The current state of **social dialogue realization in Society 4.0** in the Czech Republic

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ČMKOS

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CONTENT

EXECUTIVE SUMMARY

- The Czech lands have gone through all stages of industrial revolutions and are one of the most affected parts of the world by the Fourth Industrial Revolution. This is evidenced by the expected impacts on the labor market.
- In the Fourth Industrial Revolution, it is necessary that the Czech Republic avoids the developmental delays it has experienced in all previous stages of industrial revolutions. The reason is the effort to approach economically more advanced western economies not only within abstract macroeconomic indicators but also in the realistic living standard of citizens.
- Trade unions are, and must continue to be, a key player in the implementation of Society 4.0, i.e. in the implementation of public policies aimed at strengthening or mitigating the effects of the Fourth Industrial Revolution on society.
- The trade union movement itself has to respond to changes in the labor market. Consideration should be given to the new potential content of collective negotiation, which is likely to affect also workers' digital rights, such as personal data protection and control.
- A critical moment is to extend collective negotiation to other groups of workers who are presently forced into non-standard forms of employment, such as self-employment in digital platforms. CMKOS, in cooperation with the European Trade Union Confederation, will act and find solutions in the context of the whole EU.
- Occupational safety must cover new and increasingly unhealthy working environments, such as the prevention of burnout syndrome, constant online disposition of an employee, etc.
- Given that one has to respond quickly to the changes in the Fourth Industrial Revolution and is more likely to have more professional careers than just one, the public administration shall provide every single citizen with a sufficient network of affordable education services and give higher priority to lifelong learning.
- Similarly, public services shall also ensure other aspects of the transition to the digital economy and focus on frictional (voluntary) and structural (involuntary) unemployment, which can theoretically occur. A sufficient "social pillow", which is currently underfinanced, will be crucial for trade unions.

INTRODUCTION

The following information is written by CMKOS primarily with the assumption that the current form and content of social dialogue may soon prove to be outstripped, mainly owing to dynamic and complex transformations triggered by the forthcoming Fourth Industrial Revolution, both on the part of employees and employers. The time to look also in a social dialogue for the corresponding response of both partners heading towards its overall higher efficiency is approaching.

The task for creating this document is extremely difficult for each of the tripartite participants, who should inevitably fulfill its task, i.e. defending the legitimate interests of those who have actually nominated them into the tripartite for this very purpose. Yet, the only thing that already seems to be virtually certain is the realization that the ongoing changes concern not only the economic system itself (and thus both social partners anchored in opposing positions given by the clash of labor and capital), but practically all systems linked and related to an economy on scales that are more and more transnational.

Therefore, in connection with the grasp of the Fourth Industrial Revolution, it makes sense not only to talk closely about the Industry agenda 4.0 or Construction agenda 4.0 (and thus to understand the phenomenon of "4.0" typically only in terms of departments, sectors or unions), but, at the same time, urgently talk also about the Work agenda 4.0, Education agenda 4.0, Healthcare agenda 4.0 or Mobility agenda 4.0, and in the next step, certainly about Institutions 4.0 and, more broadly, about Society 4.0. And not only in the narrower definition, i.e. "national, Czech", but undoubtedly also in the broader, transnational, perhaps European, but, even better, in the global definition.

Although this is a topic of paramount importance, it cannot be dealt with in its full scope in the limited space of this information. Therefore, we will confine ourselves quite pragmatically to the often-alluded description of key elements and connections, when we deliberately devote a significant part of the text to the genesis of the forthcoming Fourth Industrial Revolution. It is not an end in itself, but goal directed. The conceived structure of information should reflect the finding that the most typical feature of the Fourth Industrial Revolution will be the fundamental differences of their manifestations from all previous industrial revolutions known to us and their impact on the society.

In this sense, the information is an attempt to clarify the main components of the external environment in which the future social dialogue and tripartite negotiations are likely to take place during the Fourth Industrial Revolution.

Owing to this, the structure of this information is divided into six chapters. First (in the parts 1-4, covering the period of the First to Fourth Industrial Revolution gradually), we will discuss their main features and their factual, geographical or technological contexts, as well as projections into economic and population growth, or alternatively, we will mention other vital impacts, especially the social ones.

The fifth part tries to present the first reflection on *the current state of realization of Society 4.0* in the Czech Republic. It provides a closer look at the rather complex rigmarole of its origin, the meaning of its provisions, as well as its functioning structure

and mechanism. The information then leads to a draft outlining the whole complex of challenges to the social partners while transferring to the Society 4.0 by indicating the cumulative impact of demographic challenges coming from the labor market and the need to maintain the macroeconomic balance over a long term.

The sixth part is devoted entirely to the role of CMKOS and its vision of Society 4.0.

The choice of this information structure is purposely chosen to support the thesis that the elementary condition of the least collision course of the Society 4.0 project in the Czech Republic will be to ensure a permanent/ongoing social dialogue of both social partners and government.

1.1 Factual Context

After a very long period of "peace", when changes were very difficult to trace even in the horizon of the order of tens or hundreds of years, the second half of the 18th century allowed for accumulating a sufficient/critical quantity of innovations and for creating conditions in which these innovations could concurrently find a favorable application in the given social conditions of the then England. This entitles us to talk about the first stage of the industrial era, about the beginning of the First Industrial Revolution. As we will mention below, it was necessary to manage a higher-order innovation, in this case, within the steam-based energy source parameter and the applications of this source in practical use (steam engine).

This first economic explosion had its resources, and many assumptions made undoubtedly often in the distant past and were far from being as straightforward (linear) as the simplified description might have looked like. In fact, there were a lot of dead ends - see for instance the contradictory benefit of alchemy.

The (First) Industrial Revolution started due to the gradual creation of the necessary conditions both in the field of own technical development or more precisely in the production forces (wherein the following text we will mention only key slogans in the individual sectors), both in the social conditions which enabled and stimulated these processes, or more precisely institutionalized them in production and social, and in social or more precisely political relations.

Because the decisive impetus for the First Industrial Revolution was given by mastering steam power and its practical use on a large scale, the First Industrial Revolution often has a fitting nickname "*Steam Revolution*".

If, in the long stages of the pre-industrial period, the main source of energy was human power and then the great draft animal power, or in appropriate locations also wind and water energy, it is clear that the effect of human power has always been physiologically limited. And if energy from a water wheel mechanism was occasionally used at that time, then it was critically dependent on the flow of the water source driving the wheel. Thus, although atmospheric steam engines had been used for pumping groundwater from coal mines before, it was the invention of a steam engine (by a Scot J. Watt 1765) that actually made it possible to build factories not having water sources. Moreover, ever since, it has been possible to supply energy to a large number of machines and thus start the general expansion of large-scale factory production. In every respect, it overcame the existing craft workshops or more advanced manufactories, mainly in the textile industry. Therefore, it is no coincidence that the real date for the beginning of the First Industrial Revolution is sometimes considered to be the introduction of the first mechanized weaving loom in 1794, combining the advances in machine and plant construction with a new source of power.

A separate form of innovation (here *power*) was the transition from *one "central power unit"*, usually in the form of a rotating shaft axis connected to a water wheel and its power

further distributed through a belt within the factory, to *assign many stand-alone steam engines* as power units for any number of individual production machineries.

While the main technical direction of the evolution went first through the refinement of the steam engine, after some time, there was a further and fundamental innovation - the construction of power generating machinery as a much more versatile energy source than the "old" steam engine. This started the conditions for the era of the Second Industrial Revolution, which for a relatively long time (mostly in the second third of the 19th century, especially in England) de facto mingle with the still unfinished phase of the First Industrial Revolution.

The boundaries between the individual stages of the industrial revolutions are not sharply delimited, on the contrary: The reverberations of the earlier stages in the form of once-admired groundbreaking technical innovations are commonly evident (albeit usually in some improved form) even in the following stages. A typical example is the use of a steam engine to drive a locomotive. Here the former "steam" was commonly used, especially on secondary railways, until the end of the 20th century. Exceptionally, steam locomotives are still in use today, i.e. at a time when electric power or diesel internal combustion engines rule on the railway.

It was not until the end of the 1880s and the beginning of the 1890s that the basic procedures for the distribution and use of electricity were mastered, however, its widespread distribution dates back to the end of the 19th and especially to the 20th century. However, the electricity itself was not used in the form of primary power. Its production is dependent either on a mechanical generator, driven either by water/steam, wind or (most often today) internal combustion engine. It is precisely the internal combustion engine that has become, in certain cases, the primary power and a very mobile energy source.

And again: A precondition for the application/expansion of the internal combustion engine was to find a suitable, repeatedly expanding fuel in a confined space. Surprisingly, the solution was found not by technicians, but by chemists, right after they found that the most volatile fraction of oil - gasoline, which was an initially unwelcome waste - is ideal for combustion in light internal combustion engines. Engines burning heavier diesel fuel (injected with compressed air) appeared in the late 1880s, long after the industrial revolution had transited to a higher stage. After the diesel engine was refined by R. Diesel (1900, he developed an engine in which the very high air compression in the cylinder ensured the auto-ignition of the fuel if injected in a certain amount), another robust energy source became available. Thus, by the end of the 19th century, the combustion engine had pushed out steam in many industrial and transport applications, de facto signaling the beginning of the end of the First Industrial Revolution - the steam era.

1.2 Geographical Context

Industry on the territory of today's Czech Republic has a very long and diverse history. Its beginnings on our territory can be found already in the 16th century, during the reign of the Roman Emperor and Czech King Rudolf II. Because of his fondness for science and art, he invited to Prague a number of foremen and experts as well as "alchemists" from various fields, such as chemistry, glassmaking, precious metal and stone processing. During his reign in 1595, the first blast furnace was already put into operation in the Czech lands in Karlova Huť which was located in the territory of today's Králův Dvůr near Beroun. It was also thanks to this that the Czech Republic started a larger and continuous production of iron. However, the real foundation of industrial development began in the 18th century thanks to the reforms implemented during the reign of Maria Theresa and her son Joseph II.

However, in comparison with most of the more advanced Western European countries, the process of the First Industrial Revolution in the territory of today's Czech Republic was slightly delayed (the beginnings of the first industrial revolution in the Czech Republic date back to the turn of the 18th and 19th centuries). Nevertheless, as well as in England, it initiated on our territory in the textile industry first. It was possible to build on the experience of the existing textile manufactories and to use a number of experts from England who brought from their homeland the necessary know-how. Only after the next three decades did its elements got into other industrial areas, especially in the food industry, and later in mining and heavy industry in the North Moravian region of the Silesian Basin.

The First Industrial Revolution was gradually spreading mainly to those countries of continental Europe of similarly good preconditions as on the British Isles (mainly to France, Spain, the territory of today's Netherlands and Belgium, partly also to Germany, while east on the east from the Elbe its onset was more gradual [Purš J., Kropilák M. - 1982]). Undoubtedly, it also advanced to some colonies, especially to North America, and its manifestations were also evident in the countries of the Far East, Africa, Latin America, and Australia (naturally in the modification given by the then form of metropolitan economic policy and their dependent colonial peripheries).

In this context, the shift of focal point of innovation bearers from a national perspective is very interesting: while almost all the pioneers of steam engine innovations were British (J. Watt and his successors), most of the innovators of the internal combustion engine, on the contrary, came from continental Europe and America. This reflects the tendencies leading to a change in roles during the industrial revolution - approximately after one hundred years, the United Kingdom had been gradually pushed out of its position of formerly sovereign superiority in industrialization and technological innovation, or more precisely, on this basis, it produced the above-average GDP growth rates.

1.3 Technology

In connection with the developmental stages of industrial revolutions, it is necessary to dwell at least briefly on technologies. Long, practically until the onset of the First Industrial Revolution, the overwhelming majority of the technologies used at the time were based on

the needs generated by the predominant craft, or, at best, manufactory form of production. In the Czech lands, the manufactory (which complemented the small-scale craft production) was at that time the most advanced form of production organization. At the end of the 18th century, tens of thousands of domestic producers were annually involved in the system of the so-called dispersed manufactory, mainly by spinsters in the northern border areas. Between 1780 and 1789, their number more than doubled, reaching almost 150,000 people. Besides them, there were about 400 thousand linen, cotton, and wool spinsters in 1789 (compared to almost 174 thousand in 1780). The textile industry produced over ¾ of the total value of the then industrial production [Purš J., Kropilák M. - 1982, p. 439]. Manufacturing technologies were mostly local, often bound by guild legislation, moreover, usually without stronger support in a comprehensive technical education (which was then only in the embryonic form).

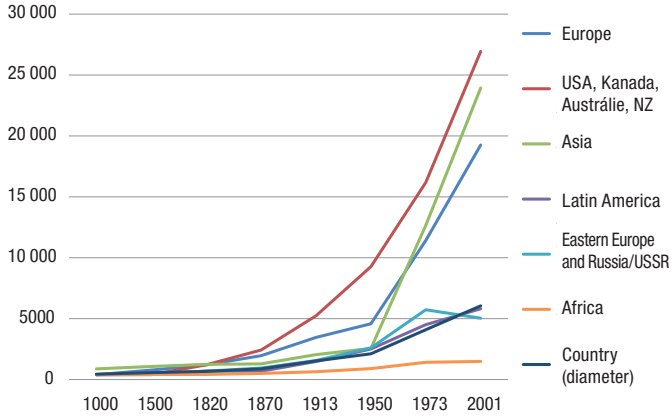
All this began to change with the arrival of the First Industrial Revolution. The sequence of successive - though still basically isolated - discoveries and inventions became typical for it. Moreover, it was still not a consciously controlled process (in the form as we know it today when medical research is looking for ways to deal with malignancies or AIDS, etc.), but rather a more or less spontaneous reaction of the then brightest brains to the existing social demand. This reflected the tendency of industrial areas to chain, which required a new, more effective actions than the previous ones.

Under the pressure of market forces, there had been a necessary systematic activity in the field of researching the laws of physics, chemistry, mechanics, etc., to the extent that, ever since, the technology has since been continuously achieving a position for being an integral part of the production process. Since the beginning of the 19th century, the number of scientific papers on technological problems has been increasing; the so-called patent legislation has been developing, polytechnic education has been formed, first professional associations of engineers and other specialized groups of technologists, "designated" companies, "postal" companies have been created. With some exaggeration, already at the end of the First Industrial Revolution, the foundations for science as a key productive force are being shaped - a feature, however, typical of the Third Industrial Revolution, and conditions that are in today's *high-tech* areas sectors of the Fourth Industrial Revolution irreplaceable.

1.4 Impacts on Economic and Population Growth

The rapid growth of production (supply, or more precisely, the indicators of gross domestic product - see the graph below, to which we will come back later) is necessarily correlated with the general growth of demand for both goods and services, especially transport services.

Chart no. 1: The estimated growth rate of GDP per capita in Africa, Asia, Eastern Europe and Russia/USSR, Latin America, Western Europe, and the world as a whole between 1000 and 2001 (in dollars in 1990 according to the Maddison method)



Source: Maddison A., Contours of the World Economy and the Art of Macro-measurement 1500-2001, 2004

Both the absolute differences at the economic level between Western Europe in comparison with other continents and their increase have been observed over a long period. If at the end of the pre-industrial era, i.e. at a time when the world was only at the beginning of the manufactory form of capitalism (around the end of the 13th century), the economic rate of the Western European average is estimated to be about $700 per capita, while at this time, Africa or Latin America had a rate of about half ($300-400 per capita, Russia about $480 per capita, but Asia - similarly to the then world's average, was right below $600 per capita). It should be noted that the two Asian powers - India and China - generated about two-thirds of the world's product (see Figure 2 below). Then, over the next three hundred years until the end of the 17th century, these distances (even with moderate and almost widespread absolute economic growth) increased only slightly except of strangled Africa, whose potential was artificially diminished by depopulating the areas around the Gulf of Guinea and transporting of captured blacks mainly to plantations to recently discovered (and then abused by Europeans) America, as well as the commencement of colonial exploitation practices mainly applied by the British and French practically throughout the entire African continent (this lasted approximately two more centuries). The production values

headed mainly to England and France; hence, the differences in economic level suddenly became fourfold.

