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Using blockchain technology in public administration by ML & AI

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Abstract

The sphere of Public Administration includes a broad system of legal relations, most of which are undergoing gradual transformation due to the development and integration of digital technologies in public administration. So, the e-government system covers not only the provision of administrative electronic services, and the adoption of legal acts in electronic form, but also other areas of Public Administration, in particular electronic Parliament, Electronic Government, Electronic democracy, electronic medicine, education, etc. At the same time, these elements of e-government do not exist in isolation but are interrelated components of a single system, through which both internal and external administrative functions of Public Administration are implemented.

First, it is necessary to point out the initiative "the state in a smartphone". It is assumed that this service will combine all the elements of e-governance and electronic public services, that is, it will become a single integral portal through which each person will be able to receive any public service online, track the most important events in the life of society and the state, take part in the discussion of draft acts adopted by state authorities, and so on.

Keywords: Blockchain; Public Administration; e-Government; Public Services

1. Introduction

At its core, blockchain technology eliminates the need for Trust, which is the core of banking and financial services. We use banking services because we trust banks, but this trust can be replaced by proven blockchain technology, as a result of which the role of banks, lawyers, auditors, and accountants will significantly weaken. For example, a classic international transfer takes at least three days.

The global banking infrastructure obliges bankers to work together and trust each other. In most cases, you will be able to withdraw your funds after three days of waiting, but banks may sometimes extend this period to make money on your funds.

Thus, using the blockchain, money can be transferred and processed in less than one hour, and the commission is usually a few cents.

The use of blockchain in international payments allows you to remove correspondent banks from this scheme, thereby radically changing the procedure for making international payments.

A blockchain is a chain of data blocks whose volume is constantly growing as new blocks with records of recent transactions are added. This is a chronological database, that is, a database in which the time when the record was made is inextricably linked to the data itself, which makes it immutable.

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2. Materials and methods

Distributed ledger technology is based on blockchain, the technology that underpins bitcoin. Since ancient times, registers have been the basis of economic transactions and have been used to record contracts, payments, purchase and sale transactions, or the movement of assets and property. The journey, which began with writing on clay tablets or papyrus, made a big leap with the invention of paper. Over the past few decades, computers have provided the accounting process with speed and convenience. Today, keeping pace with innovation, information is beginning to be stored in completely new forms, namely cryptographically secure, fast, and decentralized. Even today, distributed ledger technology has great potential and can radically change the work of the government, government agencies, and corporations. The government can use distributed registry technology in collecting taxes, issuing passports, registering land plots, granting licenses, and planning social payments, as well as in the voting procedure [5].

The main problems in the field of application of digital technologies in law are:

- the slow pace of introduction of digital technologies in various spheres of Public Administration and activities of subjects of power;
- the inconvenience of the interface of certain types of electronic services for providing administrative services;
- excessive complexity of the identification procedure when using electronic administrative services, the "electronic court" system, etc.;
- frequent failures of online services and other types of digital technologies;
- insecurity of personal data and other confidential information contained in the information and communication systems of subjects of power, etc.

3. Results

Blockchain is very useful for government agencies. Thanks to this technology, the risks of data forgery are reduced, operating costs are reduced, and the level of corruption is reduced. Participants of the World Economic Forum 2017 believe that blockchain technology will be actively used by leading countries in the field of public services by 2025.

Some countries have already started the process of implementing blockchain in the public services sector since 2016. For example, the United States uses this technology to maintain the land cadastre, register real estate, in the healthcare system, and since last year in elections. The implementation of the technology in Estonia and the United Arab Emirates is at the same level. The Netherlands is slightly behind and does not yet use blockchain for document management and elections.

In New Zealand, public authorities use artificial intelligence to provide public services based on blockchain technology, to make public services convenient and accessible to citizens, and to digitally identify users and improve feedback to citizens. The reform is being implemented through the service delivery service of the New Zealand Department of the interior.

At the same time, New Zealand does not have a centralized state body that deals with EU governance as in Australia or the United Kingdom. Different teams work separately from each other and then offer ready-made solutions to the public. For project teams to have temporary jobs, innovation laboratories were created. The New Zealand Department of the interior engages ordinary citizens in the creation and design of new services to make the development adaptive and convenient for people.

Effective use of artificial intelligence also involves the interaction of different departments to solve emerging problems. Some promising companies are already undergoing large-scale professional retraining programs necessary for the introduction of artificial intelligence and other digital technologies. Such programs are aimed not only at teaching new skills but also at changing the mentality of employees to emphasize the importance of working together with other colleagues and interacting with artificial intelligence. After that, you can implement training programs, personnel rotations, collective competitions, and other educational opportunities.

Artificial intelligence automates numerous tasks that were previously performed manually and can analyze 100% of their volume without asking for help from a person whose support would have been irreplaceable until recently. The difference between the "audit of the future" is that artificial intelligence changes the very understanding of a reasonable guarantee since it can understand the entire integrity of the data registry and detect anomalies in them, starting not from the prescribed rules, but from risks.

