Chapter I. Blockchains and DLT in the digital economy

Introduction

In 2018, one of the most frequent searches in online search engines was "GDPR". Another one, in which mainly business was interested, was "blockchain". One year ago, the second most searched phrase in Google[1], in the "global news" category, was the term "Bitcoin" (the interest increased particularly at the end of the year, when Bitcoin reached almost USD 20,000 in bitcoin exchanges). In turn, in the "how to …" category, the third most searched phrase was "How to buy Bitcoin?". In numerous conferences, business events, online transmissions, fairs and congresses, these terms are discussed at length, repeated over and over again, the startups dealing with that technology are financed, politicians announce special programs supporting that technology, serious state institutions and international organizations notice it, and a number of reports are prepared.

In February 2018, the European Commission opened the EU Blockchain Observatory and Forum, the purpose of which is to highlight the most important progress in the area of blockchain technology, to support European entities and to intensify the cooperation between the EU and the interested parties operating in that sector. The Commission indicates that "blockchain technology will significantly impact digital services and transform business models in a wide range of areas, such as healthcare, insurance, finance, energy, logistics, intellectual property rights management or government services". The Commissioner for Digital Economy and Society, Mariya Gabriel, emphasized that venture-capital funds invested over EUR 1.2 billion in over one thousand start-ups in that sector, and the European Commission is projected to provide EUR 340 million until 2020 within the EU research programs Horizon 2020 for the projects making use of blockchain technology. The report prepared for the European Parliament: How Blockchain Technology could change our lives (February 2017) indicates that, in the next several years, that technology will significantly

1 https://trends.google.pl/trends/explore?date=2017-01-01%202017-12-31&q=Bitcoin of 11 November 2018.

impact the EU economy[2] and Europe may not escape from it (Boucher, Nascimento and Kritikos, 2017).

On 10 April 2018, twenty-three European countries (Austria, Belgium, Bulgaria, the Czech Republic, Estonia, Finland, France, Germany, Ireland, Latvia, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden and Great Britain) signed the Blockchain Partnership Declaration, which is to be the tool for cooperation among the countries for the purpose of exchanging expertise and experience in the technical and regulatory areas, and preparing blockchain implementations for the whole digital market of the EU, for the benefit of the public and private sectors. The essence of the declaration was mentioned by Mariya Gabriel, Commissioner for Digital Economy and Society: "In the future, all public services will use blockchain technology. Blockchain is a great opportunity for Europe and Member States to rethink their information systems, to promote user trust and the protection of personal data, to help create new business opportunities and to establish new areas of leadership, benefiting citizens, public services and companies. The Partnership launched today enables Member States to work together with the European Commission to turn the enormous potential of blockchain technology into better services for citizens."[3]

On 16 May 2018, the Committee on Industry, Research and Energy adopted the draft Resolution for the European Parliament on distributed ledger technologies and blockchains: Building trust with disintermediation (2017/2772(RSP). It indicated that DLT[4] (A report by the UK Government Chief Scientific Adviser, 2017) may reinforce the position of citizens who become owners of their data. DLT introduces a paradigm of social value based on information technology which is conducive to autonomy of the person, trust and transparency; requires development of frameworks for legal regulations for the applications based on that technology and may

2 P. Boucher, S. Nascimento, M. Kritikos: How Blockchain Technology could change our lives, Brussels2017, pp. 3 et seq. Source: http://www.europarl.europa.eu/RegData/etudes/IDAN/2017/581948/EPRS_IDA(2017)581948_EN.pdf of 9 November 2018.

3 https://ec.europa.eu/digital-single-market/en/news/european-countries-join-blockchain-partnership of 11 July 2018.

4 DLT – Distributed Ledger Technology, more on that term below. See: Distributed Ledger Technology: beyond block chain. (A report by the UK Government Chief Scientific Adviser, 2017), http://fintechpoland.com/wp-content/uploads/2017/01/Technologie-rozproszonych-rejestrow-UK-GOfS-FTP-NASK-PL-1.pdf of 11 June 2018.

significantly streamline the operation of key sectors of the economy and improve the quality of government services, providing consumers and citizens with a high level of satisfaction with transactions. It was indicated that DLT may be applied to and significantly impact the financial sector and payment disintermediation, as well as the sectors of energy, health, education and copyrights. The cornerstone of DLT is the so-called "smart contract" – the European Commission is called to test the ISO and CEN_CENELEC technical standards as well as the legal frameworks, with which smart contracts may be legally enforced in the whole uniform market of digital content, instead of fragmented laws in the respective member states[5].

On 3 October 2018, the European Parliament adopted the resolution on distributed ledgers and blockchain technologies: Building trust with disintermediation (2017/2772(RSP)10), which takes into account the abovementioned draft resolution of the Committee on Industry, Research and Energy, the resolution of the European Parliament of 26 May on virtual currencies, the resolution of the European Parliament of 28 April on FinTech: the influence of technology on the future of the financial sector, the resolution of 6 February 2018 on geo-blocking and other forms of discrimination based on customers' nationality, place of residence or place of establishment. The resolution indicated the strategic directions of applying distributed ledger technologies both in the EU and in the member states , among others, the energy sector, ecology (contribution to generation of "green" energy), transportation, healthcare, deliveries, education, copyrights and finance. The European Commission was asked to support the scientific and educational activities related to DLT, and to develop "smart contracts", to be used, among others, by entrepreneurs. It was also emphasized that blockchains increase the security of technological infrastructure and of the data recorded in it. The European Parliament emphasizes the strategic significance of DLT and blockchains for public infrastructure. The European Commission was asked to develop and implement the strategies aimed at training and reskilling the European community in terms of digital skills. It was also asked quickly to collect the technical knowledge and regulatory capacity in order to be able to undertake quick legislative and regulatory activities. The document presents, in a comprehensive way, the direction for development of the EU and use of a new technology, in a way indicating the strategy for operation in that area for the European Com-

5 http://www.europarl.europa.eu/meetdocs/2014_2019/plmrep/COMMITTEES/ITRE/RE/2018/05-16/1144650PL.pdf of 11 July 2018.

mission. In the foreseeable future, we should expect further intensive activity of the EU in that scope.