In connection with this chart, however, it should be noted that not only among professionals (statisticians and macroeconomists) have long held discussions on the meaningfulness and the resulting value of the gross domestic product indicator. Without going into detail, let us only note here that, on the one hand, we identify with its critics (regarding its limitation to quantifying basically only measurable effects of economic events), but on the other hand, we do not yet have a different, more complex common denominator relatively reliably incorporating economic activities of this kind in a more or less comparable way over the last two centuries.

1.5 Other Impacts, especially Social Impacts

The rapid growth of industrial production gave a major impulse to the growth of both domestic (intrastate or continental) and foreign trade. It could also be said that, if there was no increase in the demand for goods on external markets, there would be no further incentive to increase supply. It's a classic dilemma of which came first *the chicken or the egg*. Evidently, this is a reciprocal dependence. However, the formation of the single internal market had accelerated, the commodity structure of foreign trade had changed, and the emerging nation states quickly recognized the (d)effects resulting from possible changes in customs and other barriers. It was the continental blockade (1806 - 1813) that was a powerful generator accelerating the early industrialization.

As for the Czech lands, in the last two decades of the 18th century the population increased by an average of 1% per year, in 1792 for the first time, it exceeded 4.5 million people (below which it has never dropped [Purš J., Kropilák M. - 1982, p. 436] In 1818, about five million people lived there and already in 1830 - immediately in the next generation - already about six million.

However, a generally different demographic model has emerged in Western Europe. It was characterized by a lower birth rate (with a lower average number of children born to a woman of childbearing age), but on the other hand, it showed a reduced infant and child mortality rate, as well as a rapidly increasing life expectancy. At the beginning of the 19th century, it was still only between 35 and 40 years, so that after approximately one hundred years (at the end of the 19th century in more developed parts of Europe), it increased to about 50 years.

Europe, however, was very different from a demographic point of view, because in Cisleithania, life expectancy was only about 42 years, and in the then Russia only about 31 years. While in 1750, the total number of European inhabitants is estimated to be around 140 million; after 100 years, it was already 266 million, and in the last year before the start of World War I (1913), 468 million people.

The needs of the industry had gradually grown beyond the possibilities and capacities of the former form of the banking and monetary system based on the combination of cash and non-cash payments. In France, a new type of universal banking institution was established, providing long-term loans in addition to standard financial operations.

The need to cover financial risks mainly in foreign trade, but also in the case of larger domestic investments led to the boom of modern insurance (LLoyd's 1769) [Hradec M., Zárybnická J., Křivohlávek V. - 2005].

For the purposes of this study, the impacts of the onset of the First Industrial Revolution, especially in the area of social relations, or more precisely, of the changes in the social structure of the population, cannot be overlooked. For example, we find a concise statement by I. Geiss: *"Without industrialization, the great revolutions and the rise of the European workers' movement would not be conceivable or understandable. Marx and Engels, who lived in the centers of early industrialization, obtained* (factual, note J. Š.) *material for their opinions and internal stimuli for their work from observing the consequences of industrialization, whose historical analysis became the basis of their world view. The heart of Marx's analysis were the great economic crises, of which the first, major-scale crisis (1847) immediately preceded the 1848 revolution and helped unleash it. At the same time, industrialization culminated the new Atlantic system, the domination of the New West over the Old East and the American and Australian continents, until the modern times isolated, which became an extension of Europe per se."* [Geiss I. 2005, p. 286].

Before the First Industrial Revolution, the landowner's aristocracy (higher aristocracy) usually had the highest position, followed by a relatively weak middle class, both numerically and politically, consisting mainly of the middle clergy, the lower aristocracy, businessmen or lawyers. Finally, there was the most numerous class made up mainly of craftsmen, skilled labors, and rural/peasant population.

All this was set in motion during the onset of the First Industrial Revolution. During its first phase (in terms of both property and politics), the middle classes, in particular, successful entrepreneurs (bourgeoisie), have grown in numbers. Its members gained such capital that in a short time, they could successfully compete with aristocracy (in terms of property, but later also politically).

1.6 The Economic Cycle and its Response

The era of the First Industrial Revolution, based on the individualistic principle of *laissez faire*, or "*keep things happen*" and "*give individuals the natural freedom to do business and the whole society will benefit from it*" were the slogans of the then-emerging liberalism as a counterbalance to feudal concepts of man's oppression and his actions. Liberal ideology was undoubtedly progressive in its time. However, soon after, it demonstrated that "free", i.e. minimally regulated economic competition necessarily leads not only to disasters often with victims but, also from the economic viewpoint, it generates cyclical development with all positive (in conjunction) and negative (in recession and crisis) features and often devastating consequences.

For the first time, a major economic crisis occurred in 1825. This was because the total production volumes (total supply) had grown significantly faster in the past than the buyers' ability to pay for the goods and services offered. This was *the first crisis of overproduction* in modern times.

More in-depth research showed that this was due to the uneven distribution of the product produced between a limited number of owners (producers) and the mass of those who generated the effective demand. In the event that the volume of produced goods began to fall behind significantly in time with the already created offer, and producers began not to receive money from the expected sales to finance the next production cycle. Hence, they were unable to smoothly convert money capital into production/commodity capital and back. The entire economic cycle got necessarily stuck.

Although it was at first small and medium-sized companies with minimum capital reserves that bankrupted in the crises, also securities exchange rates collapsed. According to the principle that "a good company is not recognized by its profits, but by how much loss it is able to survive", the crises were, nevertheless, in a way a catharsis, albeit mostly drastic.

On the one hand, they brought a huge waste of social work (in the form of write-offs of economic losses, bankruptcies, social decline, demoralization, suicides) to, on the other hand, forcibly accelerate the concentration of both production and capital by "cleaning the market". In periodically recurring crises, those companies that were not able to absorb technical and technological innovations, or were unable to make such changes that would quickly reduce their production or overhead costs, amalgamated or were pushed out of the market by more successful competitors [Schumpeter J.A. - 1987].

Thus, the crises have always escalated the issue of competitiveness, helping the recovery process achieve - from a material point of view - both a more progressive structure of production and - from a financial perspective - restore the economic balance between supply and demand.

In terms of time, crises (unless they had a direct connection, for example, to lost war, state bankruptcy, etc.) lasted mostly only one to two years [cf. Mayer A. - 1943, pp. 68 et seq.]. During this time, the industrial production volume usually dropped by about a tenth, rarely more, to surpass the peak of the previous cycle at the peak of the subsequent economic situation.

Territorially speaking, the first crises were limited to the then most economically advanced United Kingdom, i.e. being local or sectoral, but they gradually hit other advanced economies, and over time, turned into a global crisis (see below).

It cannot be said that some progressive intellectuals of that time were unaware of the negative socio-political consequences of the economic cycle distortions, or that they would not have their own solution concepts. Here, it is worth mentioning a plethora of the so-called *Utopian socialists*, such as Bernard Bolzano (Of the Best State), Tommaso Campanella (The City of the Sun), Charles Fourier (The Imminent Social Metamorphosis), Thomas More (Utopia) etc., whose many ideas are extraordinarily fresh even in the 21st century, But around the middle of the 19th century, about half a century after the French Revolution with its "evergreen" slogans EQUALITY, LIBERTY, FRATERNITY, the European proletariat had gradually and painfully realized that it was able to defend itself effectively and that under certain conditions it has a realistic chance of achieving the required changes.

The legacy of the French Revolution and its consequences was absolutely extraordinary. It could not be overlooked, for example, that Napoleon Bonaparte, who emerged

from it, subsequently funded most of his warfare through Egypt or across the whole Europe at the expense of the previously immensely powerful and wealthy Catholic Church in France, which he deprived not only of enormous property but de facto of political power, too. It is no wonder that he turned on himself - regardless of the specific European state, or more precisely, monarchy - at that time, an extremely powerful opponent in the form of the Roman Catholic Church.

A similar situation occurred with the European working class. First, the workers proceeded elementally, mostly violently and destructively. For example, by destroying machines that "took work" from the workers, which is the story of Luddism in England (according to Ned Ludd, allegedly a weaver's apprentice who, in 1779, smashed two knitting machines). The new knitting machines and mechanical looms were able to weave the yarn into cloth much faster than the most skilled artisan weaver working in his own cottage. It would seem that it was only the machines to blame for. Tens of thousands of families were sentenced to beggary because of their deployment in factories. They were crushed by the need to pay the cost of renting and maintaining household looms and, moreover, their incomes were affected by the declining prices of the yarn products sold. This had also become an objective ideological breeding ground for the rapid growth of social defiance.

Luddism expanded so much in the next twenty years (with its peak from 1811 to 1812) that the frightened British government had to send more troops to troubled textile areas than Wellington had on the Iberian Peninsula against Napoleon. Over 100 Luddites were hung or expelled to Australia. It was these drastic measures that restored the legendary "peace for work" [Kašík VI., Suchopár VI. et al. - 1968, p. 9.].

Thus, the European proletariat had proceeded - using contemporary terminology - against its "social partner", against unemployment, low wages, poor working conditions, including long working hours, against poverty and hunger, etc. Not only violently, but, for a long time, often individually. However, only during the course of time in daily practice, it had verified on many victims that the chances of enforcing the requirements were much higher only if they were more organized. The first workers' trade union movements originated in England (1825), clashing with a strong and well-organized bourgeoisie or - increasingly more closely connected with it - the state power [e.g. Sojka M. - 2010, p. 92].

This key insight into the ancient ancestors of social dialogue has been confirmed many times since then and is still valid.

PART 2. **THE SECOND INDUSTRIAL REVOLUTION**

The First Industrial Revolution was able to multiply human productive power through a steam engine. Subsequent phases (in the form of the second or later Third Industrial Revolution) meant further substantial shifts not only in the industry itself and the increasingly wide-spreading application of industrial products but in virtually all areas of human action (including the development of natural and social sciences and the practical application of their knowledge). The preconditions for entering into the *Fourth Industrial Revolution* had thus been created over a long period.

2.1 Factual Context

Just as steam became the symbol of the First Industrial Revolution, the symbols of the Second Industrial Revolution became, in particular:

- electrical power,
- internal combustion engines,
- chemistry.

In addition, science, bringing new production processes and discoveries, is increasingly becoming a common source and initiator of societal change. Scientists are coming up with the use of new materials and ground-breaking processes also in the organization of the workflow, where the introduction of belt production in factories had been a major impetus, revolutionizing not only productivity but also new professional qualification requirements for many employees. Thus, the Second Industrial Revolution is characterized by a relatively broad application of new scientific knowledge, in virtually all fields of human activity, starting with the construction of water-pipe networks and sewerage systems (thanks to reducing mortality among all age groups, the growth of sanitation became a prerequisite for increasing life expectancy), and ending with the construction of further infrastructures.

The conditions for the development of the Second Industrial Revolution were also given by a favorable shift in production relations. It is no coincidence that, following the ideas of the Great French Revolution (1789), we see the rudiments of civil society formation, especially in the USA.

This is particularly true of those countries where the state did not significantly interfere with the civil society. This was not - unfortunately - the case of the Czech lands. The promising phase of the Theresian and Josephine reforms (with the abolition of serfdom or the introduction of schooling) has left its positive marks. For example, literacy began to increase significantly, thanks to which the level of the then monarchy overtook much more advanced Western countries.

The Second Industrial Revolution is, in many aspects, very similar to the previous revolution, but with the difference that the progress relies much more on the use of the dynamically growing mass of knowledge, especially the natural sciences, and does not

rely solely on the intuition of isolated inventors and discoverers as in the previous phase. Individual scientific fields gradually define their own subject of investigation and also their own methods.

Taking the first symbol of the Second Industrial Revolution - *electric power* - in the search for the person who has contributed most to its development and practical application, it is necessary to, first and foremost, name the inventor and innovator T. A. Edison. He invented or improved several products. However, his best-known invention remains the bulb (1879), although the printing telegraph, the typewriter, microphone, electrometer, dynamo, voltage surge protection device, the electric car, rotary cement kiln, helicopter, etc. have also found their application.

The growing production of electric power enabled its application especially in industrial production in the drive of various machines, or in the drive of means of transportation (trams, metro), but also in public and private illumination of cities, roads, and dwellings. The invention of the transformer by N. Tesla (1888) found its application not only in heavy-current electrical engineering but also in weak-current, especially in the production of household electrical appliances (irons, washing machines, refrigerators, radio receivers, etc.).

The inventor of the European stature is Fr. Křižík, a native of Plánice near Klatovy, who has greatly contributed to the electrification of the Czech lands. He was not only the designer of the arc lamp (1880)[71], but also participated in the construction of electric railways (in Prague or Bechyně) or in the construction of the first power plants in the Czech territory. Although the first electrotechnical factory was founded by E. Kolben in Vysočany, it has long been in competition with Fr. Křižík's factory located in Karlín.

The electrotechnical industry in our territory had been developing almost continuously throughout the period of the Second Industrial Revolution, and already in the interwar period successfully competed (in both high and low current) with leading European or world companies (Dutch Phillips, or German Siemens, American IBM, or GE, etc.).

The advances in the electrotechnical industry had been driven by a number of fundamental discoveries in physics, be it the discovery of electromagnetism and other building blocks of electrical engineering (A.M. Ampère and G. S. Ohm, both 1827 or M. Faraday 1831). Radioactive rays were discovered in the form of X-rays (P. Curie and M. Curie - Sklodowska 1896) enabling penetration through matter, or the discovery of radioactive radiation from a pitchblend (1898). In 1905, A. Einstein brought fundamental scientific achievements with his special theory of relativity, the idea of quantization of the electromagnetic field and the explanation of the photoeffect, or Brownian motion, but for the most part, by the general theory of relativity (1915), which so far best describes the universe on a large scale.

Analogically to physics and electric power, the same happened to the other symbol of the Second Industrial Revolution, chemistry.

As scientists delved more into the essence of matter, they were able to initially experimentally and then industrially prepare artificial products that do not occur in nature at all. Examples are colorants, fertilizers and pesticides (intended for agriculture to increase crop yields and plant protection), synthetic drugs, but also explosives, nylon or artificial silk, synthetic rubber, cellophane, celluloid film, saccharin, etc.

By combining knowledge from more natural sciences and mechanics, it was possible to further advance in the development of drive units, following on the improvement

of diesel engine (R. Diesel) and further development of internal combustion engines. In 1883–1886, the petrol engine was constructed by German G. Daimler; at the same time, another petrol engine was built by C. F. Benz.

The petrol engine has found wide application as the drive of motorcycles, cars, ships, and later also aircraft. It was primarily the development of the automotive industry, which has become not only a profiling sector since the 1920s, but at the same time, a passenger car has become an important means of increasing labor mobility (reducing the time required for individual commuting from home to work), lifestyle, social status of the owner and maturity of the country. Trucks became important for the transport of goods, particularly to places not covered by rail transportation. The development of the automotive industry was connected with other fields (steel industry, rubber industry, oil extraction and its conversion to petrol/diesel, transport engineering, including bridges and roadways construction, transport legislation, car service, etc.).

