Digital Technologies for the Sustainable Development of the Economic Ecosystem of the Territory

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Abstract: The article deals with topical issues affecting the key areas of development of digital technologies and their implementation in the management of the economic ecosystem of the territory. End-to-end technologies, including predictive analytics, create unique opportunities in many public sectors, and the speed with which they develop provides an opportunity to achieve sustainable development goals. The paper considers economic relations for the development of methods for managing changes in the sustainable development of economic ecosystems of territories. The purpose of the article is to systematize the planned digital technologies for managing the sustainable development of the economic ecosystem of the territory.

1 INTRODUCTION

Sustainable development and digitalization are two frequently encountered terms defining modern social, political and scientific spheres. Sustainable development is associated with serious social and economic problems, such as uneven development of the territory, social inequality, which are becoming more and more obvious and are reflected in initiatives such as the UN Sustainable Development Goals (SDGs). In this vein, research has begun to cover the concept of sustainable development of the economic ecosystem of the Territory as a vital source of promoting efforts to create a favorable, competitive environment with a high standard of living for the population by ensuring a sustainable socio-economic system.

Digitalization lies in the transformative power of digital technologies and their widespread introduction into everyday life. Digital technologies such as platforms, blockchain, artificial intelligence, virtual reality or the Internet of things have transformed many industries (e.g. housing, agriculture, transportation), providing companies with unprecedented advantages and new business opportunities. Recently, scientists and government policy makers have begun to consider digital technologies as key tools for mitigating and countering the most pressing economic and social problems of our time. This article is aimed at conducting additional research in the field of sustainable development of the economic ecosystem of the territory and digitalization, presented through a scientific review of the literature. The article conditionally consists of two parts: the first reveals the concept of the economic ecosystem of the territory, considers an approach to ensuring the sustainable development of the economic ecosystem, examines the methods of digitalization in the management of the economic ecosystem, extracts and presents the main topics from the literature, developing the role of digital technologies for the sustainable development of the ecosystem. These topics include ensuring socio-economic sustainability in the interaction of stakeholders in the ecosystem. In the second part, the application of planned digital technologies in managing changes in the sustainable development of the economic ecosystem of the territory is additionally discussed and systematized, as well as promising areas for future research are

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developed. In particular, the focus is on the prospect of achieving the UN SDG targets by 2030 by stakeholders of the Territory's ecosystem through the use of end-to-end digital technologies in management. Thus, this work contributes to the formation of a new field of research that can change the theory and practice in managing changes in the ecosystem of the territory (Holzmann et al., 2023)

2 THE CONCEPT OF THE ECONOMIC ECOSYSTEM OF THE TERRITORY

Considering the concept of an economic ecosystem, most researchers draw an analogy with natural ecosystems, which are communities of living organisms interacting with their environment. The "eco" part of the term refers to the environment, while "system" refers to a group of related parts working together as a whole.

Natural ecosystems can be large or small, but they usually exist within a specific geographical area. An economic ecosystem is similar, consisting of a core group of entities, the environment, and various stakeholders who interact with each other through interconnections. These elements coexist and evolve within the ecosystem. The ecosystem plays a crucial role in the dynamism, sustainability, and viability of a territory. It creates competitive advantages and adds value, which in turn contributes to the economic success of the area. This success contributes to the reputation of the ecosystem, attracting financial, human, and other resources. An ecosystem must perform two main functions: creating value for itself and distributing that value among its members (Audretsch et al., 2019).

2.1 Digital ecosystems

The digital ecosystem enables each participant in the system to generate, share, and consume a vast amount of data and knowledge, which can be utilized in various fields such as artificial intelligence, data mining, and information retrieval. These technologies help organize and process digital assets and determine the interactions between them.

A digital ecosystem is a self-organizing, scalable, and sustainable system composed of diverse digital objects and their connections. It focuses on facilitating interactions between objects to increase the system's effectiveness, reap benefits, and facilitate information sharing, internal and personal cooperation, and system innovation.

The sustainability of a digital ecosystem depends on the alignment of digital resources, knowledge, and people. This indicates the ability to sustain good performance, resist changes in the internal and external environments, and recover from mistakes and system failures. The development of technologies that support ICT for digital ecosystems is another important task. This includes the research and development of intelligent and autonomous infrastructure, advanced software development platforms, and protocols and formal languages for implementing digital ecosystems (Behera et al., 2019).