In 2018, Vice President and Prime Minister of the United Arab Emirates Sheikh Mohammed bin Rashid announced the "UAE Blockchain Strategy 2021", which is to make the United Arab Emirates the global leader in implementing blockchains in 2021.It follows from the estimates made by the government of the United Arab Emirates that almost USD 3 billion is spent annually on document circulation and archiving. It was calculated that replacing traditional documents with electronic ones, based on blockchain technology, in the United Arab Emirates, will save one million hours of work, will allow the number of "produced" documents to decrease by 389 million and limit the number of kilometers of document transportation by 1.6 billion a year. It is expected that in 2021 half of government transactions will be conducted using blockchain technologies[6].

In the last three years, many serious blockchain consortia and councils have been established in the world, for the purpose of supporting, developing and promoting blockchain technology, as well as its practical application. These councils usually comprise prominent scientists as well as representatives of government organizations and of the biggest global companies from the IT sector. Based on the publication entitled[7]: Blockchain Consortia and Councils in the World (Garstka and Piech, 2017), it should be indicated that 252 such councils were identified in 2017. They are mainly registered in the USA, Great Britain, Japan, Canada, China, Luxembourg and Dubai. They were established for, among other purposes, exchange of experience and know-how, and commercialization of blockchain solutions. The opinion-forming arrangements include, among others: World Economic Forum and GFC (26) The Future of Blockchain (26 of 35 Global Future Councils), IC3 Initiative for Cryptocurrencies and Contracts in NYC (scientists and leaders of the sector from, among others, Cornell University, Cornell Tech, UC Berkeley and University of Illinois). The arrangements aimed at standardizing blockchains: FCA Sandbox Project, China, ISO TC/307. The most important implementation consortia: Global Blockchain Council – Dubai (government organizations of the United Arab Emirates, but also including Cisco, IBM, SAP, Ericsson and Microsoft), R3CEV Consortium (among others J.P. Morgan, Royal Bank of Scotland, Credit Suisse, Goldman Sachs etc.). The main objective of the

6 https://comparic.pl/rzad-emiratow-arabskich-chce-stac-sie-swiatowym-liderem-technologii-blockchain/ of 9 June 2018.

7 Garstka i Piech (2017), pp. 2-20.

consortium is to design and provide advanced blockchain technologies for the global financial markets. Another example is Blockchain Embassy Asia (cooperation between different business entities and Asian society). In June 2016, the consortium of Bank of Canada, Payments Canada and R3 was established in Canada for the purpose of introducing blockchains in the financial infrastructure of Canada. Soon after, the National Bank of Canada, Canadian Imperial Bank of Commerce and ATB Financial enlisted the services of San Francisco-based Ripple Labs to integrate blockchains practically in their business environments[8].

Also open-source organizations are undertaking activities to promote and implement blockchains. An example is Hyperledger – a community of programmers functioning based on Open-Source principles, managed by the Linux Foundation, which guarantees transparency and openness. The consortium consists of businesses, organizations and individual programmers. The objective of Hyperledger is to develop an open standard developed through architecture frameworks. Within the project, each blockchain initiative should be based on an open standard of protocol and licensing model, and the solution introduced should support communication among various networks based on DLT, blockchains and traditional data systems (System of Record SOR). The developed codes are to provide native support for all types of transactions, regardless of the type of assets (cryptocurrencies, tokens or other values). Therefore, what is necessary is a consensus mechanism, management of roles, administration of network access[9] etc. (Zandberg-Malec, 2016)

One of the largest blockchain-related joint venture consortia was established in January 2018, consisting of Maersk and IBM, with the following entities interested in the project: General Motors, Procter and Gamble, Agility Logistics, Cypher, DuPont, Dow Chemical, Tetra Pak, Port Houston, Rotterdam Port Community System Portbase, the Customs Administration of the Netherlands, and U.S. Customs and Border Protection. The objective of the consortium is to use blockchains, but also AI and IoT for digital supervision of transfers of goods by, among other methods, tracking

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8 E. Ducas, Al. Wilner: the security and financial implications of blockchain technologies: Regulating emerging technologies in Canada. [in] International Journal 2017 No. 72(4) (Ducas i Wilner, The security and financial implications of blockchain technologies: Regulating emerging technologies in Canada, 2017) p. 540.

9 See M. Jedrzejczyk, Karolina Marzanowicz, Blockchain jest fundamentem cyfrowej gospodarki opierającej się na współpracy, ed. J. Zandberg-Malec, [in] Blockchain, inteligentne kontrakty i DAO, Warsaw 2016, pp. 26-29 (online publication).

their routes, and also for digital clearance and a paperless approach (excluding paper documents from circulation). Other producers of vehicles are also interested in improvements based on DLT and blockchains. MOBI: Mobility Open Blockchain Initiative was established in May 2018. Its main participants are: BMW, Ford, General Motors and Renault. Other partners include: Accenture, Aioi Nissay Dowa Insurance Services USA, BigChainDB, Dashride, Deon Digital AG, Dovu, Cgronicled, ContexLabs, Crypto Valley Association, Foam, Hyperledger, IBM, IOTA, MotionWerk, NuCypher, Oaken Innovation, Ocean Protocol, ShareRing, Shift, Spherical Analystics, Trusted Internet of Things, Alliance, Vasily, Xain, and ZF Friedrichshafen AG. The objective is to implement blockchain technology in the automotive sector by developing joint standards and API for launching payments and data exchange among vehicles (cars – so also IoT), Ridesharing and Mobility ecosystem commerce.