The development has moved forward quickly in other scientific disciplines, for example in biology, where, the gradual absorption of Darwin's theory of evolution by natural selection: all organisms evolved gradually from primordial living matter, represented an essential contribution to the development. These have evolved and are further developing, depending on the surrounding environment. The cellular structure of the body was investigated (J. E. Purkyně 1837), with the laws of inheritance being formulated later (G. Mendel 1856 - 1863). Foundations of dactyloscopy were laid, essential breakthroughs for health care were discovered (the agents of infectious diseases were identified, which gave rise to bacteriology as a science with Pasteur's theory of immunity in 1864, etc.).

Similarly, knowledge came thick and fast in many other scientific fields (many of which were actually established between the mid-19th and 20th centuries). Many scientific institutions, academies, associations and foundations emerged, especially in developed countries to find synergies. In order to emphasize the benefits of the civilization of individual disciplines, the Nobel Prize has started to be awarded annually in key fields (physics, chemistry, etc.) to those who have contributed most to the development of natural sciences and humanities.

2.2 Geographical context

The process of the Second Industrial Revolution, along with the development of land, especially road and rail transport, but also maritime transport and with the massive use of the wireless connection, it quickly spread to all continents, so that the colonization process could soon be completed. In this sense, it is necessary to briefly mention at least the synergy of colonialism and capitalism as an unforgettable developmental source for the 19th and partly the 20th centuries (and in a different form still existing so far, with all the resulting consequences including the fundamental cause of current migration flows from "poor South" to "rich North").

The Metropolitan cities have long used their economic and military superiority and have consistently ensured sufficient material and human resources to accelerate their own development at the expense of less developed and dependent countries, first and foremost, of its colonies. This caused the deepening of the economic gap between both worlds, which we still deal with today.

2.3 Technology

During the Second Industrial Revolution, most of today's technological processes were mastered (except those that combine knowledge from multiple disciplines, such as *biotechnology* or *nanotechnology,* which were not known until the mid-20th century).

Thanks to the increasing labor productivity, factory mass-production could reduce the prices of most of the products to the point that, over time, they became widely available (in combination with widespread wage and salary increases, or more precisely, with the increase of free time). Subsequently, equipment standards in both the wealthiest households and the middle class are moving forward. The term "consumer society" starts to be used [Keller J. - 2007, p. 26 et seq.].

The Great War (World War 1914–1918) brought a conflicting effect in this sense. The most advanced industrial powers were at the center of the clash at that time, namely Germany and Austria-Hungary, later Bulgaria and the Ottoman Empire, on the side of the Triple Alliance, and, the United Kingdom, France, Italy, Greece, Romania, Russia, Serbia and later the USA, on the side of the Triple Entente.

It soon became clear that the outcome of the war will be determined by the performance of the economies of the states concerned, or more precisely, the degree to which the innovation potential will be reflected in the individual weapons and their number used on the battlefield. This first major clash was a first mechanized war, where the knowledge of science and technology started to be applied, for example, to the construction of long-range large-caliber artilleries, primitive tanks or aircraft, but also to the production of suffocating chemical gases (yperite). Although innovations such as the improved road network or the electrical telegraph were effectively used by the military, it is generally true that, still in the 19th century, surprisingly little of the enormous technological advances had been used for military efforts. Yet, this all changes with the Second World War.

Therefore, we consider its end at the end of summer 1945 to be the stage of the factual end of the Second Industrial Revolution. Although it may be argued that one of the essential moments that decided the outcome of the war was the technology that we would include in the Third Industrial Revolution. For example, it was the deployment of *computer technology* that broke the Enigma code. Or using the radar to identify the number, height, direction and speed of aircraft up to 200 kilometers, which decided the fiasco of Luftwaffe Sea Lion operation. Similarly, the development of the atomic bomb, running fully in the 1930s and especially in the 1940s both in the USA, Germany and the then USSR.

2.4 Impacts on Economic and Population Growth

The economic and population growth during the Second Industrial Revolution continued at a slightly accelerating pace. According to UN estimates, the number of people on Earth had increased from 1.25 to 2.5 billion people in about 100 years (1850–1950), i.e. twice, global GDP about 5 times, and hence GDP per capita of about 2,5 times.

The gap between developed and - if using a current definition - economically less developed countries has also increased. This was mainly due to the export of capital both to economically weaker countries on the European continent and mainly to colonies (both

because of their comparatively low wages and the possibility of obtaining cheaper raw materials and materials), but mainly because the exported capital generally generated higher profitability than classic exports of goods and services.

This also deepened the existing inequalities. Among the world powers, there had been ongoing attempts to redistribute markets between monopoly unions both nationally and globally. Since Germany joined the industrial revolution for many reasons considerably later, it was delayed in both capital formation and the acquisition of overseas territories. At the turn of the 19th and 20th centuries, it had practically no colonies where it could effectively export its capital. Yet, it did not want to risk falling further behind Great Britain, France or the USA, which resulted in growing international tensions.

A number of sectors were monopolized and industrial and banking capital had merged into financial capital. This means that large banks became co-owners of companies and, on the other hand, large entrepreneurs became co-owners/shareholders of banks. This gives rise to a new privileged class of the so-called *financial oligarchy*. And the press also started publishing good advice on how to behave properly: "*The millionaire movement (…) culminated in the expression of opinion by Mr. Andrew Carnegie that no man should die rich*". [See Introductory Note by G. B. Shaw to his essay entitled *Socialism for Millionaires* from 1901, published in Czech by Adolf Synek, Prague 1931, p. 5.].

The unchecked course of the business cycle had not changed - and objectively speaking - it could not change. From the first quarter of the 19th century it had roughly ten years of amplitude, alternating with phases of crises and booms, when peaks of crises fell on 1825, 1836, 1847, 1857, 1866, 1873, 1882, 1890, 1900, 1907, 1913, 1920, 1929, 1937.

Then there was a break, mainly due to the world's major economies, which began to strongly influence the state. The onsets of the crisis phases had been significantly moderated by Keynesian economic policy. The periodicity of the crisis phase in the capitalist states was mainly led, from in a material respect, by the massive renewal/modernization of the machinery part of fixed capital, and, from systemic respect, by the increasing monopolization of production. This allowed the most powerful market players to effectively control the market in its entire structure (including pricing), giving them the opportunity to systematically "profit from rent".

For the labor market development, the number of unemployed was strongly linked to the business cycle phase - in the phase of regenerating economy and boom, the fields requiring a demanding manual work absorb the free labor force (to meet the growing demand for goods) and companies raise wages (thereby further stimulating demand growth), while, at the onset of the recession, the employers behave in exactly the opposite way. Attempts (especially from the state side) to principally solve long-term full employment have been and are, by the nature given by the market economy concept, unsuccessful. The exception is represented by the specific form of the German-controlled inter-war economy, after the introduction of a global labor obligation, and, of course, the centrally planned economy in the then USSR.

2.5 Specifics of the Second Industrial Revolution in the Territory of Today's Czech Republic

In the Napoleonic period and almost another half century after it, the Czech lands, unfortunately, belonged to the sphere of influence of the most reactionary European monarchies. This is the reason why the Czech lands fell behind in terms of joining the First, Second and Third Industrial Revolution, and this fact has never been completely erased and actually continues to exist [e.g. Fassmann M., Ungerman J., - 2015]. Therefore, although most of the above-mentioned features of the course of the First and *Second Industrial Revolutions* apply to the Czech lands, there were also significant economic, social and political differences:

- the Czech lands, although soon established as the industrial core of the Austrian monarchy, had been, over a long period, affected by the adverse effects of the political organization as a non-independent part of the Habsburg monarchy, and they were also characterized by a large outflow of capital created there;
- the monarchy, however, had never had overseas colonies unless we count the poor countries of the Balkans, whose use also had its limits, or the Land of Franz Joseph (near the North Pole), which certainly could not be considered a profitable colony;
- the internal market of the Czech lands and the entire Habsburg monarchy had always been comparatively small as a market; moreover, the households in these economically undeveloped regions had never had the necessary purchasing power;
- after the abolition of serfdom there was a considerable surfeit of cheap labor, but this paradoxically only delayed the onset of more expensive mechanization;
- only insignificant sources of raw materials (perhaps except wood or coal) and capital weakness (or the competitive strength of here operating financial groups, mainly French, German or British) were the only present handicaps;
- the onset of industrialization occurred with considerable delay and unevenly (from west to east, when some regions, especially Central and Eastern Slovakia, Carpathian Ruthenia, Galicia, Bukovina, etc.) fell in the industrial development behind Western Europe by up to a century). Let us add that they are still visible, despite the efforts to moderate them with subsidies from EU cohesion funds;
- it was only in the last decades of the 19th century that there was a growing need to formulate the *Czech national entrepreneurial interest* - and, at least in part, it was successfully realized, distinguishing itself from the Austro-Hungarian or German economic and political interests;
- in general, the population of cities, especially in industrial areas, had increased. Working-class suburbs were formed. Prague was transformed into a capitalist city thanks to engineering plants (Daňkovka in Karlín, Českomoravská engineering company in Vysočany), the food and textile industries, and the electronics industry (Kolben, Křižík, Praga cars) were on their rise. Both industrial (Smíchov, Holešovice, Libeň) and predominantly residential suburbs (Žižkov, Vinohrady) started growing;

- usually, more employees worked in one company, thus creating objective conditions for better organization. It was not only the social/interest form (for example, the establishment of Sokol in the 1960s), but soon also political;
- the organizational work between the working class grew stronger and the Workers' Association Act (1870) legalized their associations. There was a belief that to organize the proletariat, an own workers' party needed to be established. On our territory, there was a strong influence of the Austrian Social Democratic Party, which fought for universal suffrage and demanded eight-hour working time. In 1878, the Czech-Slavic Social Democratic Workers' Party was founded in Břevnov and its program was identical to that of its Austrian counterpart. In 1890, 30,000 workers marched to Prague, with the party enforcing political recognition and acquiring a large electoral base;
- the Second Industrial Revolution in the Czech lands is connected with the contradictory consequences of the First World War, the establishment of the independent Czechoslovak Republic in October 1918, but mainly, it is given by the possibilities that the regained political independence brought after three centuries of lost sovereignty for our economic development. However, it cannot be overlooked that, as part of the defeated Austro-Hungarian Empire, we were sentenced by the Treaty of Versailles to pay war reparations, where the last amount was repaid in the 1950s.

The rigmarole of the economic development of Czechoslovakia in the inter-war period or during the Protectorate of 1939–1945 is generally well known and there is a plethora of scientific literature [Kubů E., Pátek J. - 2000, or Rozsypal K. - 1974, etc.] and, therefore, there is no reason and space to discuss it here.

The industrial level of development is also reflected in statistics, according to which in the 1930s over 300 persons in the Czech Republic had a net annual income of more than a million crowns and roughly about half of them earned it in the industrial sector. The strong representation of the industry, where besides light industry, the Czech and Moravian armaments factories had a strong position, also brought some risks during the war period; during World War II, the production of Czech factories was mainly used to supply the German army with combat equipment when only the supplies from Škoda Pilsen accounted for almost 30 percent of all arms supplies for the German army.

The Czech economy continued to maintain a similar profile (i.e. also through the Third Industrial Revolution). Such an inherited industrial structure (which is not only the case of usual superficial indicators of the shares of individual industries in value added, employment etc., but also the industrial profiles of secondary and tertiary education or significant parts of the scientific research base) quite significantly modifies the maneuvering space of the current Czech business sector and, equally, trade unions as a social partner for the future years.

3.1 Material and Technological Context

We consider the time of onset and the full development of the Third Industrial Revolution in developed countries to be the shortest period. It lasted only about forty years, roughly from the end of World War II to the beginning of the 1990s (undoubtedly with overlaps to the present, in a completely analogous way to the previous two industrial revolutions).

The beginning of the onset of the Third Industrial Revolution usually dates on the first - unfortunately devastating - "practical" use of controlled thermonuclear reaction technology (the atomic bomb explosion in Hiroshima and Nagasaki, August 1945). While these "atomic" data are known to the minute, the end of the Third Industrial Revolution is much more diffused. It is usually placed at the beginning of the 1990s. Its end is associated with the time of the onset of decentralized connections via the Internet. This is what we consider to be one of its defining features.

The Third Industrial Revolution is often referred to as the period of scientific and technological revolution. It was characterized by the introduction of computers primarily in industry, but also in other sectors and its accompanying phenomenon was quite a wide penetration of scientific and technological development into the production process, its manifestations in automation, cybernetics, energy (practical use of nuclear energy for peaceful purposes), in the research of the atomic and molecular structures of matter (forming the production of new materials), in biology, genetics, cosmology, etc.

Subsequent response to major transformations in productive forces are adequate shifts in marketing [Kotler Ph., Armstrong G. - 2004] and in management processes [Drucker P.F. - 1985], especially in the introduction of automated control systems (ACS) not only of production lines, but also of transportation and complex machinery and equipment (control rooms in power plants, autopilots in aircraft).

Although the last decades at the end of the last century were already marked by "information profusion", and it would seem that (except for patent barriers, embargoes or other artificial hurdles caused not only by the Cold War but also by business geopolitical interests) there was no radical issue to acquire these modern achievements, the reality showed the contrary. The statement of a Nobel Prize winner, Jan Tinbergen, who examined the processes in global economy and their causes, is absolutely self-explanatory: "*Rich countries are rich mainly because they are rich - and vice versa.*"

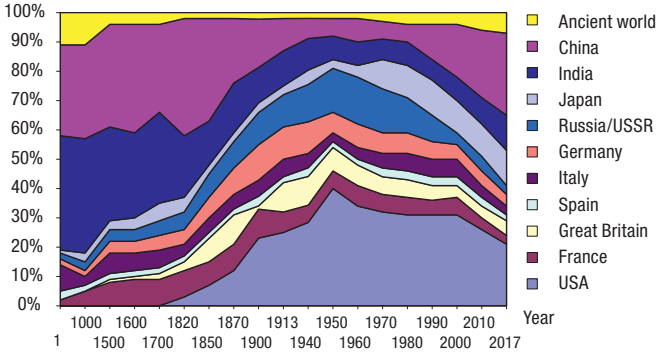
He commented on the observable fact that those (from the past rich) countries, which were, in timely manner, able to accumulate a sufficient amount of tangible, scientific and technical or human capital (including the necessary know-how), since the 1940s, have had the opportunity to gain an above-average profit from the benefits that the Third Industrial Revolution had continuously generated. They could afford huge investments in science and research, including education and science education, gaining valuable lead in labor productivity and earning above-average rent for a while. Its part was usually invested in improving infrastructure, social

services, strengthening social cohesion (see expensively paid/big-ticket the so-called social state in Scandinavian countries), part reinvested in the most perspective fields (space research, modern transport systems, etc.) and invest the rest in quickly globalizing world into long-term attractive fields regardless of the specific country. As a result, they could generate a new wave of profits from the adoption of the scientific and technical revolution. This looped scheme is very logical and, in many cases, valid.

A more detailed overview of the statistical data over a very long period forces the above-mentioned theses on the importance of capital, application of technological progress, investments, mineral resources, labor, etc., to somewhat relativize and at least add production factor that is difficult to be named and specified. Sometimes it is called the "quality of governance", or the "U-factor - the level of management system, or more precisely, the functionality of the economic mechanism" (according to Michal Kalecký), other times we see how external factors, such as major natural disasters, epidemics or the consequences of war events, affect the production performance of the country or the whole region.

