Artificial intelligence and digital transformations in the society

A V Lavrentyeva, A A Dzikia, A E Kalinina, D P Frolov, E A Akhverdiev and A S Barakova

1Volgograd State University, pr-t Universitetsky, 100, 400062, Volgograd, Russia

E-mail: oponir@volsu.ru, lavra.ne@mail.ru

Abstract. The article describes the global trends in the digital economy development. The role of artificial intelligence for the formation of the institutional environment of ecosystems is highlighted. Tendencies of society’s institutional changes in connection with digital transformation of economy are described. New organizational forms of cooperation and the role of artificial intelligence for the formation of effective methods of organizations management that seek to build a strategy of interaction in the digital environment are described. The problems of transition to a new level of post-institutional economy development are highlighted. The paper describes the boundaries of the digital economy and the trends of changes in the institutional environment

1. Introduction
The challenges of the 21st century are associated with a sharp impetus to the development of digital economy, globalization and the increasing speed of various changes. Global trends that affect all spheres of public life are transforming traditional ways of life, turning industrial sectors and legislation upside down. Moreover, these processes do not take place on a local scale, but on the territory of all countries and affect each of us, as the digital economy has already become one of the determinants of globalization. This process has developed since the beginning of the industrial revolution in the 17th century, but began to develop actively since the robotisation in the 21st century. Today we are on the threshold of transition to the sixth technological mode and this process is accelerating every year. The speed of innovation is growing exponentially, and new technologies such as the Internet of things, artificial intelligence, and robotics allow routine tasks to be automated. As these technologies become more widely accepted, efficiency will no longer be a key difference for enterprises. Instead, today's business leaders are looking for 25-30% faster performance and productivity improvements. They achieve this by combining the Internet of things, artificial intelligence and other digital technologies.

2. Artificial intelligence in management
Progress in information and communication technologies (ICT), in which information and knowledge are becoming available to more people, change the institutional character of the society. Societies are becoming ecosystems mediated by various digital media platforms, digital services and technologies that enable surveillance, data collection and analytics. This progress and changes in technology are bound to change the way societies are organized and how their members interact with each other. Massive amounts of data are generated every moment from a growing number of sources. Companies recognize that the data they own and the way they use it can give them a competitive advantage. Big data and business analytics also challenge existing businesses and well-established companies. However, there is a limited understanding of how organizations need to change to embrace these technological innovations, and the business changes they entail, which can transform businesses and societies.
Over the past few years, competition has increased and the system of effective management of organizations that seek to build a strategy of interaction with different users by analysing large amounts of data, using business analytics and the so-called smart environments and attracting the attention of stakeholders at the decision-making stage has changed. With the help of artificial intelligence and modern information systems of data analysis, organisations collect information about the preferences and requests of users, needs and opportunities at a particular time, build forecasts for the demand of goods and services depending on many factors, increasing the efficiency of organisations, reducing the cost of production of unclaimed goods and the cost of advertising budgets. Existing technologies allow processing large volumes of high-speed, complex, temporal data for its collection, storage, distribution, management and analysis [25]. The Internet generates and offers a large amount of data every second and companies are often found to be loaded with this data obtained from various fields (social media, landing pages, Internet search engines, etc.) [11]. At the same time, this data shows the behaviour of customers (existing and potential), competition trends, prices, costs and other important indicators for business. Moreover, these processes do not have an extensive nature in relation to specific sectors of the economy, but are characterized by pluralism and show their worth even in the field of health. Nowadays, big data technology allows us to take into account the preferences and interests of Internet users, build individual behaviour through complex digital stages and without the efforts of people, offer and independently orient them in the digital space. These processes are one of the determinants of the development of artificial intelligence.