Taking the above into consideration, in the world there is visible a serious trend related to blockchain and DLT technologies and their implementation. The engagement of a number of international institutions and organizations, scientists, the largest IT concerns as well as start-ups and single programmers, indicates that it is not only a technological curiosity, and the hundreds of millions of dollars already spent and planned to be spent on that technology demonstrate its very serious economic potential. What is important is that the established consortia are of a supranational, cross-border, or even global, character. They include not only the largest global concerns but also the laboratories and start-ups that develop their technologies based on distributed ledgers. The gigantic financial and organizational support as well as technological resources allow global implementations, the impact of which will be definitely felt also in the local markets. Therefore, it is becoming necessary to analyze DLT and blockchain technologies, but not only from the technical, economic points of view or from the point of view of development of digital technology, as presented in the publications so far, but also from the legal point of view. In other words – how blockchain technology translates and will translate into legal regulations and to what degree will it change the perception of law.

Blockchains – a new digital economy?

Introduction

Before we discuss the technical aspect of blockchains and analyze the legal aspects of implementing them, we should indicate certain areas of application of distributed ledger technologies and the tendencies of their impact on the economy and on legal regulations. It is more and more often indicated that DAO and blockchains constitute the foundations of a new digital economy, significantly separated from domestic economies, concentrating on the global economy. On the one hand, such a statement may seem like a pipe dream, but on the other – there are observable very intense activities aimed at developing a digital economy on different levels, be it global (global concerns), continental (Asia, Europe, America, etc.) or regional[10]. (Bartorski, 2012).

At the turn of the 20th century, a number of publications appeared in Europe, the USA and Asia, addressing the phenomenon of the new medium of the Internet. It had an impact on the law at the time and, indirectly, on the economy. There was emphasized the need for a number of changes in the following areas: press law, civil law, intellectual property, Labor law, tax law, criminal law, etc. People asked: to what degree will the Internet impact societies as well as laws and their application? At that time, it was difficult to predict how that medium was going to develop, or even what impact it would have on the economy. The dilemmas and legal issues appearing at that time may seem laughable today, just like the publications from the 1950s and 1960s predicting the impact and legal issues of more and more common use of the phone. Today, similarly, it is difficult to predict the direction of development of blockchain technology, and the current legal problems and dilemmas are often overwhelming not only for individual lawyers but also for serious organizations and institutions. It is probable that in a few years these issues will seem laughable, just like the previous dilemmas related to the Internet.

It is worth emphasizing that, nowadays, we are dealing with a very intense development of the so-called new technologies, on an unprecedented scale. It has to be faced by lawyers, often trying to catch up with the gallop-

10 See also ed. D. Batorski: Cyfrowa Gospodarka. Kluczowe trendy rewolucji cyfrowej, Warsaw 2012, p. 3 et seq. http://www.euroreg.uw.edu.pl/dane/web_euroreg_publications_files/1335/cyfrowa_gospodarka_kluczowe_trendy_rewolucji_cyfrowej.pdf of 12 June 2018.

ing pace of change. Twenty years ago, the discussions were related to the spread of desktop computers and data transferred in analog form on durable media, and only later the use of electronic means of communication (Szostek D., Czynność prawna a środki komunikacji elektronicznej, 2004)[11]. At first, the Internet was used solely for short text messages, and the capacity of an email box was usually limited to 20 MB. Online distribution of images, films or sounds was very costly, complicated and, most importantly, slow, and often even impossible. Electronic transmissions and communication became common only later, with the spread of the Internet, fiber-optic connections, development of online portals and stores, and as proper legal regulations followed. However, it needs to be noted that in the first stage, the Internet was mainly used for communication (email, chat, then Skype), and then to conclude offline agreements, and only later online agreements, while agreements continued to be performed mainly in a traditional way. The Internet was seen as a support for the traditional economy and not as a digital economy. Agreements were rarely performed over the Internet and, at first, the process was quite complicated[12] (Barta and Markiewicz, Handel elektroniczny. Prawne problemy, 2005).

A significant breakthrough in the development of the digital economy took place in 2007 with appearance of the first iPhone and, most importantly, with a shift in the philosophy of functioning of the Internet, e.g., the appearance of mobile devices and access to the Internet, digitization of assets which used to have a traditional form (music, films, images, photographs, etc. and document digitization), the spread of laptops and notebooks with online access, the first tablets, etc. This significant change resulted from a change in technology and data storage. The shift from open archiving on a computer, through remote access to it, a partial shift to clouds[13] (Szostek D. r., 2018), (Szostek D. r., 2018) and, finally, a complete shift to storing data in a cloud, data dispersion and, most importantly, removing data from a concrete territory, the ease of transmitting it and then, providing it. Nowadays, you just need online access, e.g., from a mobile device, for cross-border access to all kinds of digital resources or, based on

11 More in: D. Szostek: Czynność prawna a środki komunikacji elektronicznej, Kraków 2004, p. 31; A. Wiebie: die elektronische Willenserklarung, Tubingen 2002, p. 5 et seq.

12 D. Szostek: Wykonanie zobowiązania z użyciem środków komunikacji elektronicznej [in:] Handel elektroniczny. Problemy prawne, ed. J. Barta, R. Markiewicz, Kraków 2005, p. 255 et seq.

13 D. Szostek (ed.). Bezpieczeństwo danych i IT w Kancelarii Prawnej, Warsaw 2018, p. 290 et seq.

the wording introduced by the EU – digital content, located anywhere in the world. Consumers often lack any knowledge of the location of their data, which is not present, at any given time, in one place, but often in several places, stored in a scattered manner.

