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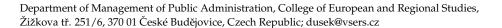
Data Boxes as a Part of the Strategic Concept of Computerization of Public Administration in the Czech Republic

Jiří Dušek

Department of Management of Public Administration, College of European and Regional Studies, Žižkova tř. 251/6, 370 01 České Budějovice, Czech Republic; dusek@vsers.cz

Abstract: The paper focuses on the analysis of the computerization of public administration in the Czech Republic in the context of the implementation and operation of data mailboxes, which have been an integral and very important part of e-Government in that country since 2009. A data mailbox has been defined in the Czech legal system since 2009 as an electronic repository of a special type established under the relevant Act No. 300/2008 Coll., which is intended for delivering electronic documents between public authorities on the one hand and natural persons and legal entities on the other. The data mailbox is mandatory for public authorities, legal entities registered in the Commercial Register, and natural persons engaged in business and may also be established by individuals not engaged in business. Public authorities are obliged to send documents preferably to the data mailbox of an addressee, if the latter has set up one, and, considering the legal assumption of delivery, entities which have set up a data mailbox are de facto obliged to collect documents from it. The aim of the study is a detailed description and critical analysis of the data mailbox system in the Czech Republic. The study also focuses on understanding the specific aspects of the implementation of data mailboxes in the Czech Republic. The main methods used are description, thematic and comparative analysis, so this is a descriptive case study. The results of the analysis confirm a number of problems related to the operation of data mailboxes, whether they be technical problems, security risks, usability problems, legal and regulatory problems or other organizational and procedural problems. The forced "computerization" of communication of a number of legal entities in 2023 is also mentioned.

Keywords: e-government; Czech Republic; data mailboxes; computerization; communication; public administration

1. Introduction

Due to the transition from a centrally planned economy to a market economy, the 1990s were a significant milestone for the Czech Republic, representing not only political but also economic, social, and cultural changes. After the needed reforms, it was time to begin the modernization and computerization of public administration in order to increase its efficiency and transparency (Brůna et al. 2005). As a result of the development of IT at that time, the authorities started to create their own information systems for their internal use, which is related to the beginning of e-Government in the Czech Republic. According to a number of national and international experts and organizations, the computerization of the Czech Republic is described as an endless story costing billions of CZK each year (see, for example, Veselý et al. 2016 or Bohatá et al. 2020), with the need of a reliable solution for authenticating and identifying citizens on the Internet. The projects seem to have been unreasonably expensive, and corruption is suspected. There are other projects for IT services in which the state, municipalities, or authorities have significantly failed and in which millions to billions of CZK from taxpayers have disappeared irretrievably (see, for example, the issues with non-functional basic registers, The end of the 11-year-long IZIP project—electronic health books, electronic records of sales due to the control of payments

of value added tax—termination after 6 years, Opencard—a system of multifunctional cards in the capital city of Prague operating in 2006–2016, etc.). In the Czech Republic, there is an incredible number of 7700 information systems for public administration, and their acquisition costs 110 billion CZK, and 25 billion CZK is spent on their operation every year (see Razima 2018 for more information).

According to Kala (2019), in many everyday situations, the Czech state administration still requires that the applicant come in person and fill in paper forms, sign them, and even provide a duty stamp in some cases. Even users of electronic data mailboxes, which are not very numerous among ordinary individuals, have no choice but to visit the authority in person and go through the traditional procedure. It is not possible to ensure the effectiveness and efficiency of investments into e-Government if IT technology is deployed in an environment where rigid legislation and unadapted agenda processes have to be followed. It is not necessary to go far to find successful examples—for example, an electronic sick note was introduced in Denmark in 2010, and application for maternity allowance and parental allowance is also submitted electronically; classic duty stamps were replaced in Slovakia by electronic ones as early as 2014; and today Estonia offers its citizens and entrepreneurs several hundred online public services and has equipped its citizens with electronic ID cards and electronic signatures, while interaction with state administration can be completed simply even using one's electronic identity on one's mobile phone.

2. E-Government and Public Administration

The digital age of the 21st century has brought new technologies, innovations, and trends that are dynamically changing the world and affecting all areas of our everyday lives. Informatization and digitization have changed how we create economic value and the structure and functioning of markets, how we communicate with state authorities, and how we open a bank account (Kolbenhayerová and Homa 2022). Information and communication technologies are key elements promoting the growth of e-government initiatives. Public administration refers to the products and procedures that the government implements to interact with its constituents: citizens, businesses, employees, and other governments. To address the needs of these different constituents, a wide variety of government services are necessary (Joseph and Kitlan 2008). For the first time since the creation of the modern welfare state, there is now a real opportunity to "reinvent" government. With the help of major IT vendors, governments realize that by applying the same principles and technologies that are fueling the e-business revolution, they can achieve a similar transformation. They have recognized the need to change the way they do business to provide services and information centered on the citizen. The result: the emergence of e-Government (Silcock 2001).

