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IoT TECHNOLOGY BASED ON AI PLATFORM FOR BLOCKCHAIN E-EDUCATION

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ABSTRACT

The priority elements of the e-government system with Blockchain technologies in the most important socially oriented areas are the electronic health system, electronic education and science system, electronic environment, etc., the introduction of which is designed to make public information open to the public, in particular on the state of the environment, directions and volumes of use of public funds, Land Management, the state of development and use of mineral resources, etc.; automate some processes of management of the relevant areas (personnel, monitoring, finance, reporting); improve the Electronic Document Management System in educational and scientific institutions, healthcare and the environment; ensure that users of the system can receive services in the relevant areas through online services, including checking the validity of documents, registering in electronic queues, and so on.

It should be noted that educational institutions provide applicants with "information", which in the learning process should turn into "knowledge". We note that the main difference between knowledge and information is the degree of organization and consciousness of Primary Data. In our opinion, the main difference lies not only in the degree of organization and consciousness of primary data but also in the orientation. So, information is the" raw material " for the formation of knowledge, the main resource, service, and product.

Knowledge, in our opinion, is systematic, structured information that an individual has. That is, knowledge is a quality of the individual. A modern successful person needs to learn throughout his life. At the same time, the ability to make decisions independently, the ability to think, and the ability to solve complex interdisciplinary problems in non-standard situations become essential. This makes it necessary for a modern person to have the skills to search, analyze and process information in accordance with the methodology of scientific knowledge using digital technologies.

The foundation for obtaining knowledge by a person is education, in the process of which educational institutions provide the applicant with "information" that he must turn into "knowledge". The process of converting information into knowledge in the modern environment is possible only if the information and research competencies are formed.

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Introduction.

Blockchain is a global distributed ledger that makes it easier to move assets around the world in seconds with minimal transaction fees. These assets vary in value type and can be represented digitally. Until Bitcoin and its Distributed Ledger were invented, digital currencies were considered impossible because of the relative ease with which digital information can be copied. In practice, this

problem is known as “double spending”, in which each transaction carries the risk that the owner will send a copy of the digital coin to the seller, retaining the original (Cedeño, 2020).

The use of Blockchain technology has great potential in terms of simplifying and improving efficiency in various areas of activity, primarily financial, by creating a fundamentally new infrastructure of financial services. However, it will not be possible to switch to the new technology so quickly, for several reasons. First, due to uncertainty in the legal and regulatory spheres. In addition, large-scale implementation of Blockchain requires significant investment and effort in terms of standardization and Unification. It is necessary to build a multi-level Blockchain infrastructure and strengthen the confidence of consumers and regulators in this technology. At the same time, the capabilities of Blockchain and the growing interest in it indicate its great potential and wide opportunities for development and efficiency improvement in various fields of activity. It is already obvious that Blockchain technology will improve, penetrating various spheres of economic relations.

Materials and Methods.

The information society should ideally become synonymous with a fair and Legal Society. In this regard, the prospects for further development of digital technologies in public administration and other types of legal activities should be (Brown, 2021):

1) the introduction of certain elements of e-democracy (electronic elections, referendums), electronic legal services, e-education, e-health, etc. and their legislative regulation;

2) improving electronic administrative services by expanding their types, optimizing the terms of provision and reducing the bureaucratic burden on recipients of such services;

3) integrating national electronic resources into a single electronic system, including on an international scale;

4) bringing information security standards and the quality of interfaces of some information and communication systems in line with European standards;

5) increasing guarantees for the protection of information rights of citizens in connection with the use of digital technologies in law.

Considering the issue of other elements of e-governance, it is necessary to mention such of them as e-medicine (electronic health system), e-education and Science, e-economics, etc. in addition, the progressive development of the use of digital technologies in such areas of Public Administration as the use of Natural Resources, Energy, Utilities, law enforcement, etc.