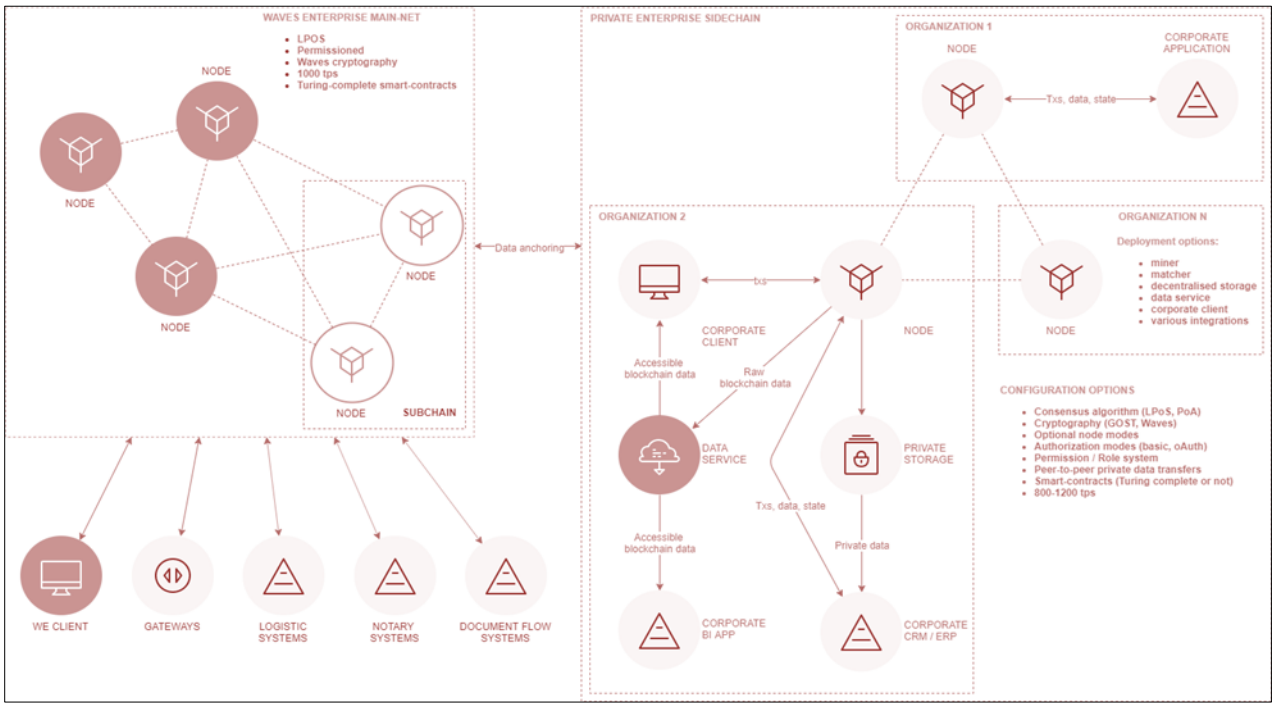
When registering and installing the necessary software on the workstation, each network participant receives a set of two cryptographic keys: private – for encrypting the transaction and public – for verifying the transaction.

Each regular participant, sending a transaction to the next one, signs the hash of the previous transaction and the public key of the next one and adds this information to the end of the transaction. Thus, the recipient can check the entire transaction chain by checking all signatures of previous participants in trans shares [1].

In this scheme, the hash acts as an array of data converted using the hash function. As for cryptocurrencies, this is information about transactions, in more complex systems – this is information about smart contracts and the current state of the program code entered the blockchain. As a result of the transformation, we get an almost unique, except in cases of hashing collisions, alphanumeric string that characterizes the original element but cannot be changed in the opposite direction. The combination of using public and private keys together with a hash provides blockchain technology with a high level of data storage security.

The disadvantages of certain types of digital technologies in law are:

- insufficient functional capacity of the ECITS: the actual lack of a convenient electronic cabinet created for judges, assistants and employees of the court staff; the lack of opportunities for feedback from participants in the judicial process and interaction with the systems of other courts, the implementation of electronic exchange of documents between courts of different instances and jurisdictions, when such a need arises;
- the lack of legal, organizational, and material-technical capabilities for the subject of providing administrative services to independently obtain separate information (documents, extracts) from state and regional registers necessary for the provision of such services, which makes it necessary for the recipient of administrative services to collect relevant documents.