Speaking about process automation and artificial intelligence (hereinafter – AI), it is necessary to understand the multiplicity of complex algorithmic methods that allow machines and computers to simulate human actions [14]. With the help of these technologies, it is possible today to streamline and simplify a large number of tasks that are important in the process of creating a product. In this context, there is a significant facilitating role of big data for artificial intelligence, the work of which is provided by information about interactions, preferences of people, and the history of cyclical actions. Today, it is predicted that the stimulation of AI growth will be carried out in three ways:

1. creating a virtual workforce,
2. increasing existing skills and workforce in the digital economy,
3. innovations used in AI work.

It is worth noting that the automation of processes with elements of artificial intelligence is already being implemented in various areas of business.

In this part, we are interested in the issue raised above – about the methods and measures of regulation of the digital economy. Representatives of politics, business, and lawmakers fluctuate between two positions. The first ones propose to provide a free market without violating the free movement of information, to abandon data control and only provide legal certainty of the sphere. The latter are on the position of the need to control data and information, attempts to regulate the maximum possible types of digital legal relations to ensure confidence in digital trade and the legality of the existence of such sectors of economy. This problem is currently the most urgent, each state and state association solve them in their own way. Big data may be one of the most significant technological failures in business and academic ecosystems in recent years [18].

While the vast majority of executives say that achieving business sustainability is a priority for them, companies are also seen as responsible for multiple societal challenges with social, environmental and economic consequences [15, 19]. According to the report of McKinsey & Company, which was released in 2015, 45% of professions in the next 15-20 years will be replaced by robots or programmes. The volume of displaced money according to experts' forecasts will be more than 20 trillion dollars only in the US economy.

There is a growing need for accessible, networked ecosystems and data management standards that provide greater access to information in society. Investing in such infrastructures allows innovation and digitization of urban services and the introduction of a wide variety of technological ecosystems. Digital ecosystems are now an integral part of many areas (e.g. business, healthcare, transport,
finance). But there remains an important question of how to make data available to a large number of stakeholders and at the same time keep them safe to accelerate sustainable development of society.

In the ecosystems of the 21st century, none of their participants can be considered in isolation. All participants in this system must actively interact and cooperate with each other forming new chains of connections and teams among themselves, to create new knowledge, innovation, technology, the interdisciplinary nature of the discipline of artificial intelligence can be a driving force that will give meaning to big data and improve the relationship between stakeholders and data. Digitalization of services and transformation of modern business models are needed to accelerate the creation of sustainable societies. New digital business models will not only be more accurate and efficient, but will also go beyond economic needs and address social issues that generate shared value that affects companies, organizations, consumers and the public at large. Big data plays a key role in this transformation and brings them together from different sources, shares them with different stakeholders and analyses them in different ways, enabling digital transformation and the creation of sustainable societies. Comprehensive analysis and access to large amounts of data and relationships allow the development of new business models that will provide new solutions that will benefit all participants in the ecosystem. As a result, political, economic and legal disputes arise on the issues of the actual non-legal existence of the digital economy on the international platforms and on the platforms of legislative bodies of various countries. The risks stemming from this situation range from the abuse of intellectual property to digital fraud in the financial and credit sphere, to hacker attacks on power grid units and commissioned or independent cyberterrorists capable of paralysing public institutions.

New organizational forms of cooperation are emerging, such as joint communities, peer-to-peer organizations, as well as holocracy and other forms of self-government. Thanks to digital technologies, they are transforming large industries and public sectors, such as IT, transport, hotels and housing, scientific discoveries, health, military, and even changing the way knowledge and labour are generated and organised.

The literature mentions a variety of matching terms and concepts for collaborative organisational forms, such as I-form, virtual organisation [15], C-form [20], market management [8], community [10], meta-organisation [13], and actor-oriented organisations [8]. Echoing the calls for research and the theory of adaptive, self-organizing and innovative organisations [5], there is a need for systematic discussion by scientists and practitioners, to analyse and design collaborative organizational forms, and to understand the dynamism and heterogeneity demonstrated by modern organizations. In addition, organisations combine and match mechanisms from different forms into new, rapidly developing hybrids, some of which are radically different from the usual hybrids of the market hierarchy known from the classical literature of the economic organisation [22]. We need better understand the distinctive design features of collaborative organizational forms, including new collaborative hybrids. In particular, we need a coherent framework to describe, analyse and conceptualize organisational forms of cooperation and how they relate to conventional projects.

