Japan had to develop a new model of society as it experiences problems related to energy shortages and imports from abroad, limited natural resources and an aging society. One of the main ideas of decision makers is to use artificial intelligence (AI) to solve long-term problems. The Japanese government has developed also The Japan Revitalization Strategy 2015 and the Japan Growth Strategy 2017, which show how it will work to support economic growth in key areas of the economy. New economic growth will take place, among others through the development of artificial intelligence and further robotization of society and the automation of indus-

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Rys. 9. Czynniki sprzyjające budowie społeczeństwa 5.0 – na przykładzie Japonii.

⁵ 5th Science and Technology Basic Plan http://www.mext.go.jp/en/policy/science_technology/lawandplan/title01/detail01/1375311.htm

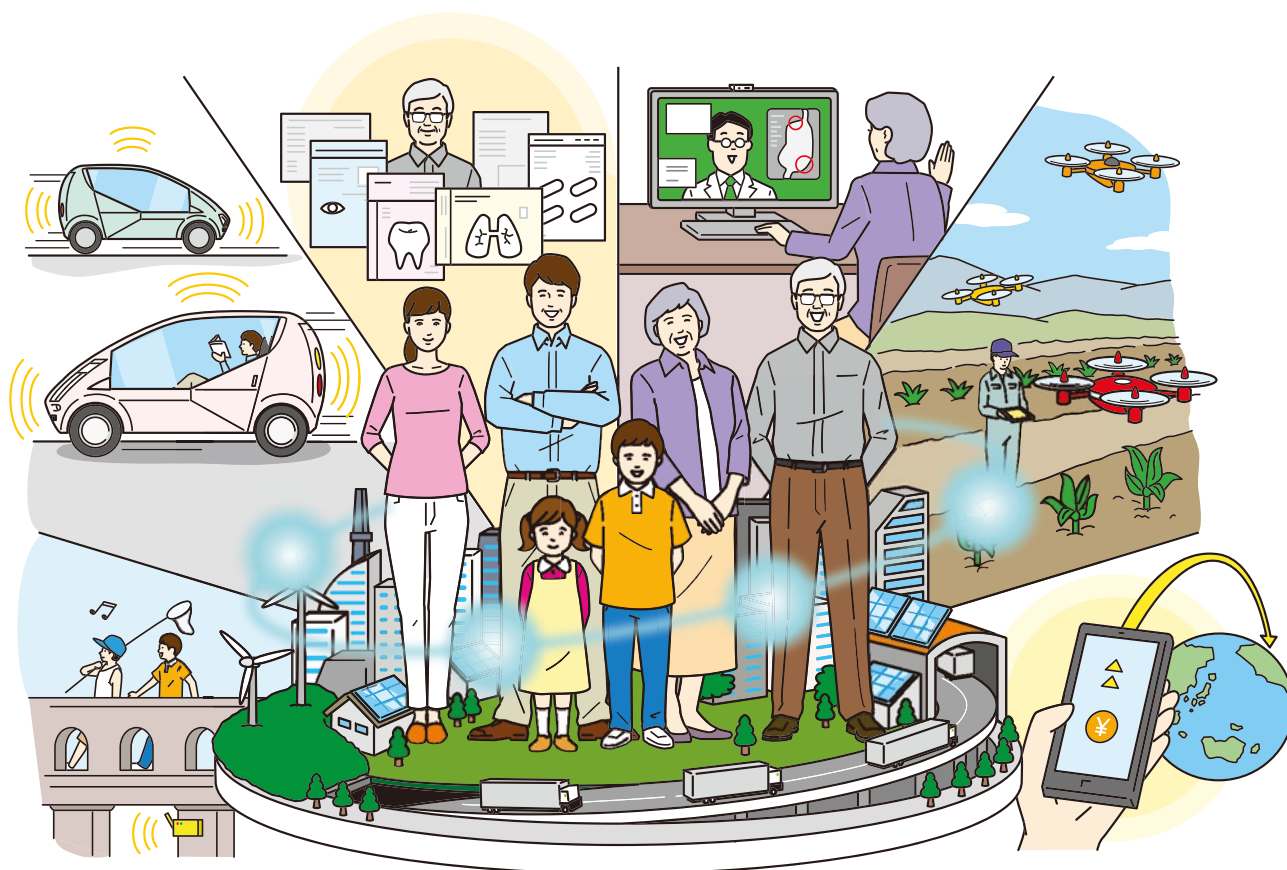


Fig. 10. Vision of Society 5.0, source: Japanese website on Society 5.0.
https://www.japan.go.jp/abonomics/_userdata/abonomics/pdf/society_5.0.pdf

try with ubiquitous super-fast communication. It is in advanced techniques and technologies that the Japanese government places the greatest hope for development and counts on a further increase in productivity and social well-being. The role of software that should be developed in parallel with the development of hardware and robotics was emphasized. Due to the aging of the population, it is AI and robotics that are to play a significant role in improving medical care as well as support local companies in connection with the shortage of employees in the Japanese transport sector.

The Japanese strategy for revitalizing society and the economy focused on five areas that assume:

- obtaining a long life for the residents by the significant use of robotic and computerized medical or nursing care,
- reducing transport costs and ensuring the mobility of employees and families throughout Japan through the use of autonomous vehicles and drones,
- creation of supply chains through streamlining

based on software and the promotion of so-called smart factories,

- providing comfortable infrastructure and smart cities in connection with the migration of people from the countryside to the cities (smart city),
- implementing innovation in finance (fintech) that combines the latest financial and IT technologies.

These five areas are aimed at creating Industry 4.0 and at solving the problems of the constantly decreasing birth rate and aging population.

The pillar of this transport revolution is the promotion of autonomous vehicles and drones, which will alleviate a serious labor shortage in

For example, in 2020, the government will conduct a test with an autonomous vehicle following a human-driven car on the Shin Tomei expressway, to commercialize such vehicles as early as 2022⁶.

Therefore, Japan wants to be a model of a new society in which various social challenges can be solved by implementing the vision of Industry 4.0

⁶ <https://mainichi.jp/english/articles/20170604/p2a/00m/0na/006000c>

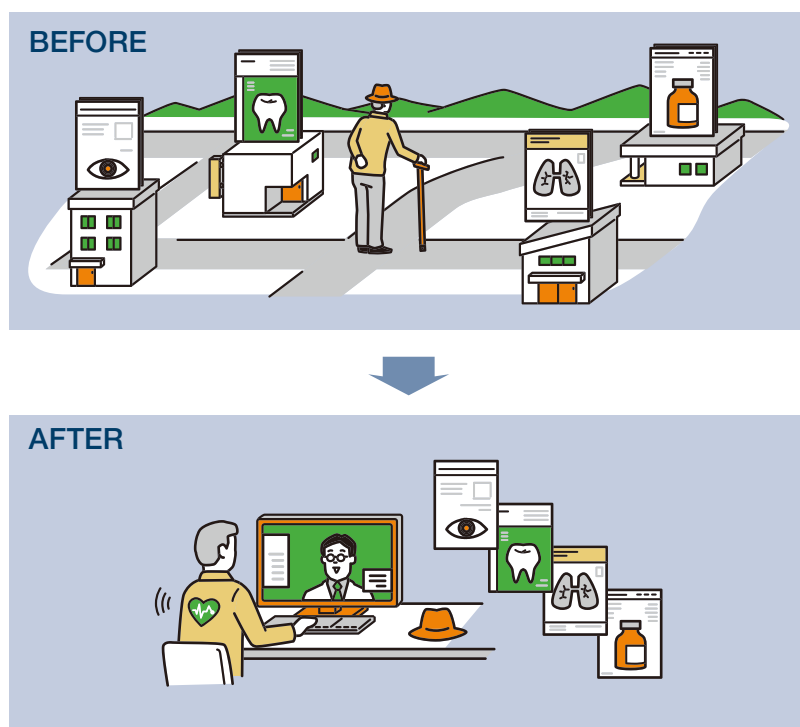


Fig. 11. Examples of use of new technologies, Industry 4.0 and 5G network in Society 5.0.

can also measure and manage home health data such as heart rate, ECG, or even predict or at least record the fall of an elderly person.

Problem #2: The decrease in population means that sparsely populated rural areas do not have access to transport, as rail and bus (PKS) connections are constantly being cancelled. Rapidly developing e-commerce emphasizes the problem of driver shortage.