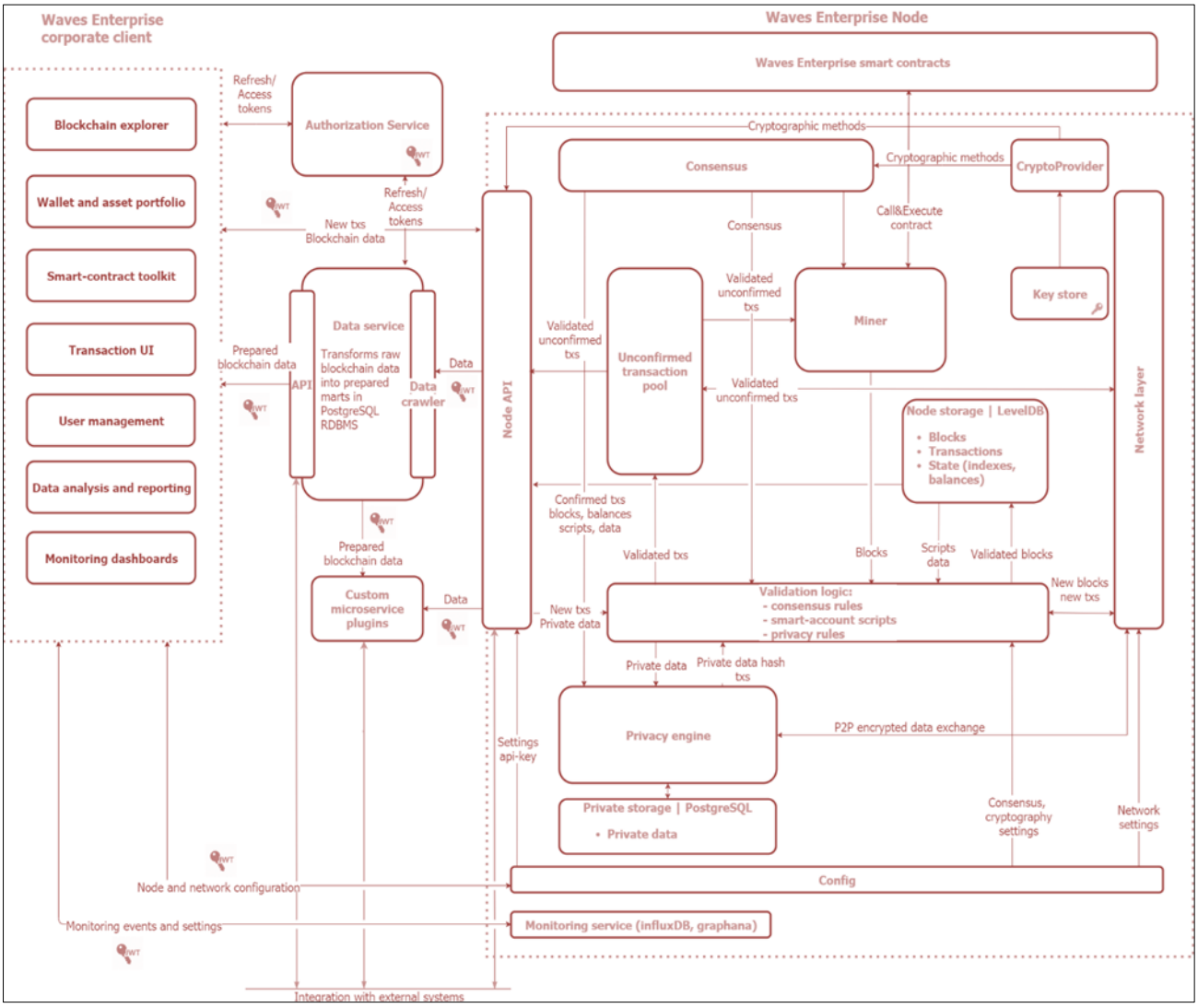
Source: author's own research

Figure 1 Blockchain e-government structure

The root causes of problems in the use of digital technologies in law are:

- inconsistency of the state policy in the field of introduction of digital technologies in the sphere of Public Administration, which is due to the lack of a unified and comprehensive state strategy in this area, which would be developed taking into account the recommendations of EU institutions, other international organizations, experts and specialists in the field of Law, Information Technologies, etc.;

- digital inequality, which is expressed in the unavailability of internet technologies, operating systems, and high-quality software for certain segments of the population, which complicates, and sometimes makes it impossible to use electronic public services, as well as in the lack of proper equipment of local state authorities and local self-government bodies of individual regions with the necessary technologies for providing high-quality electronic services;
- lack of digital competence, that is, the skills necessary for the use of electronic administrative services, and other electronic services, as well as the ability of civil servants, employees of educational institutions, and other employees to use appropriate technologies in their activities, which significantly slows down the pace of development of electronic services, making them inaccessible to a wide range of users;
- the imperfection of legal regulation in the use of digital technologies;
- insufficient budget funding, which causes the lack of proper technical support for state and local government bodies, insufficient quality of electronic services, low level of user satisfaction, and, as a result, an increase in confidence in this format of public services.



Source: https://wavesenterprise.com/

Figure 2 Transaction process in IoT e-government structure with Waves Enterprise blockchain platform

The disadvantages and gaps of legal regulation in the use of digital technologies in law are:

- disordered legislation, inconsistency with international standards, which is due to the adoption in different periods of normative acts regulating various types of public legal relations in the information sphere, in the use of digital technologies in public administration in the absence of consistency and a unified approach;