Such international technological concerns as Google, Facebook, Amazon and Yahoo or Apple, Microsoft and Samsung, have played a significant role in the creation and development of the digital economy or knowledge-based economy. What is interesting is that many of these entities have been functioning in the market not for a long period of time (e.g., Google since 1998, Facebook since 2004), and their impact on society, e.g., methods of communication, behavior, has been gigantic (e.g., over 2 billion people all over the world use Facebook). It has become extremely easy to perform an agreement online, even from the level of a cell phone or another mobile device. Downloading music or films from the Internet, from any place in the world, has become common. Access to digitized resources of the largest libraries in the world is no longer difficult – you just need to register online – while access to some resources does not even require logging in. This has increased access to knowledge on an unprecedented scale[14]. On the Internet, which was initially used mainly for communication and entertainment, there exist the largest bases of knowledge, science and information (with the problem of verifiability) ever created. And the availability and universality of the Internet has caused significant social change, consisting in, among other examples, sharing, using instead of possessing, etc. The so-called generation Y is not as interested in possession or ownership as their predecessors, instead preferring low cost and availability based on new technologies. Their demand is addressed by, among others, streaming applications (access to music instead of owning it), car or bicycle rental companies (instead of buying one), etc., based on technologies and availability (so-called uberisation). The ease of concluding agreements, their cross-border character, or simple payments, significantly contribute not only to the development of services, access to digital content and other digitized resources, but also to cross-border shopping. The issues of applicable law, court jurisdiction and evidence are becoming more and more of a problem. Many people, particularly younger, who use the Internet, do not realize at all the legal acts they perform, not to mention the fact

14 In preparation of this publication, the author also made use of electronic sources, documents and publications, thus allowing it to be written in several locations, away from the home university. Several years ago, it would have taken several times longer to write it than now, mainly due to more difficult access to sources.

that they are performed under the legal regulations of another country. The evidence for performing a legal (conclusion of an agreement) or factual act (its performance, for example, by downloading digital content), is often stored solely in the ICT system of the provider and may be easily deleted or manipulated. For that reason, the ICT projects related to securing evidence, including DLT and blockchains, associated with a new method of recording data, are becoming more and more popular. The issues of providing proper and unchanging, properly secured, evidence is very important in evidentiary proceedings, both civil and administrative. The use of DLT or blockchains provides the opportunity to ensure certainty and an unchanging character of the saved electronic document.

Trends of the digital economy

We are witnessing the development of a new knowledge-based economy, within which industry or production constitute "only" the results. A significant element of that economy is the digital economy fully based on intangible resources and online access. What is interesting is that that economy, unlike industry (based on raw materials and labor) is subject to the principle of growing returns. The principles of the digital economy were described in the so-called "Moore's law" and "Metcalfe's law". According to the former (from 1965), computing power (of microprocessors, among others) doubles on average every 18-24 months, which has actually been taking place for over fifty years. Just compare the computing power of a microprocessor of a cell phone and that of the computer that allowed people to land on the Moon. Current phones often have greater computing power than of former "supercomputers". The latter, i.e., so-called "Metcalfe's law", states that the usefulness of computer networks is proportional to the square of the number of its connected users. The capacity of two connected computers is much greater than it might seem based on their total computing power. Taking into account both "laws", the gigantic computing power of contemporary computers and the probability it is going to double over the next two years, and the combination of those computers in networks (which is easily available thanks to current technologies), the fascination of the economy with DLT and blockchains is no surprise.

Before a more detailed discussion of the issues of "blockchains", we should list the most important trends in the digital economy[15] (Batorski, 2012). One of them is network convergence, i.e., integration of networks that used to be separate. An example is the integration of online services: today we can easily order a product, pay online (using electronic banking networks or the mechanisms of the PSD2 directive), on the basis of an online agreement, etc. Another example is the combination of phone services, online access, digital content, online services, all provided by one entity. The current convergence is associated with the "Internet of Things", i.e., the integration of "ordinary" items, such as cookers, fridges, coffeemakers, into one network with the possibility to control it using one's cell phone. There are also more serious projects, such as smart gas, electricity or water meters, remote energy networks or the project most important from the point of view of social change and behaviors, developed nowadays: a network of autonomous vehicles. What is very important is that the "Internet of Things" has been applied in recent years in logistics, management of product flow, warehouse inventory and logistics control, including control of vehicles, but also of transported goods. In the "Internet of Things", information is transferred among "things" automatically and autonomously, without the physical participation of a human being. Blockchain technology is "just" the next stage of the development of convergence.

The other trend is convergence of bits and atoms that introduces the so-called digital industry next to the digital economy. The first stage was integration and transfer of information and documents online, and then of digital content. The current trend indicates more and more frequent use of online production, order customization, etc. An example is the production of goods using a 3D printer, where product content is sent online (such printers are used for, among other purposes, manufacturing elements of airplanes, cars, etc.). What is also noticeable is the tendency to customize the product, but also to eliminate people (labor) from the process of production.

Another trend that is already present in the modern economy is data processing and storage in clouds, both for business and private purposes. It is associated with people's growing mobility. Computers, laptops, tablets

15 See also the report "Digital Economy. Key trends of the digital revolution", ed. D. Batorski, http://www.euroreg.uw.edu.pl/dane/web_euroreg_publications_files/1335/cyfrowa_gospodarka_kluczowe_trendy_rewolucji_cyfrowej.pdf of 15 June 2018.

and phones are becoming terminal devices, while content is more and more often stored away from those devices. On the one hand, we are becoming dependent on the provider of cloud-computing services, while on the other, data security increases. Loss or failure of a device does not cause irrecoverable loss of data or access thereto. There is also visible the tendency for dispersing data in the network, out of touch with the physical territory of (the country) processing the data. An example might be the Microsoft Office 365 software which is cloud-based, where access to documents takes place from any device with the installed access application, as long as it is connected to the Internet. The first stage was transferring data from computer disks to the servers of professional server rooms, often for backup purposes. Then, the main resources were transferred to external servers, data was transferred to foreign servers and, finally, data was transferred to ICT systems in the form of distributed data recorded on multiple servers in many places in the world, not in contact with any physical territory, which is becoming more and more similar to the so-called autonomic cyberspace. A serious problem is dependence on one provider. The blockchain is another stage associated with transferring to clouds and limiting the monopoly of the provider.