To a considerable extent, the term "e-Government" arises by analogy to the concepts and practices of electronic commerce applied to the public sector, referring to the delivery of government services to the public "online" (typically over the internet) or to the technological infrastructure required to deliver those services. The state of Texas, for example, defines e-government as government activities that take place by digital processes over a computer network, usually the Internet, between the government and members of the public and entities in the private sector, especially regulated entities. These activities generally involve the electronic exchange of information to acquire or provide products or services, to place or receive orders, to provide or obtain information, or to carry out financial transactions. A broader view of e-government is that it relates to the entire range of government roles and activities, shaped by and making use of information and communications technologies (ICTs). A high-level statement of this view is "knowledge-based government in the knowledge-based economy and society". More concretely, e-government brings together two elements that have not been naturally joined in the past. One is the environment, within government and in the society at large, created by the use of electronic technologies, such as computing, e-mail, the World Wide Web, wireless, and other ICTs, combined with management models, such as client/citizen centricity and single-window convergence.

The other is the basic model of the state and of public administration within it, linking the dynamics of democracy, governance, and public management. This broader view situates e-government in the four domains (the jurisdiction of the state, the state and its relationship with its citizens and the rule of law, operations of state institutions—opening up issues of electronic public administration—and the state in the international environment) into which governance and public administration can be divided (Brown 2005). Currently, there is a broader concept of digital era governance that includes the e-government but goes even beyond that (Dunleavy et al. 2006; Margetts and Dunleavy 2013).

The importance of computerization of public administration (e-Government) is multi-faceted and includes several key aspects:

1. Efficiency and speed: Computerization enable reducing the amount of administration and speeding up time-consuming processes of public administration, which brings efficiency and greater promptness of services provided. For example, submitting applications in electronic form, electronic payments, or electronic communication with authorities allow citizens and businesses to access public administration services more quickly and easily.

2. Transparency and openness: The computerization of public administration facilitates access to information and data from the public sector, increasing transparency and openness of administration. Electronic platforms enable easy retrieval and sharing and make public data and information accessible, which promotes participation of citizens and strengthens democratic principles.

3. Quality and reliability: Computerization can improve the quality and reliability of public administration services by minimizing human errors and increasing the automation of processes. Electronic systems can be designed to be accurate, consistent, and up-to-date, increasing the quality and credibility of the services provided.

4. Sustainability and environmental friendliness: The computerization of public administration can also contribute to sustainability and environmental friendliness. For example, reducing the need for paper and printing thanks to electronic documents and communication can have a positive impact on the environment.

5. Economic potential: Computerization can have economic potential, for example, by reducing the cost of running public administration, increasing the efficiency and competitiveness of businesses, and promoting economic growth.

6. Improvement of the relationship between citizens and public administration: Computerization enables citizens and businesses to communicate with public administration more easily and more comfortably, which results in greater satisfaction for citizens.

It can be said that the computerization of public administration has the potential to significantly improve the quality and efficiency of the services provided, and the transparency, sustainability, and economic performance of the public sector, thereby strengthening the relationship between public administration, citizens, and the business sector.

Developing an e-government system is influenced by the internal and external environment. It does not only depend on the resources available but also relates to the political will of the government to develop such a system. It also indicates that the overall external environment (economy, democracy, education, Internet usage, and peer pressure) does affect e-government development, with internet usage, democracy, and education exhibiting the most significant influence. The economy can also indirectly impact e-government by affecting other factors (Zheng and Manoharan 2015). Technical matters also contribute to the quality of e-government facilities when they are used. One study states that perceptions of ease of use, compatibility, and trustworthiness are significant indicators of citizens' intention to use e-government services. Citizens' intention will increase if citizens perceive the service as easy to use, intuitive, and easy to navigate. Citizens will be more willing to use online services if the services are congruent with the way they like to interact with others. Compatibility was found to be the most significant motivating factor which increases citizens' intention. Agencies should provide information and services in a manner that is consistent with other ways citizens have dealt with the government (Carter and Bélanger

2005). However, this means that an e-government system should not only be advanced and sophisticated but, most importantly, it should be customer-oriented (Aritonang 2017).

Al-Hujran et al. (2015) argued that e-government is still experiencing implementation and adoption challenges. The failure of e-government projects is still a reality, from partial failures to complete rejections, negatively affecting end-user satisfaction due to not addressing real business needs. It is normal for a project to have positive and negative effects, but if the adverse effects dominate over the positive ones, this represents a concern (Anthopoulos et al. 2016). There are many challenges and barriers that can delay the progress of e-government implementation. The variety and complexity of e-government initiatives imply the existence of a wide range of challenges and barriers to its implementation and management—see Table 1 for more details (Alshehri and Drew 2010).

Table 1. E-government barriers (Alshehri and Drew 2010).

Category	Barriers
Technical	ICT Infrastructure Privacy Security
Organizational	Top management support Resistance to change to electronic ways of Collaboration Lack of Qualified Personnel and Training
Social	Digital Divide Culture
Financial	High Cost

E-government has the potential to greatly benefit society by increasing efficiency, improving services, and providing better accessibility to public services. It also allows for more transparency and accountability in government operations. However, it is important to consider the potential disadvantages, such as unequal access to the internet, reliability of information, hidden government agendas, hyper-surveillance, cost, and inaccessibility for certain populations. As with any new technology, the adoption and implementation of e-government should be carefully assessed to ensure that the benefits outweigh the risks (E-Spin 2023).