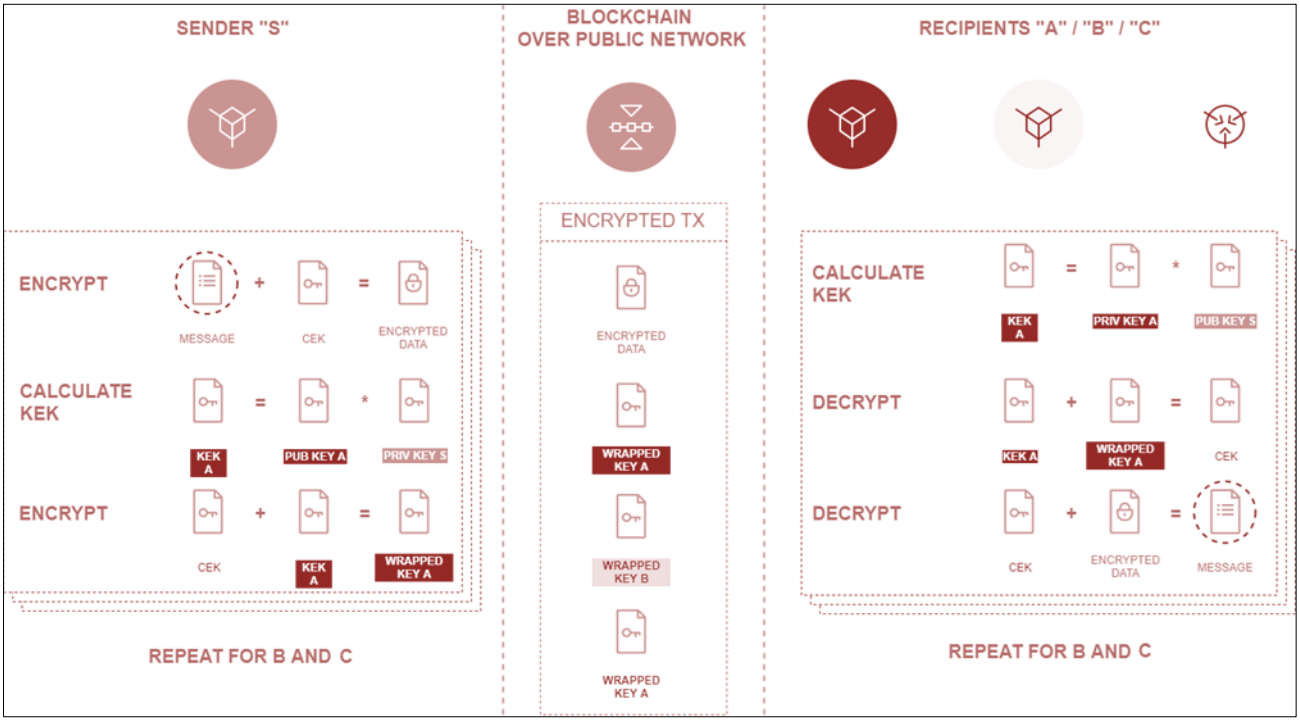
- the lack of unified terms in the use of digital technologies in public administration, which leads to unequal use of basic categories and concepts;
- non-regulation of certain types of legal relations arising on the Internet, in particular, the use of certain types of digital technologies in public administration in various areas (for example, education, healthcare, etc.);
- the problem of protecting personal data and rights in the use of digital technologies in the field of Public Administration, which is caused by the lack of regulation in the legislation of issues related to ensuring the security of operating systems and services, etc.

The active process of introducing digital technologies in various spheres of Public Administration continues, which makes it necessary to study positive foreign experience in this area. Special attention should be paid to the study of such aspects of the use of digital technologies in public administration as security, convenience, efficiency of providing electronic services, functioning of e-Government, Electronic legal proceedings, etc.

First, it should be noted that for a long time most of the world's leading countries have adhered to the strategy of non-interference in the telecommunications sector. Especially in Germany, Finland, the United Kingdom, and the United States, governments have played a relatively passive role in this sector. However, with the beginning of the financial and economic crisis in 2008, there were signs of rethinking [2].

Since this period, the global process of legislative regulation of the use of digital technologies in public administration has begun. However, the integration of digital technologies into law began much earlier than most states of the world realized the need for regulatory regulation of this process.

So, it is believed that European countries started the process of digitalization around 2008-2009 and already have a successful working system. At the same time, the European e-justice strategy, which was first presented by the European Commission on 30 May 2008, has made a significant contribution. The main goal of its implementation was to improve judicial cooperation at both the national and European levels. Subsequently, strategies for 2009-2013, 2014-2018, and 2019-2023 were developed [6].



Source: author's own research

Figure 3 Few types of senders in blockchain

Based on the analysis of the experience of implementing e-government in foreign countries, some scientists conclude that in response to changing political, economic, and social challenges, countries in all regions of the world have developed policies for implementing online government. Moreover, the policy priorities in the field of e–government in most foreign countries are to promote greater involvement of participants in the political process through a developed

multi–channel information structure, and the ultimate goal of the policy is a horizontally integrated, publicly accessible government with a technologically equipped administrative apparatus and citizens-users who have full access to it [14].