The e-education system allows users to: get information about registered public and private educational institutions; check the validity of student and student ID cards and educational documents (diplomas, certificates of external independent assessment); register for an independent external assessment; register for admission to higher educational institutions, etc.

Less developed today is the e-science system, which includes only certain elements, in particular: official information resources that allow the user to get information about institutions of science and education, scientific developments, documents accepted by institutions of Science and education; electronic textbooks and electronic scientific publications, scientific works in electronic form.

The priority elements of the e-government system in the most important social areas are the electronic health system, the electronic system of education and science, the digital economy, the electronic environment, etc., the introduction of which is designed to: make public information open to the public, in particular on the state of the environment, directions and volumes of use of public funds, Land Management, the state of development and use of mineral resources, etc.; automate some management processes in the relevant areas (personnel, monitoring, finance, reporting); switch to an electronic document management system in Educational, Scientific, and healthcare institutions; provide an opportunity for users of the system to receive services in the relevant areas through online services, including document authentication, registration in the electronic queue, and so on (Egelund-Müller et al, 2017).

First, it is worth noting that most companies that specialize in providing legal services, as well as individual lawyers and lawyers and legal clinics at institutions of Higher Education, Human Rights public organizations have their own official websites, with the help of which, as a rule, you can get an answer to typical legal questions, get acquainted with examples of claims. Some websites also offer an overview of judicial practice, an analysis of legislation and its application on specific legal issues.

The capabilities of artificial intelligence in law practice, in addition to keyword search, also allow you to find the system and analytical data regarding judges. So, users can see on which days the judge makes more positive decisions, and at the same time analyze the point of view and arguments that can convince them to accept a particular legal position.

Results.

Blockchain technology in its application has long gone beyond the financial world. Today, it is used in the preparation of cadastres and registration of property rights, and social networks have not been left out. The main characteristics of Blockchain – the availability and immutability of Information allow it to be effectively implemented in the field of education, that is, it can confirm the actual qualifications of students of various courses or students. If educational institutions Register issued diplomas of education or certificates of study using Blockchain technology, then it will not be difficult for a potential employer to make sure that employees actually studied at a certain university or courses and did not falsify the diploma. This data, which will be publicly available, will also be available to investors who are looking for promising theses, as well as universities, to decide on rescheduling previously completed disciplines when a student changes his place of study or specialty. Blockchain allows you to record not only the number of hours required for transfer, but also the intermediate results of modular knowledge assessment, and this information can be fully trusted (Gürpinar et al, 2020).

The most important factor in promoting Blockchain technology in the field of education is the state attitude to the formation of a digital society. Thus, at the end of 2016, the Board of the CBR approved the Cashless Economy roadmap, which sets out plans for the use of Blockchain technology (Brassler & Dettmers, 2017).

In April 2019, the Government agreed with the American technology company Bitfury Group to create a full-scale electronic management system for country using Blockchain technology, and also approved the introduction of Blockchain technology in the work of the State Register of real property rights and the electronic trading system for seized property (SETAM) (Düdder et al, 2019), the Ministry of Agrarian Policy and food together with the state agency for electronic management and Transparency International presented an updated state land cadastre, which will now work on Blockchain technology, and the introduction of this technology will ensure reliable data synchronization, which will make it impossible to replace them as a result of external interference, as well as make it possible to exercise public control over the system (Guustaaf et al, 2021).

Currently, in the field of education, there is an understanding of the need to expand students ' opportunities when forming their own digital learning portfolio and creating new opportunities, as well as what can improve and simplify both the process of issuing and recognizing credentials (Casino, Dasaklis & Patsakis, 2019).

The importance of Blockchain technology in the world is increasing every day. It is currently one of the fastest growing industries. The demand for qualified specialists in this field is also constantly growing. More and more educational institutions are concluding that the study of Blockchain technology is necessary for a modern person. Cornell Blockchain and University College London were among the first to introduce Blockchain technologies to the curriculum. Cornell Blockchain offers its students to learn how to link business and technology. With the support of the ICN research organization, expert consultants, and partnerships with major Blockchain organizations around the world, Cornell Blockchain already provides real-world experience for interaction, training, and innovation development.