After all, the data presented in the graph showing the shares of selected countries and regions in the global volume of gross domestic product between 1 AD and 2017 in %, directly encourage these reflections on the real drivers of the economic growth.

Chart: Two thousand years of economic history in one chart (Shares of selected countries and regions in the global volume of gross domestic product between 1 AD and 2017 in %)



Source: Elaborated based on https://www.visualcapitalist.com/2000-years-economic-history-one-chart/

Based on historical knowledge and this graphical data processing, the following conclusions can be drawn:

- From the turn of the AD to the first third of the 19th century, it is estimated that China and India generated 2/3 of the world's production volume, and initially, about one-eighth received the ancient world, i.e. an estimated sum of Greece, Egypt, Turkey and Iran (Desjardes J. - 2017). After about two centuries, since the 1980s, with a 40% share, they are now quickly returning to the positions they had long held since ancient times. True that India is still postponing its *come back*, as the dynamics of these superpowers have been carried exclusively by the Asian countries in recent decades. In addition, in this "region of the future", let us not overlook the growth expansion of other East Asian tigers, including temporarily subdued growth of Japan with its advanced state-of-the-art technologies.
- The USA was another major global player - at least as far as the period of the Second and Third Industrial Revolutions was concerned, i.e. about a century and half long period. For a transitional period in the middle of the last century, they were able to "bite" about 40% of the global GDP pie. In other words, the same proportion that was estimated for India for a thousand years after Christ, or more precisely, which was attributed to China still around 1820. However, since the second half of the 20th century, the onset of the Third Industrial Revolution, the USA at first glance surprisingly and quite permanently clear their positions, when, since 1950, their share has fallen to about half already. The question is, to which extent can Trump's policy change anything about this trend.
- Similar trends are observable for virtually all other significant countries (except perhaps for the aforementioned Japan, whose "economic miracle" launched at the end of the 1960s multiplied its position on a long-term basis and actually held it up to this day). This applies to all countries in Western Europe represented in the chart, as well as Russia/USSR, where there is a noticeable dramatic retreat from the positions still held in the 1980s.

The Third Industrial Revolution in the geopolitical and geographic sense represented only another stage of parceling the world and the onset of a new level of wealth spillway towards the countries that have fully exploited the chances offered. The history of the effects known from the First or Second Industrial Revolution has been repeated here, but in a multiple dimension. Without wanting to anticipate the timeline, it is certainly necessary to ask a fundamental question: "*Why should the Fourth Industrial Revolution be somehow different?"*

3.2 Impacts on the labor market

The nature and content of the Third Industrial Revolution was also dramatically reflected in the labor market, which was under an increasing pressure as compared to the period of the previous two industrial revolutions (also) due to the transition from Keynesianism to Thatcherism.

Above all, the so-called *natural unemployment rate* was increasing, as the growing pressure on competitiveness pushed out of the labor market the growing mass of people, who, for various reasons, were not able to enter into employment. There is a wide range of reasons - from the increasing number of people addicted, for instance, on addictive substances, who are unable to cope with the increasing demands of employers, through open or hidden discrimination (by race, age, religion, gender, etc.) to the inability or impossibility of professional retraining, etc. On the other extreme, we see a growing part of a paradoxically well-educated group of young people, often fresh school graduates, who often have the disadvantage of zero employment practice in finding an adequate job position.

Statistics demonstrate that the rate of supply of jobs requiring minimal (or no) qualifications is increasingly falling behind the population growth in given age groups. It is the low-skilled group of employees who are most likely at risk of fluctuations in the business cycle and are, therefore, typically the first ones to be fired if a crisis occurs. Moreover, they lose their work habits quickly during the unemployment period and are thus handicapped even after this period is over. They also mostly suffer from low incomes, which continues to be negatively reflected both in the possibility of financing adequate education of their children and in the higher level of crime and criminal sanctions. Having a criminal record makes it much harder to find an adequate job - and. for generations, the story ends where it began. If it is a horizontal issue, then the negative phenomena can determine one another, entangle and result in the emergence of so-called excluded localities or whole regions. Unfortunately, this does not apply only to a narrow framework of national states, but this is a clearly transnational issue, traceable across continents.

The period of the Third Industrial Revolution is thus characterized by the onset of the so-called *structural unemployment* phenomenon, reflecting the falling of labor retraining behind the pace of structural shifts in the economy. This applies not only to “classic” employees in blue-collar professions, but also increasingly to middle-class members. The so-called working poverty (low-income sector) [Švihlíková I. - 2015], which is a term for employees with strictly precarious employment contracts, with minimal protection, low wages, etc., is, at that time, becoming a new phenomenon in developed countries.

At the end of the Third Industrial Revolution - with the beginning of globalization, the critically above-mentioned neoliberalism, the weakening of the state and the position of trade unions - the harsh methods of capital were initially transferred to the block of Central and Eastern European countries to be subsequently implemented retrospectively in their own developed western states with previously relatively strong labor market protection. After the first few decades of the Fourth Industrial Revolution, there are already, a fortiori, loud calls for a more coordinated and more sophisticated approach of trade union central offices.

Before discussing its specificities, challenges and limits in more detail in the following text, let us summarize in the following clear table the existing findings. We will try to simplify the scheme of individual phases of human society development, especially its industrial phases.

It is undoubtedly a simplification of the existing development line, when the time boundary between the stages of the beginning and the ending of the First to Third Industrial Revolutions has never been so peaked that it could be precisely delimited by a specific year as outlined here.

Table: Structure of the sequence of industrial revolutions

Legend:	**Period Pre-industrial**	**Period of succession of individual industrial revolutions (industrial epoch of human civilization)**			
Indication of the order of industrial revolution and approximate location over time	Until the second half of 18th century (until 1760)	First 1760 -1830	Second Approx. From the mid 19th century until the mid-20th century	Third Approx. from the late 1940s to the turn of the 1980s and 1990s	Fourth (Industry 4.0) We have been in an early stage since the turn of the 1980s and 1990s
Common name	Civilization with a natural character	Age of Steam	Machine Age and the Age of Mass Production	The scientific and technological Age and the Computer Age	Digital age
Occasional name	Age of physical strength of man and animals	***The First Machine Age***			***The Second Machine Age***

The term the Fourth Industrial Revolution is somewhat confusing as it gives the impression that it is essentially a further stage of revolutionary changes in the productive forces, and even primarily in the field of industrial production, as the name suggests. There can be no bigger mistake.

The general consensus is that by the end of the second decade of the 21st century, of which for two or three decades we have been witnessing the combination of elements and features of the Third and Fourth Industrial Revolutions. This situation is similar to the one in the past, when the First Industrial Revolution mingled with the Second and the Second with the Third, when it was simply not possible to determine a specific date of "before" and "after". After all, we consider this particular circumstance - the attempt to determine an exact date of origin or end - to be a totally empty discussion. All industrial revolutions are characterized by a continuous process and the usual prerequisite for moving to a higher developmental stage of the industrial revolution is the acquisition of the previous stage.

This does not have to be always true, just one example of China's basic research in the automotive propulsion would do. By 2015, China purchased approximately 75 million passenger cars with internal combustion engines from the world's leading car manufacturers without developing its own internal combustion engine. Thus, the urgent demand for passenger cars was more or less fulfilled by import, and at the same time China was very right to assume that the development of the internal combustion engines, in terms of power or exhaust rate, is already on the edge of physical limits and make no sense to spend on it its capital. Therefore, it deliberately skipped the "combustion stage". Although it still continues to import in bulk cars with internal combustion engines, as far as science and research in the field of motor vehicle propulsion is concerned, it focuses exclusively on the development of more modern electric propulsion. Let us note that five years ago, even in China, famous for the long-term nature of its decisions, it was only possible to vaguely foresee the retreat of diesel car engines.

It turns out that, in parallel with the completion of the Third Industrial Revolution, the long phase, when the *capacity of the physical human force has substantially multiplied* thanks to the deployment of the machines, is also reverberating. This was typical in basically all the so-called manufacturing sectors - especially in industry, similarly in agriculture and forestry (by their mechanization), similarly in transportation, etc.

Technological advances in the Fourth Industrial Revolution phase will be characterized by having three characteristics parallelly: *exponentiality, digitization and combinatorics* [Brynjolfsson E., McAfee A. - 2017]. The following text is devoted to all three characteristics, explaining them.

4.1 Technology Accompanying and Determining the Fourth Industrial Revolution

4.1.1 Exponentiality

After the conventional tubes, capacitors, etc. with silicon chips in the so-called integrated electronic circuits started being replaced in the 1960s, the experts in the field of electrotechnics soon noticed the manifestations of a new phase of basic scientific research in

this area: *it was possible to get the same utility power after a certain time from half of the volume of the integrated electronic circuit.*

Theoretical economists dealing with efficiency have formulated this feature in their own way: Because of the fact that up to twice as many units at the output can be obtained from one unit at the input over time, the so-called *absolute intensification* occurs. Economists have described this historical change as follows: "If until now it has been true that the growth of production of utility values had to be simultaneously redeemed by the growth of consumed natural resources, then with the introduction of science as a productive force, this age-long direct proportion between the quantity of produced useful values and the quantity of natural resources consumed, begins to turn into inverse proportion. By controlling the inner structure of matter, it is possible to produce ever-greater amount of useful values with an ever-smaller amount of natural substance. (…) Enhanced reproduction can be accomplished by an *absolutely intense growth, an absolutely intense type of enhanced reproduction*" [Valenta Fr. - 1975].

Humanly speaking, this new developmental type of technological advancement gives scope to radical cost reductions. To put it differently: If we were able to buy one mobile phone for a certain amount of money in the first year, the next year it was already two phones, in the third year four, then eight, sixteen, thirty-two, etc.

Let us just remember a common cell phone that nowadays fits in a breast pocket and weighs a few decagrams. Just two decades ago, it had only about ten functions - it was mainly used for making calls, sending SMS messages, or as an alarm clock, or a calendar and a calculator. Presently, theoretically and practically, hundreds of thousands of applications can be used in a smartphone, as it represents a mini computer with an extremely powerful processor and increasing memory capacity.

And with the purchase of goods, this exponential development is not over yet. Similar growth of indicators has been observed in the last decade in corporate investments in information technologies, in the speed and volume of households' internet connection, in the performance of supercomputers, etc., or more precisely, wherever *progress is made in digital technologies*.

4.1.2 Digitization and barriers to its full application

To get closer to the concept of "digitization," it is necessary to go back to the 1960s. Already at that time, the so-called *binary revolution* was fully running. In one of the aforementioned industrial area - electrical engineering, but especially in cybernetics - the routine work involved the transition from a decimal system to parallel use of a binary system. Instead of ten symbols (0, 1, 2, etc. to 9), to express any value it only needs zero and one (0; 1). 0 is zero, 01 is one, 11 is two, 100 is three, 101 is four, etc. In electrical engineering, for example, when conducting electric current, zero and one commonly have a meaning

0… current does not pass,
1… current passes.

The binary system has been known to mathematicians for hundreds of years, but only in recent decades its real potential starts to be fully appreciated. This happened after successfully solving the conversion of various forms of information records (whether in the form of text, picture, sound, video, etc.) from the former analogue form to the newly established only zeros and ones. As the unit performance of computers has increased and continues to increase, *digitization becomes a complement to exponentiality*.

Digital information has two remarkable economic features: first, they are not *rivalry*, and secondly, *the decline in costs for their further reproduction is close to zero*.

A *rival good* is a good or service that can be consumed by only one user at a time, and then it is easy to calculate the selling price, for example, for a single passenger on a bus. The same applies to headphones when watching a movie on a bus. Only one passenger can wear one set of headphones at a time. But at the same time, the film can be viewed by any passenger (in the case of built-in screens). Thus, the film itself is not a rivalry good and thanks to digitization it is available to the user at any time during the drive at zero cost. The first or thousandth copy has exactly the same number of bits as the original, or one storage server overcame the need to own several portable disks with the same content.

We can continue. What are the costs of creating information resources such as Wikipedia? And what is the price the "buyer" pays for their services, when we know that writing Wikipedia passwords, including tuning them, is a free and voluntary and mutually provided service of millions of consumers?

And what are the savings for an individual who cannot speak a foreign language, if he/she does not want to invest time nor a lot of money in his/her studies, and right now he/she needs to read some text "in its original version" and use Google Translate to understand it?

Undoubtedly, the initial costs for creating and improving Google Translate were not small. At first, they meant to pay dearly for the work of linguists and computer scientists, but that is the past - today's costs for using this service are negligible for the consumer.

The individual productivity of digitization users has mostly multiplied, without meaningfully affecting the GDP indicator. The productivity has increased also only because the consumer saves a lot of time. For example, the electronic banking service eliminates the need for a personal bank visit and the same applies for example to paying a public transport ticket using your own mobile phone or for operatively finding out the timetable and finding any connection, etc.

Let us not raise doubts even here about the predicative power of traditional macroeconomic indicators. However, even intuitively, there is no doubt that this type of performance growth, in this case of provable time savings, is not simply and in principle reflected on the gross domestic product. Generally, it can only be stated that the higher underestimation of GDP levels, the more increased frequency of digital communication in the given country, yet, not only between people but also between machines and people, or machines mutually.

Digital information is by its "genetic nature" non-rivalry, very cheap, and is not "worn out" by the increasing consumption/sharing. Quite the opposite - paradoxically, as the

number of consumption/uses increases and the price drops, their value continues to grow, and their usability increases.

For example, by registering the number of clicks of any Internet user on a given word in a search engine, it is possible to very quickly identify a change in preference about a particular area/event/goods. This proves to be a significant marketing information, usable traditionally not only for commercial purposes, but also for estimating citizens' behavior in the elections (see the background of D. Trump's victory in the last USA presidential election). This is also the economic-political background for generating large data sets.

Digitization - as steam in the First or electricity in the Second Industrial Revolution - has the characteristics of the so-called *universal technology,* as it is, from a technical point of view, capable of generating significant global effects, which currently represent:

- the potential for rapid expansion (to other sectors and fields),
- ability to self-improve (self-learning system),
- creating a basis for further innovation (an inexhaustible innovation focal point).

At this point it should be noted that, certainly inadvertently, it has one negative side. Until now, it has been perceived primarily as a technological phenomenon, which it undoubtedly is, but unfortunately, with regard to digitization, minimal attention is paid to the socio-economic aspect.

It can then be assumed that with a similar degree of digitization, an increasingly stronger class will be singled out within the society, which may not accept the changes associated with it for purely physiological/psychological reasons, or may show open aversion to them. Therefore, the second branch of the digitalization barrier cannot be underestimated, as it usually has a background in conflicting economic interests.

There are likely to be many examples of digitalization barriers - at random, we can mention the distribution of high-resolution DVB-T2 television signals expected at the end of this decade. Even this innovation will probably suppress the effects and costs of users connected -with not old- switching to receive the digital signal from analogue, hence with the necessity to buy a new *set-top bo*x etc. And this may be only the first forerunners, which may not necessarily mean a family budget disaster. But it is enough if it induces a negative social consciousness of aversion against innovation waves also in other fields.

4.1.3 Combinatoriality

The core of combinatoriality at the stage of the Fourth Industrial Revolution lies in the ability to interconnect/combine existing or just developed processes and products into a new good/service that, thanks to it, shows signs of high innovation.