Solution #2: Promoting the use of autonomous taxis and buses for public transport to increase transport in rural areas. Distribution and increased transport efficiency are facilitated by introducing innovations such as a single cargo truck for drivers in a convoy using an unmanned vehicle system and using drones.

(e.g. IoT, big data, artificial intelligence, robotization and the circular economy) in every industry and field of life social. In this way, the society of the future will be one in which new values and services are constantly created, making people's lives more comfortable, while ensuring sustainable and permanent development.

People in sparsely populated areas face difficulties while shopping and visiting hospitals due to a lack of public transport. However, autonomous vehicles will allow them to travel more easily, while delivery drones will allow them to get whatever they need.

EXAMPLES OF USE OF NEW TECHNOLOGIES, INDUSTRY 4.0 AND 5G NETWORK IN SOCIETY 5.0 IN POLAND

Problem #1: Poland is facing an aging society. The economy loses through increased spending on health and medical care, especially for the elderly.

Solution #1: Connecting and sharing information in between users of medical data.

this sector, including medical examination records and documentation regarding treatment and nursing care. The use of telemedicine supported by the Internet of Things and remote medical services based on a super-fast communication network. The use of AI and robots in health care facilities to support people's daily tasks. By combining and deciphering medical data, which are now dispersed in different hospitals, effective data-based treatment will be provided. Remote healthcare will prevent older people from visiting hospitals as often. You



CHAPTER V

DEVELOPMENT BARRIERS

The economic and social chapters justify joining the reform program as soon as possible. The conditions of the current system of creating industrial and social policy, and finally law making, make it impossible to prepare and agree on a coherent and planned for many years program to build the ecosystem of Industry 4.0 or Society 5.0. However, it is possible to identify barriers that hinder or prevent the expected direction of development, which is easier to then be transformed into postulates of legal changes. The main disadvantage of this method is that there is too little interest in eliminating outdated regulations. In some areas, they cease to be relevant, but sometimes block rational decisions, as exemplified by the confusion about radiation regulation of a cellular network called an electromagnetic field (PEM).

The main barrier hindering overcoming all other barriers is the lack of universally accepted principles of law making. It seems that the widest agreement platform should be trust in objectively acquired and experimentally verified scientific knowledge. However, in practice it is different. When conclusions from knowledge lead to regulations violating the economic interests of specific social groups, they are able, contrary to the generally accepted principle, to negate the image of reality presented by science, and even obvious facts. For example, in Poland, the fact that energy from renewable sources is the cheapest has been negated for years. As a result, the costs of energy production are rising, although they should fall, which reduces the competitiveness of Polish industry. Despite this, instead of implementing a law conducive to investments in renewable energy, we subsidize conventional energy, for which people pay lower quality of life (smog, wages) and energy poverty. Another problem is simply ignoring knowledge. For this reason, we have so polluted air that it causes about 50,000 deaths a year⁷.

The matter is even worse when the condition of the effectiveness of the law is its international influence. The point is that it should work the same, e.g. in the countries of the economic and political region (e.g. in the EU), or even throughout the world. The tragic effect of this impossibility is the mass extinction of species. The pace of death of live which has been in

balance for the last 200 years, is an ecological dis-

aster. Climate change forecasts are just as gloomy. These are the effects of negating knowledge about the climate and insufficient protection of the natural environment.

In general, the main sources of conflicts that impede the efficient establishment of economically rational law are:

- lack of knowledge or trust in objective scientific knowledge,
- disinformation, especially efficiently filtered in social media and through opinions of bloggers
- selfishness of specific social groups – conflict of interests, nationalism, etc.,
- discrepancies in understanding of justice,
- differences of political views,
- differences of opinions regarding religions,
- superstitions and cultural stereotypes.

It seems that the only path to bypass this barrier is to significantly improve education and training and, above all, communication and dialogue with society. We need a renaissance of logical thinking and decisions based on objective scientific knowledge.

Narrowing the review of barriers to those hindering entry into the accelerated path of digital industrial, infrastructural and social development – we have arranged them into the following groups:

1. Economic.
2. Structural.
3. Social.
4. Political.
5. Legal.
6. Organizational.

The disadvantage of any classification is the division of matters that should be seen together. For example, legal barriers can result from social, political and economic barriers. Therefore, when designing solutions – it is necessary to fully take into account the effects of impact on all areas of life.

Poland is facing reforms which effects may be noticed only many years after their introduction.

Well-designed and implemented – they should display social benefits, which will best serve the fulfilment of technological needs and will help over-

⁷ Why is Poland losing to smog? Every year, polluted air kills 50,000 people <https://www.new-sweek.pl/biznes/gospodarka/smog-nad-polska-z-zatrucia-nim-umiera-50-tys-osob/3rdvp4v>

come economic restrictions. Even the best prepared economic reforms, but incomprehensible to the public, are usually deformed and given up. Reforms that demand even large and long-term sacrifices from people are accepted if they are understood. The successes and failures of the Polish transformation are the best justification for this statement.

Let's have a closer look on the obstacles on the Polish road to Industry 4.0 and Society 5.0, guided by the above thematic division.

ECONOMIC BARRIERS

Economic competitiveness, similar to sports, depends on the conditions in which the participants of the game operate. An EU company, paying higher wages to employees, complying with strict environmental regulations, etc., is difficult to compete in price with a non-EU company that produces cheaper labour and poor legal protection of the environment. These are the main sources of social tensions that manifest themselves in the form of anti-globalization movements. It is also one of the barriers to the development of the global economy.

The weakness of mechanisms equalizing differences in the development of individual societies and regions is a barrier to using the benefits of human cooperation on a global scale. The task of politics is to work them out, otherwise there will be wars and ecological disasters of unknown scale. The awareness of this fact is growing, but will we make it in time? This question remains unanswered and exceeds the scope of our considerations.

It is in the interest of the European economy to be open to the world, i.e. globalization. The organizational basis will be cooperation networks and large network economic areas. Industry 4.0 is a network production system that needs to develop a large market. Small countries will adapt their economic policies to the structure and rules of global Industry 4.0 based on global networks. Lack of knowledge about the inevitability of this development is an important barrier.

The profitability of the European digital economy, and in particular the economy operating in a virtual space, requires a unified digital market. The ability to adapt local markets to this fact is a condition

necessary for keeping Europe at the forefront of developed societies. 5G networks are a technological infrastructure that will connect regional economies together, thus enabling development towards a Society 5.0.

ECONOMY OF SCALE BARRIER

In majority of cases, the profitability of economic activity increases as the enterprise grows. On the other hand, the experience of the past tells us to protect competition, otherwise progress will stop and costs will increase. The solution to this dilemma is to increase the market so that large, and therefore more profitable companies do not monopolize the market, but can compete on it, and thus give better, better quality at a lower price.

The whole EU is a project for which solving this problem is one of the main goals. The pace of reforms aimed at creating a completely single market is slower than the pace of technical progress. Connecting economies has met with resistance from societies devoid of knowledge about the real causes of a drop in job security and halting wage growth.

To make EU countries accelerate again, I have to split with the illusion that it is possible to create a single market with semi-permeable borders and regional economic laws.

CONSOLIDATION BARRIER

One of the effects of the suppression of merger processes is the extremely fragmented, archaic structure of the European media and technology telecommunications market (TMT). In Europe, over 100 operators serve as many customers as three operators in the USA. It is similar in Asia. The same applies to manufacturers of telecommunications equipment, machinery, devices, etc. Obstacles to consolidation harm network activity in particular – Industry 4.0 and the TMT market more broadly. If we do not change this, sooner or later Europe will become mainly an area of small niche, craft and tourist activity.

STRUCTURAL BARRIERS

A serious barrier hindering the construction of a single market for the development of Industry 4.0 and Society 5.0 are differences in the level

of development, and the resulting differences in the priorities of economic policies of individual countries. The EU has too little cohesion fund, which is a fund dedicated to rebalancing economic and social differences constricting the consolidation of markets between countries. And this is not a purely financial problem, because the EU is a very wealthy part of the world. It is rather a lack of will to change the budget structure more significantly, which results from national egoisms and short-sightedness of political mechanisms. A good illustration of the problem is to compare the size of the agricultural fund with the cohesion fund. The size of the agricultural fund is archaism sustained by the political power of agriculture, which damages agriculture itself, and limits the possibilities of allocating these funds for network investments.

