SECURITY 4.0.
PART ONE: SECURITY AND THE FORTH INDUSTRIAL REVOLUTION

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***Abstract**: The Fourth Industrial Revolution implies a total change in our way of life. To be adequate to the new security threats stemming from high technology, we need to analyze and evaluate them from the point of view of people's security.*

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1. Introduction

Industrial revolutions

Over the past 250 years there have been three industrial revolutions (Figure 1). They have changed the process of building and embracing values and the world as a whole. During each of them, technology, political systems and social institutions are developing. Production, people's perceptions of themselves, the relationship between them and the environment are changing.

First Industrial Revolution

The transition to machine production and the promotion of the capitalist economy as a leading one reflects so vastly on the way of life of mankind that they are often compared to the Neolithic Revolution in which people find agriculture and stop to lead nomadic life. A number of factors cause these significant events in decades – among them history indicates both technological and socio-economic and cultural.

The central role in the development of the first industrial revolution have innovations in the steel and textile industry and, of course, the steam engine. Invented and patented in 1775, it was used to propel various machines, gradually replacing the animal and water power applied to date.

Significant innovations begin in England, and it quickly realizes its advantage over other European countries. In their leadership position, the British ban the export of skilled labor, technology and machinery. This monopoly does not last long – in 1807, the two Britons William and John Cockerill opened machinery stores in Belgium, making it the first continental state to change its industry and economy.

France is lagging behind in the period of major changes due to the unstable political situation in the country, which is also due to the lack of large investments.

Despite the enormous coal and iron deposits, innovation only entered Germany after the national reunion in 1870. But once it began its development, Germany quickly accelerated its pace by the end of the century, becoming an absolute world leader in steel and chemical industry .

Second Industrial Revolution

The second industrial revolution is related to the use of electricity, conveyor production, the internal combustion engine, the car, the radio. It unfolds between the last decades of the nineteen and sixties of the twentieth century. It imposes large-scale manufacturing and heavy machinery and chemical industry. Different industrial branches with specific technological processing are identified.

Between 1870 and 1930, the new wave of technology continued economic growth and developed the success of the First Industrial Revolution. The radio, the telephone, the TV, the household appliances and the electric lighting show the transforming power of the electricity. The internal combustion engine allows for the creation of cars and airplanes, and consequently their ecosystems - with new jobs and high-speed networks of roads. There are breakthroughs in chemistry: the world gets new materials including thermosetting plastics and new processes. For example, the Haber-Bosch ammonia synthesis process opens the way for cheap nitrogen fertilizers, the "green revolution" of the 1950s and the subsequent sharp increase in population. The Second Industrial Revolution marks the advent of the modern world – from sanitary services to international air transport.

The main resources of production, the most important factors for capital growth and respectively for active economic activity in the modern state up to the 1960s, are more or less limited to, and can be controlled by, their respective territorial boundaries. It is an economy of mass production, of homogenization of consumption and the mass market, which creates a mass consumer of the same type of products, and in this sense is an economy of the scale, in which the one, who can create, produce and sell more identical products, reducing their production costs has an advantage and gains.

The governance structures needed to regulate and control mass production and consumption are highly hierarchical, with inter-linkages going through the center.

Third Industrial Revolution

Approximately in 1950, breakthroughs in information theory and numerical calculations began. These technologies form the core of the Third Industrial Revolution. Of course, the causes of the industrial revolution are not only new technologies but their impact on economic and social systems. The ability to store and process and transmit information in digital form transforms most industries. The labor and social relations of billions of people are radically changing.

The cumulative impact of the three revolutions has led to an exceptional increase in the welfare of the developed country's inhabitants. General technology changes create a practical basis for moving to a new phase of development.

Fourth Industrial Revolution

In practice, this is the foreseeable with a high degree of probability near future, which is already at the start. Massive cyber-physical systems will develop in production, serving human needs. Измененията ще се отразят най-широко на всички страни на живота. There are, of course, risks – increased instability and the possibility of a collapse of the global system due to a change in major paradigms of coexistence. The technologies that are already being developed and will cover everything are: Big Data; the Internet of Things (IoT); virtual, augmented and mixed reality; 3D-printing; printed electronics; quantum computing; blockchain technology; artificial intelligence; neurotechnologies; new materials; space and geotechnology.

On April 1, 2011, a small article titled "Industry 4.0: The Internet of Things on the Road to the Fourth Industrial Revolution" was published in the weekly newspaper of the German Engineers' Union – VDI Nachrichten. It was not a joke announcing that at the forthcoming Hanover Fair, a working group of three experts,

representatives of entrepreneurship, politics and science, would present to the public the previously unknown Industry 4.0 initiative.