Let us mention an example illustrating the use of combinatoriality in today's practice, i.e. creating Facebook through a combination of a few elements:

- digitizing the social network of users,
- wide availability of internet connection,
- web infrastructure.

With the use of combinatoriality, it can be concluded that putting together/combining individual elements into new configurations is only a partial building block for other possible combinations, for other innovations that were relatively simply create in this manner, yet bringing a whole new useful value.

Without wanting to repeat the conclusions of the previous subchapter (about the features of digitization as a universal technology), it is clear that the progress within the Industry 4.0 agenda is likely to evolve in two ways in the future:

- in one way, through other technical discoveries, inventions and processes;
- in other way, through the possibility of combining already known innovations, especially those based on digitization.

Moreover, this second way of technological advancement has the advantage that it is virtually inexhaustible over the course of time and apparently has no real limitations in the near future, since the space for the application of (moreover, increasingly cheaper and more powerful) sensors or microcomputers etc. is limited a little.

From an economic perspective, the second way is clearly multiple times cheaper than the first one. From the position of the Czech Republic, however, it is always necessary to consider its major disadvantages:

- the possible absence of own national basic and applied research, from which we expect original discoveries;
- zero financial benefits from (un)sold patents for government revenue, etc.;
- voluntarily relocation to the periphery of world science and research, with all personnel, educational and other connections, especially in the need to pay for patents and know-how purchased in the future from countries/companies that can afford to finance their own primary science and technology discoveries, and, conversely, effectively sanction plagiarism.

This "passive" variant of acquiring the latest knowledge on technological advances in recent decades has been tried mainly by Japan, and then, on a much larger scale and seven decades later, by continental China.

Conscious "copying" was, especially of these countries, part of the concept of governmental science and technology policy as a cheap way to overcome the underdevelopment. The assumption was to have nationally set up mechanism that would allow the maximum time between obtaining sufficiently comprehensive information on some remarkable innovation and the time before it could be plagiarized and then brought to the global market on a massive scale as soon as possible, hence mining the time-limited monopoly rent, to be reduced. The slogan "time is money" has fully materialized here.

4.2 First Applications in the Fourth Industrial Revolution

It is not necessary to present a list of discoveries and inventions not even in such limited form as we did in the First, Second and Third Industrial Revolution, however, it is impossible not to mention at least two key products obtained thanks to the concurrence of the exponential, digital and recombination building blocks of the Fourth Industrial Revolution.

These representatives are both *the possibility of connecting all interested people in the world online* and a shift in the development of *artificial intelligence*.

While we have already outlined the universal use of the digital network, it is obvious that the second product and the attribute of the Fourth Industrial Revolution - *artificial intelligence* - is quickly moving from science fiction novels to reality. Although we are only at the beginning, machines with cognitive functions are already capable of such tasks as:

- Identifying/recognizing facial markers, walking pattern, body height, etc. of a particular person walking in real-time in a crowd of people down the sidewalk towards a sensor/camera that is connected to a computer. Obviously, the extreme capacities invested under the pretext of counter-terrorism policy undoubtedly produce tangible results in this respect;
- Processing a text in a given language and translate it into any world or regional language (while the accuracy and quality of translation gets "spontaneously" improved with the increasing number of users);
- Controlling machines (from robots on the line to cars or aircraft - autopilot) based on on-line information from a number of sensors;
- To a certain extent, provide sight replacements for blind people and hearing replacement for deaf people.

In substance, however, it is necessary to mention what is likely to determine a significant part of "smart engineering" - the vision of "smart factories". Based on the results of previous experiments, it can be assumed that they will probably be based on the following features:

- Individual production facilities will be interconnected within a global network;
- Their mutual communication will cover not only the delivery of components (parts, semi-finished products to robots from step-by-step assembly to the final product, i.e. the entire logistics *in time*), but also continuous control (tolerance, functionality, fault reporting, its diagnostics and automated resolving) and subsequent distribution including deliveries to pre-known final customers, with the possibility of individualizing otherwise the same mass production, i.e. as "custom-made";
- Each product has its own "digital twin", which allows optimizing a number of processes including costs.

It is not a futurological vision at all. For example, this system has already been used by one of the SIEMENS plants in Amberg, Bavaria, where SIMATIC programmable automatic controllers are manufactured, which are then implemented, for example, to control production processes, ski lifts, etc.; as similar in Mohelnice, etc.

4.3 The Risks Borne by the Fourth Industrial Revolution and the Solutions to Face Them

The potential of the Fourth Industrial Revolution seems enormous. Let us repeat the basic pros of digitization as an accelerated application of information and communication technology (ICT) knowledge in practice, particularly the ability to acquire and process *big data* in real time. This is likely to have enormous and perhaps yet unimaginable impacts, especially when it comes to addressing the classic dilemma of the market economy, namely *the production structures of goods and services (in the form of supply)* against de facto unknown (or very indeterminate) *demand*. A global application of ICT is likely to allow overcoming today's prevalent anonymity in the production of a large proportion of consumer goods by allowing the offer to take into account the unique individual requirements of an individual customer (wholly), allowing *individualized products* to be profitably produced simultaneously *in large volumes without losing margin*.

However, the crucial question of the overall success of the deployment of the Industry 4.0 agenda is likely to be the result of the new round when technology replaces employees. In other words, it is assumed that less skilled workers performing routine activities will be replaced, further intensive use of technics and technology, creation of new jobs requiring higher qualifications, as well as higher wages and salaries. Nevertheless, all of this will only be possible if it brings an increase in profitability from this individual business decision - market decision permits nothing else.

Solutions to face these and other risks associated with the Fourth Industrial Revolution must be sought in two directions [cf. Skidelski R. – 2013]:

- Use a popular journalistic shortcut and "throw money between people, if necessary, even from a helicopter, just so they have money to spend to keep the economy from getting stuck." The question is what the longer-term application of this tool really would mean for labor productivity, work ethics, motivation, material interest, attractiveness of the country that will introduce this for people from neighboring countries where it has not been applied, etc. Similar "effects" should be expected from an analogous idea to allocate a minimum amount of money (the so-called *guaranteed income*) to people regardless of their work performance, even if it is a media hit. Undoubtedly, at least part of the purchasing power can be artificially generated through this form (unemployment benefits or many social benefits act similarly), but it should be carefully considered whether the benefits would actually outweigh all the costs associated with this measure on a long-term basis.
- Mastering the concept of time economics "*consisting in saving total social work tied to production, in a time unit, instantly captures the degree of creation of a new productive power of society, and, at the same time, a degree of new possibilities open for the creation of man production power. The wealth it generates and refers to its amount, is disposable time, a space for the development of human powers, for the development of man as a purpose of his own.*" [Richta R. - 1969]. It is a challenge to find a mechanism of how to transform a large and uncontrollably increasing surplus of human labor capacity to the needs of the reproductive process convert especially into leisure time. It is not just a purely

macroeconomic solution - knowing that, in comparison with other European countries, the Czech Republic is not doing well at all in terms of the excessive number of working days within the calendar year; it is also a social-ethical solution, i.e. increasing the scope of leisure time as a measure of human freedom. In this respect, one can claim allegiance to the legacy of Miloš Pick, who in the then Czechoslovakia initiated the transition to a five-day working week (although almost one-sixth of the working week was removed, the economy did not collapse, as many doomsayers prognosed).

Current and especially future employees must not only prepare for these changes, but it is absolutely necessary - in particular by trade unions and preferably in international cooperation - to conceptually initiate and support their desirable directions. The first outlines of this approach are already shaping and will be discussed in more detail below.

5.1 Discussion over the document Industry 4.0 Initiative

In the middle of this decade, the Ministry of Industry and Trade took over the elaboration of the conceptual document on the issues related to the Fourth Industrial Revolution. As it soon became apparent that the issue in question was significantly beyond its normal "clerical" type of materials processed by the state administration, the assignment was assigned to a team of external researchers mainly from the scientific research sphere and the Confederation of Industry led by prof. Vl. Mařík.

The first - shortened - version of the document entitled *Industry 4.0 National Initiative* was presented at the International Engineering Fair in Brno in September 2015 [MIT: *Industry 4.0.* National *Initiative September 2015*], which stirred the deserved interest.

The team of prof. Vl. Mařík worked on its significantly extended version in the following months, so the first draft of the Industry 4.0 Initiative was completed at the end of March 2016. It was submitted for discussion to the Economic Policy Working Team of the Council of Economic and Social Agreement (the so-called tripartite, i.e. representatives of the government and social partners, i.e. representatives of employers and employees), consequently to the tripartite and finally the final document was discussed by the Czech government.

The aim of the document is to provide key information related to the topic of the Fourth Industrial Revolution, show possible developmental directions, and outline proposals for measures that could not only support the Czech economy and industrial base, but help prepare the whole society to absorb this technological change, since, according to the authors, only this can ensure the long-term economic attractiveness and competitiveness of the Czech Republic.

Given the importance of this document, we will use its key passages in the following text [for the full text see MIT: Industry 4.0 Initiative - 2016] or comment on it.

The Industry 4.0 Initiative reflects the fundamental changes caused by the introduction of information technologies, cyber-physical and artificial intelligence systems into manufacturing, services and all sectors of the economy. Many developed countries (Germany, France, China, Russia, USA, etc.) have already understood the opportunities and threats of these changes and accepted to support the Fourth Industrial Revolution in systemic measures and its resulting dedicated programs. The Czech Republic must also respond to these trends, as they offer huge opportunities in terms of sustainability and increase in productivity of industrial production and services, and, hence, the demand for qualified work. In the reverse situation, the Czech Republic is in danger of losing its competitiveness, with great impacts not only on employment and productivity, but the whole development of the society.

For this reason, the Industry 4.0 National Initiative aims to mobilize key sectors and industry representatives to develop detailed action plans in the areas of political, economic and social life. The assumptions and impacts of the Fourth Industrial Revolution are indeed far-reaching, thus, a nationwide social debate and especially the cooperation

of all members of the government, but also of the social partners will be necessary in the implementation of the Industry 4.0 Initiative. Individual chapters then describe the current state, directions of further development and key challenges in individual areas, which need to be urgently solved in order to increase the preparedness of the Czech Republic for Industry 4.0 principles.

The document part that states that the Industry 4.0 stage allows for increasing labor productivity, while there might be significant shifts in the labor market, in particular the risk for less qualified profession, represents the key to trade unions. At the same time, however, this stage will also bring new vacancies, which will, however, be linked to higher qualification demands of the workforce, in particular in the field of digital and engineering skills, or they will depend on timely and quality retraining. The critical factor for success in managing the impacts on employment is, therefore, primarily the quality and functioning of the education system, including lifelong learning.

The needs for changes in the education system are also analyzed in the text. The whole system must be set up in a way to anticipate labor market needs and reflect the appropriate competences for Industry 4.0 at all levels of education. At all levels of education, it is necessary to provide quality teaching, inter alia in the area of ICT skills, provide general knowledge needed during the Fourth Industrial Revolution, as well as more specialized to highly specialized expert knowledge. At universities, it is necessary to incorporate the teaching of the industrial revolution principles, and, in specialized programs, increase the emphasis on systemic and interdisciplinary perspectives. Students of humanities must also get acquainted with the ideas and trends of the industrial revolution to the extent necessary for their involvement in the development of society.

The Industry 4.0 Initiative, in the area of research and development, continues in the National Research, Development and Innovation Policy of the Czech Republic for 2016 - 2020. Also, the measures proposed by the Industry 4.0 Initiative in the area of research and development relate to the framework resulting from this policy. The Research, Development and Innovation Council and the existing Section for Science, Research and Innovations within the Office of the Government of the Czech Republic will, within its working groups, further develop the concept of Industry 4.0 in the area of science, research and innovation.

On the one hand, the unions represented in the tripartite supported the basic thesis of the document, namely that "… *Industry 4.0 is about a responsible support for a change in the way the whole society is thinking rather than about specific technologies*" [MIT: Industry 4.0 Initiative - 2016], however, (among other things also due to the fact that they did not participate in the creation of the document from the very beginning and, therefore, could not, in time, share their approaches, suggestions and recommendations to the teams processing the individual chapters) regarding the text of the document, they also raised a number of comments and recommendations.

The most important comment of the conceptual character was criticism of the *technical character of the document*. The narrowly technical approach of the document is inapplicable for a much more general phenomenon, to which CMKOS already at that time gave a working name *SOCIETY 4.0.* And in this sense, they required to change the name

of the material to one more general. Especially because, similarly to the First, Second and Third Industrial Revolutions, they had an enormous impact on virtually the whole of society (as described in the previous sections). Thus, it can be assumed by analogy that Industry 4.0 and its products also vigorously exceed the narrow borders of the industrial sector. See, for instance, smartphones created by the advancement of digital technologies that not only shape completely new communication paths through social networks, but also quickly form new social-political movements with increasing impacts on political development, etc.

Another major reservation highlighted the almost *zero attention paid to the political and economic and macro-economic impacts* of Industry 4.0. While from the historical perspective we know that all industrial revolutions have also generated a huge waste of created social wealth as a result of the their incapability to manage their economic side, i.e. recurrent economic crises (including the recently ended global financial and economic crisis) whose cycle is getting shorter.

Trade unions have also criticized the *confusion of goal and means*, arguing that the own agenda of Industry 4.0 i*s not an aim* per se, but "only" a *means* of detaching the Czech economy from the hitherto mostly subordinate role of a significant number of companies clinging on multinational corporations. Therefore, there is a chance to gradually create an environment where the enormous amount of wealth created here will no longer be drained from the Czech Republic - officially, in the second half of the second decade of the 21st century, it counts for about 6–7% of generated GDP. These 300 billion crowns a year - although some of its part is reinvested - is then necessarily missing for both domestic salaries and wages, investments, or financing the "social state", be it social services or old-age pension.

In this respect, most foreign sources relating to the Fourth Industrial Revolution are useless, simply because the so-called old Western European industrial countries are now in the position of long-term money recipients (mainly in the form of dividends) from both the Czech Republic and other Central and Eastern European countries. While the East expects from Industry 4.0 to be given a chance to break free from semi-colonial subordination, the West, on the contrary, expects to consolidate its existing positions. *In this sense, CMKOS perceives Industry 4.0 in the exactly opposite way than Western countries.*

In this sense, CMKOS considered necessary to complete the text of the document with at least an *order quantification of the likely impact of higher robotization and automation levels* on the household economy. The estimation is especially necessary when the Czech Republic implements an economic policy based on *cheap labor.* CMKOS therefore demanded that the main message be framed in a philosophical-social and macroeconomic context.

Concerning the specific comments of CMKOS on the Industry 4.0 Initiative document, after the discussion at the Legislative Council of the Czech-Moravian Confederation of Trade Unions on April 20, 2016, the authors received comments on the passages, where the document fully reflected reverberating neoliberal doctrine, especially in the viewpoints on the functioning of the labor market. It had to be clear that CMKOS would be very reserved about all recommendations concerning the so-called *labor market*

flexibilization. CMKOS's experience is often such that the term *flexibility* is used to introduce such measures that usually lead to weakening employment protection of employees, enforcing lower wages and also extending the false self-employment. Therefore, CMKOS demanded to add and emphasize the need to apply the principle of "*flexicurity*" (flexibility and security), not just "*flexibility*".