INFRASTRUCTURE BARRIER – OPTICAL FIBER AND COMMUNICATION TRACKS

Both Poland and other EU countries invest too little in optical fiber. Furthermore, there is no concept of digital consolidation of all infrastructure networks into one European network infrastructure. This will slow down the development of autonomous communication and the consolidation of the European sector of small and medium-sized enterprises to the network of Industry 4.0. These are just two examples of the inhibitory effects of the infrastructure barrier on development.

BARRIER OF 5G TECHNOLOGY

The regional planning and management of major technological changes concerns both the national level (lack of cooperation of central and local government levels) and the EU level – lack of sufficient interest, and thus real support for projects of international range. We are currently struggling with a barrier that can be called a barrier of 5G technology. Due to the weakness of the EU change management system, despite the enormous economic potential, the EU is ineffective in solving cyber security problems and hardly resilient to external pressure, effectively inhibiting the development and use of this technology.

BARRIER OF UNIFIED MARKET

The weakness of actions aimed at structural consolidation of the EU economy, which is the real

measure the size of the barrier, is shown by the fact that only 8% of small and medium-sized EU companies export their products or services outside their own country. The lack of a fully unified market is primarily reflected in the lower level of technological SMEs development.

PUBLIC LIFE LONG LEARNING SYSTEM (LLL)

Industry 4.0, and especially Society 5.0, needs a systemic solution that will initiate the development of a universal lifelong learning system. Only in this way can we ensure that skills of EU employees are constantly updated at a level that is compatible with the needs of the economy. As Digital Europe points out, by 2025 over 50% of the population must acquire new skills (reskilling).

SOCIAL BARRIERS

MYTHS POPULIZATION ASSOCIATIONS

The vulnerability of society to disinformation and propaganda sabotage is growing. The number of entirely false information regarding the following subjects is growing in the media:

- catastrophic impact of artificial intelligence on further socio-economic development,
- negative impact of the development of Industry 4.0,
- threats related to the inability to provide an adequate level of cyber security,
- harmfulness of the electromagnetic field (PEM) for health,
- the negative impact of 5G on privacy and even security,
- negative impact of the 5G network on the increase in PEM intensity in the environment.

Associations emerging from society's fear and thanks to the possibility of spreading lies professionally. There is no shortage of people with academic titles in the anti-vaccine, anti-demon and flat-Earth associations. The social harm of these movements is already noticeable. The mechanism of this type of phenomena requires research and definition of long-term protective operations.

In particular, it is necessary to urgently undertake educational activities and to present scientific evidence, along with progressive disinformation carried

out in social media.

The involvement of many scientists in heating the atmosphere of distrust towards colleagues is particularly surprising. Many prominent experts who have prepared European reports on the state of knowledge about the effects of PEM on living organisms claim for bias or misconduct – without evidence. They cynically take advantage of the fact that the very nature of the problem is very complicated and extremely difficult to measure.

Surprisingly, the logic of the problem is extremely simple. We have been living with radio waves for over 100 years, and we have been walking with transmitters in our pockets for several dozen. The only effect we have identified as harmful to organisms is heating. Standards developed in the world eliminate this threat and reduce the effect of mutual interference of the devices to a minimum. Careful statistical observations do not record any increase in the incidence that could be associated with the development of wireless access. As the saturation of interconnecting devices continues to increase, their transmission power and thus the average PEM intensities at the human location will decrease. The same applies to smartphones. Their transmit power depends on the distance to the station to which they connect, so the closer the station is to be, the less power the pocket device will emit. The increase in operating frequency allows the use of electronic control of the shape of PEM beams from transmitters. This is another way to reduce power and useless emissions. In addition, higher frequency signals are more quickly suppressed by the surroundings.

We devoted more attention to the PEM problem, because removing this barrier is an urgent infrastructure need and its nature is social, not technical or environmental. Poland has become a country of absurdity in this matter. We use smartphones manufactured according to international standards, so by definition they are able to generate PEM locally with a power density of up to several watts per square meter. By the rule, radio communication is the main source of PEM energy absorbed by humans. The more we use them, the less emission there is. A statistical Pole uses a smartphone over 2 hours a day, and some young users easily double this time. The smartphone itself regulates the level of emission power and gives it the less, the closer the base station is. Therefore, the main

way to effectively reduce the energy emitted by smartphones is to put as many low-power stations as possible near the places where smartphones are used.

Some think that there are people in the world who are particularly sensitive to PEM. Although many studies suggest that electro-sensitivity does not exist and the ailments are psychological, these people with this condition should be helped and shown compassion. We should provide them with living conditions in which they will not be exposed to discomfort. This is another civilization effect, such as allergies to certain food ingredients, materials, grass and trees pollen, etc. People are killed in traffic accidents. However, no one thinks about withdrawing peanuts from sale or limiting the speed on highways to 5 kph.

It would be necessary to examine and explain to the public why air and water pollution, climate disaster, soil poisoning with glyphosate, mountains of toxic waste in forests and landfills (which have a serious and documented impact on our health, even in a small extent) do not cause such social activation as investing in a wireless transmitter. Unlike all other human impacts on the environment, the development of wireless networks causes a gradual decrease in the PEM field strength in the environment. In addition, services provided this way contribute to: reducing the number of deaths resulting from accidents, reducing fuel consumption, monitoring water and air levels, reducing crime, etc.

An important direction of the development of the entire radio access technology is increasing the time of use on one battery, reducing the costs of devices and their operating costs as well as reducing the levels of mutual interference. In any case, the cheapest way to improve these parameters is to reduce the levels of equipment operation. Haircutting will contribute to the gradual decommissioning of high power broadcasting devices and the transfer of all transmissions to the IP network. As a result, total radio emissions will continue to decline slowly. In other words – more transmitter stations simply means less transmit power and longer operating times.

BARRIER OF SOCIAL TRUST

Widespread distrust, which characterizes Polish society, is a factor facilitating the propagation of these myths. It hinders the building of social solidarity and reduces the role of authorities. Particularly worrying is the lack of trust in logical, rational and well-documented arguments. This creates space for social engineering activities playing on cultural emotions and stereotypes.

DISTRUST BARRIER FOR NEW TECHNIQUES AND TECHNOLOGIES

In general, Polish society is open and willingly uses new techniques and technologies. The problem begins when some interest group wants to arouse such distrust. Then a low level of public trust and a low level of common knowledge are used to build such a barrier.

BARRIER OF COMMON KNOWLEDGE LEVEL

In many social activities we observe a low level of common knowledge, but without research it is difficult to assess what is the reason for it. These may be: cultural rejection of emotionally 'unpleasant' knowledge, flaws in the education system, lack of lifelong learning, or a conflict of worldview theses with scientific knowledge. This barrier reduces the value of substantive argumentation, requiring basic technical and economic knowledge. Without relying on knowledge, it is difficult to obtain social support for the reforms necessary for the development of Industry 4.0, Society 5.0 and 5G networks.

BARRIER OF EDUCATION

The lack of modern programs and competent staff in the field of pre-school and early school education kills the natural curiosity and spirit of innovation of students. These damages are impossible to make up at later stages of education and training. The Prussian model of teacher-student relation, useful in unified education of the discipline needed in the army and industrial factories of previous eras, is now counter-productive. The economy of the future needs a diversified school whose walls leave new knowledge. Without this, it will not be possible to effectively update rapidly aging skills and knowledge within lifelong learning systems. Graduates culturally shaped to permanently maintain ideologically profiled vision of reality leave Polish schools. The

oppressive nature of didactic methods creates a persistent reluctance to continue learning. The long-term effect is the growing distrustful attitude towards new life, and a negative attitude to any changes. This is the basic mechanism for the emergence of various types of social exclusion.

The education barrier has a global dimension. The problem was noticed already at the beginning of the 20th century, when innovation was defined as a significant factor increasing the efficiency of the economy. A lot of new, activating and curiosity-oriented educational methods have already been developed, but most have not become so widespread that significantly reduces the disadvantages of modern school. One reason is that any impact on intelligence is extremely complicated. Therefore, research on this problem will continue for a very long time.

The development of the first effective methods of teaching something infinitely simpler than the human brain – the network of artificial intelligence – took scientists about 60 years and we are still at the beginning of the road. For these networks, it has been mathematically proven that there is no single universal method for teaching intelligent networks.

Therefore, it is naïve to assume that we will develop one universal educational method in the foreseeable future. However, participation in European research into this problem should be intensified. It is likely that we should be open to the evolutionary process of implementing various activation teaching methods, tailored to the specific interests and capabilities of students. We already know from current research that it is more effective to strengthen students natural predispositions and stimulate their overall activity and curiosity.