2.2 The concept of sustainable development of the economic ecosystem of the territory

The sustainable development of regions is a complex process that includes changes in both quantitative and qualitative aspects taking place in the field of social, economic and environmental activities. The process of regional development takes place in changing conditions, which include endogenous factors associated with the effective use of the internal economic and social potential of the region, as well as exogenous conditions.

The level of vulnerability of the economic ecosystem of the Territory depends on the resilience to failures. Therefore, the crisis, which exposed the imperfection of the territory's ecosystem, should be considered as an impetus for changes aimed at increasing resistance to various external influences that may occur in the future. Sustainable development in the context of a socio-economic ecosystem is influenced by various factors that affect the acceleration or deceleration of the processes of change (Barska et al., 2022)

Currently, one of the most important tasks for the ecosystem of the territory is to stimulate sustainable development, which includes spatial, economic and social planning, which allows for better coordination of activities and increase the efficiency of the system. The decline in the pace of sustainable development of the territory's ecosystem ultimately affects its competitiveness and the standard of living of the population. The stability of the Territory's economic ecosystem is tested not only by its ability to "recover from the crisis", but also by its sensitivity to crisis phenomena, which is manifested in various reactions of the socio-economic system of the territory to

negative external stimuli and changes in the economic situation.

The concept of "territorial vulnerability" can be defined as the susceptibility of an economic ecosystem to external influences, including negative crises or structural changes of a global nature. It is about their reaction to developmental disorders and the ability to follow the right trajectory of development (Wyrwa et al., 2022).

Currently, the priorities of sustainable development are focused on socio-economic issues, since the greatest effort, in accordance with the 2030 agenda, should be the eradication of poverty in all its manifestations while ensuring social and economic goals. The success of the sustainable development of the economic ecosystem of the Territory depends on various factors, including the active interaction of all elements of the core system and all stakeholders. Thanks to this structure, the economy of the territory contributes to socio-economic prosperity and promotes social stability (Kajiita et al., 2024).

2.3 Digitalization of management methods

Digitalization can be defined as the adoption and use of digital technologies by individuals and organizations within the economic ecosystem of a particular territory. The sustainability of a digital ecosystem refers to organizational activities that aim to achieve sustainable development goals through the use of technologies that generate, process, transmit, and receive electronic data. In short, research into the digital ecosystem focuses on applying digital technologies as tools that support and facilitate the socio-economic growth of the territory's ecosystem (Holzmann et al., 2023).New digital technologies are affecting the fundamental mechanisms of interaction within the economic ecosystem of a territory. This requires the application of new management methods and strategies in order to cope with the challenges posed by digital transformation.

The impact of digital technology is particularly significant due to the potential for introducing technologies that can improve business processes. These technologies are flowing into the ecosystem of the territory in order to achieve results such as increased efficiency and reduced costs through automation and process optimization (Klos et al., 2021).Digital tools expand the capabilities of the territory's economic ecosystem by collecting and analyzing data in real time to monitor productivity and activity across all elements of the system. The core of this ecosystem generates a vast amount of data in the digital age. However, new data analysis software and artificial intelligence can help monitor and analyze this data more efficiently. Stakeholders in the territory's ecosystem can better control and coordinate their activities by obtaining better insights into the needs and preferences of other participants in the system through data analysis. This allows them to introduce new digital technologies more effectively (Lindquist, 2022).Advances in digital technologies have led to their widespread use in various sectors of the territory's economy. The development of digital ecosystems, platforms, and solutions not only enables real-time monitoring of environmental conditions but also supports well-informed management decisions that contribute to improved quality of life for citizens, increased social and economic development, and more sustainable use of domestic resources. Additionally, these technologies help to enhance general literacy and knowledge among the population (Martins et al., 2022).

3 FORMULATION OF A RESEARCH PROBLEM

The active development of digital technologies leaves an appropriate imprint on the organization of the territory change management system and requires coordinated steps to improve it.

The result of the research of scientific papers showed that at this stage of the development of the digital ecosystem of the territory there is no systematization of digital technologies for managing changes in the sustainable development of the economic ecosystem of the territory. Based on this, it is necessary to identify the main end-to-end technologies for managing stakeholders of the ecosystem of the territory, as well as to rank them by importance.