The German concept for the industry of the future – Industry 4.0 is based on the collaboration of manufacturers, scientists and governments. A wide network of people, objects and machines build a whole new production environment. The real world and the virtual world are already beginning to merge into production, giving rise to Industry 4.0 or the Fourth Industrial Revolution. The German concern Siemens defines the driving force behind the development of this project: from "Big Data" to "Smart Data", data-driven production, merging worlds – virtual, augmented and mixed reality, self-organizing factories.

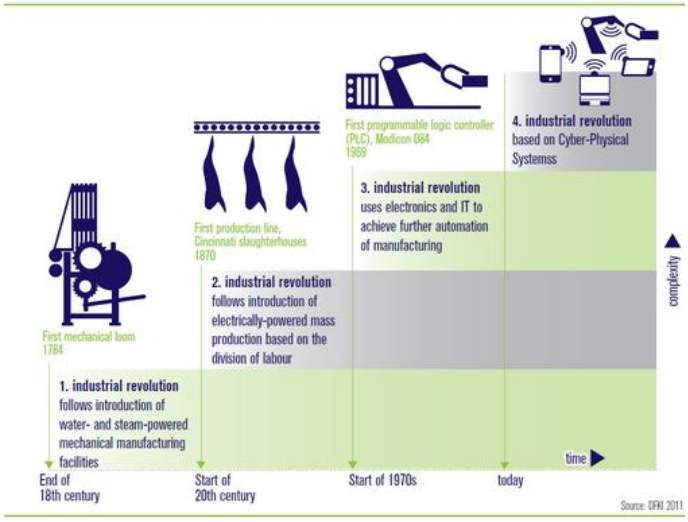

***Fig. 1**. Industrial revolutions*

2. Security and industrial revolutions

The development of systems of public order and security undoubtedly follows the development of the economy and social relations. The development of technology often occurs first in military and security organizations, and subsequently it also appears as civilian products Crime is aimed at illegally acquiring goods by organized and unorganized criminals. With the development of industry, wealth – capital, movable and immovable property, storage in banks – all this is of interest and desire for illegal acquisition by criminal world. Since it is dissolved in the normal world, it is also subject to development and the use of the benefits of technical progress. Criminals are becoming more and more creative, educated, sophisticated and greedy. Well-educated and well-equipped criminals invent increasingly innovative ways of criminal enrichment. This causes normal people to demand from the government adequate protection due to citizenship and taxing. Much of the crimes are aimed at big capital. This makes the interests of the poor and rich to higher security synchronous. Therefore, resources are earmarked, specialists are trained and research and development are being carried out to address crime and, of course, espionage. There can be no innovative industrial development without resource-intensive development. From the point of view of opposing countries, intelligence should be a productive force that, for example, spending a total of € 100 million, gives its producers an advantage worthing millions.

There is no technical breakthrough that is also not relevant in the light of the need for security – rail transport, in addition to its economic importance, allows for easy transport of people over long distances, whether military formations, criminals or police forces; aviation, photography, besides their exceptional iconic significance, have a great value since their emergence for intelligence, counterintelligence, military and special operations. Cybercrime, cyber-intelligence, cyber-security are interconnected industrial and social phenomena demonstrating the possibility of modern crimes and the creation of modern products for civil and national security.

At each stage of industrial development, a stage of development of the security system corresponds. Therefore, when we reflect on security in the stream of Industry 4.0 ideas, we are talking about innovative paradigms, technologies and security technologies that match the high technology that we can unite under the common name Security 4.0.

Industry 4.0 and Security 4.0. Security and insecurity

It is important to perceive and consider the technologies of the Fourth Industrial Revolution on a large scale, outside the context of simple instruments, in close connection and interdependence, in the light of the idea of synergy. We must look for opportunities that, on the one hand, allow security and public order services to positively influence the product, the level of national and civil security, and on the other, to derive and prioritize these technologies and combinations of them ensuring that the security sector works only for people's benefit and protection. Technologies should also be analyzed in terms of the possibilities for their use by criminals and to create a conceptual response environment.

The Fourth Industrial Revolution will fundamentally alter all these aspects of our lives and security as it did in previous revolutions.

Technological innovation is a powerful factor in multiplying the wealth and well-being of people. The free funds and the need to protect the developing property lead to investment and development of security, both in its broad understanding and in its understanding of the security and safety of the life of the individual citizen. Today the average person lives longer, healthier, more wealthy, and also less likely to suffer or die of violent death than in previous epochs. There is no crime-free society, perhaps in the far future it will be possible. **Hence, assumptions and projections should outline future possible offenses based on leading technologies.**

How will future crime look like in the face of the consequences of the Industrial Revolution? This is the next stage of criminological knowledge by rationalizing the image of future crime and developing measures for future counteract, in accordance with the new conditions.

For today's criminologists, the social consequences of "Industrial Revolution 4.0" are important. Are there any predictions that criminologists can handle? Yes, there are. Such are the works of the famous economist and politician Jacques Attali [1], the leading analyst of the US National Intelligence Council Matthew Burrows [2]. When their books appeared, especially the one of Attali, they were simply perceived as a science fiction or Hollywood-like scenarios of post-apocalyptic works. But just after their publication, it becomes clear that the most incredible negative scenarios seem completely realizable in life. For example, Attali describes three scenarios for the development of mankind.