The sharing and service-based economies are other important elements of the digital economy. The trend of the need of availability replacing the need of ownership is becoming more and more visible, in particular among young and very young people. Applications and new technologies allow the use of things but, most importantly, provide full access to them in a manner similar to ownership. Such an approach is related to transferring goods to clouds, but also to the habits associated with joint participation in global ICT systems. The generations raised and strongly functioning in the traditional economy are characterized by a prominent need for ownership, both of things and "ownership" of digital content. The result is purchasing CDs, downloading music files to one's own devices, installing software on devices, having one's own cars, bicycles, etc. Sharing consists of full access without "appropriating" or full authority over things or digital content. Instead of purchasing a CD with music or a film or downloading data to one's own device, there is full online availability, for example by streaming. Instead of purchasing a book (in paper or digital form), there is subscription and online access to books. Instead of one's own bicycle, we can rent one and share it with others when we don't need it, which is no longer surprising for anyone. Just like sharing a car (e.g., renting a vehicle with payment by the minute), we can share an apartment – home swap-

ping is provided by a number of websites, such as Intervac or HomeExchange2.

Another stage is autonomous vehicles which, most probably, will not be owned by a single person. They will be available in the time similar to "driving a traditional car out of your garage". That trend is an obvious combination of: data convergence, the Internet of Things, digitization and development of the digital economy, transferring data to clouds and network convergence. The ownership-based model of the economy is transforming into a model based on services and availability. The Saas Software is a Service model instead of a single purchase, a service payable periodically, based on demand. And, again, the blockchain seems to be "just" another, but more and more essential, element related to the trend of sharing.

The decreasing significance of intermediaries and activity platformation are the next strong trends of the digital economy. The development of eCommerce has been primarily based on that trend. Resigning from, or minimizing the use of, intermediaries is the basic objective of business-process optimization. That process is progressing fast. Instead of distribution, with a producer, importer, domestic distributor, wholesaler, regional seller and end seller, that process is shortened to producer, domestic distributor and seller or even producer – seller, producer – end user. The latter trend is particularly visible in the field of digital content (e.g., you can purchase a Windows software license directly on the Microsoft website), where intermediaries are practically eliminated. The manner of distribution is also changing, new channels are developing, and so are new services, e.g., short-term apartment rental. Where it is impossible to eliminate intermediaries, they are significantly changing into fully computerized entities, online platforms that allow someone to perform an activity in real time. Examples include Amazon, eBay, Booking.com, or the Polish website Allegro which allows a customer to conclude a cross-border agreement, pay, and also to verify the purchased product or service. What also plays a role is the guarantee and complaint procedures provided by these platforms. Tokenization, and thus blockchain technology, result from that trend. Cryptocurrencies were developed and introduced under the slogan of eliminating intermediaries. It is not completely true because, in practice, previous intermediaries were replaced by new ones, such as cryptocurrency exchanges, miners collecting fees for providing computing power, etc. Platformation or convergence have changed the principles of competition, introducing global competition in place of local competition. Online availability of digital content, as well as ease of buying and delivering traditional goods, even from the other side of the world, and also the popularity of the Eng-

lish language, standardization of processes, services and products, result in a situation in which entrepreneurs act, more and more often, on a global, and not a local, scale. Examples include App Store, Amazon, Alibaba and Booking.

Other visible trends include crowdsourcing, or allowing consumers to make decisions, and prosumerization, i.e., entrusting consumers to perform more and more tasks, so that they provide the services or develop content themselves. DLT and blockchain technologies are mainly based on these two trends.

Another visible change in the modern economy is automation and replacing the work of people with the work of machines, computers, robots and artificial intelligence. It is a direct result of the industrial revolution of the previous century which replaced first the work of animals, and then of people, through the application of machinery. Digital economy automation not only eliminates physical labor, but typically also intellectual work and a number of services. It is particularly visible in the fields of banking and finance where, in combination with crowdsourcing and prosumerization, it has significantly impacted employment. Artificial intelligence and big data have seriously affected analytics and projection and have also impacted and developed convergent projects which would have been considered science-fiction just several years ago (e.g., developing a network of autonomous vehicles). That tendency significantly affects the development of so-called technological unemployment which we are going to have to face in the foreseeable future[16].

Taking the above into consideration, the tendencies of recent years associated with the creation of cryptocurrencies away from the banking system, tokenization of multiple activities, including obtaining investment funds through ICO[17], are no surprise. Traditional issues of securities are being replaced with virtual (digital) issues, in a way bypassing domestic regulations[18]. It is a consequence of all the other tendencies and, in a way, immortalizes them, but in the eyes of employees it seems surprising and requires serious analyses of the law, of social behaviors, new legal and financial instruments, as well as assessment of their impact on legal regulations.

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16 Prepared based on the report "Digital Economy. Key trends of the digital revolution", ed. D. Batorski, http://www.euroreg.uw.edu.pl/dane/web_euroreg_publications_files/1335/cyfrowa_gospodarka_kluczowe_trendy_rewolucji_cyfrowej.pdf of 15 March 2018.

17 ICO (Initial Coin Offering) – contemporary crowdfunding that consists of collecting capital via start-ups, using cryptocurrencies or tokens. See also below.

18 See also below.

DLT and blockchains as a catalyst for lex electronica?

Technology, particularly its convergence in the digital economy, the cross-border character of concluded agreements, the lack of physical borders for online activity and state-of-the-art technological novelties, such as tokens and so-called tokenization of actions, ICO, smart contracts (self-implementing), cryptocurrencies, including Bitcoin, DLT and blockchains, big data and IoT, are just some of the tools that may replace or have already replaced the law in many statements (mainly by economists and IT specialists). The latest technological tools have certainly changed human behavior and the manner of concluding and performing agreements, have introduced new tools unknown before (such as tokens) which, however, is a modern substitute for previous legal instruments (to be elaborated on below). The question appears of whether they will actually revolutionize the previous legal principles, will affect them, will allow the development of the concepts related to a separate legal system, the so-called *lex electronica* or cyberspace, or whether they will become just a modern instrument, a tool that just modernizes the principles of the law we have known so far. The appearance of the Internet several years ago also gave rise to predictions of revolution in the law, while in fact previous rules have worked perfectly with new technologies which, however, have changed the previous interpretation of laws, caused a number of legal issues and doctrinal disputes, also leading to significant evolution of legal views and regulations and to completely new legal concepts and legislation. However, they did not replace previous achievements, supplementing and slightly modifying them instead. New technologies have also required new legal solutions, mainly associated with the online environment, at first on a local (domestic) scale, and then, at a community scale[19]. Will DLT and blockchains cause legal changes on a global scale considering they are applied on a global scale, or will they change little?