The potential risks associated with e-government, regardless of the technocratic context, are numerous; the author identifies 17 of the most significant ones:

1. Data security: With the expansion of digital services and the collection of personal data of citizens, the risk of their misuse or threat to security increases. A successful cyber-attack on e-government systems could lead to the leakage of sensitive information and the loss of citizens' trust.
2. Lack of digital literacy: Some citizens may have limited knowledge and skills as regards the use of digital technologies. This may lead to the exclusion of certain groups of citizens who do not have access to or are unable to use online services effectively.
3. The digital gap: E-government can contribute to deepening the gap between people who have access to modern technologies and the internet and those who do not. Unequal access to resources and digital services can lead to the increase in social and economic inequalities.
4. Lack of transparency: E-government should be transparent and accessible to citizens. However, the lack of transparency in the functioning of e-government systems and decision-making processes can lead to public distrust and concerns about the fair use of public funds.
5. Dependence on technology: E-government is dependent on technology and ICT infrastructure. In the event of a system failure, technical problems, or insufficient availability and reliability of technology, the continuity of service provision and communication with citizens may be impaired.

6. Privacy and personal data protection: The collection and processing of personal data of citizens is increasing with e-government. It is important to ensure that strict privacy rules are followed, and that personal data is properly and securely managed to minimize the risk of misuse or unauthorized access to them.

7. Legality and regulation: When implementing e-government, it is important to ensure compliance with applicable legislation and regulations. Lack of attention to legal aspects can lead to privacy violations, insufficient protection of personal data, or misuse of public resources.

8. Lack of accessibility: E-government services and websites should be designed to be accessible to all citizens, including people with disabilities or limited digital capabilities. Lack of accessibility can lead to the exclusion of certain groups of citizens.

9. Dependence on suppliers: The implementation and operation of e-government systems often require cooperation with external suppliers. This can mean dependence on these suppliers and the risk of failure if suppliers are unable to properly adapt or provide the necessary services.

10. Social innovation: The transition to e-government may require a change in the attitudes and ways of working of government employees and citizens. Insufficient preparation and support for these changes can lead to a slower pace or failure of the implementation of e-government.

11. Financial costs: The implementation and operation of e-government systems can be financially challenging. Inadequate planning, inefficient use of resources, or long-term maintenance costs can be a burden for public budgets.

12. Abuse of power and corruption: E-government can bring new opportunities for abuse of power and corruption. Lack of oversight mechanisms, lack of transparency, and a weak ethical culture may allow abuse of e-government systems for personal benefit or unfair practices.

13. Technological obsolescence: The rapid development of technology means that e-government systems can be prone to technological obsolescence. This may require regular updates and upgrades to maintain their effectiveness and safety. Insufficient investment in technological development may mean that e-government systems will be outdated and not provide the optimal user experience.

14. Lack of public confidence: The success of e-government depends on public trust. If citizens do not have confidence in the system, the protection of their personal data, or the ability of the government to provide quality and reliable services, the adoption of e-government and its effectiveness may be reduced.

15. Lack of interoperability: E-government often includes various systems and platforms that need to work together and exchange information. Lack of interoperability between these systems can lead to communication problems, data mismatches, and disruption of service provision.

16. Dependency on the Internet connection: E-government services often require access to the Internet. In areas with insufficient infrastructure or limited connectivity, access to e-government may be limited or impossible, creating inequalities for the benefit of citizens with access to the Internet.

17. Political instability and changes in government: Political changes and instability of government can have an impact on the continuity of e-government initiatives. The interruption of projects, changes in priorities, or lack of support for the new government can lead to the failure or incompleteness of e-government projects.

It is important to carefully analyze these risks and address them within the framework of the e-government strategy in order to minimize their impacts and ensure the successful implementation and operation of digital services for citizens. More about the risks associated with the implementation of e-government, operation, and other perspectives and challenges of e-government (Fountain 2001; Moon 2002; West 2004; Norris and Moon 2005; Heeks 2006; Sahoo et al. 2021). In order for nations to remain competitive in a globalized world, it is required to fully utilize e-government, and factors influencing e-government

adoption are relevant in both the government's internal and external environment (Savoldelli et al. 2014). Incompatible systems, complex organizational systems, initial cost increase associated with non-conformities, lack of integration guidance, lack of resources, lack of management commitment, the demand for training, and cultural change compromise e-government initiatives (Lam 2008).

A mechanism utilized to consider this government's internal and external environment is critical success factors referring to a limited number of conditions, variables, or characteristics that have a direct and significant impact on objectives, such as effectiveness, efficiency, and viability of a government (Aziz et al. 2016). To achieve the intended overall objectives, activities related to the critical success factors must be performed at the highest possible level of excellence—see Table 2 for more details (The Business Dictionary 2019).

Table 2. Critical success factors for e-government service delivery (Apleni and Smuts 2020).