4 METHODOLOGY

This study is a review of scientific articles based on the results of studying issues related to economic relations for the development of methods for managing changes in the sustainable socio-economic development of the economic ecosystems of the territory. Methods of change management are considered, as well as the use of end-to-end digital technologies. Three dominant digital technologies in each quadrant of the matrix were identified based on a survey of experts. The focus group of experts

included representatives of municipalities, the media, universities, business, and society.

5 SYSTEMATIZATION OF PLANNED DIGITAL TECHNOLOGIES

Digital technologies can be defined as a wide range of electronic equipment, systems, resources and tools that generate, store or process data. Thanks to innovations such as the Internet, mobile technologies, digital networks and applications, the field of digital technology is constantly evolving and changing. New technologies such as artificial intelligence, robots, data analysis and machine learning are becoming more widespread in the digital sphere (Shikongo et al., 2019)

Based on the expert assessment, a matrix was developed that reflects the change management system for the sustainable development of the economic ecosystem of the territory. This matrix represents the use of end-to-end digital technologies by stakeholders of the Territory to achieve the targets of the sustainable development program until 2030.

Table 1: Digital technologies used to achieve the Sustainable Development Goals (SDGs) of municipalities.

SDGs	Technologies
Ensuring a healthy lifestyle and promoting well-being for everyone at any age	1. Big data
	2. Wireless communication technologies
	3. Neurotechnology and artificial intelligence
Ensuring inclusive and equitable quality education and promoting lifelong learning opportunities for all	1. Wireless communication technologies
	2. Virtual and augmented reality
	3. Big data
Promoting sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all	1. Neurotechnology and artificial intelligence
	2. Big data
	3. Blockchain
Building resilient infrastructure, promoting inclusive and sustainable industrialization and innovation	1. Neurotechnology and artificial intelligence
	2. Virtual and augmented reality
	3. Big data
Ensuring the transition to rational consumption and production models	1. Neurotechnology and artificial intelligence
	2. Big data
	3. Blockchain

The key "end-to-end" technologies for the public administration system include big data, artificial intelligence, and blockchain. These are the most promising areas for integration. Big data technologies aim to solve this problem by analyzing large amounts of data to formulate goals, determine public policy directions, and monitor and evaluate results. Artificial intelligence can produce highly effective results when combined with big data, generating decisions and making short- and long-term forecasts. Human participation is minimal, as AI can identify and diagnose problems. Information is the basis of decision-making in public authorities, allowing for forecasting the consequences of different types of activities and identifying deep interdependencies between elements of controlled systems. The continuous flow of diverse and unstructured information about citizens demands streamlining and innovative processing methods that adhere to the principles of privacy and security. Blockchain is a database where information is stored and updated independently by participants in a large network. Each node processes transactions and makes decisions, forming a block. After creation, the block is verified by other network members. If everyone agrees, it is added to the chain. The distributed ledger is then updated, but each node retains an identical copy, making it impossible to alter the record.In addition, the information stored and processed on the blockchain is encrypted, completely eliminating the possibility of data deletion or alteration as a result of a hacking attack on the blockchain links. Thanks to distributed ledger technologies, it is possible to enhance the level of government database protection against intruders, facilitate rapid and efficient interdepartmental communication, and organize effective information management regarding

individuals and legal entities as well as their activities.

Wireless communication technology is utilized to transfer data between two or more locations at a distance without the need for a wired connection. The 5G network standard offers high bandwidth, reliable connectivity, and security, as well as low data transmission delays, making it possible to effectively utilize large volumes of data. Radio waves, infrared radiation, optical signals, or laser beams serve as carriers of information in these networks. In the municipal economy, 5G networks will enable real-time monitoring of urban spaces, housing and communal services, energy management systems, and utilities. Thanks to the high data transfer rates, fifth-generation networks offer great opportunities for telemedicine applications. Wireless communication will improve the efficiency of transport infrastructure, including systems for monitoring traffic congestion, public transportation based on video analytics, detecting traffic violations, and monitoring road conditions.

In industry, agriculture, logistics, and retail, 5G will enable the use of robots and drones. The practical application of virtual and augmented reality technologies is based on the projection of virtual elements into the real world, enhancing physical objects with digital additions or markers that can be seen, heard, or even felt using mobile devices. The main reason for introducing augmented reality technologies into public administration is to visualize complex and diverse information from large amounts of data that are collected and analyzed. This information is used to make better management decisions.