VULNERABILITY TO DIVERSE PROPAGANDA

Vulnerability to the effects of subversive propaganda is the sum of many factors. Operational and technical blocking of this type of aggression in the world of globalised electronic media is practically impossible, even with the usage of strong tools of preventive censorship. Social media facilitate radicalization of society, and radicals are easier to "integrate", effectively polarizing societies, which makes changes difficult. The only effective remedy

is education and social communication based on mutual trust.

POLITICAL BARRIERS

PRIMACY OF CURRENT INTERESTS ABOVE LONG-TERM INTERESTS

It is a culturally educated state that has its rational grounding in experience. Forecasts of short-term benefits are much more likely to materialize than long-term benefits. There is no cohesion policy that would limit the realization of current interests with negative long-term effects. This is the reason for postponing infrastructural investments (5G, green energy) and growing problems with: maintaining the state of the natural environment, implementing reforms of demographic and ecological significance (Society 5.0), and long-term economic impact (Industry 4.0). We need a more efficient multi-year project management system, especially when the first effects are postponed for more than one term of elected authorities.

MACROECONOMICS AND BUSINESS CONFLICTS OF INTEREST

Conflicts of this type are a natural element of social development. Solving them based on a common platform of values has a very positive impact on building social solidarity for development. In Poland, this platform has been destroyed in recent years, so an increasing proportion of these conflicts have a fatal impact on our development opportunities in the future.

TRADE WARS AND TECHNICAL RELEVANCE IN A MODERN ECONOMY AND SOCIETY

Poland's participation in the globalization of the economy has so far been a source of accelerated economic development. It should be clearly emphasized that Poland and other emerging markets were a huge beneficiary of globalization and the multipolar world. With the entry into the group of developed countries, the sensitivity to conflicts characteristic of countries participating in the global technology race increased. The development barrier is the lack of stable policy regarding strategic technical and technological alliances.

CONFLICTS OF REGIONAL, NATIONAL AND SOCIAL EGOISMS

Polish society feels the negative effects of a long-lasting deficit of general and migration freedom resulting from closed borders. The homogeneous ethnic composition and the social distrust mentioned above help to arouse aversion to migrants and foreign companies investing and operating in Poland. Arousing selfish and nationalist attitudes on the basis of social uncertainty makes it difficult for us to enter closer network cooperation, which is the basis of modern Industry 4.0 and Society 5.0.

INTERNATIONAL COOPERATION WITHIN NATO AND EU

Deteriorating relations between the superpowers, combined with the lack of coherence of defence policy with the economic, are barriers hindering and delaying strategic decision making, which are of key importance for the costs and pace of construction of the 5G network and Industry 4.0.

LEGAL BARRIERS

Legislative barriers hindering innovative directions of economic development are rooted in declining technical competences – both on the side of decision-makers and society. This is the main source of long-lasting disputes with ever-higher levels of negative emotions.

REGULATIONS EXCESS

The current EU law-making system leads to the phenomenon of "over-regulation". We try to solve every emerging problem by means of another regulation, usually without trying to answer, why the current one is not working properly. A good example illustrating the problem is the legal harmonization of roaming rates within the EU (RLAH). Instead of creating market conditions forcing operators to such change of the network structure, to make the equalization of rates profitable – a legal obligation was introduced. The result of the discussed regulation is a decrease in revenues of operators operating on the most competitive markets calculated in billions. Then, in turn, we are introducing further regulations that allow the differentiation of these rates again.

RADIO SPACE MANAGEMENT

Radio space is currently a good indispensable for the development of wireless data transmission. Delaying the necessary changes in outdated legal regulations in the scope of the size and methods of measuring the permissible power density of PEM has led us to a state in which we have major problems with the development of electronic communications networks. The quality of existing wireless networks is constantly deteriorating. The applicable law does not meet the needs of telecommunications operators also in terms of frequencies and bands. In addition, the reorganization of the frequency planning and use system is hampered by consents to specific powers of specific transmitters. Without solving these problems, we cannot count on accelerating investments in telecommunications infrastructure and innovative development directions for industrial and agricultural production as well as services.

NO TECHNICAL SPECIFICATION POSING SYSTEM

An important barrier to the technological development of small and medium-sized enterprises is the lack of an efficient system for determining the applicable technical specifications. Its efficiency is crucial in periods of accelerated technological development. Despite the clear postulates formulated in 2016 by the Industrial Transformation Team, there was not even a draft of an appropriate act. Without a change in this matter, we will not be able to actively participate in this process within the EU, which will increase the costs of industrial development in the future.

CONSTRUCTION LAW

The construction of the 5G network is primarily a need for a dense optical fiber network. You need a cheaper system of consents for running light wiring for micro-transmitting devices, optical fiber cables. There are also no regulations allowing for common use of small architecture objects (poles, lanterns, road signs, sheds, rain/solar guards, stops, etc.) for the installation of these micro-devices. We should adapt the law so as to use already existing facilities for telecommunications and not allow for an increase in the number of physical objects in space.

MEGA ACT (IMPLEMENTATION OF THE COST DIRECTIVE)

Mega Act is a law aimed at limiting the costs of building network infrastructure. To put it simply, the point is to build any communication route and use it to build all the wiring, lay pipelines, etc. In large part, this was not done in the first attempt. However, the need to provide electronic communication everywhere should be a priority overcoming the egoism of road and energy operators. It is a condition of joining the best organized societies and ensuring our economy a competitive 5G network.

ORGANIZATIONAL BARRIERS

The efficient implementation of strategies, programs, plans and other decisions is equally important. The low level of awareness of the importance of implemented decisions, and often also low confidence in their sense or correctness, causes what can be called the "ill will" syndrome. This is particularly evident when applying and complying with the law. The same law in different EU countries gives completely different results. Unfortunately, in Poland we usually do it much worse.

CENTRAL ADMINISTRATION AND TERRITORIAL GOVERNMENT COOPERATION

In many areas of this cooperation, confrontational relations dominate, which has a very negative impact on spatial economy, economic efficiency in the construction of network infrastructure, joint use of available resources, etc. Egoisms and short-sightedness make telecommunications infrastructure more expensive and slower, and the costs of its use they are higher, which increases fees for telecommunications services and slows down the development pace of many local communities.

COOPERATION OF THE PRIVATE SECTOR WITH STATE TREASURY COMPANIES AND PUBLIC INSTITUTIONS

Despite countless recommendations and appeals, this collaboration is still not going well. The culture of distrustful approach to private activity is lifted from communist times. Public-private relationship is never easy, due to various business goals and ways of achieving them. In Poland, we lose many opportunities offered by combining public and private funds. One can get the impression that the public sector still has trouble accepting the fact that

a private company must act for profit because it will not survive. The potential for using public procurement to generate real innovations in the Polish economy is wasted.



CHAPTER VI

HOW 5G WILL CHANGE OUR LIVES?

To tell the truth, to understand the significant benefits we will have from the services provided by 5G networks, we do not need to know what the concept of their construction is. We do not need to study in detail what technical consequences have the improvement of specific parameters and introduction of new functionalities. Instead, we need to understand what they are useful for and why we should build new ones instead of modernizing the ones we have. And here the first important information: 5G is just an idea on how to modernize and expand what we already have. There is no need to destroy anything. What is more, 5G is an idea how to make better use of what we already have – i.e. optical fiber, towers, poles, tele-technical sewage system, etc.

Those who want to know more precisely how this evolution will proceed – we encourage you to read the attachments describing a more technical language, what the differences are and how the evolution to 5G will take place. We did it in the most accessible and understandable way, but we tried to limit the description of the 5G network to the most important aspects.

We know that in order to accept a new technique, we must understand it. Only a few dozen years ago, every driver had to pass an exam on the knowledge of the construction and operation of the car and most of its subsystems. Today it sounds absurd and it does not make sense anymore, but in the early days of motoring it was very necessary and practical. The cars were new and people were afraid of them. They needed to tame them, if only in such a way that they could fix them. This fear was important because there were no mobile phones, the traffic was very low, repair workshops less available, etc. The driver wanted to believe that if he breaks something, he will be able to fix it himself. In practice, this was generally an illusion, but it improved trust, both in the network and in cars.