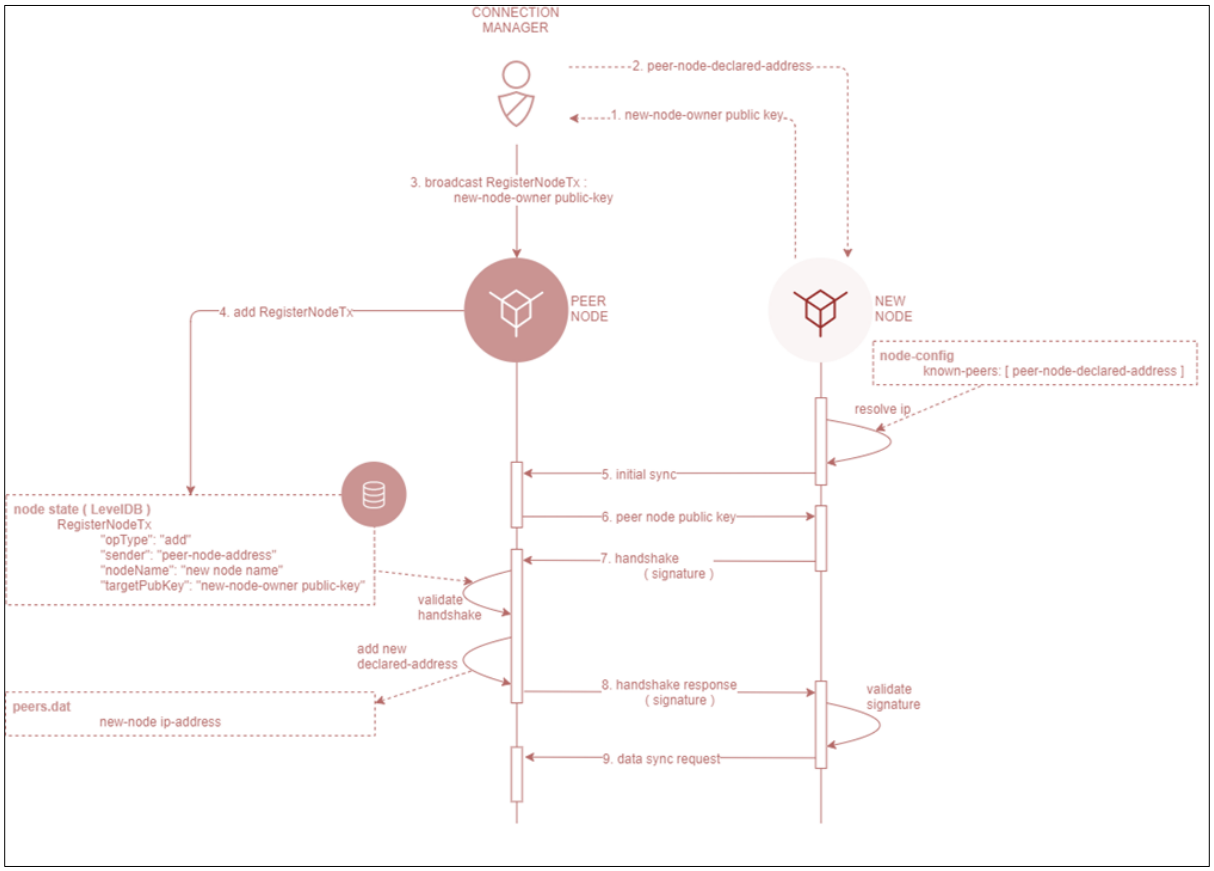
So, the main goal of the large-scale introduction of digital technologies in the sphere of Public Administration in most countries of the world was to provide accessibility and convenience of administrative services and involve citizens in the public administration process. It is characteristic that the general principles and regularities of the introduction and use of digital technologies in law in the vast majority of foreign countries are similar. However, each state has certain features in this area [3].

Therefore, we will describe some features of the use of digital technologies in individual foreign countries to determine possible ways to use the experience of such countries to improve and improve the efficiency of using digital technologies in public administration.

For example, Austria has developed and is implementing a unified e-governance strategy. At the same time, the main priorities of the Austrian strategy for the development of e-governance include:

- The creation of compatible systems that will be open to all participants, based on open-source code;
- Improving ease of use for users;
- International cooperation aimed at implementing cross-border projects;
- Interaction at different levels of public administration for the implementation of compatible projects;
- E-inclusion [14].

The e–governance model in Austria provides for the availability of ways to identify citizens who are users of electronic administrative services. In particular, the corresponding identification can be carried out using a "citizen's card" or a mobile phone. At the same time, the identification procedure is simplified as much as possible for the user. At the same time, the functioning of the Austrian portal has a solid legal framework, which consists primarily of the law on e-government, the law on electronic signature, and the law on the procedure for administrative procedures, as well as a number of further normative legal acts [6].



Source: https://wavesenterprise.com/

Figure 4 Permissions in e-governance blockchain platform

That is, as the experience of Austria shows, it is not necessary to have a codified legislative act in the field of regulating the use of digital technologies to ensure the effectiveness of such use, however, the state must form a unified policy in this area, which in this country is reflected in the state strategy.

Belgium has certain features of using digital technologies in law. Due to the complex territorial and National Organization of the country, the regions have their government, and their structure is not hierarchical. Also, each region has its own legislative and executive power, which directly deals with issues and protection of the interests of communities, taking this into account, each government also develops its initiatives in electronic governance [10]. Meanwhile, all the proposals that come from regional governments, after careful study, are embodied in a single concept of e-governance of the country.

The experience of organizing e-governance and other forms of using digital technologies in the UK can also be useful.