CMKOS therefore continually promotes the creation of quality job vacancies and believes that even under the conditions of digital technology implementation, this goal is achievable. Moreover, it considers that all the digitization process is shall bring greater work efficiency and, at the same time, create space for reducing working hours, even if the compensation for work is not reduced. Referring to the historical development, when each stage of the industrial revolution sooner or later meant a gradual appreciable improvement of the overall working conditions and quality of people's life, CMKOS assumes that this time it should not be otherwise.

In the spring of 2016, after the global financial and economic crisis was over, CMKOS was already well aware of the growing inconsistency between labor supply and demand. It attributed it to several factors. Firstly, to the fact that those unemployed for a long time lose their ability to return to the labor market. Secondly, to the continuing disintegration of the education system, when the formerly elaborated apprenticeship system disintegrated and therefore, the labor market lacks in particular the technically skilled workers. And thirdly, to the fact that this is a recurrently mentioned problem of low wage. In this situation, the motivation to work is low and the vast majority of the unemployed prefer to live on social benefits. Not because of their generosity, but because of their low level of earned income.

The solution must be coherent, combining the solution of "old" afflictions with new challenges, namely:

- rebuilding and supporting an education system that will no longer be unilaterally left to the "invisible hand of the market",
- improving conditions for labor mobility, i.e. affordable apartments, globally well-accessible health and social services,
- cheap transportation, especially to and from work,
- last but not least, sustained pressure on labor income growth.

CMKOS also strongly opposed the proposals presented in the Industry 4.0 Initiative on "*reducing the tax burden on labor*" as it does not consider the level of labor costs in the Czech Republic to be an obstacle to increase employment. On the contrary, the real level of labor costs in the Czech Republic is only about one third compared to the more advanced EU countries and moreover - a potential reduction of social security contributions could endanger the balance of relevant insurance systems (which was "tested" in practice, for example between the years 1996–2003, when the pension pillar plunged into almost a hundred-billion deficit, demonstrating even more considerable annual deficits of up to 50 billion for the same reasons at the end of the last decade).

For the same reasons as mentioned above (to reduce employment protection and to attempt to covertly install the false self-employment), CMKOS also disagreed with the

intentions of solving problems related to the introduction of new technologies by supporting self-employment for self-employed persons.

From the trade union point of view, the impact of the Fourth Industrial Revolution on employment is crucial. Although less space is devoted to this area within this document than it would deserve, it nevertheless makes it clear that implementing the aims of the industrial revolution will result in the loss of a relatively large number of less qualified job vacancies. Although it will also bring new job vacancies, they will be associated with higher demands on the qualification of the workforce. It would be desirable to elaborate on these passive passages, including the effects on unemployment and the real solution to all negative consequences.

From the concrete factual comments or recommendations to extend access to the "non-industrial space" of the discussed material, CMKOS expected at least the two following key effects:

- the material will cease to be in the form of one of the 136 existing (at that time - in 2016) existing sectoral concepts and will finally become a common platform for both other sectors, the scientific and research base and the social partners
- the material will be perceived not as a one-time action, but as a continuous process where state authorities, together with the social partners, should create necessary mutually favorable conditions for undisturbed absorption of stimuli and inspirations borne by the global trend of the Fourth Industrial Revolution onset.

As it is in similar cases, the author considers and accepts some comments and others does not during their employment. In the case of the Industry 4.0 Initiative, the document title has not changed, as it would have to be fundamentally fine-tuned and extended, however, some changes to the document text have been made. The subsequent decision of the Czech Republic government from the end of summer 2016 to establish the so-called *Alliance Society 4.0* [Government Office of the Czech Republic - 2016], should be considered a significant shift in the required direction following the Industry 4.0 Initiative.

5.2 Alliance Society 4.0

Alliance Society 4.0 is a term for the coordination mechanism of the entities involved in agendas connected with the Fourth Industrial Revolution. It was based on the government decision. The reason for the shift from the original narrow "Industry 4.0" was the work of the other ministries on partial aspects of the Fourth Industrial Revolution. Documents such as "Work 4.0", "Building Industry 4.0", "Education System 4.0", etc., were elaborated, which logically led to the need to name the initiative as "Society 4.0". Today, the entire 4.0 agenda is reincorporated into the strategy called Digital Czech Republic, where the role of the Alliance has been taken over by the Council of the Government for the information society. Despite this major technical change, however, nothing changes in the content of 4.0 public policies. Therefore, we will continue to use the term Society 4.0, or more precisely, Alliance 4.0.

The term “Society 4.0” - when using the wording taken from the official text prepared by the then coordinator of the Digital Agenda of the Czech Republic with the Office of the Government of the Czech Republic [Office of the Government - 2016] - thus includes mainly new approaches and opportunities in the area of new technologies, industry, business in manufacturing and services, energetics, raw materials, labor market, education, research and development, environmental protection, healthcare, transportation, legislation, standardization, digitization, fiscal and monetary policies, security and cybersecurity, e-Government, fast internet infrastructure, smart cities, smart region/regional development, Internet of things and services. The Society 4.0 agenda is apparently strictly supra-sectoral. This specific characteristic was the main motivation for establishing the Alliance as a platform, which directs and coordinates the activities of all partners collaborating together to create conditions for the Society 4.0, both from public administration and in cooperation with economic and social partners and academia. One of the aims of the Alliance is also to create the widest possible knowledge background for the Society 4.0 and a system for information and feedback in public administration, promote the dissemination of information on this issue to the general public, and use it to educate the public administration.

The assignment of the need to “*educate… in the issues of Society 4.0… by public administration*” [Office of the Government of the Czech Republic - 2016] is not mentioned by accident. Although nearly three decades have passed since the end of the centrally managed economy, it does not mean that the “top-down” approach to hierarchically structured management that was used for dozens (maybe even two hundred) years have been, in the general consciousness of managers, abandoned. This is quite common in large companies where the mother has a number of subsidiaries, in the management of branches, etc., and binding instructions (production output, or desirable amount of turnover, revenues, costs, etc.) are directed from the center down. But already in the past, and then fully in the Third Industrial Revolution, it came to the realization that in the economy structure the increasingly important production factor, i.e. the field science and technology, or the scientific and technological development, is basically impossible to be manage in this direction.

More precisely, hierarchically and directively, the “environment” of science and research, such as staff numbers, their wages and salaries, the construction of the necessary infrastructure (both in terms of material, i.e. buildings and their equipment consisting of machinery, devices and technology, and in terms of secondary and tertiary education structure, including science education, providing the necessary numbers of young scientists in the required structure of education, etc.) and last but not least, the overhead costs for the operation of the entire scientific and research base, can be managed in a hierarchical and directive manner. But this creates “only” the necessary material and human prerequisites and conditions for generating new scientific knowledge, discoveries and inventions. However, this does not mean that the actual discovery and invention itself can be directly planned from the top. These are often already a product of intuition and brilliant imagination in combination with a convenient environment in which they are born, cultivated and, sooner or later, find their application.

Two seemingly unrelated examples speak volumes.

The first is purposely does not relate to science and research, but to art, yet it well illustrates the substance of the things - it is the story of William Shakespeare's worldwide reputation and his dramatic work. In England, around the last third of the 16th century, the conditions were created to allow "*… theater… becoming the subject of business. (…) The decisive change was that, after 1567 in London, there was a very large audience willing to pay money for theater poetry. Not only Shakespeare, but dozens of his prominent contemporaries were playwrights and poets. The English word for a theater audience is "audience" which emphasizes the act of listening, not the act of watching. Of course, theater could only be a spectacular show. However, the spectators of Shakespeare's time were also, or above all, listeners. Dramatic poetry had become a new and extremely popular performance art. For the first time in England's history, poets received such a large community of listeners.*

Shakespeare and his contemporaries lived and worked in a unique situation which was unprecedent in the past and could never repeat itself in the future. They were the first English poets who could write for newly established theaters and for a huge audience. [Shakespeare W. - 2016, p. 37].

The second example is from a much younger period. It ties to the end of World War II, when, among others, a British soldier, Arthur Ch. Clarke, until then serving as a member of the then super-modern radar defense of the Great Britain, was demobilized. After dramatic experience with the devastating effects of the German V2 missile, carried in their ballistic path towards the British Isles to the ionosphere, this former radar operator asked himself seemingly simple questions: *And what if this missile had not been programmed to "return" to Earth with its devastating charge, but remained permanently fixed at its top dead center and, if possible, to rotate with the Earth in a 24-hour cycle? And what if more of the same missiles were sent to orbit around the Earth and individually placed in a way to form a compact network above the Earth? And would not bring destruction, but rather very "constructive" content, such as a "mobile" telephone exchange apparatus?*

At that time, the first artificial satellite (Sputnik 1957) to orbit Earth was still more than a decade away, hence, Clarke's brilliant vision seems to have gone ahead of its time. However, only now, after three quarters of a century, when over two thousand artificial bodies are placed into the orbit - not only communication but also meteorological, monitoring, etc. - we are able to fully appreciate his invention, followed by economic, political, military and even societal impacts, starting from the possibility of watching the Olympics online via a television signal at the opposite end of the globe or to get with a car to the desired point via GPS.

These two examples - a quarter of a millennium apart - have both attempted to illustrate the thesis that the path to Society 4.0 represents an extraordinarily large, yet complex and, in terms of time, basically gradual societal change. We assume that the links between industrial production systems, transportation networks, energy systems and raw materials supply systems, but also social systems, will increasingly have to be taken into account. Recently, dynamic interaction has been increasing between these systems, stimulated by integration at the level of information technology. The introduction of new technologies is changing the entire value chains, creating opportunities for new business

models, as well as pressure on the flexibility of modern industrial production or increased demands on cyber security and interdisciplinarity of access.

It should be noted that even though in the text on Society 4.0 we are working with issues on the national (Czech) level, there is no doubt that other countries, especially industrialized countries, are dealing with the analogous issue, too. In this regard, it is assumed that the Alliance will be continuously establishing cooperation with other states to identify successful and best practices from abroad and reflect developments in other countries. The reflection of Alliance's activities into the positions of the Czech Republic within the framework of activities at the EU level, where the issue of Industry/Society 4.0 is gradually gaining importance, will also be critical.

But all of this, while knowing that the most fundamental change in organizing and managing the agenda of the Fourth Industrial Revolution lies in an inverted guard than we have been working in until recently: If so far we have relied in most areas on the effects resulting from *centralized management and decision-making*, now it will be quite the opposite; the agenda of the Fourth Industrial Revolution cannot be managed in a centralized manner; this is possible only for the conditions for its development. The stage of the Fourth Industrial Revolution is, above all, the *stage of decentralization*.

5.3 Outline of the Main Challenges to the Social Partners in Transition to Society 4.0

As in other cases, in considering the role and position of the social partners in the transition to Society 4.0 and the considerable challenges it poses, it is reasonable to look at the whole issue from multiple perspectives. In the first step, let us give priority to the *time perspective*, where we distinguish between the *short-term horizon*, in the order of a year or a few years specific to the particular phase of onset of the Society 4.0 phenomenon, then the *med-term horizon* covering the period until roughly 2030 and finally the l*ong-term horizon* going beyond 2030. To this point, it is necessary to mention that in the cognizance of the "never-ending series" of changes in basically all areas, we will only deal with it to a limited extent of current knowledge.

In the *short-term horizon*, it is likely to be a continuation of the traditional approach, where the social partners "test their mutual resistance" against smaller or more significant deviations from the current practices. In the short term, it is nothing less than a continuous creation of conditions ensuring compliance and cultivation of social peace, especially in the form of social dialogue, seeking a final consensus in collective negotiations, etc.

It should be noted that, in the middle of this decade, the time period started by the CMKOS Vision [Fassmann M., Ungerman J. - 2015] seems to be reverberating under the trade union motto END OF CHEAP WORK, which was accompanied by an average annual rate of gross wages increase of 5.5% in 2015-2018, without exacerbating employers' economic position. True that the above-average rapid growth in remuneration for work was largely due to external factors - the overall good condition of the Czech economy, increased demand for new workforce, etc.

The impacts of the Fourth Industrial Revolution have so far proved to be only marginal, at least in terms of meeting the previously announced risks. The only significant friction surface so far has been the onset of a *"shared" economy - platform economies* as a consumer-friendly welcome alternative to traditional ways of selling or goods and services leasing. It was primarily due to the development of modern information and communication technologies and the Internet in connection with digital platforms, where the supply and demand of unknown entities meet at the digital platform *on-line*. Shared economy (where the term shared economy originally meant something completely different, note R.H.) represents an alternative distribution and user model. In the real service market, it represents a strong competitive alternative to traditional entities offering the distribution and use of products and services. New entities operating in a shared economy are using insufficient legal stipulation and insufficient regulation, as they are avoiding the fulfillment of certain obligations, especially taxation, professional examinations, etc. As a matter of this fact they offer an incomparably lower price for a comparable service, thus achieving substantial competitive advantage [Office of the Government of the Czech Republic: Shared Economy and Digital Platforms - 2016].

In the *mid-term horizon*, the social partners face somewhat more sophisticated challenges, even though long-term experience exists here, too. It can be assumed that one of the outcomes of Alliance Society 4.0 will be legislation responding to both the challenges and threats of the Fourth Industrial Revolution. Essentially, the question is whether the social partners will have such qualified expert teams to be in the position not only of traditional *commentary points* (or dignifiedly play the role guaranteed by the Lisbon Treaty, for example), but also *be able to come up with legislative initiatives* either on platforms where they are systematically established, or perhaps through third parties (MPs) according to applicable legislative norms, etc.

Probably the highest number of challenges is waiting for the social partners in *the long-term horizon*. Fortunately, we can predict many of them quite well today, but we can only be speculating about many others in terms of their extent and impact. However, it is already clear that Czech society will have to deal with the *confluence* of the future challenges, if possible consensually, (many other and significant ones, such as the need to face ecological crises - drought, bark beetles, pollution, etc. are not discussed in the text, although, in terms of society, they might represent a far more urgent issue).

5.3.1 Demographic challenges

Demographers - based on their knowledge of the dramatically reduced birth rate, since the late 1980s have been, for a long time, announcing about the high probability of a relatively considerable decrease in the age groups of working age population. And already for these and the nearest decades of this century. At the same time, there will be an increase in the number of senior age population (the so-called Husak's children), by about one million compared to the current situation.

This will undoubtedly place unprecedented, yet not unmanageable, claims on the first pension pillar. Recent examples from many European countries set aside about 10 to 13% of gross domestic product for pensions suggest that the share of pension expenditure (as

measured by the share of gross domestic product formation) in the Czech Republic can be increased gradually and temporarily for about two decades of about 2-2.5 pp. Under certain circumstances it would not have to mean any financial disaster, as it is sometimes suggested.

It might be sufficient to mix well the sensitive shaping of today's greatly distorted contribution conditions between companies, employees and self-employed persons and complete the efforts to establish order in the collection of taxes and contributions; after good experience with the introduction of EET, to better capture the yields of the "gray" and even more of the "black" economy, or to look for realistic possibilities to reduce, in international comparison, the extremely high balance of dividend outflow from the Czech Republic. Its current officially declared amount based on CNB data is roughly double that of the future need to increase the share of pension expenditure (by the aforementioned 2-2.5 pp).

5.3.2 Challenges related to labor market changes

Following the previous (*demographic*) challenge in the first step, let us note that the expected slight *absolute decline in the domestic* workforce in the upcoming decades in the Czech economy (unless partially or fully compensated by immigration, which in view of current developments may, for example, be Ukraine, which is territorially or linguistically close to us, cannot be completely excluded), may paradoxically, under certain circumstances, be an advantage. After all, the absolute lower potential of the working-age population objectively reduces the risk of potential unemployment (and the complex costs for taking care of it - in financial, social or political terms).