Critical Success Factor
Funding
ICT Infrastructure
Adequate legal and policy formulation
Awareness
Top management and government support
User computer efficacy
Stakeholder involvement
Communication and change management
Clear vision and strategy
Training
Government departmental goals
Citizen empowerment (as opposed to marginalizing groups)

3. Materials and Methods

The paper focuses on the analysis of the computerization of public administration of the Czech Republic in the context of the implementation and operation of data mailboxes, which have been an integral and very significant part of e-government in the Czech Republic since 2009. A data mailbox has been defined in the Czech legal order since 2009 as an electronic repository of a special type established under the relevant Act No. 300/2008 Coll. (Chamber of Deputies of the Parliament of the Czech Republic 2008), which is intended for delivering electronic documents between public authorities, on the one hand, and natural persons and legal entities, on the other. The data mailbox is mandatory for public authorities, legal entities registered in the Commercial Register, and for natural persons engaged in business and may also be established by individuals not engaged in business. Public authorities are obliged to send documents preferably to the data mailbox of an addressee, if they have established one and, considering the legal assumption of delivery, the entities which have a data mailbox established are de facto obliged to collect documents from it. The methodology of the presented paper is based on the utilization of the latest theoretical insights based on the study of the academic literature, scientific research and studies, journals, and materials of the individual actors of computerization of the Czech public administration. Furthermore, it is based on searching for and assessing mutual relations and connections, which help clarify the addressed issues and derive and formulate adequate conclusions resulting from this analysis. The aim of the study is a detailed description and analysis of the data mailbox system in the Czech Republic; the study also focuses on understanding the specific aspects of the implementation of data mailboxes in the Czech Republic. For comparative reasons, the study also deals with other EU countries to a limited extent. The scientific study focuses mainly on the critical analysis of the current technical and legal situation. To achieve the main goal, a total of three milestones are set: a description of the implementation of data mailboxes in EU countries, a description of the historical development of data mailboxes in the Czech Republic (including an overview of relevant legislation), identification of problems and

recommendations regarding the implementation of data mailboxes on the example of the Czech Republic. The main methods used are description, thematic and comparative analysis, so this is a descriptive case study. The impulse for writing this study is the forced "electronization" of communication for a number of legal entities in 2023. The obligation newly applies to all entities kept in the register of persons, i.e., self-employed persons, associations, or foundations. Ordinary citizens are not affected by the obligation in the end, although it was originally planned. The second impulse was the newly introduced plans for the electronization of public administration. However, in the time of fiscal restrictions, these plans bring new but currently "unnecessary" and mainly financially demanding topics (e.g., the cancellation of birth numbers, which is the main identifier of persons in the Czech Republic) instead of solving the existing problems of the electronization of public administration. Due to the extent of the issue of the electronization of public administration, the author focuses primarily on the issue of public administration communication via the electronic system of data mailboxes. Statistical data (secondary data) comes from the authority responsible for the data mailbox system in the Czech Republic, i.e., the Ministry of the Interior of the Czech Republic 2023. The comparison of the implementation of data mailboxes in EU countries is based on the author's own research and insights, and the specification of functional problems with the implementation of data mailboxes (primary data). The results of the analysis confirm a number of problems related to the operation of data mailboxes, whether they be technical problems, security risks, usability problems, legal and regulatory problems, or other organizational and procedural problems. The forced "computerization" of communication of a number of legal entities in the Czech Republic in 2023 is also mentioned.

4. Data Mailboxes and Their Implementation in Selected EU Countries

Data mailboxes are an important part of the e-government concept, which is the introduction of modern information and communication technologies into public administration in order to provide public services to citizens, businesses, and other entities more effectively and transparently. Data mailboxes are electronic mailboxes intended to enable secure communication between public administration entities, businesses, and citizens in terms of electronic state administration. The implementation of data mailboxes in European Union (EU) countries is part of the EU's efforts to digitize public administration and promote e-services for citizens and businesses. Each EU member state has its own data mailbox system, which is in line with European legislation and particularly Regulation (EU) No 1094/2010 910/2014 on electronic identification and trust services for electronic transactions in the internal market, known as the eIDAS Regulation (European Union 2014; see also Gregušová et al. 2022). This Regulation lays down requirements for electronic identification, electronic signatures, electronic stamps, and secure communication between public administration entities, businesses, and citizens.

Since 2009, the data mailbox system has been developing rapidly in EU countries. Denmark, Estonia, and Austria are among the most advanced users of such systems. Additionally, in the other EU countries, the system is based on the same principles as in the Czech Republic. It is always a stand-alone information system for the transmission of data messages, which is legally placed on the same level as registered letters (Šíma and Novák 2014). The implementation of data mailboxes may vary from country to country in the EU in several different respects, such as the name of the system, its technical specifications, user registration requirements, the types of communication required, and other details. Some EU countries have mandatory data mailboxes for certain entities, such as public authorities or businesses, while in other countries, data mailboxes are optional.

Examples of implementation of data mailboxes in various EU countries are as follows:

1. Austria: In Austria, the data mailbox system is called "Bürgerkarte", literally "Citizen Card". It is a system operated by the Austrian government which allows citizens and businesses to communicate with public institutions through encrypted and signed messages. The Austrian Bürgerkarte also serves as a platform for electronic identifica-

tion and authorization. In Austria, data mailboxes are mandatory for entrepreneurs and legal entities. Citizens also have the opportunity to voluntarily set up a data mailbox.