In this country, the State digital service of the Cabinet of Ministers Secretariat is the responsible authority for shaping digitalization policy. It was formed in 2011 to facilitate the transfer of public services to an electronic format, as well as to calculate the cost of switching to electronic services, calculate potential profits and participate in the development of a State Electronic strategy [10].

The country has also already developed the Direct Access Program, which allows all official institutions to provide citizens with electronic access to all documents at a convenient time. Moreover, now the number of forms of such documents exceeds 100 thousand [8].

The implementation of this project took place in several stages, which made it possible to consider shortcomings and miscalculations during the transition to each subsequent stage to be able to eliminate them without significant losses.

At the first stage of the project implementation, it is assumed that citizens will print out forms, fill out and send them to state bodies by regular mail. In the second stage, when the technology of electronic signatures was properly developed, forms were filled out on computers and sent via electronic communication channels. Consequently, the Direct Access Project helps to reduce the flow of paper documents and reduce costs, and the main advantages of this project are that it is implemented in all central and local authorities throughout the UK [3]. This ensures that the direct Access system is publicly available to all territories of the state.

Separately, we should focus on Electronic Document Management, which is organized in the UK. This state currently has various national standards for managing documentation: storage, transportation, and operation of media used in data processing and information storage, information security management, documentation management, legal admissibility, and information with legal force contained in Electronic Document Management Systems, Information Management, practical application of the 1998 law on data protection [11].

It should be noted that electronic litigation is also actively developing in the UK. In this area, the UK still has plans to create "mobile vessels" with online access. So, in England and Wales, a special court was created to consider online cases of small cash liens of large plaintiffs, such as energy companies and banks. This system is now available to all residents of England and Wales. The functionality of this court, in addition to money Claim Online (MCOL), has also been expanded to another simple procedure, namely the procedure for returning property to ownership: Possession Claim Online (PCOL). However, the most recent achievement of the British government was legalizing the use of audio and video communication in courts in all categories of cases [12].

Denmark is a state whose experience should be considered when developing measures aimed at improving the use of digital technologies in law, especially concerning electronic administrative services.

Denmark has already implemented initiatives such as mandatory e-mail and mandatory online self-service for individuals and legal entities; electronic medical services specifically for people with chronic diseases, digital learning tools, and the availability of public sector data online free of charge for individuals, businesses, and authorities. The e-governance strategy also emphasizes the need for close cooperation between the public sector and businesses, public organizations, and other entities to create a flexible and adaptive society ready for a fully digitized world [9].

It is important to note that receiving electronic administrative services in Denmark is carried out using an identifier – an electronic digital signature that is recorded on identity card chips, and therefore the identification procedure is as simple as possible and does not require additional actions on the part of the recipient.

In particular, the launch of the service for recording an electronic digital signature on identity card chips of a new type to increase the security of storing and using an electronic digital signature took place back in April 2010. Thanks to this, since the beginning of 2010, services for registering legal entities and entrepreneurs have been launched, electronic services for issuing passports, identity cards, and driver's licenses, as well as for registering the population at the place of residence have been launched in a pilot mode, and many auxiliary services for legal entities and land relations have been launched [1].

Estonia is considered a leader in the use of digital technologies in public administration in terms of the pace of development and scope of coverage of various areas of law.

In this country, each citizen receives a unique Estonian identification code, which is the key to accessing the services of the digital Estonian state. This code must prevent the need for constant copying of the personal data of a citizen by each government agency. In Estonia, state institutions store in electronic registers only the data of a citizen that are needed to provide specialized services. At the same time, if in the opinion of a citizen, the request for processing personal data was unfounded, he can file a complaint with the Inspectorate for personal data protection [2].

The specified body is independent of the government and has special powers, and the inspection staff has the right to check all state authorities for compliance with the rules for the protection of personal data during their processing.

In addition, Estonia has a rule according to which a state body does not have the right to create registers with data that is already stored in other registers, and a state agency does not have the right to demand personal data from a citizen if this data is already stored in the register [3].

A special feature of the Organization of e-governance in Estonia is that citizens who use an ID card on the Internet are connected not to a single database, but to many databases. In Estonia, to avoid creating one giant database, the Perekrestok technology has been developed, which allows you to use several databases of different institutions through one portal. The modular design is quite efficient since a failure in one system does not affect others. The technology avoids the emergence of monopolists in the development of software systems since the state does not rely on a separate specific developer [4].