The concept of autonomous law in cyberspace is much older than the technical solutions allowing its implementation, and dates back to the early days of Internet development on a global scale. It is supported by, among others, D.R. Johnson and D.G. Post[20], who stated:

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19 An example is personal data protection which was first regulated locally, while now it is regulated in the EU with a regulation directly applicable to all the EU legal systems.

20 D.R. Johnson, D.G. Post Law And Borders – the Rise of Law in Cyberspace, Stanford Law Review 1996, No. 48 p. 63 (Johnson i Post, 1996 nr. 48); D.R. Johnson,

> "Regardless of the doctrine attached to territorial jurisdictions, there will appear new principles applicable to a number of electronic activities, managing the whole spectrum of new phenomena, without direct equivalents in the real world. The new principles will perform the role of laws, by defining legal personality and ownership rights, used for solving disputes and contributing to development of positions regarding the fundamental, common values" (Johnson and Post, 1996).

The concept of separate cyberspace law refers mainly to eliminating the doubts regarding jurisdiction and applicable law, as well as the distribution and flow of goods in the digital world[21]. A similar view is presented by promoters of DLT and blockchain technologies in the scope of, for example, distribution of digital content and so-called virtual property. D.C. Menthe[22] (Menthe, 1998) suggests cyberspace should be considered international space. He believes that the previous principles of jurisdiction and applicable law are not sufficient for the Internet and that it is necessary to create a new, separate, legal area. In his opinion, jurisdiction should be solely based on a personal criterion[23], cyberspace as an ex-territorial area, commonly owned by all countries. The concept of Lex electronica was presented by Pierre Trudel[24] (Trudel , 2001) who suggested not only the development of cyberspace but also the functioning in it of a lex electronica, or electronic law, separate from domestic law, and applicable mainly to virtual goods. That concept mainly refers to law of the contracts concluded online. A similar concept, but in the scope of copyrights, was presented by Vincent Gautrais[25] (Gautrais, 2016). (Railas, 2004). The attractiveness of these concepts mainly consists of eliminating doubts regarding jurisdiction or choice of applicable law for the contracts concluded or performed online, but also in providing the opportunity to develop new legal structures

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D.G. Post The New "Civic Virtue" of the Internet, the Emerging Internet – 1998 Annual Review of the Institute for Information Studies, 1998.

21 Kulesza, J. (2010). *Międzynarodowe Prawo Internetu.* Poznań, p. 291.

22 D.C. Menthe, Jurisdiction in Cyberspace: a Theory of International Spaces, $ Michigan Telecommunications and Technology Law Review 1998, No. 69 pp. 69-103.

23 Kulesza, J. (2010). *Międzynarodowe Prawo Internetu.* Poznań, p. 299.

24 P. Trudel: La lex electronica w: Le droit saisi par la mondialisation, ed. Ch. A. Morand Bruksela 2001, p. 221.

25 V. Gautrais: Lex Electronica: d'aujourd"hiu a demain 2016. http://www.lex-electronica.org/articles/volume-21/lex-electronica-daujourdhui-a-demain/. The issue of lex electronica is also indicated by L. Railas: The Rise of Lex Electronica and the International Sale of Goods, p. 500 et seq.

only for the Internet or, more broadly, for the digital economy. There also appear more utopian concepts indicating that the Internet is a space of complete freedom, where the main principles include open source and everyone's right to all the content published online (in practice, the elimination of copyrights as we know them). Publishing something online would be tantamount to allowing all Internet users to use it. These concepts are significantly inconsistent with the principles and trends of the digital economy which, in fact, is based on the exchange of goods (payment and the right to use personal or other data).

At the level of the European community, there has appeared the concept of a separate legal regime for contracts concluded online. It was to be a legal regime separate from the domestic system, both available for the consumer to choose from. The choice was not to constitute choice of applicable law, but rather as choice of domestic law, e.g., the Polish Civil Code or an EU regulation. That concept was transformed into the real-life draft regulation of the European Parliament and Council regarding European sales provisions which, in practice, contained uniform provisions of the general part of civil law and of the general part of liabilities, as well as the issues regarding sales agreements (including for sale of digital content) and liability for defects. The regulation was limited to sales agreements, agreements connected with digital content and services related to it, and was only to apply to online contracts concluded on a cross-border basis. In the end, despite its complementary character, the draft was not adopted.

The concepts based on DLT and the blockchain as the tools allowing the development of a new order in cyberspace, without the participation of previous institutions or authorities, based on completely autonomous and democratic activities, with the Internet-user community responsible for supervision (the concept on which Bitcoin is based) instead of the institutions applying domestic law, are nothing new. They should rather be considered a reflection of previously developed concepts or of the whole philosophies of the new order based on a cybernetic society. People are often incorrectly think that performance of an act online, e.g., tokenization of an action or smart contracts of ISO replace, as factual activities, legal regulations, or that legal regulations do not apply to them. – cyberspace based on DLT or blockchains, deprived of legal regulations, based on technological factual acts as the space of functioning of the digital economy. Such an approach seems highly revolutionary or even, despite its superficial attractiveness (as fulfilment of the idea of democratization of society and of the activities undertaken by it), dangerous for people using new technologies and functioning in the digital economy.

We should start from the concepts of agreements that justify their binding character. A deeper analysis indicates many consistencies of those with the contemporary ideas based on technological tools.