To achieve this goal, several tasks need to be completed, including collecting primary data, classifying it, storing it, sharing it between different departments and employees, preparing it for processing, transforming it, visualizing it, and providing direct and feedback links with those who implement government decisions and those who receive government services.

Table 2: Digital technologies used to address the Sustainable Development Goals (SDGs) of the media.

SDGs	Technologies
Ensuring a healthy lifestyle and promoting well-being	1. Wireless communication technologies
	2. Big data
for everyone at any age	3. Neurotechnology and artificial intelligence
Ensuring inclusive and equitable quality education and promoting lifelong learning opportunities for all	1. Wireless communication technologies
	2. Blockchain
	3. Big data
Promoting sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all	1. Big data
	2. Wireless communication technologies
	3. Blockchain
Building resilient infrastructure, promoting inclusive and sustainable industrialization and innovation	1. Wireless communication technologies
	2. Big data
	3. Neurotechnology and artificial intelligence
Ensuring the transition to rational consumption and production models	1. Big data
	2. Wireless communication technologies
	3. Neurotechnology and artificial intelligence

End-to-end digital technologies are able to perform important functions in the activities of mass media, such as generating original content based on big data and verifying additional news to exclude fake messages. They also analyze the qualitative composition of the audience and take into account its requests. These technologies help find potential advertisers and, as a result, develop the processes of monetizing content broadcast by specific mass media.

The field of application for end-to-end technologies also includes the work of journalists and creators of materials using big data, such as graphs, databases, and statistical information. Accessing this kind of data becomes one of the main sources for conducting extensive investigations, analytical programs, and creating stories covering historical events. It also helps create news programs on TV. The neural network allows for the moderation of both

verbal and visual texts, and in this context, the media, through end-to-end technologies, can not only resist dangerous trends but also form genuine dialogical relationships with their audience. Big data, according to recent research, allows for decisions based on user feedback to be made five times faster (Oleshko et al., 2022). Blockchain technology provides both authentication and a high level of security. In a highly distributed world where journalism is increasingly dependent on third-party technology, there are two challenges that need to be addressed.

Table 3: Digital technologies used to support the Sustainable Development Goals of universities.

SDGs	Technologies
Ensuring a healthy lifestyle and promoting well-being for everyone at any age	1. Virtual and augmented reality
	2. Big data
	3. Quantum technologies
Ensuring inclusive and equitable quality education and promoting lifelong learning opportunities for all	1. Virtual and augmented reality
	2. Wireless communication technologies
	3. Blockchain
Promoting sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all	1. Big data
	2. New production technologies
	3. Wireless communication technologies
Building resilient infrastructure, promoting inclusive and sustainable industrialization and innovation	1. Neurotechnology and artificial intelligence
	2. Quantum technologies
	3. Virtual and augmented reality
Ensuring the transition to rational consumption and production models	1. Big data
	2. New production technologies
	3. Components of robotics and sensors

The use of big data in education. Over time, educational institutions have collected a significant amount of information about different aspects of their activities: academic and educational content, information about students and teachers, electronic library archives, and more. Big data technologies allow us to create a unified structure by extracting useful information and using it for various activities in educational organizations.

In the field of education, big data sources include information from learning management systems, certification results, sociological research data, and other sources that are used to analyze resource management effectiveness, student performance, and develop individual educational paths for students. This information is processed using artificial intelligence techniques. Artificial intelligence technologies are a set of tools and techniques for creating intelligent systems that mimic human cognitive functions using mathematical models and computational algorithms. Neurotechnologies address a similar goal. Blockchain is a data storage technology based on a decentralized ledger that ensures data security, integrity, and confidentiality.

The value of blockchain for education lies in its ability to provide reliable and long-term preservation of documents related to academic achievements. It protects against unauthorized access and alteration, making it easy to retrieve and verify information.

Blockchain allows the storage of various types of educational data, such as personal files, diplomas, exam results, essays, video recordings, awards, and more. These principles form the basis for a cooperative approach to education. This model assumes that students achieve a specific, planned, and measurable educational goal. Blockchain serves as the concept of "learning is earning," where students earn tokens by studying topics funded through a marketplace. Artificial intelligence (AI) methods are used to create smart and robotic devices that are integrated into the educational process. AI technologies are also used to ensure adaptability in learning, based on evaluating student performance and predicting academic outcomes.