2. Belgium: The data mailbox system is operated under the name "eBox". It is an electronic system that enables communication between citizens, businesses, and various government institutions. eBox allows the delivery of official documents, and communication with tax authorities, social security, and other public institutions. In Belgium, data mailboxes are mandatory for certain groups of entities, including legal persons, entrepreneurs, and public institutions.

3. Bulgaria: In Bulgaria, the data mailbox system is called "Електронна администрация" which means "electronic administration". It is a system operated by the Bulgarian government, allowing citizens, businesses, and public institutions to communicate through encrypted and signed messages. The Bulgarian electronic administration system also serves as a platform for electronic identification and authorization. In Bulgaria, data mailboxes are mandatory for legal persons, public institutions, and certain groups of natural persons.

4. Croatia: In Croatia, the data mailbox system is operated under the name "e-Građani". This system allows citizens to communicate with various public institutions, such as tax authorities, health insurance companies, and others. E-Građani is used to deliver official documents and electronic communication between citizens and public institutions. In Croatia, data mailboxes are mandatory for legal persons, self-employed persons, and public institutions.

5. Cyprus: In Cyprus, the data mailbox system is called "Ariadni", which means "Ariadne". It is a system operated by the government of Cyprus which allows citizens, businesses, and public institutions to communicate through encrypted and signed messages. The Ariadni system of Cyprus also serves as a platform for electronic identification and authorization. In Cyprus, data mailboxes are mandatory for legal persons, public institutions, and certain groups of natural persons.

6. Czech Republic: The data mailbox system is operated under the name "datová schránka". Data mailboxes are mandatory for communication between citizens, businesses, and public institutions, such as financial authorities, trade registers, social security, etc. The data mailbox allows official documents and communication to be delivered among entities registered in the Commercial Register. In the Czech Republic, data mailboxes are mandatory for legal persons (companies), entrepreneurs registered in the Commercial Register, and natural persons who are registered in the Trade Register. They are also mandatory for some authorities and public institutions.

7. Denmark: In Denmark, the data mailbox system is known as "e-Boks". It is a private online platform operated by a private company that is a contracting partner of the Danish government. Citizens and businesses can set up their data mailboxes free of charge on this platform and communicate with public institutions, such as authorities, health insurance companies, or banks. In Denmark, data mailboxes are mandatory for legal entities, including companies and public institutions. They are also mandatory for certain groups of individuals, such as lawyers and doctors.

8. Estonia: Estonia is known for its advanced e-government system, which also includes a data mailbox system called "e-postkast". Citizens and businesses are obliged to have their own data mailbox and to receive and handle certain types of communication with public institutions through this system. The system is secure, encrypted and enables electronic identification and signing of documents. In Estonia, data mailboxes are mandatory for all citizens, residents, and non-profit organizations. They are also mandatory for government institutions and public organizations.

9. Finland: In Finland, the data mailbox system is called "Viestit" and is operated by the Finnish National Agency for Digital and Information Management. Citizens and businesses can set up their data mailbox free of charge on this platform and communicate with public institutions, such as authorities or health insurance companies. In Finland, data mailboxes are mandatory for all citizens, residents, legal persons,

and self-employed persons. They are also mandatory for public institutions and organizations.

10. France: In France, the data mailbox system is called "Courrier recommandée électronique" (CRE), which means "electronic registered letter". It is a system operated by a private company, enabling communication between citizens, businesses, and public institutions through encrypted and signed messages. In France, data mailboxes are mandatory for certain groups of entities, including legal persons and public institutions.

11. Germany: In Germany, the data mailbox system is called "De-Mail". It is a fully digital system operated by private service providers certified by the German government. De-Mail enables communication between citizens, businesses, and public institutions through encrypted and signed messages. In Germany, data mailboxes are mandatory for certain groups of entities, including legal persons, business companies, individuals with a profession, and some offices.

12. Greece: In Greece, the system of data mailboxes is called "ΔI@ΥΘΥΝΣΗ" (Diavgeia), which means "electronic channel". It is a system operated by the Greek government which allows citizens, businesses, and public institutions to communicate through encrypted and signed messages. Diavgeia also serves as a platform for electronic identification and authorization. In Greece, data mailboxes are mandatory for legal entities, self-employed persons, and public institutions.

13. Hungary: In Hungary, the data mailbox system is operated under the name "e-Cégkapu". It is an electronic system for communication between businesses and various public institutions. E-Cégkapu enables the delivery of official documents, communication with tax authorities, the Statistical Office, and other public institutions. In Hungary, data mailboxes are mandatory for legal entities, public institutions, and certain groups of natural persons, such as lawyers and tax advisors.

14. Ireland: In Ireland, the implementation of data mailboxes is provided through the "eTenders" and "eInvoicing" systems operated by the Irish government and used for electronic communication between public institutions and contractors. In Ireland, data mailboxes are mandatory for certain groups of entities, including legal persons and public institutions. There is also a system called "eBox", which serves as a digital mailbox for citizens.

15. Italy: In Italy, the data mailbox system is called "Posta Elettronica Certificata" (PEC), which means "certified electronic mail". It is a system operated by private service providers certified by the Italian government. PEC enables communication between citizens, businesses, and public institutions through encrypted and signed messages. In Italy, data mailboxes are mandatory for legal entities, entrepreneurs, and public institutions.