The situation with 5G networks resembles the construction of a sewage system in Warsaw in 1897 or the construction of an electricity network in London in 1880. New situations generate similar suspicion, as was the case in history. Like now, small groups of opponents were created, be it plumbing or electrification. No reference was made to the world of science or physics. It was mainly based on the opinions of others and superstitions.

Today with 5G networks it looks similar. This new technology seems to be very complicated

in details, but there is nothing in the physical foundations of action that we would not use for a long time. It's just an evolution from 4G to 5G, something like the next floorboard in a next-generation car. But this complication means that many people do not even understand the basics of new devices, so they are suddenly afraid of radio waves, mysterious harmfulness, danger, espionage and, simply, "new". The solution is one. They must learn them in practice, that is, start using them. Then the shamans of fear will lose their power. This happened with bikes, windmills and also with smartphones. This will also be the case with any new device that is useful and secure.

However, it is worth adding a new, unprecedented aspect. One of the main sources of fear in the field of electromagnetic fields and 5G networks is deliberate disinformation. In Poland, materials prepared outside our country are distributed, aimed at delaying the implementation of modern networks, and thus helping to slow down GDP growth and the quality of our lives. Materials with "lethal 5G technology" are distributed, causing "birds falling", increasing radiation power 100 times, threatening us to build public space with a forest of large antennas or, finally, "grilling our brains" due to the fact that the 5G network uses same frequencies as the microwave oven.

5G is a specific and necessary expense, so these networks will certainly be created. As with all other networks, customers will pay in the final bill. And this is not a problem, because it will pay off in the long run. The case we are calling for is time. This must be done as soon as possible, because then the benefits will be greatest. To make this possible, we need to encourage decision-makers to put the investment program on the 5G network first in the to-do list. 5G networks, and with them fiber optics, are a skeleton, a kind of bloodstream of a healthy, modern economy. Without this bloodstream, we will not be able to successfully spread in all areas of the economy and combine all its instruments into one mechanism.

Below is a list of things that we can do the cheapest and the fastest, thanks to the rapid modernization and expansion of telecommunications networks:

1. Thousands of enterprises and tens of thousands of young programmers will be able to take part in the development and installation of artificial intelligence for most devices that surround us. This will be a process comparable to converting wooden or bronze tools to iron, or converting everything from lamp systems to integrated circuits.

2. Tens of millions of intelligent machines and industrial Internet devices installed in production plants will work in a continuous cycle without interruptions, because they will not require service of people. They will eventually be able to repair themselves or warn about an imminent failure well in advance. The costs of industrial production, and therefore prices of goods, will fall – they will therefore become even more accessible.

3. Intelligent public transport control systems (rail, bus, car) connected with weather forecasting systems, traffic etc. will provide us with shorter travel times, lower costs, increase punctuality and safety, which is difficult to achieve today.

4. Mortality in car accidents will fall many times, and autonomous car travel times will be shorter than those we have today, because the machines do not get tired, are more precise and faster. The number of traffic jams in the city will decrease, which will have a positive effect on air quality in cities.

5. Robotization will enter agriculture. Agricultural machinery will become cheaper and maintenance free. With the entry of electric agricultural micro-robots, it will be possible to quickly limit the use of plant protection products. Farms will become self-sufficient in energy.

6. Power networks will eventually be able to switch completely to the use of renewable energy sources. This is a way to cheap and widely available energy. When fuels cease to be a cost, the option of subscription energy downloading will become available, just like today we have unlimited data download option.

7. Any patient requiring continuous medical care will be able to receive it without having to be in a hospital. The quality of this care will be as different from the current one as the punctuality of today's quartz watch for PLN 100 from the punctuality of an expensive watch 50 years ago.

8. Most employees will be able to work anywhere. Each of us already knows most of the services possible if this worked. And they work only when we are connected to the 5G and fiber optic networks, because they are the ones that enable it.

9. The number of radio and television transmitters will radically drop down, since both radio and TV will switch to Internet transmission.

10. The development of automatic trade and home supply chains will begin.

11. Students will stop sitting behind desks and will start learning through practice, just like pilots nowadays learn how to fly in special simulators.

12. Management of fiber and wireless network bandwidth resources will allow every user to buy at a reasonable price „certainty” of their applications and devices.

13. The costs of maintenance of the whole infrastructure will drop down, since used optimally, without „traffics”, overloads and breakdowns, and we will be informed about the necessity for new technology much earlier.

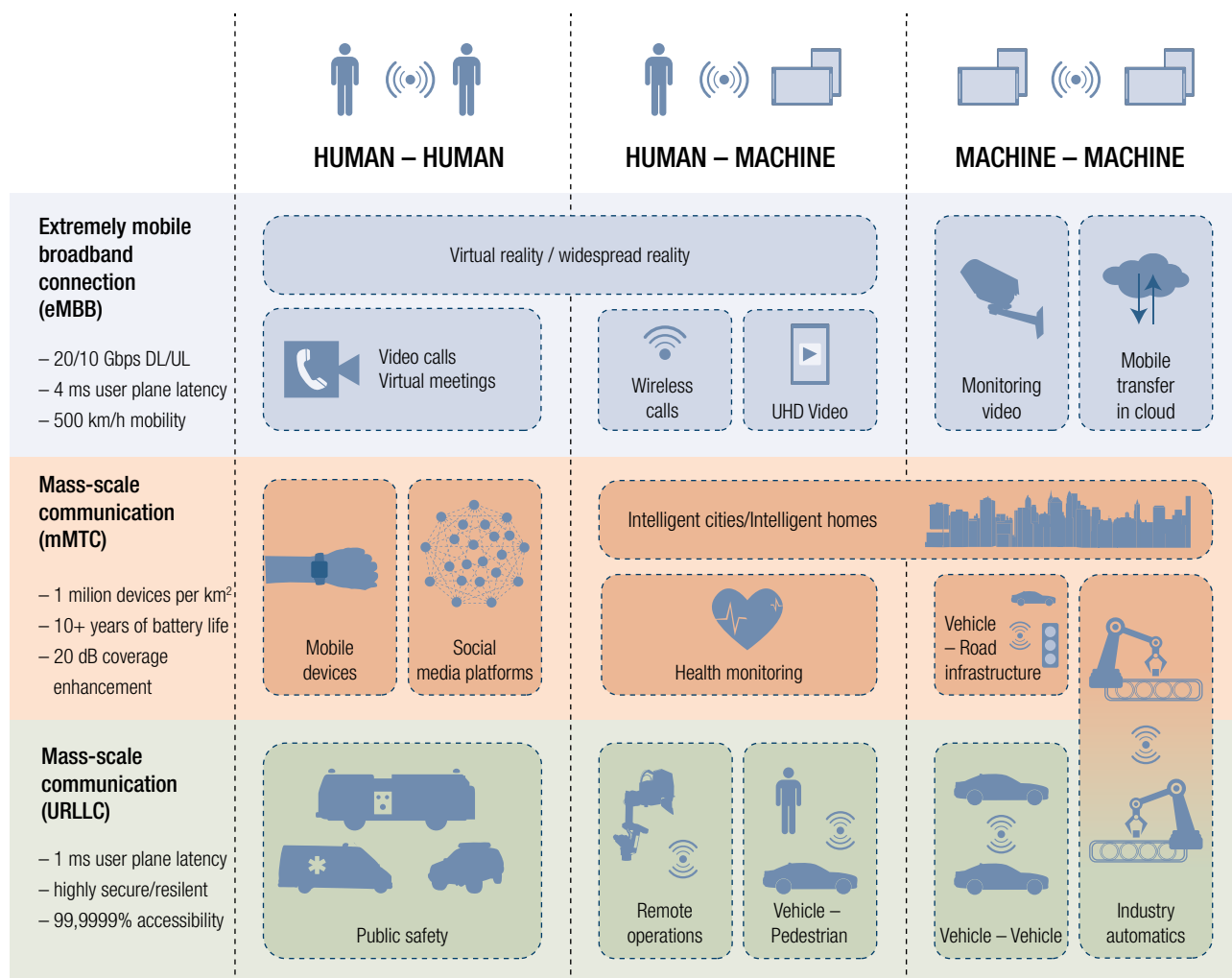
14. Systems of analysis of human competences and possibilities will eliminate the problem of unemployment for good.

15. We will reduce the costs of power for real estate and network infrastructure.

16. Medical care, together with automatized diagnosis and monitoring, will also be available remotely, what will elongate our average life expectancy.