How to effectively organise and manage production activities in new organisations is the main issue. This applies to key issues such as decision-making, the choice between buying different products, ownership and distribution of resources, contracting, knowledge sharing and other forms of cooperation. Most studies on comparative analysis of organisational forms in the literature of economic organisation were based on two ideal forms - markets and hierarchies - and combinations of the two, called hybrids. With the advent of knowledge and the networked economy, the time for market hierarchy is becoming increasingly inefficient. The importance of trust and cooperation in the knowledge economy is increasing, Adler suggested the community as the third ideal type, which is superior to co-production of knowledge and with trust to view as the primary coordination mechanism [2].

Currently, legislators from different countries and the digital business community find it difficult to come to common understanding. The former advocate legal regulation of all aspects of the new economy in order to avoid undermining the constitutional and economic foundations, while the latter
take the position of free regulation, which will not interfere with the development of innovation, digital trade and new ways and forms of relations between people and organisations.

In this regard, in our opinion, one of the most important issues arises – the issue of the legal boundaries of the digital economy, which should ensure a balance between stimulating the development of a new way of economic relations and the security of citizens and states, as risks and threats acquire completely new forms.

It is worth noting that the time of the so-called digital revolution in the economy, scares the public in terms of the rapid development of the digital economy in a fairly short time and its deep inclusion in almost all spheres of public life [23], which fundamentally transform the relationship [13]. In addition, lawmakers understand that modern technological developments are so diverse and unpredictable that developments under soft (free) regulation can expose the inefficiency of the legal system and expose public institutions to even greater risk, as the limits of the emergence of innovative developments, as well as the speed of their implementation and use on an industrial scale, will grow exponentially [9].

In the United States "Digital Economy Agenda" was adopted in 2015, which covers 4 areas of the digital economy (free and open Internet, trust and security on the Internet, Internet accessibility, innovation and new technologies in the digital economy) [17]; in the UK a number of programmes are developed and implemented, for example, "UK Digital Strategy"[24]; in India there is a program "Digital India", adopted in 2014 and aimed at turning the country into a "digital society and knowledge economy" [7]; in Germany in 2011 a strategy called "Industry 4.0" was adopted, which involves a full transition to Internet production by 2030 [19]; in China in 2015 the "Internet plus" concept was adopted [4].

In Russia in 2017, the "Digital Economy of the Russian Federation" Programme (hereinafter - the "Digital Economy of the RF" Programme) was adopted. The programme of the government of the Russian Federation consists of the five areas:

1. legal regulation,
2. personnel and education,
3. research competence and technological background,
4. information infrastructure,
5. information security.

Legal regulation is the principal direction for the functioning and development of the digital economy. In this direction, according to the "Digital Economy of the RF" Programme, it is planned to solve the following tasks:

- creation of a permanent mechanism for managing changes and competencies in the field of legal regulation of the digital economy (control over the state of the regulatory framework, rapid response to changes);
- removal of key legal restrictions and creation of new legal institutions, allowing to implement priority measures for the formation of the digital economy;
- formation of complex legislative regulation (bringing to a common conceptual denominator of basic regulations and reflection of the general principles of regulation of the digital economy);
- adoption of measures aimed at the development and promotion of activities in the digital environment;
- formation of policy for the digital economy development in the territory of the Eurasian Economic Union;
- creation of a methodological basis for the development of competencies in the field of regulation of the digital economy (adoption of methodological documents on the development of competencies of lawyers, civil servants and other persons involved in the preparation, adoption and application of legal acts in the field of digital economy).

All these tasks should be implemented in the bosom of the existence and development of those technologies that have been disclosed earlier, and which in turn form the basis of the digital economy. In the legal community, the discussion and evaluation of the programme mentioned by us has become particularly relevant in recent years. Many of the researchers consider it successful and complete,
others are sceptical, pointing to the possibility of improvement. However, we proceed from the position that the existence of such a document, implemented by the state, is already a progress, as the society, represented by the state bodies, has realised the need to develop provisions aimed at the development of the digital economy.