One of the most commonly used educational tools is the chatbot, which supports the learning process by performing informational, consulting, supportive, and entertaining functions. Chatbots act as virtual teaching assistants, providing assistance with various tasks and answering questions. AI tools are also utilized in the development of educational simulators and games, as well as virtual learning environments. Virtual simulators and training simulators are used at various levels of education. They are particularly important in the development of practical skills and abilities for future specialists, especially in cases where real-life practice is difficult or impossible due

to technical, ethical, safety, or other reasons. These simulators play a crucial role in the training of various professionals, including machinists, pilots, medical professionals, law enforcement officials, and technical specialists (Grechushkina et al., 2022).

Table 4: Digital technologies used to support the Sustainable Development Goals of businesses.

SDGs	Technologies
Ensuring healthy lifestyles and promoting wellbeing for all at all ages	1. Neurotechnology and artificial intelligence
	2. Virtual and augmented reality
	3. Robotics and sensor technology
Ensuring quality education for all and providing lifelong learning opportunities	1. Blockchain
	2. Big data
	3. Neurotechnology and artificial intelligence
Promoting economic growth, employment, and decent work	1. Components of robotics and sensors
	2. Big Data
	3. New production technologies
Building resilient infrastructure, promoting inclusive and sustainable industrialization and innovation	1. Components of robotics and sensors
	2. Big Data
	3. New production technologies
Transition to Sustainable Consumption and Production Models	1. Components of robotics and sensors
	2. Neurotechnology and artificial intelligence
	3. Virtual and augmented reality

Businesses actively use end-to-end digital technologies in their operations. Virtual reality (VR) technology is a complex system that allows users to immerse themselves in a virtual world using specialized devices. Augmented reality (AR) technology, on the other hand, integrates information with real-world objects, such as text, computer graphics, audio, and other representations, in real time.

Currently, data technologies have seen the most significant development in the entertainment and marketing sectors, but this is only the beginning of their potential. The most promising applications from an economic perspective are in industrial production, education, healthcare, and consumer services. VR is entirely computer-generated, and the most common method of using the technology involves the use of specialized glasses or helmets, which connect wirelessly or via cables to a computer, game console, or smartphone. In augmented reality, a virtual image is combined with a real-world image to create a single view that the user sees on their device's screen. This is achieved through the use of neural networks, which learn to recognize objects, markers, and locations in the real world.

The benefits of augmented reality include increased productivity and efficiency in industrial settings, creating new ways of communicating and providing services to consumers, and improving the skills of workers. It also leads to the creation of new media for the younger generation, such as augmented reality apps and games.

New production technologies, also known as advanced manufacturing techniques, are a set of approaches, materials, and processes that have the potential to revolutionize industries. These technologies are rapidly developing but have not yet been widely adopted. They can reduce the need for manual labor, increase productivity, and create new opportunities for businesses.

There are several types of new production technologies, including 3D printing, robotics, and artificial intelligence. 3D printing allows for the creation of complex objects with precision, while robotics automates repetitive tasks and improves efficiency. Artificial intelligence, on the other hand, uses machine learning to analyze data and make decisions.

Besides,

- Digital design, mathematical modeling, and product lifecycle management,
- Technologies of "smart" production,
- Manipulators and manipulation technologies.

The blockchain distributed ledger system is a database that is shared among several network nodes or computing devices. The technology of distributed

ledger systems represents a new approach to database creation, the key feature of which is the absence of a central control center. Each node independently compiles and records updates to the ledger.

This system is a way to transform payment and settlement processes, increase trust in various services, allow direct transfer of database management capabilities, and keep records. Robotics is a technical field that studies the automation of production and other systems through the use of robots. This involves designing, creating, and using robots to interact with their environment and perform various tasks without human assistance. Sensorics, on the other hand, is the study of how robots perceive sensations and interact with their surroundings.

Robotics and sensorics draw on the principles of mechanics, electronics, and other scientific fields. The applications of modern robotics are vast, with robots already being used in everyday life, human services, medicine, agriculture, and more.