This is a very incomplete list of applications that will increase work efficiency, free us from many tedious activities that take us a lot of time, reduce the cost of goods and services, increase the safety of life and increase its comfort.

Most readers of this short story at some point will say: well, you convinced me – it makes sense. But a moment later they must ask themselves about its impact on whether the construction of the 5G network will take place sooner or later. Well, this influence is decisive. First, telecommunications operators will not invest in something that customers will not buy. We are clients of



the network in many ways – as individuals, and workers of all kinds.

When we understand the benefits and convenience of new services, we will buy it as an efficient tool that facilitates and accelerates work, and as a convenient home service. Then we will perceive every administrative slowdown in the development of this system as the inefficiency of the company, but also of the entire state structure. We can react to this when purchasing telecommunications services and during each subsequent election. The sooner we understand this, the less delay we will have in relation to the most innovative and cooperating societies.

The list contains only the most important ideas that are already being developed. However, we must remember that this is only the beginning of development. What did we know about the Internet 25 years ago, even though it was already there and ongoing? Who dreamed about current applications?

Most current uses could only be read in fantasy genre books.

Awareness of this fact is a trigger to launch projects aimed at searching for new, yet unknown applications. Pilot implementations of 5G networks launched in many countries are used to a greater extent to examine the needs / services and new ideas for business models, than to test the possibilities of the 5G network itself. Many civil and professional associations, student organizations and entrepreneurs organize meetings and workshops where people discuss spectrum of new opportunities.

Therefore, at least at the beginning of development, we should get to know the very large number of new possibilities of the 5G network as best as possible. Thanks to this, everyone will be able to compare what we have with what we can have. We are convinced that this is possible by describing the benefits in simple words.

Social interest and support for the investment will raise when users start to use it in a creative way, often different than its initial purpose was. The case of a SMS, which was supposed to be a message within signal network of the operator, is not a single extraordinary one in the history of technology. We hope that many engineers and entrepreneurs will be inspired to more detailed and creative familiarization with new features of wireless networks and possibilities of a full optical fiber network, even if they have not even started to think about their benefits coming from this new technology.

THE BIGGEST WEAKNESS OF A MODERN TELECOMMUNICATIONS NETWORK

The assessment of whether something is weak, good or very good is the result of a comparison. If we have no idea that there could be something better, we agree with what we have and adapt to it. Change is always initiated by innovators. They are people who want and can do something better, more efficiently. However, real progress begins when people find out and become convinced that they can also benefit from this improvement. Therefore, we will refrain from telling you about the current disadvantages and advantages of future access networks. You can read about it in the attachments at the end of this short story, on Wikipedia and websites devoted to this topic. Engineers and equipment suppliers will constantly and quickly improve 5G access, so it will have a higher quality than the current one very soon. 5G access can be considered a "wireless fiber" to make each of us realize their potential. Of course, in order for them to work efficiently, 5G networks need fiber optics connected to new antenna systems and pico cells themselves.

The biggest weakness of modern telecommunications is the lack of a common optical fiber network. Fiber optic cabling is durable and should be installed at any construction site, even when it will be fully used in 20 years. We need a denser fiber optic network than a power grid. Optical fiber is already cheap, but its supply is still a bureaucratic and competence obstacle course. The construction process lasts nearly 2 years.

The explanation that the process of building is too expensive is not true. Poland, being ruined by war and much poorer than today, in a period of several dozen years has provided every household with electricity, even though it was much more expensive than optical fiber one. If there is a clearly stated aim and a path how to reach it, it will turn out that it is possible to reach with common effort.

The lack of optical fibers and the slow pace of their construction are only the competence barrier of citizens. THE PACE OF DEVELOPMENT AND QUALITY OF 5G NETWORK DEPEND ONLY ON CITIZENS. Active pressure on each local governmental official and demanding the construction of channels for carrying out optical fibers for every renovation of a sidewalk, road, street, sewage system, water supply system or power line is the responsibility of every citizen. No house or building should be without optical fiber, let alone put into service. The optical fiber must be provided to each apartment as soon as possible. It must be laid along each road and street. Only widespread civic pressure can accelerate the process. This is the most important thing we can do for the future of our children and future generations. Fighting for optical fiber everywhere – therefore fighting for better health care, kindergartens, schools, social security, public and private communication, for clearing traffic jams in cities, for better roads, cleaner air, soil and water, saving energy, reducing PEM emissions, stopping climate change, decent home medical care and safety on the streets. It is a struggle to reduce the cost of travel, electricity, water and street lighting. This is an opportunity to reduce the costs of maintaining roads, pipelines and sewage systems.

This is the justification for the need to build a 5G network. It must also be made clear – the weakness of the optical fiber network is the weakness of civil society. The government is very aware of the need for fast 5G network construction, so blaming the government for this state of affairs is a lack of elementary responsibility for itself and its offspring.

And in this whole tirade there is not even a bit of exaggeration. And if someone thinks otherwise, they do not know what world they live in.



CHAPTER VII

WHAT WILL ACCELERATE THE DEVELOPMENT OF ACCESS 5G NETWORK

There are three main factors that determine the pace of 5G access network development:

1. Availability of fiber optic connections.
2. Elimination of barriers.
3. Demand development.

First of the above we discussed the factors in earlier chapters. We have only mentioned current demand in the context of existing applications that cannot be disseminated through 4G access.

In a market economy, the basic mechanism for stimulating demand is advertising and supply, that is, the availability of goods / services at a price that the customer is willing to pay. This mechanism works great for consumer products that the customer knows. The effectiveness of this mechanism decreases in the case of charges for the use of infrastructure. In the case of general use infrastructure with very high investment costs, used for generations, the tax financing model of these investments has gained more popularity. When it comes to living costs, very different business models are used.

In telecommunications, the ownership situation is very diverse, and further development pathways are the subject of disputes. Initially, private operators functioned best. After strengthening the market competitiveness at the beginning of this century and the decrease in the costs of telecommunications services, operators faced a challenge. Technical progress has become so rapid that before they offset the costs of investing in one technology, another one appears that they cannot finance. The total socio-economic benefits of telecommunications innovations are so great that it is difficult to wait for operators to complete the next investment cycle. In this way, the idea of separating investments in optical fibers began to develop. Their importance, durability and optimization of utilization could be much better if the fiber optic infrastructure were shared by operators. Possible solutions appeared in the draft update of the National Broadband Plan. Let's hope that some idea will eventually appear, so that the business model of rapid construction of a dense fiber optic network does not interfere with the pace of development of the 5G access layer and supports it instead of inhibiting it. Another key points in this aspect will be agreements for TMT

consolidations which will impact building of the scale effect, very needed in the capital-intensive telecommunications business.

In the initial period of development, 5G access networks will not be widely available. Investors will mainly accept business models in which the return on investment will be fast enough to prevent the situation in which networks will technically get old before they pay off. On the other hand, customers will not accept too high prices. The demand development scenario must fit within this framework. First, investments in large cities and industrial centers will start, where the number of clients, the level of client competence and needs are the highest. Then prices will be immediately acceptable and the development will be very interactive. New business models will be shaped, and users and suppliers will gain experience.

At this stage, it will be very necessary to involve you in training staff and financing R&D projects – especially in the SME segment. The strategic goal should be to facilitate them "technological catch up" in the field of Industry 4.0 and the introduction of the concept of Society 5.0 in Poland. The state should ensure that 5G networks are needed in technology and industrial parks, innovation centers, universities and SME clusters. Thus, by engaging public funds in the development of science and innovation, it will be possible to stimulate the demand for 5G and optical fibers. Much will depend on the cooperation of the National Center for Research and Development and the Industry Platform of the Future Foundation (FPPP) under programs to strengthen the innovation of the Polish economy and cooperation. The effectiveness of this cooperation will depend on the commensurability of training and R&D efforts and our openness.

A separate task is to stimulate demand along busy communication paths. We expect the benefits of building autonomous communication infrastructure in areas for which the state is responsible. It is about road safety and optimal use of road infrastructure. Therefore, public-private partnership would be the most appropriate in this case. This is due to the belief that at the beginning the main functionality will be the management of autonomous car traffic, but after the initial stage of development, the demand for professional end entertainment services will start to grow rapidly, since the vehicles will become places of work and rest. Perhaps the entities operating

on the market of electric car charging devices will develop electricity management routes in cars, ensuring smooth and full use of fast chargers at fuel stations. The greater your involvement in R&D in this type of 5G network remote control (5G test-beds) expanding the demand for 5G network, the greater the economic benefits will be. Moreover, such pilot centers are being created in the world⁸ and if they are not established in Poland, Poland will lose the chance to develop.