16. Latvia: In Latvia, the system of data mailboxes is called "Latvijas e-paraksts", which means "Latvian electronic signature". It is a system operated by the Latvian government which allows citizens, businesses, and public institutions to communicate through encrypted and signed messages. The Latvian electronic signature system also serves as a platform for electronic identification and authorization. In Latvia, data mailboxes are mandatory for legal entities, self-employed persons, and public institutions.

17. Lithuania: In Lithuania, the data mailbox system is called "Lietuvos e. valdžia", which means "Lithuanian electronic government gateway". It is a system operated by the Lithuanian government which allows citizens, businesses, and public institutions to communicate through encrypted and signed messages. The Lithuanian e-government gateway also serves as a platform for electronic identification and authorization. In Lithuania, data mailboxes are mandatory for legal entities, self-employed persons, and public institutions.

18. Luxembourg: In Luxembourg, the data mailbox system is known as "Guichet.lu" and it is a platform for electronic communication between citizens, businesses, and public institutions. Guichet.lu allows sending encrypted and signed messages, and electronic identification and authorization. In Luxembourg, data mailboxes are mandatory for

legal entities, commercial companies, and public institutions. They are also mandatory for certain groups of individuals, such as lawyers and notaries.

19. Malta: In Malta, the data mailbox system is called "eID Malta" (Electronic Identification Document Malta). It is a system operated by the Maltese government which allows citizens, businesses, and public institutions to communicate via electronic messages and documents. The eID Malta system also serves as a platform for electronic identification and authorization. In Malta, data mailboxes are mandatory for legal entities, entrepreneurs, and public institutions.

20. Netherlands: In the Netherlands, the data mailbox system is called "DigiD Post". It is part of a wider DigiD system that allows citizens and businesses to access online services of the government. DigiD Post is used to deliver digital mail from public institutions, such as authorities, tax authorities, or social insurance companies. In the Netherlands, data mailboxes are mandatory for all legal persons and self-employed persons. They are also mandatory for some authorities and public institutions.

21. Poland: In Poland, the system of data mailboxes is called "ePUAP", an acronym for *elektroniczna Platforma Usług Administracji Publicznej* "electronic platform of public administration". It is a system operated by the Polish government which allows citizens and businesses to communicate with public institutions through encrypted and signed messages. ePUAP also serves as a platform for electronic identification and authorization. In Poland, data mailboxes are mandatory for legal entities, public institutions, and certain groups of natural persons, such as lawyers and tax advisors.

22. Portugal: In Portugal, the data mailbox system is implemented under the name "Sistema de Faturação Eletrónica do Estado" (SFE) and is used for electronic communication between public institutions and their contractors. In Portugal, data mailboxes are mandatory for legal entities, entrepreneurs, and public institutions.

23. Romania: In Romania, the data mailbox system is called "SPV", short for *Sistemul de Plăți Virtuale* "virtual payment system". It is a system operated by the Romanian Ministry of Information and Communication Management, which allows citizens, businesses, and public institutions to communicate through encrypted and signed messages. The Romanian SPV also serves as a platform for electronic identification and authorization. In Romania, data mailboxes are mandatory for legal entities, entrepreneurs, and public institutions.

24. Slovakia: In Slovakia, the system of data mailboxes is called "Slovensko.sk" (Slovakia.sk). It is a system operated by the Slovak government which allows citizens, businesses, and public institutions to communicate through encrypted and signed messages. Slovensko.sk also serves as a platform for electronic identification and authorization. In Slovakia, data mailboxes are mandatory for legal persons, self-employed persons, and state and public institutions, but also for certain groups of natural persons, such as lawyers and notaries.

25. Slovenia: In Slovenia, the data mailbox system is called "eUprava", which means "electronic management". It is a system operated by the Slovenian government which allows citizens, businesses, and public institutions to communicate through encrypted and signed messages. The Slovenian eUprava system also serves as a platform for electronic identification and authorization. In Slovenia, data mailboxes are mandatory for legal persons, citizens, and public institutions.

26. Spain: In Spain, the data mailbox system is called "Notificaciones Electrónicas Obligatorias" (NEO), which means "mandatory electronic notification". It is a system operated by the Spanish government which allows citizens and businesses to communicate with public institutions and organizations through encrypted and signed messages. In Spain, data mailboxes are mandatory for certain groups of entities, including legal persons and public institutions.

27. Sweden: The data mailbox system is called "e-Brev" and is operated by the Swedish government. It is a secure system that allows citizens and businesses to communicate with public institutions and organizations through digital mail. In Sweden, data

mailboxes are mandatory for all legal entities, self-employed persons, and public institutions. Citizens also have an opportunity to set up their own data mailbox.