Through the use of robotics and sensing technologies, the quality of products and services can be improved, operating costs can be reduced, and the competitive advantage of businesses can be enhanced. Neurotechnologies and artificial intelligence refer to any technologies that have a significant impact on how we understand the brain, consciousness, mental activity, and higher cognitive functions. Artificial intelligence is the ability of artificial intelligent systems to perform tasks that were previously thought to be the exclusive domain of humans. It is the science and engineering of creating intelligent machines, particularly intelligent computer programs, that can perform tasks such as protecting and monitoring equipment, improving products and services by understanding psychophysiological processes, and creating robots with artificial intelligence to assist in the production of goods. Big data is a term used to describe large and complex sets of data that are structured or unstructured. These data sets can be analyzed using special programs and tools to extract valuable information. Big data technologies help businesses understand their current state, make forecasts, automate routine processes, and quickly process large amounts of information.

End-to-end digital technologies are essential for reducing costs, improving production, providing better services, and collecting and processing information more efficiently. These technologies are the future of the economy and the country as a whole.

Table 5: Digital technologies used to achieve the Sustainable Development Goals (SDGs) of society.

SDGs	Technologies
Ensuring a healthy lifestyle and promoting well-being for everyone, regardless of a ge	1. Wireless communication technologies
	2. Blockchain
	3. Virtual and augmented reality
Ensuring inclusive and equitable quality education for all	1. Wireless technologies
	2. Virtual and augmented realities
	3. Blockchain
Promoting sustainable economic growth and full employment	1. Wireless technologies
	2. Big data
	3. New production technologies
Building resilient infrastructure and promoting industrialization	1. Virtual and augmented realities
	2. Neurotech and AI
	3. Big data
Ensuring the transition to more sustainable consumption and production patterns	1. Neurotech and AI
	2. Big Data
	3. New production technologies

The use of end-to-end digital technologies plays a crucial role in the development of society. Artificial intelligence enables intelligent machines to learn, improve and make informed decisions, allowing them to perform tasks that were previously thought to require human experience, creativity and ingenuity alone. These areas include medicine, education, business, science, crime fighting, cybersecurity, recruitment, entertainment and solving everyday issues. For example, in Russia, a robot named Vera conducts initial interviews at some recruitment companies. The public sector currently faces the challenge of processing large amounts of unstructured data and responding to citizen requests, making information and knowledge more accessible. Thanks to automation, "deep analytics", or analysis of data that is not publicly available, can isolate, store, and protect important data from sources such as documents, emails, tickets, videos, and social media.

Image recognition algorithms can read machine-generated documents and handwritten texts, using contextual databases for automatic verification. This allows us to uncover trends, user preferences, population movements, and demographic data. For example, we can analyze the purchasing power of a population to improve customer service and make decisions in areas such as migration more transparent, targeted, and informed. Smart applications and platforms are already being used to make government correspondence and customer services faster, more efficient, and cheaper. These technologies support the digital payment process, manage information flows, and help with reporting. By using analytics, human resources are freed up and costs are reduced by accelerating data collection, transmission, and recognition. This ultimately leads to better customer service.

Technological developments and information exchange between government agencies and the commercial sector can benefit vital areas such as national security, healthcare, social services, financial services, transportation, and public safety. Through digital technologies, governments can easily extract and use data, limiting the number of requests from users. Citizens have the right to change or delete data, and receive information on how and where it is used. (Denisov, 2019)Smart cities are being developed using wireless communication technologies. 5G networks in urban areas will allow real-time monitoring of urban spaces, housing, and communal services, as well as monitoring energy management systems and utility services. Thanks to their high data transfer rates, fifth-generation networks will create great opportunities for telemedicine systems. These networks will also increase the efficiency of transport infrastructure through systems for monitoring traffic congestion and public transport based on video analytics. They will help detect traffic violations and monitor the condition of roadways. Wireless communication technologies are an essential part of smart cities, which consist of several components that work together to create a more efficient and sustainable future. Blockchain technology has several advantages, including enhanced security. The blockchain utilizes advanced cryptographic algorithms to ensure the safety and integrity of data. Each transaction recorded on the blockchain is transparent and can be verified by all parties involved. This eliminates the need for intermediaries, streamlining processes and allowing for direct transactions between individuals or organizations. Virtual and augmented reality technologies have revolutionized education and training, offering a new and immersive learning experience that simulates real-world scenarios. Students can gain practical skills and experience through interactive virtual tours, historical reconstructions, and scientific simulations. This makes learning more engaging and accessible, enhancing the traditional textbook experience by overlaying digital content and animating static objects.