Public-private partnership should be an important mechanism for synchronizing public and private expenditure. Investments in optical fiber, in which your involvement will be much needed, should go hand in hand with investments in the 5G access layer, which require dynamics, agility and innovation – features that are the domain of private entities.

⁸ <https://www.5gtechritory.com/> or <https://www.encyr.ca/> czy <https://www.businessinsider.com/uber-s-fake-city-pittsburgh-self-driving-cars-2017-10?IR=T>



CHAPTER VIII

SUMMARY

Enterprises associated in chambers of commerce, members of the Industrial Transformation Team, telecommunications market experts, consulting companies and branch specialists from industry prepared a series of detailed reports on key economic problems. They contain lists of recommendations – based on professional analysis and provided with solid justifications. They express deep concern with the lack of actions corresponding in any way to the scale of challenges posed by programs for the development of Industry 4.0, 5G networks, Society 5.0 or digitization of infrastructural networks (electric, road, rail, etc.). That is why the subsequent lists of recommendations are getting longer and the technical and technological distance of Poland in relation to the leaders of technical and digital technologies is increasing.

Poland without a recession in 2009 survived the global economic crisis. Since then, it can boast of economic growth, but it is too slow for us to reduce the distance to highly developed countries.

That is why the environments of digital industry and non-governmental organisations are concerned and alarmed. Well, the current economic growth cannot be faster, because it is based to a minimum degree on the increase of innovation and technological productivity.

It is primarily paid for by the prolonged working time and its intensification. Poles have become one of the hardest working nations in the world. Enough to give two numbers. A statistical employee in Poland worked 1928 hours in 2016, while in Germany – 1363 hours⁹. Despite such a great effort, over the past 20 years, the difference in per capita national income, including purchasing power, has not narrowed or even slightly increased, which means that the big difference in the standard of living of the inhabitants persists. It looks even worse in purely financial terms. In the period 2010-2018, GDP per capita in Germany increased by \$ 5,623, and Polish inhabitant by \$ 2,829. It looks equally bad throughout the 21st century, as GDP per capita in Poland increased by \$ 10,955, and Germany by \$ 23,963. Therefore, delight over the percentage of

GDP growth is feeding illusion. We earn and pay with money, not with interest. This is not a problem of short-term and short-term changes in the economic situation, but a fundamental difference in the mechanisms of economic growth. Simply put, the Germans scare their heads much more than the gruff from dawn to dusk. Therefore, we must switch to an innovative way of development. The advocates and leaders of this change are the digital industry and foundations promoting Society 5.0, because digital innovation is 60% of the value of all innovations. Moreover, with the development of artificial intelligence, the role of digitization in innovation will continue to grow. **THIS MEANS WE HAVE TO ACCELERATE THE CONSTRUCTION OF 5G NETWORK AND INDUSTRY 4.0 AT ALL COST**, to be able to put the image of Society 5.0 into reality.

This will allow digital techniques and technologies to be used to solve structural problems such as aging society and climate change. Any action slowing

down or challenging this direction of growth reduces Poland's development opportunities.

Employees pushed into hyper-competition modes are exploited to the limit, and therefore more and more stressed, less creative, socially inactive, and, worst of all, increasingly negative about all changes

and reforms. And it is hardly surprising, because all the previous ones always ended with increased effort and a decrease in the sense of security at work.

After leaving school, a Polish employee has no time to read or expand their knowledge. They do not have enough time or strength to even update their skills, which means that the number of people excluded due to loss of competences or skills increases quickly with age. Poland occupies distant positions, e.g. in lifelong learning, and Poles spend little time reading books or self-improvement.

Even from statements by government representatives it is clear that this path of economic growth has already exhausted its possibilities. We hear all the time that the time has come to increase innovation.

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Therefore, the authors of this study asked themselves other questions. Why do we not make decisions adequate to the tasks? Why does Polish economic policy not respond to contemporary challenges?

The answer is unfortunately very easy. Polish politicians do not make difficult economic decisions because they do not have to. Euro2012, highway, airport and stadium construction has disappeared over the horizon. The Polish voter rarely uses the evaluation of the economic program of the politicians he is voting for. On the other hand, politicians examine their constituents very closely and act accordingly. They also skilfully use modern, digital tools to shape the opinions of their constituents, and especially social media. Therefore, they try to shape them so that they do not require them to take on challenges. The essence of modern politics is eating fruit collected by others and postponing difficult and risky decisions for later. The public debate mainly deals with the distribution of Polish fruit, the 30-year transformation and the change of society into even more consumption-oriented.

Entrepreneurs of the digital industry are fully aware that the slowdown in entering the 4.0 economy may push Poland off the path of rapid economic growth for a long time. That is why they urgently call for the creation of conditions for investment in the 5G network. Without these networks, we will not be able to capitalize on the upcoming waves of economic growth. Therefore, we need much more effective communication directly with the public, because only voters can encourage politicians to act. That is why this publication is not a consulting report but a brochure written in a language that is widely understood. We decided that a professional report addressed to public space and devoted to the economic and social revolution that is taking place makes no sense. It would be to draw up another detailed list of specific recommendations recommending a program of changes in law, economic decisions, etc.

We decided to focus on recommendations stimulating social activity for the establishment of a new strategic national goal for the next generation – Society 5.0. It is entering the group of the most developed economies, using the beginning new phase of economic development as rising waves. Therefore, the recommendations below are addressed mainly to the average person and the media.

In particular, the recommendations are original and are equally addressed to the average citizen, media and entrepreneurs interested in innovative development directions.

EDUCATION AND SOCIAL COMMUNICATION

In social communication, we must break with harmful canons. It is not true that the voter is always wise and infallible. The level of economic competence of politicians depends on our votes. If an incompetent politician gets power, it is also the fault of the voters who voted for him. It depends on the votes of voters and will depend what kind of state we will have and how we will live. The thesis that the voter is not responsible for his choices cannot be further popularized. We decide how much in the country we will have policies from Venezuela, Greece or Argentina, and how many from Denmark, Sweden, Finland, Germany or Japan. In social communication, it must be reminded that one of the economic miracles of the world has happened in Poland and has been going on for 30 years. We have entered groups of developed countries. We also have every chance and opportunity to make the next leap, this time to the group of the most developed countries. To this end, we must actively demand reform of the entire education, training and social communication system by setting ambitious goals.

REFORM OF THE PRE-SCHOOL AND SCHOOL EDUCATION SYSTEM

This reform should take into account the needs of the labour market in 2050. At the new school, the teacher should be a friendly and helpful guide to the world of knowledge. One should immediately invest in educating the teaching staff so that the school becomes a student-friendly place, developing in it natural curiosity and innovation. One rigid curriculum should be abandoned. Teachers should be given the opportunity to implement modern and diverse education methods. The main task of the new school should be to strengthen curiosity about the world, educating the student's willingness to learn and openness to changes. You must give up evaluating students using numbers.

COMMON LIFELONG LEARNING SYSTEM

The pace of technical progress and the development of artificial intelligence will forever change the nature of human work. The new economic environment will be characterized by high variability in the scope of necessary skills. That is why you will need a training system that will allow everyone to devote a significant and growing part of their working time to updating their skills and knowledge.

SYSTEM OF THEMATIC SOCIAL COMMUNICATION PROGRAMS

Entering the path leading to a knowledge-based society implies the need to inform society in a mercurially competent manner and in accordance with scientific knowledge. The rapidly changing reality and the growing strength of the impact of electronic media on the individual created the possibility of mass, targeted disinformation to achieve specific commercial, economic, political, ideological or military goals. There are too many examples of the effectiveness of this type of impact. It seems that ad hoc measures in this area will be ineffective. That is why we postulate to launch a permanent support mechanism for social communication programs, taking into account the specificity of digital and social media.

The topics of individual programs should respond quickly and competently to the emerging disinformation threat. At present, expert social communication programs are needed, which in a simple and reliable way will explain the need for widening or expanding common knowledge emerging in the public space. The so-called Fact-checkers, i.e. institutions verifying messages and correcting false information. The lack of common knowledge creates space for activities that exploit this deficit. Perhaps it should be considered whether social communication programs focused on widening common knowledge should be part of the state's protection / defence policy. There is an urgent need to launch a system to protect / defend society against the effects of such phenomena in the information space.