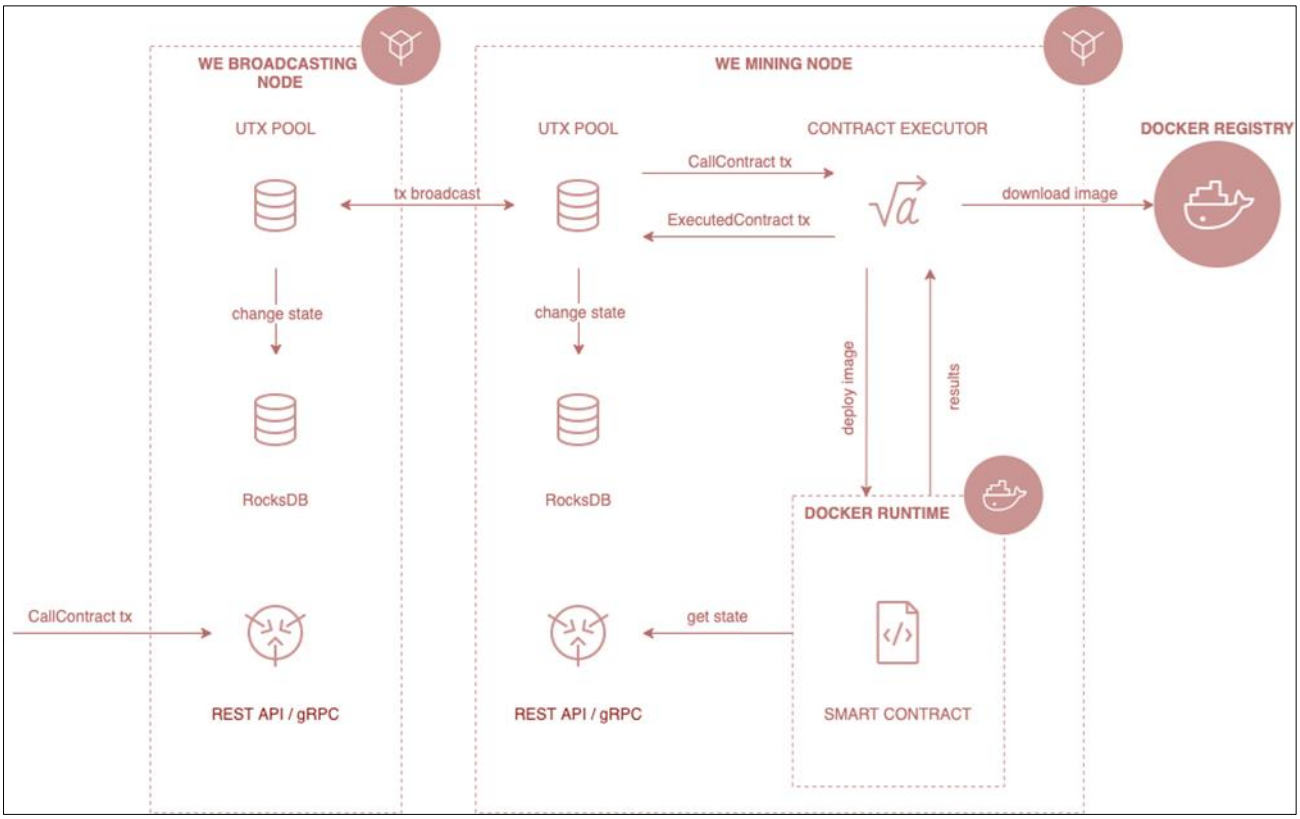
It should be noted that all public services in Estonia operate in the X-Road system, where data is encrypted and transmitted to various departments so that information cannot be intercepted. There is a situation of complete security since unauthorized access is not possible – no one can send a request for data if they do not have the appropriate level of access, authorization, or a specific reason. At the same time, the decentralized nature of X-Road also played an important role in building a network society in Estonia: it can be scaled indefinitely, and new services can be added [7].

In addition, it is planned to use robot judges in this state. Documents related to a specific case will be submitted to the robot judge, who will analyze them and make a final decision. Since this project needs to be improved, the advice of practitioners will be considered to improve the work of the robot judge [10]. In addition, it is expected that a judge working based on artificial intelligence considers small legal disputes (less than 7,000 euros), and his decisions can be appealed to a human judge [5].

Thus, to achieve a high level of integration of digital technologies into public administration, the state has attracted the support of business entities and created appropriate competitive conditions for this. Thanks to this, the Estonian government managed to avoid monopolism and concentration of a single subject of the personal data database, as well as achieve a high level of security and security of information contained in the databases of state bodies.

The Federal Republic of Germany (FRG) has certain features of the organization of e-government and other forms of using digital technologies in public administration. Thus, at the first National Information Technology Summit in 2006, an agreement was reached on the need for legislative regulation in the field of it. one of the first steps at the state level was the approval of the concept of "federal IT regulation" at the end of 2007. To implement the concept, new structures were created, and first, the position of the Federal Government Commissioner for Information Technologies was introduced [7].

At the same time, it should be noted that the first step taken in Germany for the development of the digital state, and accordingly the development of legislation in the field of regulating legal relations arising in connection with the use of digital technologies in public administration, was monitoring called "legislative regulation of access to the information society". That is, in the beginning, Germany evaluated and analyzed the existing legal framework in this area.



Source: https://wavesenterprise.com/

Figure 5 Smart contract in e-governance IoT

A key step in the field of regulatory and design support for the development of digital technologies in public administration in Germany was the introduction in 2009 of amendments to the Constitution-the Basic Law of Germany, in particular, the introduction of a new article 91c, which defined that "the federal government and federal states are obliged to coordinate their actions in planning, creating and operating information technology systems necessary to perform their tasks" [8].

It seems that the consolidation of this legal norm in the basic law demonstrates that in Germany great importance is attached to the introduction of digital technologies in public administration, and most importantly, that such implementation is coordinated and corresponds to a single state concept.