Regarding changes in the numerical potential of the workforce, probably two circumstances will be in the long-term horizon key for its real application: the ratio between the *number of people displaced from the labor market and the number of people demanded*, always monitored in the structure by professions, competencies, education, age, gender, wage and salary levels, from a regional perspective and also with respect to the current phase of the economic cycle.

It can be assumed that individual disciplines and professions will have different capacities to deal with digitization. Evidently good use of digital technologies is offered in fields where it will be, on a long-term basis, advantageous in terms of economic profitability, or where it can be used as a tool to increase company's competitiveness and profitability for its expansion to the global market, etc. And last but not least, this can be used to further rapid growth in employment and wages.

On the other hand, the disciplines and professions will be exactly the opposite, characterized both by the loss of a large part of the existing employment positions and stagnation or even a decline in remunerations for work.

In real life and at every stage of digitization it will, therefore, always be *about the resulting balance between the number of newly created job vacancies and job vacancies lost* due to digitization. Regardless of how fashionable today's estimates of future balances are, they should be seen as that they still often differ in the mark of whether the balance will be positive or negative. We are referring to one of the older *pessimistic* variants,

elaborated in 2013 at the Oxford University, which counts on a generally negative balance (i.e. decrease) in the current number of jobs of up to 35% in the UK, even up to 47% in the US, some other expert estimates go beyond 50% job losses compared to the current situation, with, on the contrary, more recent and much more optimistic options available according to which one lost job vacancy should create up to 2.5 new jobs vacancies. For example, last year's (2018) World Economic Forum in Davos came up with a prediction that, during the third decade, about 75 million jobs worldwide would be lost as a result of the introduction of robotics, but at the same time around 133 million jobs would be created [Svoboda J. - 2019].

In this context, it is necessary to repeat that while looking at the absolute numbers (both towards increase as well as possible decrease), it will always be necessary to look at the structure of changes, too. It is likely that the prediction will come true: *smart factories will need even smarter people to prosper*. This suggests the thesis that the era of simpler routine service professions is likely to soon be over in the digital era, with engineering professions or with specific knowledge demand getting at the forefront.

There is no doubt that the labor market will remain the focus of trade union head offices [Šulc J. - 2017]. It will be the trade unions that in the near future should be able to professionally identify and analyze all relevant challenges put in front of employees (and, in time, apparently also in front of people with *home work*). Not only that, but they should also play a role as an institution that will be able to see what risks will *work people* have to face if they are either directly ignoring the challenges of the Fourth Industrial Revolution or would want to address them but will lack strength, money, capacity or invention to handle them on time and to a sufficient extent.

The problem is that all countries that have understood the challenges of the Fourth Industrial Revolution and the inapplicability of the option, perhaps hoping to ignore it as an objective socio-economic process, stand in front of the same task. While it is relatively easy for employers' representatives to make decisions in a given situation, basically assigning their business to anyone - to their "core" employees, employees from abroad, robots - employees' representatives have it much more complicated.

In this respect, it is necessary to fully agree with Václav Bělohradský that "… *trade union response to labor market globalization should be global solidarity of trade unions, but this is hampered by mutual competition of states in attracting investors for lower taxes or less stringent environmental standards in the name of creating job vacancies*". [Bělohradský V. - 2017].

In the direct relation to the quantitative aspect of the labor market, it is also necessary to monitor the qualitative aspect, given in particular by the degree of demand-supply matching of a specifically qualified workforce in a given time, profession, region, etc. It is precisely from the changes in the qualitative aspect of the labor market that the requirements for a corresponding transformation of the "external environment" of the labor market will probably be resulting from. Mainly, the need to create the necessary conditions to harmonize the concrete demand and supply in minimum time advance is likely to be the subject of an even more intensive social dialogue between trade unions and employers than hitherto. In addition to traditional negotiations on wages and benefits, it may be

assumed its supplementation with other areas - in summary, to face the often-surprising challenges of the Fourth Industrial Revolution. Especially on the basis of the unifying cognizance of both social partners that a possible lag in the retraining of the workforce will probably have catastrophic impacts, not only for the already unusable part of the employment teams (in the form of unemployment due to non-adaptation), but at the same time for the company itself risking a fall (precisely because of the underestimation of continuous retraining of its core employees, the inability to obtain the necessary professions by headhunting from rival companies or in the loss of timing in productivity, or jeopardizing the company's profitability to tendering processes.

It will not be only about the fact that digitization of individual fields is likely to lead to a higher demand for people with technical education, but above all it will force a *drastic change of thinking and behavior in the sense that there will be permanent changes in virtually all spheres of societal life*.

To make the things even more complicated, it is almost certain that, as it will be necessary to develop a high-quality mapping system for future developments, it will be necessary to maintain the standards developed during the Third Industrial Revolution. The importance of maintaining continuity can be illustrated on two examples from the last two decades.

The first example concerns banking. When about 20 years ago, the banking sector introduced the possibility of a 24/7 online access to private bank accounts via the Internet, and it was no longer necessary to waste time visiting a bank branch to enter a payment order or similar operation, it was believed that the massive transfer of "institution-client" agenda on the electronic form will drastically reduce the need for manpower in the financial sector, in particular "at-the-counter staff". However, it soon became apparent that there was still a significant minority of clients that required and continues to require personal contact with the appropriate financial specialist. We do not mean only the personal bankers for VIP clients, but also for a large group of people who, for various reasons, do not intend to communicate with the machine, but want to discuss their financial matters fully in person.

The second example reflects the current situation both in food processing companies dealing with meat processing and in thousands of meat stores, including supermarkets: The disdainfulness to mere apprenticeship certificate and a pathological desire for a high school-leaving certificate (maturita) or a Bc. diploma, or even better Ing. or Mgr. diploma leads to an estimated deficit of up to five thousand skilled butchers.

There is no reason to continue in other examples - the professions of nurses, police, engineers, etc. are well familiar with this issue. These already existing labor market imbalances are a manifestation of the inability to manage a complicated balance between supply and demand in the recent past and a striking warning - shall these continue to reproduce - in the future. The losses resulting from these distortions are difficult to be quantified, and unfortunately, they are not just and only primarily economic, even though they are primary with many reverberations.

If we remain "only" in the field of economics, we can almost certainly expect that the connection between the existence and the effect of the *basic economic law - the law*

of the economy of time - will manifest itself even stronger than hitherto. It also implies an already easy-to-verify finding that the success of a business plan is usually decided by a realistic (as short as possible) response time to market changes, including the speed with which it can handle the technological innovation flawlessly. Among other things, also thanks to its (in advance) retrained employees, thanks to how well a given company can reach the existing customer base (and how much it wins clients over the competition), how flexible management it will have, etc. Another expression of the law of the economy of time is better known under the slogan *time is money.* It is this law that will apply in the digital and globalized times, when Czech companies will have to face competition not only local or regional but international and literally global, many times more than it has so far.

5.3.3 Challenges related to Macroeconomic Developments

The indispensable intersection of the manifestations and consequences of the Fourth Industrial Revolution will be the necessity to, *on a long-term basis, move towards the desired state of macroeconomic indicators*, including the balance of public finances. If it is fair to highlight positive feature of any area, then it is the development in this particular one. There is no room for a more detailed analysis of significant macroeconomic variables and their evolution, hence, we will limit ourselves to partial aspects only.

First of all, however, it will be necessary to acknowledge the up-to-date success of the efforts to improve the key parameters of public finances.

This is primarily - after a long era of budget deficits - a recurrent real (not so much needlessly discussed *budget*) *surplus of public finances*, namely +0.7% in 2016, +1.6% in 2017 and, finally, +0.9% in 2018 (always in relation to the nominal amount of gross domestic product created in the given year). This allowed the general government sector debt to be depressed by another two percent to 32.7%, which is a great result on a European and global scale.

Undoubtedly, the results could have been even more favorable, had it not been for the bare necessity to gradually suppress the effects of the long-lasting, unenviable heritage from previous years. These have been manifested in many cases by deep under-funding of virtually all sectors, starting from the quality of road transportation services (and repeatedly postponed repairs, in particular of the highway network and hundreds of bridges in dilapidated states) through collapsing basic health care networks (especially in more remote regions), up to unworthy low pay in education, culture or social care, not to mention the amount of old-age and disability pensions. There is no doubt that the pressure on domestic public finances was fortunately moderated by an average of roughly fifty billion positive balance between payments of the Czech Republic to the EU budget (1% of GDP per year, i.e. approx. CZK 50 billion), while the money flow from Cohesion Funds to the Czech Republic was roughly double (over CZK 100 billion a year). Again, it is necessary to remark here the negative: the extent of the balance of incoming and outgoing dividends to the Czech Republic - approx. CZK 300 billion/year in the last approx. five years, i.e. about 6% of GDP, which is about six times the inflow of money from European funds (including the Norwegian funds).

Despite the government's efforts to settle a lot of afflictions, starting from salaries of public service employees in a number of sectors up to unfinished infrastructure modernization (see, for example, further postponement in building high-speed railway networks, 4G, 5G mobile networks, etc.), there still remain a number of problem areas where further postponements in their revitalization not only complicate the possibility of their proper functioning, but secondarily create a socially explosive situation.

The long-term failure to cope with housing issues, where, from a material point of view, the attractive vision of Building Industry 4.0 remains - in confrontation with, for example, the (not) adoption of the draft law amending the Building Act or the Social Housing Act, speaks volumes. When we were highlighting above the mutual interconnection and interdependence of a number of social phenomena and processes, housing issues with all its consequences can serve as an almost textbook example of how the state is failing on all conceivable fronts: Whether as an owner (yet still smaller parts of the housing stock held mainly through municipalities), as well as the regulator (starting with the disproportionate length and unpredictability of building proceedings regarding new housing construction applications and ending with the resignation of rent amount in rental apartments within reasonable limits).

The consequences of the state administration collapse and the factual absence of state housing policy are becoming increasingly apparent: the real unavailability of own housing for the vast majority of people after the vocational training phase results in people postponing to start their own families (over 40% of women of childbearing age does not have and is not planning to have own child, especially for economic reasons), getting own home through a seemingly cheap mortgage still entails indebtedness for the rest of one's productive life, creating permanent stress on the family due to the fear of losing permanent income, limited mobility, etc.

The problem, however, is not only about the emerging generation, but about nearly 100,000 communities of adults across all regions: The current situation is that approx. 83,000 people, of whom one quarter are children (20.5 thousand) are found in the so-called *housing dearth*, i.e. living in conditions of provisional housing, unsatisfactory apartment, or even completely homeless. A more detailed look at the structure of people in the housing dearth state is as follows (in thousands of households):

- without a roof over their heads and provisional shelters up to homelessness 16.6
- duly approved quarters 17.9
- shelters 3.2
- unapproved quarters 1.7
- by force staying at relatives and acquaintances 4.1
- institutes, sanatoriums and homes for the disabled persons 5.6

Not only the high number of fellow citizens affected in this way (moreover, suffering from various diseases and addictions above average, resulting in a significantly shorter life span) is warning, but the extremely high dynamics of the housing crisis onset for the oldest population affected in this way: between 2015 and 2018, the number of households

with seniors increased by 70%. In year-on-year comparison, 11.7 thousand households are in a state of housing dearth, a part for the first time, another part repeatedly.

Meanwhile, the state has practically (with some exceptions) resigned to the demographic challenge - known for decades - in the form of an increasingly urgent need to build houses for the growing population of the elderly. For now, for every 1,000 people over 80, there are only 83 available spots in senior homes. If the rate of construction of new accommodation capacities does not change, it would not be even half in the middle of the century (only about 33 spots). In order to maintain the current level of services, the number of beds for seniors would have to rise from the current 35.6 thousand to almost 90 thousand (by 2050), taking into account that a significant part of current capacities is located in old buildings, hence the number of the newly built bed capacities will surely exceed one hundred thousand [ČTK, svj, zr - PRÁVO 3 April, 2019].

In connection with the need to maintain the balance of public finances absorbing the concurrence of all the costs of an aging Czech population also in the upcoming decades, i.e. not only the aforementioned dynamically growing old-age pension payments but also health care, it is necessary to reckon with the so-called *structure change effect*, as a result of higher representation of seniors in the population and their average higher cost per person. This "effect" will more or less automatically generate increasing requirements for the "pension" expenses of the state budget, and, last but not least, also for the growth of the total costs connected with the provision of social care.

This is reflected, for example, in the care allowance expenditure, which is currently received by approx. 355 thousand people. The need to increase the costs of occupational retirement pension is also apparent from the statistics on pensions received. In 2018, 317,000 people received an old-age pension of less than 10,000 crowns, and only thanks to an increase of the basic amount of retirement of CZK 570 plus of the variable amount of 3.4%, the number of beneficiaries of such low pensions dropped by 137,000 to 180,000 people, especially women. It is still 9.8% of the total number of seniors with such low pensions, i.e. we speak about every tenth pensioner.

According to a prognosis prepared in spring 2019 by the Association of Social Service Providers and presented by its president, Jiří Horecký, their number may roughly double by the middle of the century (to 734 thousand people) [ČTK, zr - PRÁVO 3 April 2019]. If at present, almost CZK 30 billion is paid for the care allowance (CZK 26 billion in 2018 and this year's expenditures are estimated at CZK 28 billion after the increase since April 2019), then future estimates indicating more than doubling of these expenditures reflect the risk we are talking about - that the aging Czech population will be much more expensive than the current one.

5.3.4 Challenges for High Efficiency of Alliance Society 4.0

We are therefore coming back to the thesis stated on the previous pages and the meaning of this whole subchapter. The Fourth Industrial Revolution - since it is a global process and competition - will undoubtedly bring a lot of winners, but it will be a new round of competition in which not everyone will win. There is no need to worry about the winner, they can usually take a successful care of themselves. It is about the "others".

Without exaggerating the state's paternalistic role, none of us can remove the essence of its important role from its shoulders - if it wishes to continue talking about a civilized environment and respect for human rights, including the right to live in dignity. Outsiders who will be among the losers of the Fourth Industrial Revolution will represent a large portion. Similarly as until now, where in the wage statistics, the values of average and median are getting more and more distant, which should be more clearly explained on an example, which in our case is that two-thirds of the beneficiaries have lower wages than the average value. And the scissors are slowly but surely getting more and more apart.

Therefore, if we talk about the need for the *effectiveness of Alliance Society 4.0* as one of the instruments of the coordinated efforts of the state and the social partners to best "grasp" the chances and risks borne by the Fourth Industrial Revolution, then, among other things (i.e. beyond own technical side of the process), we mean, first and foremost, the search for a mechanism/algorithm that ensures encouragement to maximize the benefits and all the positive aspects on the one hand, and on the other, a systematic and thoughtful countermeasures to all the negative aspects of the Fourth Industrial Revolution.

Therefore, when we discussed in this section some aspects of the aging of the Czech population in relation to the macroeconomic balance, which, among other things, will be particularly strongly threatened by pressure on the expenditure side, we had to emphasize the joint and integral responsibility of all three tripartite partners - naturally with respect to their primary mission. The new stage in this respect raises a new level of requirements on each of them, and one cannot accept that a member of the Council of Economic and Social Agreement of the Czech Republic may not comply with the new requirements: no one wants a "failed state" with disintegrated public finances and dysfunctional state power (after all, there are too many warning examples around the world lately). Similarly, the complete dominance of one of the social partners (and hence the collapse of the other) would probably be the shortest road to a social conflict (whose possible image we have been seeing for months on the example of "yellow vests" in France).