According to the first, which he calls "Hyperempire", the money will liquidate anything that can hinder their triumph, including the states they will gradually destroy. Everything will become private, including the army, the police, the judiciary. Most people will become an artifact for production and sale.

If humanity does not follow such a future, globalization will cease forcefully, a barbarian age will come, the world will be involved in destructive wars. States, religious groups, terrorist groups and pirates using the new weapons will exterminate each other. Such a course of events Atali called a „Hyperconflict". The hyperconflict is also a planetary hypercrimal. According to this scenario, instead of the countries that will break up under market pressure, there will be pirate states and non-state entities, areas of lawlessness. They will be run by armed gang leaders, controlling regions, ports, oil pipelines, roads and resources. Pirate countries will behave according to the model of ordinary nations, fight against traditional states, securing their existence at the expense of the work of intellectuals. **In essence, the realization of such a scenario is seen in the Islamic state, the Taliban structures, the Mexican**

and Latin American cartels. In fact, today's global economy is increasingly becoming a mafia federation.

As Mark Goodman writes, it can now be estimated that transnational crime accounts for 15-20% of the world gross product as a purely criminal turnover and no less than 25% as a legal turnover controlled by criminal groups. Generally speaking, criminal groups can control not less than a third, but rather about 50% of the global turnover of all kinds of goods and services, assets and finances. Considering that the concentration of property in the criminal world is higher than that in the legal business, it can be concluded that the most important asset owners and resource holders on the planet are the criminal syndicates.

Between modern and old crime there is not only antagonism but also a huge difference in the methods and organization of criminal structures. Modern criminal organizations abandon the old, traditional hierarchical structures of Don Carleone and Lucky Lucciano and are built in the form of flexible network structures. They actively use outsourcing, collective entrepreneurship, platform solutions, and more. In short, if the criminals were in the queue of technical and financial technologies by the middle of the 20th century, they are no doubt today in the avant-garde.

For example, the profit of an average cyber-criminal is seven times greater than that of the average criminal. In New York, the detection rate of ordinary crime amounts to 40-60% in different years, and cybercrime – 4%. In other words, cybercrime is highly profitable and low-risk criminal activity.

The third scenario of development, Atalli calls "Hyperdemocracy". Its essence is the creation of a single world government and several regional centers of power. This is the most positive development for mankind, in which every person with the help of the latest technology can live wealthy, fairly, protect the environment and so on, that is, a society of universal prosperity.

The latter scenario looks the least likely in the near future. Therefore forensics profession for a long time will be sought and criminological knowledge will enter the system of education in every type and orientation. Of course, this will happen if criminologists adequately assess the social processes of the present and qualitatively predict their future change.

On the basis of what has been said so far, several specific forecasts can be made.

Crisis phenomena in the economy, the complexity of entering the new industrial revolution, increase the tensions in the labor market, in international relations, in the migrant environment. This negatively affects security by increasing both traditional and non-traditional types of crime. There is no way they will disappear, but the proportion of widespread and violent crimes in the overall crime structure will grow, not only in the years to come, but also in the coming decades.

Law-protection bodies in the conditions of a shortage of funds for their existence will have to fight in two directions - traditional and non-traditional crime. It is also clear now that the law enforcement system will be constantly delayed in its actions to counteract the technology of the criminal world. It is known that whoever has lost the initiative in the fight will most likely collect the final loss. To avoid such a large delay a radical change of the whole system of selection, recruitment and training of staff is necessary. In essence, in the recent decade the police and security services should be transformed into a cyber-police and cyber security services, using the latest achievements in working with large data transmission of information and its visualization.

In the detection of crimes, the system of using new technical means to obtain objective information about the culpability of one or another suspect must be completely modified. To consider and frame under medical and prosecutors' supervision the use of medical devices that have been called "serum of truth" in the media and literature. New-generation truth detectors should be used. Contemporary neurobiology even today allows to establish the 100% authenticity of one or other testimony.

It is necessary to eliminate the archaic, cave methods for investigating criminal cases, the writing and reading of the volumes of these cases, without machining, especially in economic cases and organized crime.

A revolution in expertise is needed. Right now, the most recent discoveries in a number of areas of science have to be used in this area, which we traditionally define as forensic expertise.

It is necessary to change the archaic judicial system. Judgments in specific cases must be based on a deep psychological-psychiatric investigation of all accused persons, with the creation of predictions of their individual post-criminal behavior. And only on such a basis in the 21st century one or other punishment can be determined. For now, criminal justice, the penalty enforcement system is practically not in line with technological reality.

We may soon find ourselves in a situation where criminals will use quantum computations, and we will continue to perforate the sheets and make the files of criminal cases.

Sources

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