At the same time, there is a danger that in the process of creating an institutional and legal system regulating the ecosystem of the new digital environment, a situation may arise in which the transition and functioning of the state in the new economic realities will be difficult. We are talking about the correct definition of the legal boundaries of the digital economy in the Russian Federation.

3. Conclusion

As noted earlier, the digital economy is currently based on four general technologies that have great potential for development. All of them are already radically changing the traditional way of life in various spheres of human activity. Speaking about the problems arising in the digital economy existence system, it is necessary to highlight some important ones.

First, the development of basic digital legal concepts. Depending on how accurately, affordably and professionally this or that concept is built, the functioning of the entire regulatory system and the effectiveness of its action will depend. For example, such concepts as "digital economy", "blockchain", "artificial intelligence", "smart contracts", "cloud electronic signature", "biometric personal data", "cyber physical system", "crowd funding", "cryptocurrency" and many others require legal definition [25]. As we can see, the digital economy is actively changing the legal plane, introducing new legal proto-institutions. In this regard, some lawyers talk about the existence of the so-called "digital jurisprudence"[1].

Secondly, such an array of new concepts, which are likely to emerge in the next few years, points to the problem of a temporal character of existing economic mechanisms. This situation implicitly leads to the fact that the traditional approaches and norms that exist today will no longer be enough. For example, the mechanisms of formation of the price of a product, its cost, the sale of digital products, the composition of the delivery set and other economic mechanisms are already gaining a new appearance. However, both traditional and specified processes do not arise at the same time, but are created purposefully, therefore, the main task is to create them, after which the regulatory framework should be modified [21]. Today, the countries are already facing the task of legal regulation of the full cycle of digital products. In addition, it is necessary to take into account the specifics of such products – its intangible form. For jurisprudence, there is a huge task to streamline these relations, because, for example, it is not clear how the transfer of rights to products from one owner to another will be carried out. This also applies to lease, a pledge, etc. In addition to the issues raised, there is a need to determine the legality and legal force of these transactions in Russia. For example, most large foreign companies enter into essentially illegal or sham M&A agreements, to which Western law enforcers do not respond. This policy is based on the principle of the impossibility of full regulation of the digital economy on the one hand and the provision of freedom in the development of its activities in the global sense on the other. Indeed, an objective view of existing large companies and how they profit raise some questions that do not yet have a single recognised solution. For example, Facebook and Google, registered in the United States, pay income tax in the United States, although the activities through which their income is generated, is conducted in all countries where there is Internet. How can the tax issue be handled delicately or should the situation be left untouched?

Thirdly, there are questions about the preservation of the existing order of labour relations. The digital economy highlights the creative and intellectual work, which entails the non-normality of the working schedule, the independence of the employee from the employer, special conditions for the organization of work. All these and other aspects of the changes should be taken into account in the labour legislation in order to harmonize and stabilize labour in the digital economy. To date, the idea of transition to paperless interaction of workers and employers, the creation of electronic employment record books, etc. is proposed.
Fourth, the issue how to identify the subjects of legal relations and the rules of processing, storage and collection of data. Today, there is a need to change the federal legislation in terms of unification of the identification requirements of the subject, as well as to expand the possibilities and methods of such identification. There are proposals to ensure the possibility of identification and authentication by any technically possible means: electronic (mobile) signature, subscriber number of an individual, biometric data. In this regard, it is possible to regulate the status of electronic documents. For example, the conclusion of contracts in electronic form, through correspondence between two representatives of organisations or ordinary individuals, can reach a new level. Today, there is some uncertainty in connection with the impossibility of a reliable definition of the person who sent the message or expressed the will to commit legally significant actions. In some court systems, in order to preserve and ensure the stability of business turnover, the names in the "header" of the messages are accepted as the signature of electronic agreements.