These examples illustrate different approaches to the implementation of data mailboxes in EU countries. They differ in whether the use of the system is mandatory or voluntary, in the way users register, and in the name of the system itself. However, the common objective is to increase digitization and efficiency of public administration and to promote electronic communication between entities within the EU (See also Zefferer 2015; Nixon and Koutrakou 2017; European Commission 2017, 2019, 2022; Skóra et al. 2022; Săraru 2023). Šíma and Novák (2014) identify a total of 11 different approaches to the implementation of data mailboxes:

1. The data mailbox operator (whether it be a national postal operator, specialized company, public authority, commercial entity, etc.);
2. The strategy for the implementation of data mailboxes (scope of the obligation to set up a data mailbox, establishing the obligation to use a data mailbox, targeting a specific topic, or communication flow);
3. Complementary services provided along with data mailboxes (connection with electronic banking, hybrid mail, messages from the tax office, choice of entities to receive messages, monitoring of the status of sent messages, sharing messages, the status of requests submitted by the user to public administration, sorting of messages, setting up a mailbox for foreigners, archiving, etc.);
4. The size and nature of the data storage of messages (including charging for services and the possibility of saving one's own documents);
5. The type of communication provided (communication of authorities on the one hand and business entities and natural persons on the other, one-way/two-way communication, sending messages to business entities, or communication between companies);
6. What charges the data message system involves (whether it be that fees for a message are charged to the sender, it is free of charge to receive a message, fees depend on the volume of the message, flat fee for data mailbox management, some additional services are charged or sending data messages between private entities is charged);
7. The obligation to set up a data mailbox (the obligation to set up a mailbox for businesses and public authorities, the implementation only by selected public authorities, setting up a mailbox for all types of entities is entirely voluntary, etc.);
8. The obligation to send data messages (the obligation to send an official document via a data mailbox, the choice of an institution to communicate with via data messages, or voluntary choice of the communication channel);
9. Assumption of delivery (a document is considered to be received when it arrives in the addressee's mailbox or after a certain period of time; delivery assumption of delivery is not applied—if the message is not opened, it is rejected or not delivered);
10. The access interface of data mailboxes (a dedicated web portal, log in to the service included in the provider's portal, access of data mailboxes in electronic banking, access via a mobile application, or via a written service or document system);
11. User identification (with a unique identifier—social security ID, national identifier, multifunctional "electronic ID card", an already created account with the national post office, "chip ID", "DigiD", an identifier saved on the user's ID card, etc.).

The level of implementation of data mailboxes thus varies between the individual countries of the European Union since each country has its own legislative and technical framework for electronic communication between public institutions and other bodies. European Union countries with a high level of data mailbox implementation include Denmark, Finland, the Netherlands, Estonia, Sweden, and Norway. These countries have advanced data mailbox systems resulting from a strong digital infrastructure (advanced digital infrastructure and wide internet availability), an e-commerce culture (historically strong e-commerce culture and trust in digital technology), cooperation between sectors, great emphasis on data security and data protection, and user-friendliness and simplicity of using the data mailbox system.

On the other hand, in EU countries, such as Greece, Bulgaria, and Malta, the level of implementation of data mailboxes is lower. Although the level of implementation of data mailboxes among the EU countries is quite different, a long-term trend is the increasing use of electronic systems for electronic communication with public institutions.

5. History of Data Mailboxes in the Czech Republic

In the Czech Republic, the vision of data mailboxes started to be considered in 2005. The concept of data mailboxes was openly discussed in both political and professional circles. Between 2006 and 2008, several proposals for legal regulation of data mailboxes were made. In 2008, a key law on electronic acts and authorized conversion of documents was adopted. The data mailbox system was launched in 2009 and has undergone constant development since then (Šíma and Novák 2014). In 2009 the Czech Republic introduced an obligation for some entities to communicate with public administration via electronic data mailboxes. Here, is an overview of key events related to the history of data mailboxes in the Czech Republic:

➢ 2000: Introduction of the new Act No. 365/2000 Coll. on public administration information systems and on the amendment of certain other acts (act on public administration information systems) (Chamber of Deputies of the Parliament of the Czech Republic 2000), which regulates obligations of public administration obligations in the area of information systems and electronic communication. The act also covers the possibility of communicating with public administration via data mailboxes and introduces new procedures and standards for electronic communication.

➢ 2009: Introduction of mandatory electronic communication with state administration for some entities with the status of an entity subject to mandatory electronic filing (POP) and are required to have a data mailbox.

➢ 2010: Act No. 300/2008 Coll., on electronic acts and authorized conversion of documents (Chamber of Deputies of the Parliament of the Czech Republic 2000), was amended to strengthen the role of data mailboxes in communication with public administration. New entities subject to mandatory electronic filing (POP), which must have a data mailbox, were added, and the number of entities subject to communication via data mailboxes has increased.

➢ 2012: Integration of data mailboxes with information systems—In 2012, data mailboxes were integrated with public administration information systems, which enabled more efficient and automated data and document exchange between public authorities and their clients.

➢ 2019: Obligation of data mailboxes for entrepreneurs—An obligation has been introduced for entrepreneurs (VAT payers) to have a data mailbox and to receive electronic documents from the public administration.

➢ 2021: Modernization of data mailboxes—In 2021, the data mailbox system was modernized, and new features and improved user environments were introduced. This has enhanced the efficiency and user-friendliness of data mailboxes. Selected statistics on data mailboxes are listed in Table 3.