They are not new or completely unknown challenges. In this sense, we are looking at the agenda of the Fourth Industrial Revolution today of CMKOS as a unique chance to break free from the poverty trap and the practice of CHEAP WORK. But, at the same time, we also see it as a risk that if we fail to enter this "express of the Fourth Industrial Revolution" in time, then we are in danger of being moved to the outskirts of Europe. And this cannot be allowed, because then some profound discussions about the European social pillar or its Czech modification lose its justification. Our chance, on the other hand, should be to seize all the opportunities that the express of the Fourth Industrial Revolution undoubtedly offers us.

A historical excursion and a critical assessment of existing state policies now allow us to follow up on the next part of the text. This entails a set of principles or instruments that should lead the state and the social partners to sustain social reconciliation. We decided to divide this task into two parts.

The first will focus on "institutions". This general word implies not only public authorities, such as the Ministry of Labor and Social Affairs, or public institutions, but also the ethical dimension of digitization, related laws, public services, etc. We are trying to at least indicate the direction in which we want to move in order for the Czech Republic to be the winner of Industry 4.0 and not its loser.

The second part describes the challenges and the desirable response of the social partners to the changing society. Given the new forms of work, thinking in social dialogue, partners' priorities and collective negotiation will also have to change.

6.1 Institution

6.1.1 Ethics

The logic of this subchapter is built from general to more specific. Therefore, first of all we deal with ethical limits for the development of new technologies. In the European context, great emphasis is placed on this issue, perhaps because Europe was the continent where the greatest socio-economic turbulence occurred.

Perhaps on the basis of this experience, the European Commission has decided to create a document (Ethics Guidelines for Trustworthy AI), in which it defines the key principles for the development of artificial intelligence. The most important principle is technological humanism, i.e. that a human, not a machine, must be the centerpiece of all technology development and progress. This may, to a certain point, limit the full autonomy of the machines, which is necessary in some cases, but on the other hand, it may limit innovation. The restrictions of innovation per se might not be a problem because during their current grow, it is far from talking about a general slowdown, but it can have a great geopolitical impact. Neither China nor the United States speak of a code of ethics, and therefore, these powers could theoretically, in terms of technology, pull away from Europe, as it is already happening today to a certain extent. However, the question remains whether development without ethical rules is socially and ecologically sustainable and, above all, democratic. The warnings may represent social credit systems in China, complemented by the ability of cameras to automatically identify citizens on the street. Or from the other, private, side of the behavior of recruitment boots in Amazon, who favored men over women. The European model proposed so far seeks to respond to these negative examples with its precautionary method (i.e. before we introduce anything to the market, we test it first). The model contains in short principles with which trade unions fully identify.

The technology should:

- allow human management and supervision,
- be robust and secure,
- protect privacy and data,
- be transparent,
- promote diversity, equal treatment and prevent discrimination,
- be socially and environmentally beneficial and responsible.

Of course, there is room for deepening these principles; for example, about deprivatization of services. Here comes the time when it is necessary to define a digital "public space" and critically reflect on its current state of privatization. Companies like Facebook, Google, Twitter and others have found a way to exploit and monetize human relationships and behavior, and it is only recently that the questions on their responsibilities have been raised. It is the European Union that is making the most progress of all global powers; states are beginning to apply a digital tax and the greatest success can be considered GDPR, which allows citizens having a little more control over their data (although in some cases this legislation is controversial) and reinforces the issue of cyber security.

6.1.2 Preparedness of Public Administration

Public administration plays a key role in the transition to the Fourth Industrial Revolution. Not only is it a good source of data for various innovation applications (for example, in health care system, where big data can improve diagnostics, as well as make i more accurate), but also thanks to legislation and public policies that shall operate within a defined ethical framework and aim to help accelerate development or, on the contrary, to mitigate some of the negative effects.

Therefore, greater preparedness of the state administration for changes in society is an unquestionable necessity. Unfortunately, the current situation does not suggest that we would be approaching a systemic approach. Within the Digital Czech Republic, or Alliance 4.0, still one authority has not been established; competences are fragmented among several ministries that are coming up with partial strategic thoughts. At the present moment (i.e. in 2019), we are talking about roughly 800 partial plans of public administration that it wants to implement and whose correlation is questionable. This bottom-up principle of building does not seem sustainable to us, although it has already managed to interconnect some of the agendas.

Another aspect of public administration preparedness is the ability of individual employees to manipulate with new technology or learn new procedures. Even in this case, there is not yet a sophisticated system of internal education and the introduction of new services usually turn out to be counterproductive, because public service employees are not sufficiently prepared to operate it.

We believe that the top-down approach is the solution. This means that it is necessary to define by one authority the formulas which the individual public authorities will follow during the implementation of new technologies and services. This will also ensure

the interconnectivity of systems, which is a prerequisite for a rapid response of public administration to technological changes or needs in the private sector, as well as for quality source of information, which should subsequently serve for better legislation and generally better government policy decisions.

All this must be done in parallel with the improvement of the working environment of public service employees, which means, among other things, a sufficiently high salary and a meaningful and continuous internal education.

6.1.3 Educational System

In the previous part, we have already mentioned education, which is one of the most discussed topics for the professional community on transition to Society 4.0. For a quite understandable reason. It is important for employers to have qualified employees who bring (with still low wages in relation to the Western world) higher added value, i.e. profit. For the state and the non-profit sector, it is important to reduce the privatization of the initial education, which is manifested in the existence and prosperity of private nursery, primary and secondary schools, leading to increasing inequalities among residents where poorer households remain in public education, and richer attend private organizations.

From the viewpoints of trade unions, the principle of man self-sufficiency, or his emancipation, plays a crucial role in education. This is manifested both in employability on the labor market (see employers' point of view), sufficient access to public services (see state viewpoint), and the attainment of competences that prepare him for life outside the labor market. Such skills include, for example, orientation in the information society, which is often reduced only to media literacy, financial and digital literacy, interpersonal communication skills, problem solving using logic, knowledge of social institutions including e.g. basic awareness of labor law etc. Above all, it is the ability to adapt to new situations and the ability to learn continuously. Therefore, it will be important to unify and refine the lifelong learning system, which is currently fragmented and uncoordinated.

6.1.4 Social System

Given the great impact of automation, robotics and the overall production and services digitization, a large impact on job structure is expected. The impact of digitization is often misinterpreted, described as completely destructive, i.e. that some job vacancies will vanish. However, the most recent in-depth analyses speak of the impact on individual work activities that will be automated. The number of these activities will grow as artificial intelligence develops. First, the machines take over routine work; and in this case, it almost does not matter who carries out the routine work. Thus, artificial intelligence can affect both more qualified and unqualified positions.

It is difficult to predict the future, but a certain cautionary approach to the matter should be adopted. It is clear that without any support scheme, mainly the poorest and less qualified workers will be disadvantaged. Accessing high-quality retraining to guarantee them sufficient adaptability in the labor market would be more

difficult for them than for their qualified/wealthier colleagues. It would also be more time-consuming.

From our point of view, it is therefore absolutely essential to talk about a functional safety network (in parallel to the widely available lifelong learning), which will provide enough room for every person to change its career path.

In the current situation, our social system does not fulfill such a role sufficiently. It is sufficient to look at the effectiveness of retraining of labor offices and, for example, the minimum subsistence, which, unfortunately, has been stable since 2012 at CZK 3,410 for individuals. In the considerations about social policy, the society will have to move away from excessive budgetary fetishism and look for a truly effective solution to the situation that will not destabilize the economic-social and consequently also the democratic order of the country.

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The transition to the Fourth Industrial Revolution will, of course, cover a number of other areas, such as the increasingly important environmental protection, health care system, transportation services, etc. Describing the vision of the functioning of all the areas concerned is not realistic. Therefore, we have tried to on these two key examples to outline the absolutely basic logic - in the Fourth Industrial Revolution, only the one who supports, by the sufficient standard of living, development of human skills1 and thus the ability to explore, invent and innovate, will be the winner.

6.2 Social dialogue

The social partners themselves will also have to respond quickly to changes in the labor market. Meanwhile, the Fourth Industrial Revolution is manifesting itself in such trends that go against the engagement of workers, that is, the increasing use of self-employment or work performance agreements as the "full time agreement". This means a certain individualization of workers because their contracts make them flexible units, which often do not become permanent parts of the work team. All of this is a consequence of the current trend of the so-called gig economy, i.e. people with short work engagement. Gig economy came into fashion when applications were launched, or more precisely, employers such as Uber or Upwork. These digital platforms began to offer human work in the quick, initially without any qualification requirements, and, to this day, without guaranteed income, if no "gig" appears. The concept of precarious work has thus been strengthened by this new business model.

Thus, in the new era, the workforce as the institution based on human relations becomes a commodity. Throughout history, unions have always taken advantage of people wanting to associate and work was also a social event. All this is changing or has already changed. The needs of workers have also changed.

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1 Economists would write "investment in human capital", philosophers would call it "sufficient resources for human emancipation."

If we make a short summary, we can divide today's workers into two categories:

1. For now, those with a full-time employment function in the old schemes and collective negotiations is of great importance to them, as thanks to it they achieve a significant improvement in income, or a reduction in working time, and an overall improvement in the working environment with diverse benefits.
2. On the other side of the spectrum, workers are being pushed into self-employment (unless it was their choice from the beginning…) and various other forms of work where collective negotiation is not yet relevant because trade unions have failed to respond in time to the new labor market organization.

From the employers' perspective, it is necessary to mention here that Czech companies are beginning to realize the necessity of their digital transformation, not only due to full integration into the value-creation chain, but also to a substantial streamlining of all in-house processes. After four years of often very general discussions and often only marketing proclamations, the second wave of Industry 4.0 is being introduced. A practical wave, where companies are already seriously addressing the individual attributes of the Industry 4.0 concept, investing in their digital transformation and gradually starting to implement advanced technologies. The existing development shows that no catastrophic labor market scenarios have yet been fulfilled. Currently, companies are rather looking for people than firing them. However, CMKOS tries to capture long-term tendencies through this brochure, and tries to avoid evaluation based only on developments in the economic boom.

6.2.1 New Approach to Collective Negotiation

In spite of this, we can currently register the efforts of trade unions to look for new forms of collective agreements or contracts that try to avoid the delays indicated in response to the environment. The European Trade Union Confederation has even prepared a document outlining new trade union strategies (European Trade Union Confederation): For New Forms of Employment, ETUC 2019). This text analyzes in in depth the space in European law for a less rigid legislative concept of employment that would be able to absorb situations where a person does not have a classic full-time employment and its income is divided among several employers. This would mean in practice that even the self-employed person could, under certain circumstances, be subject to the rights and obligations that we now associate with a classic employee. The term employee would therefore be loosening, shifting its meaning from a specific job position to the skills we use for our living, even for several employers at once, who would all have to respect the labor law standards. Although the idea is fundamental and worth implementing, the document also acknowledges that the current European legal systems are not open to this and such interference with the law would not be merely of a cosmetic character.

Even so, we have witnessed the first successes in collective negotiations in the field of digital platforms. In particular, in Denmark, the largest union 3F was able to negotiate a

collective agreement with the Hilfr.dk platform, which provides household services such as cleaning.

Thanks to this contract, platform workers can apply for an employment relationship and those who have already completed 100 hours of work are considered to be automatically employed (or they can voluntarily leave it). Of course, they have a number of "benefits" - a minimum hourly wage of approximately € 19, a certain level of income, even if the platform client cancels the service within 36 hours prior to implementation guarantee in the protection and control of personal data; reimbursement of sickness benefits; paid holiday, etc.

From a Czech point of view, this collective agreement may seem like utopia with such an employer. In the Czech Republic, negotiations with trade unions are not as socially institutionalized as they are in Scandinavian countries. The symbol may also be how many disputes with "classic" employers today are trade unions force to resolve through an intermediary (Ministry of Labor and Social Affairs), or directly in front of court. On the other hand, the highly themed data protection of the Danish trade unions could be another area that collective negotiation in the Czech Republic could conduct and give the self-employed persons a reason to organize itself.

6.2.2 New Challenges

This freely brings us to new challenges that trade unions should face in order not to lose relevance in the Fourth Industrial Revolution. The issue of data protection and control has already been mentioned and given that it is becoming increasingly important not only to employees but also to consumers, this should be one of the key points of collective negotiations in the future. The work environment is no longer defined (also because of home office) as a real space around us, but also as a virtual one, which can suffer from the same, if not more, afflictions, where, one firstly associates for instance the issue of overtime and its control.

For the trade unions, the area of occupational safety has been and remains a key area. Since robotization will indeed reduce the physical burden on a man, and thus, in an ideal world, should reduce the risk of work-related injuries, other aspects of a (un)healthy work environment will come to the light. Especially with white collars, we already observe the so-called burnout, which is also associated with the de facto 24-hour availability of employees. It will therefore be a great challenge for the trade unions to orientate themselves in issues of the mental health of a person and to start protecting its free time. And even though the opinion of employers very differs, the very first step of CMKOS is the goal to reduce working time, at that time by half an hour, which should be supplemented by additional guarantees for employees. This is, for instance, the right to be offline, which should, for example, exempt employees from responsibility for the immediate performance of the task assigned by the supervisor after working hours.

There are probably a number of similar problems that the trade unions can grasp, and many still will arise over time. But one thing is very likely. The individualization of the labor market mentioned above will make it increasingly difficult to attract new trade union members. All European countries, including the Scandinavian ones, are suffering from a decline in membership. The question is therefore what transformation the trade unions must undergo in order not to lose their important position in society, as they are the main guarantee of democracy in the workplace.

CONCLUSIONS

This text discusses the complex role of social dialogue from the CMKOS perspective across industrial revolutions. At the time of transition to the next phase, which we today refer to as the Fourth Industrial Revolution, it deals with the idea of the impacts of changes on society, its social securities and the role of the trade union movement.

Thanks to certain guarantees, CMKOS is part of the legislative process and therefore had and has the ability to exert some influence, even if it is not of an executive nature, which belongs to the government. The position of the trade unions in this regard can be summarized into the following points:

3. The realization that Industry 4.0 does not only have the impact on industry but that it also has a societal outreach, just as it was shown by all industrial revolutions before it. And the necessity of a fair economic transition (referred to as Just Transition in English) that is connected with it and which means a friendly approach to both every single person and the environment.

4. Support for innovation and more sophisticated infrastructure in those countries (including the Czech Republic) that are trying to economically converge to more advanced countries. And in parallel with it, putting science, research and technology in an ethical and legal framework that will respect man as the centerpiece of development. It will protect not only his physical part, but also his mental and virtual parts, i.e. pay attention to cybersecurity, protection of personal data…

5. Encourage investment in "human capital" not only in terms of education, where lifelong learning will be an important point, but also in terms of living standards, health state, leisure, etc. This also means the development of public services and the readiness of public administration.

6. Extend collective negotiation or employment protection to areas where it is not yet in place, i.e. especially for those working on digital platforms or self-employed persons who are not offered a typical full-time position.

Trade unions see the transition to the Fourth Industrial Revolution as a window of opportunity for the Czech Republic's economic leap from subcontracting positions in global value chains and the leap of Czech households to a better standard of living. All this only under the presumption that the points mentioned above are fulfilled and that the role of social dialogue is not suppressed in society and politics.

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