The need to change the rules of data collection, storage and processing arise in connection with the use of information by legal entities and individuals for the development of digital relations. The evolution of economic relationships dictates the removal of legal constraints that impede the rapid and efficient use of data. Therefore, the immediate task of the legislators is to develop rules for prompt and non-discriminatory access to data. Changing this area will entail the problem of the principles of disclosure and protection of various types of secrets, which will also require its legal solutions in terms of respect for the rights of all parties of legal relations.

Fifth, the novelties of the institutional and legal system of economic relations determine the need to change the principles of state systems. Already today, there is talk about the possibility of using blockchain technology for state information bases: tax, property, car owners, etc. In addition, the United States has already launched a new form of electronic lawmaking, which provides access to ordinary users to discuss bills [3]. The results of the digital economy development, as we can see, greatly improve the political, social and legal life of society. To this end, we will change the procedure by changing the rules of providing electronic evidence, expanding the practice of conducting trials using video communication systems, the development of the mechanism of electronic interaction of the parties to the trial.

Finally, it is worth noting no less important financial and legal problem of objects of legal relations. The most obvious examples are the question of the recognition subject to the right of cryptocurrencies, robots, communications, information, etc. It is interesting that in 2017 in Belgium, a robot named Fran Pepper became the first humanoid, which was included in the population register. A similar example has recently occurred in Saudi Arabia, where the humanoid robot Sophia was given citizenship. These facts are frightening to modern society, but in our opinion to make such drastic action in respect of machinery in general, is premature. It is necessary to proceed from the fact that machines with artificial intelligence still do not have full capacity, that is, for the actions of machines with AI should be responsible persons who own or control them. In this case, the closest to our legal system is the way to draw an analogy of machines with AI with legal entities that under certain conditions could be endowed with a limited legal personality.

It is obvious that the boundaries of the digital economy we have outlined are not exhaustive. The experience of European and Asian regulation of the digital economy shows that in the process of law-making there are previously unaccounted problems that need to be solved. However, the above analysis shows that the problem of institutional and legal support of a new way of economic life, affecting the political and social life of society, is an urgent topic at the moment. It should be emphasised that today it is necessary to effectively build an institutional environment and legislation, not just regulating the economy, but contributing to its innovative development. In this regard, there are three models of regulation [12]:

1. A traditional model of control and supervisory functions of the state (possibly through a regulated body of experts)
2. A self-regulation model
3. A mixed (compromise) model
The international community and authoritative researchers prefer the third model as the most effective and harmonious one. In addition, we must not forget that one of the main consequences of the digital economy is globalization. This fact necessitates the resolution of some important regulatory issues at the interstate level. However, as the practice of several years shows, compromise can be achieved with some difficulties. In the opinion of some researchers, this situation is due to the desire of the state to maintain a leading position and dominance in the markets of the digital economy. This is another reason why the Russian expert community, together with the legislator, should take all possible measures for a rapid and effective transition from the traditional to the electronic (digital) economy. At the same time, this process should not be rigid, but should contain an element of easy regulation in order to create conditions for the development of a competitive economy.