More than 570 students are already studying under the University College London program. Now, this is the largest community associated with Blockchain technology in the world, their program includes regular lectures and seminars conducted by leading experts. The Institute for Blockchain Studies is an independent research institute that studies the theoretical, philosophical, and social implications of Blockchain Technology (Ullah et al, 2021).

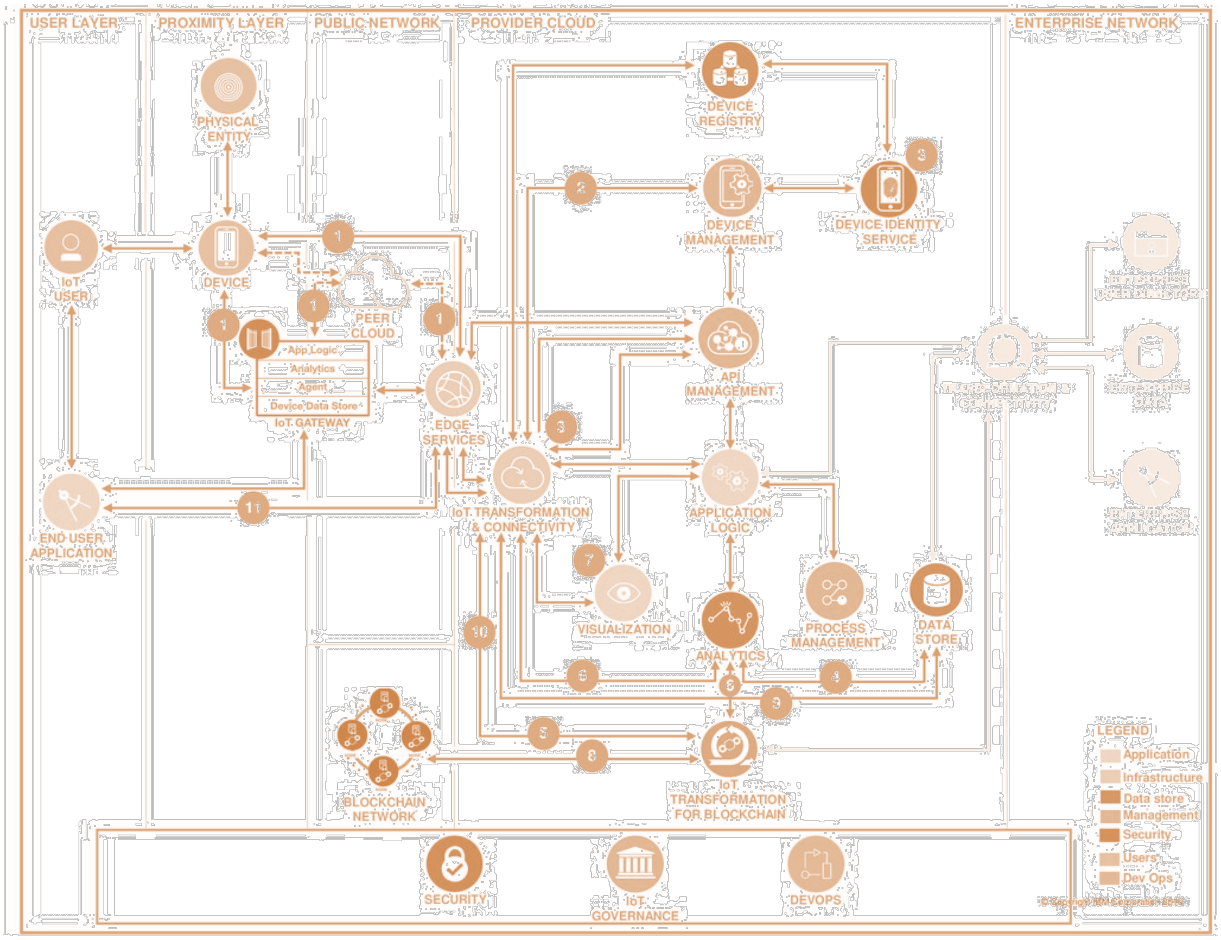

Fig. 1. IoT technology for blockchain e-education
Source: author's own research

This project was developed by Melanie Swan, an MBA graduate with a degree in finance at the Wharton School of Business at the University of Pennsylvania. As part of the training, students gain knowledge about Blockchain technologies, which include development, consensus algorithms, intelligent contracts, etc. It is also necessary to note the project to create an online learning platform of BitDegree (Ølnes & Knutsen, 2020).

They have developed the first international online platform that will focus on presenting courses based on the digital technology industry. It is thanks to Blockchain and the use of smart contracts that all students can receive remuneration for their work. They can receive dividends in the form of an "internal cryptocurrency" - BDG. It is planned that the payment will be provided directly by future employers, in whose account the company's coins should be. The BitDegree BDG token will be used for interaction between participants on the platform itself, as well as sponsors or third parties, and BDG tokens also have a guaranteed fixed exchange rate. The company offers guarantees for participants to be confident in the value of their tokens, in addition, the value of BDG is guaranteed by Hostinger.

Hostinger promises to accept BDGS at their cost, in exchange for the equivalent cost of web hosting services, and the exchange rate itself is fixed during the first year. The BDG token is the basis for the development and operation of the BitDegree project, which creates an efficient and secure economic system of the BitDegree platform based on Blockchain technology. Smart contracts and decentralized Blockchain technologies allow students, content creators, and employers to coordinate incentives. Decentralization allows you to create an online community that allows students and teachers to interact freely without intermediaries, and Blockchain technology also eliminates the need for employers to use expensive recruitment companies to get the best experts in the field of IT technologies. The BitDegree project won the Moonchise 2020 competition, and Moontec is the largest conference in Northern Europe dedicated to Blockchain technology and its implementation in various industries.