Contract as a social phenomenon was developed independently of the law, in the societies that did not know the notions of state or law. From a historical point of view, it applies both to indigenous people and, in our times, to newly discovered (although less and less often) tribal groups. Originally, contracts were associated with various forms of adoption, issues of purchasing wives and including them in tribes, but also with the compensation system that replaced blood feuds. It was only in time that the importance of contracts shifted towards trading in goods (barter), then trading in goods in exchange for money and, later on, contracts became regulated in accordance with common law, and later with codified law[26] (Weber, 1960) (Radwański, 1977). It seems that cyberspace is taking a similar route nowadays, where a number of contracts, as well as behaviors, are generated as customs on account of lack of regulations in the form of codified law. These customs more and more often transform into the so-called soft law as well as into standards (often technological ones) such as, for example, the standards determined in the ISO system which are first voluntarily accepted as support or guidelines for conduct, and finally they are included in a legal framework (at the local or supralocal level or as so-called guidelines). In cyberspace, customs are very important elements affecting the contracts concluded in the electronic environment or associated with the electronic environment. An example indicating the pattern of creation of the law associated with digital economy is the development of a contract for storing data in a cloud. At first, the contracts were based on the principle of freedom of contracts and often, depending on the parties, there were significant differences among the contracts. Gigantic legal doubts and problems related to cloud storage led to the development of opinion 5/2012 of the Article 29 Working Group of 1 July 2012 on cloud computing, then the Sopot Memorandum of the International Working Group on Data Protection in Telecommunications (the so-called Berlin Group), the consequence of which was the "cloud contract" EU strategy[27]. In response

26 M. Weber, Rechtssoziologie, Neuwied 1960 p. 110 et seq. Z. Radwański: Teoria umów, Warsaw 1977, p. 7 et seq.

27 Communication of the Commission to the European Parliament, European Council, Economic and Social Committee and Committee of the Regions "Unleashing the potential of cloud computing in Europe" of 27 September 2012. KOM (2012) 529.

to the above-mentioned soft law, the standard ISO 27018 was prepared regarding data security in the cloud, indicated as a necessary tool in connection with, among others, the execution of the GDPR.

It seems that not only the development of customs, but also other elements developed within the law-of-nature concept[28] (Jorgensen, 1968), may be found in the contemporary theories regarding new technologies and cyberspace, although the law-of-nature concept developed mainly on the basis of Roman consensual contracts, as well as knowledge of the freedom of people.

> "It was based on the assumption that the act of will of its participants constitutes not only the necessary, but also sufficient, element of every agreementThe liberal trend of law of nature then developed the theory of primal and inalienable freedoms of people. Under that theory, only the entity itself could, through its own will, impose on itself any restrictions, while the agreement had the basic function of social integration and coordination of human activity ... It is because only an agreement can make people cooperate without violating their freedom. Although an agreement is to bind its participants, that effect results from their free decisions that guarantee its moral acceptance"[29].

That concept developed into a civilist theory of autonomy of will[30] (Kant, 1971). It stated that the very individual will plays a shaping role in the scope of legal relations, because it is characterized by the proper creative force. That was to constitute the autonomic character of individual will. As a result, that theory assigned a secondary role to positive laws. Their function was to consist not only of protecting the laws developed through the autonomous will of people, but of not requiring any concession or acknowledgment by the effective legal system. Provisions of the law express the tacit consent of the parties. The theory of autonomy of will proposed the principle of freedom of contract and led to a number of theses: People have full freedom in whether to conclude a contract or not. They may freely develop the contents of a contract and, in particular, do not have to follow the nominate contracts regulated in statutory law. The legal relationship resulting from the contract may be later changed by the parties.

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28 On the law of nature: S. Jorgensen, Vertrag und Recht, Copenhagen 1968, p. 61 et seq.

29 Radwański, Z. (1977). Teoria umów. Warszawa, p. 9.

30 Term coined by E. Kant: Uzasadnienie metafizyki moralności, Warsaw 1971, p. 78.

What is decisive for determining the legal consequences of the contract is the actual will of the parties, even if it is not consistent with their declarations of intent. The contractor that has not received the consideration due from the other party may request protection from public authorities as if performing a contract. In the case of a conflict of laws, the parties may choose the act to be applied to the resolution of the case associated with the legal relationship developed by the contract. Informal agreements evoke full legal consequences[31].

The enthusiasts of the theory of autonomy of will indicated that using one's freedom may not result in its self-destruction. The autonomy of one person may not violate the freedoms of another person without the consent thereof. It would violate the principle of equality which, in the doctrine, is connected to the requirement of protection of freedom.

Other theories justifying the will of a person as the foundation of a contract include: the sociological (functional) theory, psychological theory, theory of reborn laws of nature and phenomenological theory. The sociological theory includes an interesting concept of a "living law" by E. Ehrlich[32] (Ehrlich, 1918) in which the laws comprise a certain order developing in various social groups (such as Internet users) regardless of the standards established by the state. Legal order is determined through various legal facts, including, among others, contracts. These facts are taken into account by courts taking into account interests *in concreto* and constitute, by themselves, sources of legal obligations. These are the foundations of the binding force of contracts, and the consequences are described by the abstract and general legal norms established by the state only apparently. It is worth quoting another promoter of that theory, H. Isay[33] (Isay, 1929) who stated that the connection between the factual condition (including the agreement) and legal effects results not so much from a positivist standard, but rather that there appears a sort of legal feeling, i.e., experience of social character. The phenomenological theory of laws by A. Reinach (Reinach, 1913) is similar to the theory of "reborn laws of nature".

> "The author was seeing the foundations of the legally binding character of contracts in the a priori categories, existing away from space or time, which are impossible to explain anymore. However, we may, and should, describe more closely the act of "promising" which, by itself,

31 Radwański, Teoria umów, p. 20.
32 E. Ehrlich; Die juristische Logik, Tubingen 1918, p. 280.
33 H. Isay: Recht und Entscheidung, Berlin 1929, p. 5.