The experience of Poland may be quite useful in the field under study. In particular, the development of e-governance in Poland, according to some researchers, is at a high level, which makes it possible to provide most administrative services online. Thus, Poland has developed a broad system of electronic services, namely: electronic tax calculation; electronic accounting of the Customs Service; electronic business registration; electronic elections; electronic courts; electronic procurement; vehicle registration and Road Safety Service; emergency prevention system; Electronic Patient Information Service, etc. [9].

As in Germany, Poland has created an independent body from the government – the Department for the development of the information society-to coordinate the process of introducing digital technologies into public administration, as well as to exercise special powers in this area.

The powers of this department primarily include the following:

- coordination of projects related to the development of the information society, institutions that perform State tasks and state initiatives;
- processing issues related to the financing of investments in the development of the information society from external resources;
- conducting advertising events and distributing information in the field of the information society and computerization of the State

- working out issues related to the Prevention of "digital exclusion" (digital gaps) and the use of information technologies in the information society, etc. [7].

The creation of the only electronic court in the state of Lublin also looks quite progressive for Poland. Cases (except for criminal cases) in such a court are considered in the mode of electronic procedures, that is, via the Internet.

According to the rules of the court, the turnover of all documentation in court is carried out online, in addition, it is allowed to issue electronic extracts from documents and transfer them to the parties. For such a procedure, there is a special email address of the court, and SMS messages are received for the parties to process the movement of court documents and the progress of the case [5].

So, the specifics of the use of digital technologies in public administration in Poland is that in these states electronic services cover almost all areas of administrative services that determine the interaction of the state and The Citizens. This result was achieved thanks to a well-defined and well-coordinated strategy for the development of the information society.

4. Conclusions

The root causes of problems in the use of digital technologies in law are:

- Inconsistency of the state policy in the field of introduction of digital technologies in the sphere of Public Administration, which is due to the lack of a unified and comprehensive state strategy in this area, which would be developed taking into account the recommendations of EU institutions, other international organizations, experts and specialists in the field of Law, Information Technologies, etc.;
- Digital inequality, which is expressed in the unavailability of internet technologies, operating systems and high-quality software for certain segments of the population, which complicates, and sometimes makes it impossible to use electronic public services, as well as in the lack of proper equipment of local state authorities and local self-government bodies of individual regions with the necessary technologies for providing high-quality electronic services;
- Lack of digital competence, that is, the skills necessary for the use of electronic administrative services, other electronic services, as well as the ability of civil servants, employees of educational institutions, and other employees to use appropriate technologies in their activities, which significantly slows down the pace of development of electronic services, making them inaccessible to a wide range of users;
- Imperfection of legal regulation in the use of digital technologies;
- Insufficient budget funding, which causes the lack of proper technical support for state and local government bodies, insufficient quality of electronic services, low level of user satisfaction and, as a result, an increase in confidence in this format of public services.

The disadvantages and gaps of legal regulation in the use of digital technologies in law are:

- Disordered legislation, inconsistency with international standards, which is due to the adoption in different periods of normative acts regulating various types of public legal relations in the information sphere, in the use of digital technologies in public administration in the absence of consistency and a unified approach;
- The lack of unified terms in the use of digital technologies in public administration, which leads to unequal use of basic categories and concepts;
- Non-regulation of certain types of legal relations arising on the internet, in particular, the use of certain types of digital technologies in public administration in various areas (for example, education, healthcare, etc.);
- The problem of protecting personal data and rights in the use of digital technologies in the field of public administration, which is caused by the lack of regulation in the legislation of issues related to ensuring the security of operating systems and services, etc.

Based on the study of the experience of foreign countries in the use of digital technologies in law, we can point out the following areas of its application for improving e-governance, Electronic administrative services, electronic legal proceedings, and other forms of using digital technologies in public administration in:

- Formation of a unified balanced state policy in the field of digital technology development, which will cover not only the actual use of digital technologies in the field of Public Administration, but also in such related areas as

the provision of internet services to the population, the activities of internet service providers, operating system developers, etc.;

- Increasing the independence and functional capacity of the body responsible for the formation and implementation of the state Digital Policy, assigning it, among other things, functions to ensure the protection of personal data of a person;
- Establishing cooperation between the state and leading business entities, in particular, stimulating economic activities in the field of IT development, Internet technologies, etc., by providing tax incentives and other types of state support to the entity engaged in relevant types of economic activities;
- Scaling of electronic Administrative Services, which requires simplification of procedures for using such services, including simplification of the user identification procedure, providing access to Administrative Service Portals from devices with minimal technical characteristics, etc.;
- Expanding the possibilities of electronic legal proceedings, including the transition to electronic office management and the exchange of procedural documents, court decisions in electronic form without the simultaneous use of paper documents, etc.

The process of introducing innovative technologies in the field of Public Administration provides for:

- Development of appropriate technologies and their adaptation to specific public management activities;
- Creating conditions for their implementation and use of appropriate technologies (including training specialists in this field, advanced training of civil servants, proper equipment of state and local self-government bodies, etc.);
- Simplification of access to such technologies, their popularization among users.

Compliance with ethical standards

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The author declares that there are no conflicts of interest or source of funding.

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