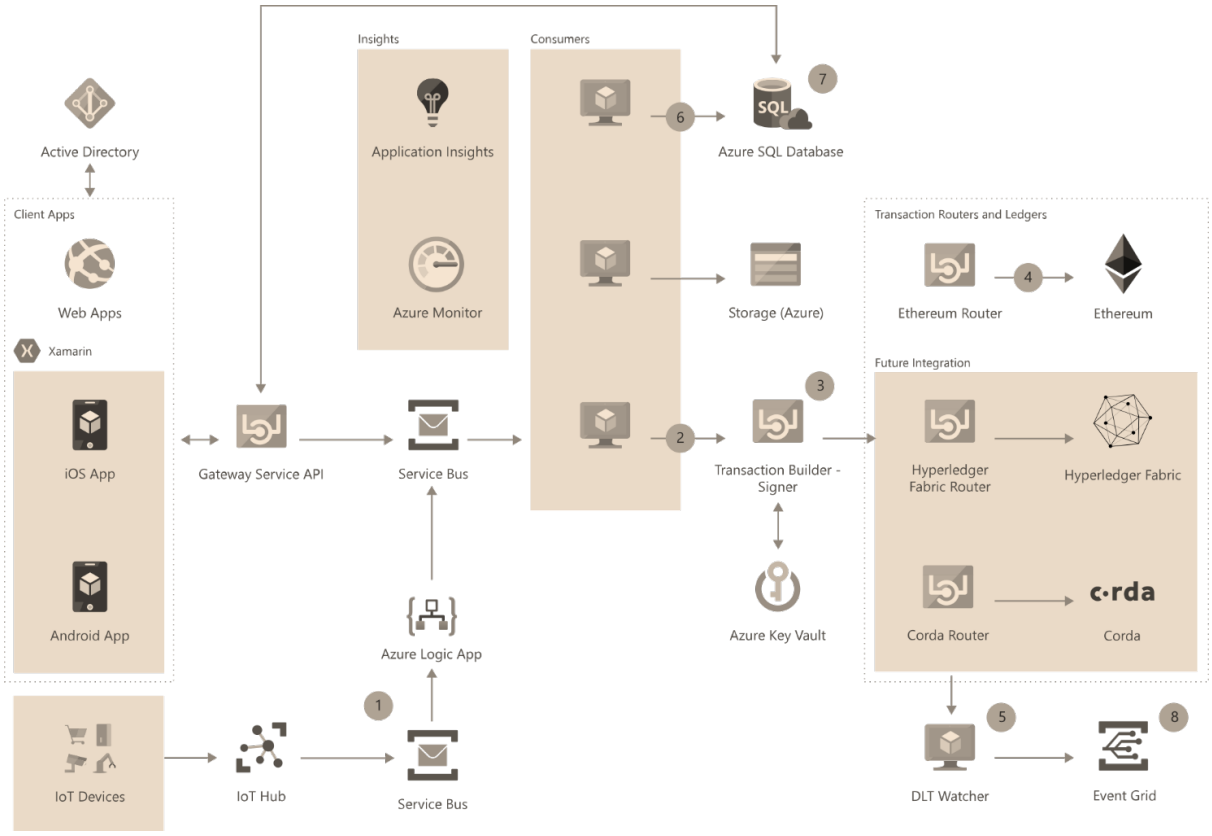

Fig. 2. Transaction in IoT education
Source: author's own research

The introduction of Blockchain technology will help reduce the cost of registering and issuing certificates, make it more attractive to issue certificates for micro-loans, that is, students will be able to automatically certify individual courses, modules, or other results of their studies. Currently, the following promising areas of implementation of Blockchain technology in the e-learning systems of higher educational institutions can be identified:

1) creation of temporary working groups of students;

2) formation of a competitive environment and support of the rating system;

3) monitoring the income received by students based on the acquired skills in the course of training and using such data to form new educational courses;

4) verification and analysis of professional skills of applicants for employers.

The introduction of blockchain is hindered by several objective and subjective factors (Lumineau,Wang & Schilke, 2020) – user inertia, lack of a developed legislative framework and the need for a coordinated consensus between a large number of participants in the educational services market, as well as the perception of Blockchain technology as a threat to their business.

At the same time, the implementation of the task of introducing and developing digital technologies in law requires solving a number of issues of a legal, social, organizational, institutional nature, in particular in the field of personal data protection, protection of other rights of persons in the information sphere, overcoming digital inequality of residents of small towns, towns and villages, improving computer, information literacy and culture of the population, as well as preventing the emergence of possible risks associated with the digitalization of certain areas of public and managerial legal relations.

Thus, the need to find an optimal model of organization of e-democracy, e-governance, e-legal proceedings, e-services, e-education, e-declaration, open data of state registers and other areas of Public Administration, improving the legislation regulating the procedures and mechanisms for applying digital technologies in law, is a task that now faces scientists and specialists in the field of law and public administration.

At the same time, the review of scientific literature shows that research on the integration of digital technologies in various spheres of public and public life, including public administration, remains sporadic. Even though there is a significant number of scientific papers devoted to certain issues and aspects of e-governance, the provision of electronic administrative services, electronic justice, etc., the proposed topic at the level of a doctoral dissertation was not studied, the available scientific papers were not fully considered.