4. Acknowledgement
The work was supported by Russian Science Foundation (project №18-78-10075.).

References
[1] Andreeva L A 2017 K voprosu o «tsifrovoj» yurisprudentsi. Aktual'nye problemy yurisprudentsi: sb. st. po mater. I mezhdunar. nauch.-prakt. konf'1(1) 32-41
[2] Adler P S, Kwon S W, Heckscher C 2008 Professional work: the emergence of collaborative community. Organ Sci 19 359–76
[3] Cass R S 2014 Democratizing Regulation, Digitally, Simposium Regulating the digital economy, Democracy a Journal of ideas. [Electronic Resource] https://democracyjournal.org/magazine/34/democratizing-regulation-digitally
[4] 2015 China unveils Internet Plus action plan to fuel growth http://english.gov.cn/policies/latest_releases/2015/07/04/content_281475140165588.htm
[5] Child J, McGrath R G 2001 Organizations unfettered: organizational form in an information-intensive economy Acad Manag 44 1135–48
[6] Demil B, Lecocq X 2006 Neither market nor hierarchy nor network: the emergence of bazaar governance Organ Stud 27 1447–66
[7] Digital India 2014 A programme to transform India into digital empowered society and knowledge economy. Press Information Bureau. New Delhi: Government of India, Cabinet, http://pib.nic.in/newsite/PrintRelease.aspx?relid=108926
[8] Fjeldstad O D, Snow C C, Miles R E and Lettl C 2012 The architecture of collaboration. [Electronic Resource]. Strat. Mgmt. J 33 734-50
[9] Gulati R, Puranam P, Tushman M 2012 Meta-organization design: rethinking design in interorganizational and community contexts. Strategic Manage J 33 571–86.
[10] Heckscher C C, Adler P S at al 2006 The firm as a collaborative community: reconstructing trust in the knowledge economy (Oxford University Press, Oxford)
[11] Hoffman A 2018 The next phase of business sustainability. Stanford Social Innovation Review (Spring)
[12] Johns N 2015 Regulating the Digital Economy. Observer Research Foundation 6 2
[13] Lakhani K R, Iansiti M 2017 The Truth About Blockchain Harvard Business Review, Jan-Feb Issue
[14] Mirjana Stankovic, Ravi Gupta, Bertrand Andre Rossert, Gordon I. Myers and Marco Nicoli 2017 Exploring Legal, Ethical and Policy Implications of Artificial Intelligence, White Paper of the Global Forum on Law Justice and Development
[15] Newman D, Data Analysts and Scientists More Important Than Ever for the Enterprise, Digitalistman, 28 April 2017 http://www.digitalistmag.com/author/daniel-newman.
[16] Porter M E, Kramer M R 2019 Creating shared value. In: Lenssen G, Smith N (eds) Managing sustainable business, vol 89 (Springer, Dordrecht) 327–50
[17] Pritzker Penny U.S. unveils Digital Economy Agenda that supports new tech, worker participation https://www.linkedin.com/pulse/today-commerce-launches-digital-attaché-
program-address-pritzker?trk=eml-b2_content_ecosystem_digest-recommended_articles-73-null&midToken=AQHvNG0sBYtAzg&fromEmail=fromEmail&ut=2vvyCZ4-89T781.

[18] Roffe P, Seuba X 2017 Current Alliances in International Intellectual Property Lawmaking: The Emergence and Impact of Mega-Regionals, A CEIPI-ICTSD Publication Series, September, https://www.researchgate.net/publication/319469614_The_Regulatory_Framework_for_Digital_Trade_in_the_Trans-Pacific_Partnership_Agreement

[19] Safiullin A R 2017 Industriya 4. 0 i prioritety razvitiya ehkonomiki i obshhestva v Germanii Vestnik UIGTU 3 (79)

[20] Seidel M-DL, Stewart K J 2011 An initial description of the C-form. Res Socl Organ 33 37–72.

[21] Semenov E H Kak postroit’ tsifrovuyu ehkonomiku v Rossi: shest’ glavnykh problem https://centerforpoliticsanalysis.ru/position/read/id/kak-postroit-tsifrovuju-ekonomiku-v-rossii-shest-glavnih-problem.

[22] Shah S K 2006 Motivation, governance, and the viability of hybrid forms in open source software development. Manag Sci 52 1000–14

[23] TechAmerica Foundation’s Federal Big Data Commission, 2012, quoted in Amir Gandomi and Murtaza Haider, Beyond the Hype: Big Data Concepts, Methods and Analytics, International Journal of Information Management Vol 3 2015 p 137-44 at p 138

[24] UK Digital Strategy, Available at: https://www.gov.uk/government/publications/uk-digital-strategy/uk-digital-strategy

[25] Vaipan V A 2017 Osnovy pravovogo regulirovaniya tsifrovoj ehkonomiki Pravo i ehkonomika 11