Reaction measures should be adequate to recognize the source and nature of the threat.

These are examples of such programs:

1. Impact of preventive vaccination system on incidence and mortality.

If such a program had been undertaken in a timely manner, we would not have allowed this level of misinformation about the real value of the vaccination system. So-called movement "Anti-vaccines" would never have arisen. The genesis of this movement is unclear, although there can be many reasons for commercial and political players. The world independent press reported that the anti-vaccine movement strongly supported Russia through social media. Ignoring the fact that there is a deficit of common knowledge in the public space about the importance of the preventive vaccination system is already resulting in increased morbidity and fatalities.

2. Rules for using the electromagnetic field (PEM) for telecommunications purposes.

Voters should receive information that will allow the state to gain public acceptance for modernizing the radio space management system, ensuring appropriate use of the entire frequency band and ensuring safe levels of PEM power density. The deficit of common knowledge about the impact of PEM on the human body has opened the possibility of raising unjustified fears. The result is a significant and completely unnecessary increase in investment costs in the radio access infrastructure of telecommunications networks. It is necessary to conduct a broad social campaign in this field and to disenchant myths associated with the electromagnetic field.

3. The essence of operation and benefits of investing in a 5G network.

The lack of universal access to reliable information on this subject has opened the possibility of creating completely irrational, not to say absurd, fears. The development of the problem seems to follow the path followed by the development of anti-vaccine movements. The campaign developing in electronic media against investing in next generation access networks may have a detrimental effect on the pace of electronic communication in Poland

4. Popularization of the Society 5.0, in which digital technologies help solve the structural problems of the country.

We propose to create educational materials on the scale of challenges Poland faces and how modern technologies such as autonomous vehicles can solve these problems.

5. Activities of the Future Industry Platform Foundation.

The development of Industry 4.0 requires new forms of cooperation with the SME sector. For this purpose, we propose to use industry chambers of commerce that have taken responsibility for the organization of economic self-government since the beginning of the transformation. Lifelong learning, planning and launching production cooperation networks should take place through chambers and FPPPs. The FPPP integration program with other such platforms operating in the EU requires urgent development.

6. SSP managerial staff development program.

The boards of state-owned companies (SSP) have a huge impact on Poland's development. We postulate the introduction of compulsory training in new techniques and technologies, which must be completed by a potential board member in order to be able to work in the SSP.

7. Promotion of R+D and cooperation programs, including social trust

We recommend greater promotion of programs such as New Horizon or Digital Economy, mapping scientific environments and business ecosystems – key in industries such as IoT, AI or Block chain. Undertaking such activities can be accomplished by working with think-tanks that spend funds in a very cost-effective way.

DEVELOPMENT OF TELECOMMUNICATIONS

Over the past 3 years, the business community has submitted a whole package of recommendations, without which the development of the 5G network will be very difficult, and in some parts impossible. Lists of such recommendations contain the following documents:

- update of the National Broadband Plan,

- postulates of changes in the law regulating the way radio space is managed, in particular the density of PEM and the allocation of frequency bands,

- postulates of changes in acts affecting the pace and costs of investment in optical fiber and wireless infrastructure.

We recommend reviewing the proposed changes, including a package of activities with a timetable and budget, which could be called a Pact for the development of 5G networks and Society 5.0, which is a program of activities for the implementation of already adopted strategic level documents.

We postulate to shorten the construction process, especially for the so-called small cells, which will be installed on lighthouses or in public buildings. The current 2-year construction process is far too long.

Construction of the 5G network is a civilization project requiring the involvement of all ministers. It is necessary to puncture some holes in the Chinese walls between them so that the initiatives of the Minister of Digitization and Ministry of PiT are not contested and inhibited by ME, MIR, or MR. Cooperation between the central and local government level is necessary. If this does not change, we will continue to build bridges and viaducts that end in the field and deteriorate unused for years.

Radio space is the same common scarce resource as water and air. Technological and economic development requires that the burden of usage charges should take into account, first and foremost, the long-term social interest. One should consider why, for example, land owned by the state and used by the railway network operator is made available free of charge so that it can provide cheaper transport services, while the radio space at the disposal of the same State, made available to a given telecommunications operator, is distributed in modes that result in a significant increase in the cost of providing services. This is one of the many arguments that the radio band economy should be deeply reformed. Otherwise we will deprive ourselves of many development opportunities.

Due to the large fragmentation of the TMT sector (telecommunications, media and technology) in Poland and the challenges related to the size of enterprises and necessary financial outlays, we recommend a more flexible approach to consolidation in the TMT sector.

DIGITIZATION DEVELOPMENT

We propose to reactivate the program From paper to digital Poland, in particular by launching projects with specific dates and budgets in the field of artificial intelligence, the Internet of Things, distributed registers (based on the Estonian x-road) and the services and data platform (PUiD).

We call for the promotion of pilot projects, such as digital road corridors, smart contracts based on Block chain in administration, and publication of ready-made templates for ordering, for example, chatbots.

CYBERSECURITY

LEGAL REFORM

We postulate efforts to introduce transparent and open sets of technical requirements common for the entire EU for suppliers of equipment and software for telecommunications and telecommunications networks irrespective of the country of origin.

We also call for sense in shaping these requirements that may cause significant and completely unjustified loss safety. It is necessary to develop a clear hazard classification and a rule proportional to the proportionality of security costs to the costs of possible losses.

There is a need to establish a clear legal framework that clearly sets out the criminal and material liability of operators, equipment, software and end-user providers for the cybersecurity of the European digital production and services network.

For the first time since the introduction of free market management principles in Poland, there have been discussions and attempts to question the legality of market access for products of a particular supplier without making specific criminal charges.

Lowering the level of economic trading security due to temporary political turmoil arising from trade fairs should be preceded by reflection and a thorough analysis of all profits and losses.

We postulate excluding from the public debate legal and technical aspects related to threats of war nature, and related to possible state cyber- attacks, from threats arising from criminal activities.

CYBER-ATTACKS DEFENSE

Poland has for many years been the subject of professionally organized information cyber- attacks aimed at:

- inhibiting the innovative development directions of Polish industry,
- inhibiting the technological transformation of power networks,
- inspiring and supporting activities based on inciting fears that block the development of wireless access networks,
- deterioration of public health,
- conflicting environments with different political views,
- undermining confidence in science by disseminating scientific "pseudo-revelations",
- dissemination of "pseudo-expert opinions" on the impact of the development of Industry 4.0 on the increase in unemployment.

Losses on this account are measurable and quantifiable. That is why a system solution is needed because the current services are completely unable to deal with it. One can get the impression that protection against such cyber-attacks in Poland practically does not exist. Therefore, we postulate the establishment of an organizational unit that will identify all such threats on an ongoing basis and publish information on this subject in a publicly available bulletin. Then economic entities will be able to limit losses related to this type of economic subversive acts.

In the face of years of negligence, a program should be taken to remedy the damage caused by attacks that were not neutralized. We have tens of thousands of misinformed and lost people in Poland who have believed the lies spread by foreign services. Information activity is needed, which will explain that they have fallen victim to a cyber -attack and help to familiarize these people with the real state of affairs.

Poland has also become a haven for criminals whose basic crime tool is information cyber- attacks aimed at obtaining material benefits. There is a lack of understanding or interpretation of the law clearly stating that an individual, profiled or area cyber-attack should be prosecuted as an attempted

fraud and as fraud when the attack was successful and the victim was sustained material damage.

The law should take into account the fact that the development of artificial intelligence, in addition to many benefits, opens up enormous opportunities for carrying out this type of crime on a large scale. Let us paraphrase the famous Polish boxer. There are no people immune to cheating – they are only ineffectively cheated. We are aware that this is a difficult task for lawyers, but artificial intelligence is and will be increasingly used as a tool for committing crimes, and lawyers will have more and more problems with this. Appropriate changes will also reduce the effectiveness and impunity of traditional professional cheaters.



ATTACHMENTS

Attachment I – Concept, functionality and benefits from building 5G
https://kigeit.org.pl/FTP/PRCIP/Krotka_opowiesc_Zal1.pdf

Attachment II – Technical conditions for 5G development
https://kigeit.org.pl/FTP/PRCIP/Krotka_opowiesc_Zal2.pdf

Attachment III – Security within 5G networks ecosystem
https://kigeit.org.pl/FTP/PRCIP/Krotka_opowiesc_Zal3.pdf



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