> results in the obligation of the promisor and in a claim, correlatively connected to it, on the part of the addressee of the expectation."[34]

The above-mentioned, briefly presented, theories, stand in strong opposition to positivist theories, including the historical school of F. Savigny or normativism, based on legalism and legal norm as foundations of contracts.

This brief review of the concept related to "sources of binding force of contracts" indicates that the contemporary concepts, based to a high degree on technology, or rather on fascination with its possibilities, related to cyberspace, e.g., lex electronica or the concept of automation of cyberspace law, are not far away from the theory of the source of the binding force of contracts from over one hundred years ago, and many discussed issues regarding the binding force of those contracts may be explained, with ease, using the already existing and comprehensively discussed theories. It even seems that, nowadays, the developing global society, functioning both in the space of the respective states (physical functioning) and globally in cyberspace in a way out of touch with physical territory, while performing a number of legal acts, including by concluding a number of contracts, is becoming a practical "entity" that makes it possible to "test" the abovementioned concepts and theories in practice. It is necessary to highlight the fact that, depending on context, the "global society", as well as the so-called digital economy, are at different stages of development.

As regards the DTP and blockchain technologies, we are currently at the stage of development and significant standardization of customs (as indicated by the initiatives related to blockchains) which will probably and quickly develop into ISO norms that are going to constitute the standards for technology as well as for the contracts associated with them. Standardization, particularly in technical terms (but not only), in the environment not regulated online, as well as soft law, are becoming permanent elements of norms, including legal ones (regardless of the source of their effectiveness), despite the lack of a uniform lawmaker or regulator. The difference associated with the procedure of development of common law (in the societies deprived of laws ages ago and the contemporary society of Internet users), and then its sanctioning, is the space (cyberspace), in which cus-

34 Z. Radwański: Teoria umów, p. 26.

toms are developed and sanctioned with unprecedented speed[35]. The states or supranational institutions which developed, within the positivist approach to sources of contracts, the legal norms and social behaviors, in the global economy are replaced by global concerns that develop ICT systems but also legal principles (among other regulations) imposing principles of conduct on vast numbers of people (millions or even billions). Examples include FB or Linkedin. Paradoxically, they limit the will of the individuals using those systems to the behaviors predefined in the software (ensuring, using technological means, that the acts not allowed in the system may not be performed). A simple example is the inability to publish content in a portal in a format other than that allowed by the system, and also the manner of functioning of "smart contracts".

The issue of institutional control and performance of online contracts, as well as pursuing claims related to them, is resembling, more and more, arbitration, including online, fully electronic, arbitration (so-called Online Dispute Resolution (ODR))[36] (Szostek and Świerczyński, Arbitraż elektroniczny, 2007). ODR is a modern version of ADR (Alternative Dispute Resolution which has been used for decades, in particular in international trading). ODR is characterized by low costs, ease of submitting complaints as well as of filing documents, speed, delocalization and the elimination of the limits of space or time. Practically speaking, all you need to conduct the whole proceedings is online access[37] (Schultz, 2006) (Kaufmann-Kohler and Schultz , 2004). The EU regulated the functioning of ODR in regulation No. 524/2013/EU and directive 2012/11/EU. It works on the basis of

35 The global character of cyberspace is not uniform. There are several zones – different in terms of the technologies applied, territorial scope and also scope of control, and thus freedom and access to the Internet. Western societies (one of the zones) are used to freedom in using the network. The freedom is quite different in Russia and in the countries dependent on Russia, while China, with hundreds of millions of Internet users, exercises full control and significant restrictions. What is interesting from the point of view of history is that the cyberspace zones overlap, to a large degree, the spheres of influence of Western countries, Russia and China. This issue significantly exceeds the framework of this study, so it was only briefly indicated, while the term "global character" will be used hereinafter, despite being aware of a lack of a uniform character of cyberspace.

36 More on development of ODR in. D. Szostek, M. Świerczyński: Arbitraż Elektroniczny, KPP 2/2007, p. 471 et seq.

37 T. Schultz Information technology and arbitration. A practitioner's guide, Wolters Kluwer International 2006. p. 5 et seq.; Gabrielle Kaufmann-Kohler, Thomas Schultz: Online Dispute Resolution: Challenges for Contemporary Justice, Wolters Kluwer International 2004, p. 11 et seq.

proper contractual provisions outside of the EU, including in B2B transactions. What is important is procedure simplification and speed of conduct, which encourages more and more parties to choose that form of dispute resolution over traditional courts. As regards disputes related to cryptocurrencies or tokenization – ODR is about to become the standard for their resolution. One of the advantages of DLT and blockchain technologies is the non-repudiation, permanence and guarantee of authenticity of the contractual provisions made using them which, to a high degree, translates into a guarantee of evidence in case of a dispute. Certainty of the fact secured in the discussed technology will contribute even more to the development of ODR, in particular for international disputes.

Therefore, social behaviors in cyberspace, tokenization of contracts, their new types, establishment of cryptocurrencies and social (democratic) control of the data recorded using blockchain technology are nothing new in terms of the theory of the source of contracts. The scope (billions of people), space (no physical territory) and speed of change are different, as are the development of principles by global concerns, process technologization and the manner of solving disputes. Courts are being replaced with the ODR procedure, including online mediation or arbitration. It is becoming common practice to submit disputes related to cryptocurrencies to ODR, in particular due to the problems of jurisdiction and applicable law. There are a lot of arguments proving that also other activities based on DLT and blockchains, in particular the services developed by global concerns and international initiatives, are going to be subject to online arbitration in case of disputes, instead of decisions made by traditional courts.

Taking the above into consideration, we might venture to say that, next to the traditional attitude to agreements, roles of states and courts, there is appearing a new area that is not going to eliminate the previous method of functioning based on codified law and common courts, but is rather going to function simultaneously, by means of cyberspace and electronic communication.