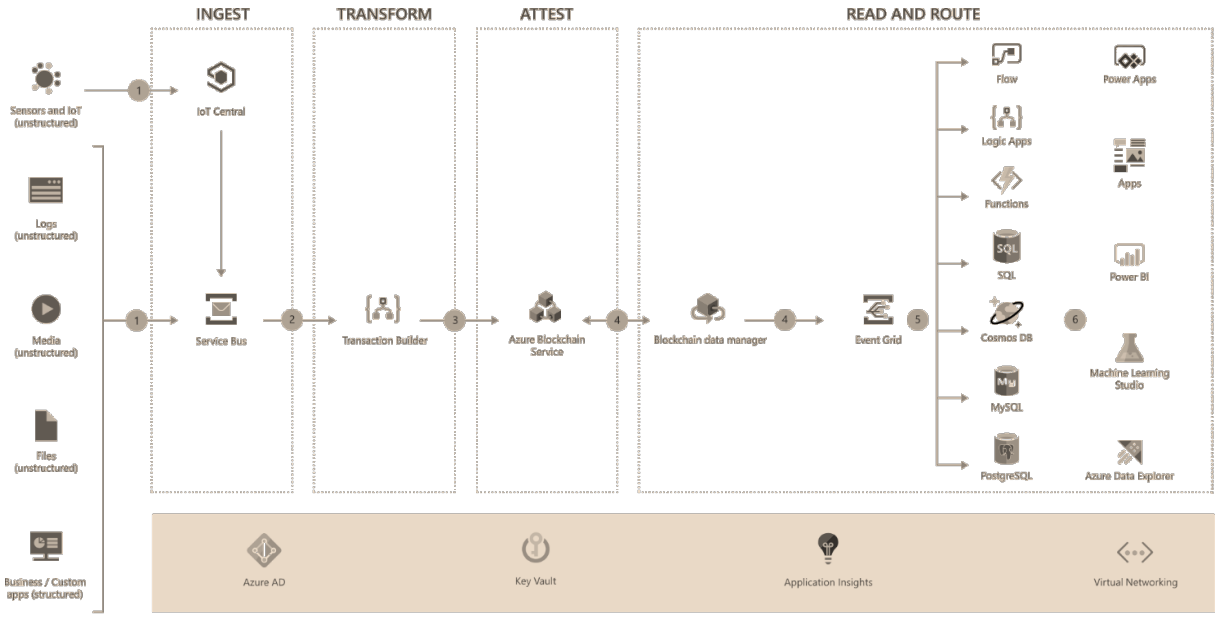

Fig. 3. Blockchain analysis system
Source: author's own research

However, the lack of a systematic theoretical study of the introduction of digital technologies in various spheres of public and managerial legal relations, including in the sphere of Public Administration, makes it impossible to comprehensively solve the problem of further implementation of administrative reform in the relevant sphere and the development of the information society.

So, the need to implement systemic changes in the integration of digital technologies in various spheres of public and managerial legal relations, insufficient development of theoretical provisions in this area, imperfection of Legal Regulation determine the relevance of a comprehensive scientific study of a wide range of issues related to the introduction of digital technologies in law, the definition of current trends and prospects for the development and application of digital technologies in the field of Public Administration, as well as the improvement of legislation in the relevant field.

Conclusions.

As a result, we note that the basic components of the digital economy that are developing through its digitalization today are infrastructure, e-business operations, and e-commerce. The digital economy is the result of the transformational effects of new general-purpose technologies in the field of information and communication. Digital technologies are rapidly transforming society and business relations, and they are an integral part of the innovation-oriented national economy of the future. In the "old" economy, or the so – called "traditional economy", the flow of information was physical: cash, checks, invoices, invoices, Reports, face-to-face meetings, phone calls, in the new one-information in all its forms is reduced to bits. The digital economy is dominated by electronic goods/services produced by e-business and e-commerce. Payments for services/goods in the digital economy are most often made using electronic money.

Thanks to Blockchain technology, in the case of its comprehensive application, there can be a transition to a digital person (identity), which will be the result of all transactions related to an individual from the beginning of his birth, recorded in the totality of Blockchain chains.

We consider the digitalization of the economy to be a significant factor in technological evolution, which will allow manufacturers to overcome territorial restrictions, reduce the transaction costs of making decisions and concluding transactions, develop new business models based on network effects, and involve consumers in the process of creating benefits.

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