Virtual reality is also making a significant impact on the healthcare industry, helping to treat pain, mental illness, and improve surgical techniques. Surgeons can use virtual reality simulations to practice and refine their skills, leading to better patient outcomes. These technologies are transforming the way we learn and work, opening up new possibilities for innovation and growth. The technology helps medical professionals during surgeries by providing them with real-time access to important patient information, increasing accuracy and reducing the risk of errors. Virtual and augmented reality technologies enable users to meet and interact with each other in virtual spaces, breaking down geographical barriers. This allows remote teams to collaborate and work together on projects, holding virtual meetings and sharing information in shared virtual environments. Architects use virtual reality (VR) to create immersive building design reviews, helping clients visualize projects before construction begins. This technology allows them to see how the building will look in real life, which helps them make informed decisions about the design. Manufacturers also benefit from VR-based assembly instructions. These instructions reduce errors and improve productivity, as they allow workers to see exactly what they need to do and where.

In the tourism sector, VR tours are offered to show potential visitors destinations and attractions. This allows them to get a better idea of what they will see when they visit the place, which can help them decide whether they want to go or not. In retail, VR can improve the shopping experience by allowing customers to try on virtual clothes or visualize furniture in their homes before making a purchase.

Virtual and augmented reality (AR) technologies have also had an impact on society and culture. They provide new opportunities for artistic expression, such as immersive storytelling and virtual art exhibitions. AR can also be used to create interactive performances, allowing users to become part of the show.

These technologies can also help foster empathy and understanding. By allowing users to "step into someone else's shoes", they can better understand

different perspectives and cultures. This can help break down barriers and promote understanding between people from different backgrounds. In addition, they have created new forms of social interaction, bringing people from all over the world together through shared virtual spaces and multiplayer games. As technology continues to evolve, it further defines the future and the way we perceive reality.

New production technologies are a range of innovative approaches, materials, methods, and processes used to design and produce products that are both competitive and in high demand on the global market (such as machines, structures, devices, and installations). These new technologies have great potential and are rapidly developing, but they are still relatively underrepresented compared to more traditional technologies.

6 CONCLUSIONS

The use of "end-to-end" digital technologies together will lead to the creation of a flexible state management system that will fully meet the requirements of modern society. The digital transformation of the mechanisms for the implementation of managerial functions and tasks has a number of advantages, including increasing the effectiveness of state control and a high level of satisfaction of citizens with the quality of public services. The new technological paradigm calls for the reformation of the hierarchy of authorities, suggesting the creation of a state architecture based on a single platform (Katrashova et al., 2020)

Thus, the digital ecosystem of the region is a digital macro environment for the interaction of citizens, businesses and authorities, contributing to the stable and sustainable socio–economic development of the region by improving the quality of management decisions through the organization of a mechanism for collecting and processing information about the infrastructure of the region in real time using end-to-end digital technologies. The basis of the regional digital ecosystem is a digital platform / multiple platforms / a single digital platform with certain services, focused on specific areas of activity of the regional government and providing convenient interaction between citizens, business and government. Its direct participants are government authorities, society, business, universities, the media and build communication processes; they exercise their rights and obligations in accordance with national and regional legislation, improve the capabilities of the digital ecosystem in accordance with scientific and technological progress, provide (enterprises and authorities) and receive services (enterprises, authorities, citizens), integrate information into the digital ecosystem through individual end-to-end digital technologies (enterprises and authorities). The network nature of interaction in the digital ecosystem of the region has a positive impact on the social and economic life of the territory of regional administration and the means to ensure the transition to the second and third stages of digital transformation, which is strategically important in the conditions of catching up with the development of the country.

The paper considered the concepts of the economic ecosystem of the territory and sustainable socio-economic development of the ecosystem of the territory. The concept of a digital ecosystem and the possibilities for its management are considered. The main end-to-end digital technologies and their application within the framework of the stakeholder representation of the economic ecosystem of the territory are studied. The systematization of digital technologies for managing changes in the sustainable development of the economic ecosystem of the territory was carried out. The data obtained make it possible to implement the resulting systematization of digital technologies by the stakeholders of the territory for the implementation of the Sustainable Development Goals until 2030.

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