It is difficult to predict the further development of data mailboxes, data messages, and data vaults. The main influence is Czech legislation, especially Act No. 300/2008 Coll. on electronic acts and authorized conversion of documents (Chamber of Deputies of the Parliament of the Czech Republic 2008). In particular, it covers, for example, the possibility tof establishinga data mailbox for all natural persons who use any means of electronic identification issued within a qualified electronic identification system (this should have been in place from 1 January 2022 but eventually was canceled) or the rules concerning private communication via data mailboxes. From 1 January 2023, a data mailbox has been set up for all legal entities registered in the register of persons (around 200,000 entities), and a data mailbox has been set up for all natural persons engaged in business who are registered in a statutory register or index (around 2 million persons). In terms of the number of entities, this is the biggest change since the creation of data mailboxes. At the

end of March 2023, more than 1.8 million new data mailboxes were activated (set up), but only 1.077 million people have logged in, i.e., currently, 733,889 natural persons engaged in business and legal entities not engaged in business have not logged in (40%). Tens of thousands of other users have decided to stop an active or suspended business activity due to the advancing electronization of communication. These are mainly people who hold a trade license but do not actively do business or older people without basic ICT skills. Currently, data mailboxes have been set up for all legal and self-employed persons in the Czech Republic. The last wave of data mailbox extensions cannot be considered successful, because about 40% of new users have not yet registered in the system even though data mailbox has been established for them. Automatic creation of data mailboxes for persons using electronic identification means issued within a qualified electronic identification system (e.g., login to electronic banking) was revoked by the Senate as late as 15 December 2022, i.e., less than two weeks before the law came into force!

Table 3. Selected statistics on data mailboxes in the Czech Republic (Ministry of the Interior of the Czech Republic 2023; author's own work).

Year	2009	2010	2011	2012	2013
Number of active data mailboxes	378,830	420,249	452,193	470,907	616,603
Number of data messages	1,474,938	2,548,208	2,836,347	3,308,682	4,243,734
Number of active data vaults	118	755	680	758	3918
Year	**2014**	**2015**	**2016**	**2017**	**2018**
Number of active data mailboxes	571,675	623,043	699,811	762,512	819,766
Number of data messages	5,244,869	6,346,195	7,018,705	7,014,043	6,304,885
Number of active data vaults	5177	6864	8398	10,490	11,698
Year	**2019**	**2020**	**2021**	**2022**	**3/2023**
Number of active data mailboxes	890,748	1,014,384	1,231,276	1,521,424	3,399,086
Number of data messages	7,169,670	8,859,970	9,490,756	9,340,933	14,705,959
Number of active data vaults	13,189	15,175	18,196	21,084	22,592

6. Implementation of Data Boxes in the Czech Republic—Discussion and Conclusions

With regard to the digitization of public administration and services, the Czech Republic is lagging far behind other EU countries. In 2018, the Czech Republic took 22nd place out of 28 member states in the category of digitization of public administration. In addition, in the rankings of using e-services offered by public administration, it took the last but one place out of 28, i.e., 27th place. Although there has been a breakthrough in the past few years, mainly thanks to such projects as e-ID or Citizens' Portal, the area of digitization of public administration and services remains largely underdeveloped compared to other member states of the European Union. If the digitization of public administration and services is to be successful, it must target both the end-user (whether natural person or legal entity) and the providers (state, authorities, and civil-service employees). According to the European Union, digitization of the public sector can reduce the administrative costs of communication between the state and the citizen by 15% to 20%. Better access to data also enables more efficient tax collection, combating financial fraud, and better allocation of social assistance and benefits. However, this potential is not always successfully realized. Often, large and expensive digitization projects are unable to provide almost any added value or greater efficiency in official procedures. Similarly, the newly created digitization processes were often incapable of replacing the original administrative procedures, which led to the existence of two analogical systems running in parallel. The prerequisite for the successful digitization of public administration is to prioritize the target user (Bokša et al. 2019). This factor often becomes a differentiating element between successful and unsuccessful digitization, which can also be demonstrated in the implementation of data mailboxes.

The implementation of data mailboxes in the Czech Republic has faced or is facing a number of complications that can affect their efficiency and expansion:

1. Low awareness: Many people, companies, and organizations in the Czech Republic may not be sufficiently informed about the existence of data mailboxes, their advantages, and the obligations associated with their use. Lack of awareness and information campaigns can cause people and organizations to not use the potential of data mailboxes at all or to use data mailboxes incorrectly. For example, educational videos have only a minimal audience. Additionally, the "forced" expansion of users is a problem—see the canceled extension to a selected group of natural persons who use a means of electronic identification issued under a qualified electronic identification system.

2. Complex and bureaucratic registration process: Registering a data mailbox can be a complex and time-consuming process that requires certain conditions and administrative procedures to be met. This may deter some users from setting them up. For example, one way to obtain an optional data mailbox is an electronic identity card with an activated chip and a special data reader, or it is possible to fill in a paper application, but this requires verification of the citizen's signature, for example, at a notary's office. A significant disadvantage is the obligation to communicate electronically, e.g., to file a tax return.

3. Technical issues: The use of data mailboxes requires technical infrastructure, such as an electronic signature and a certificate, which not every user may have or is able to use. Technical issues with the functionality of data mailboxes, such as system errors, incorrect delivery of messages, or limitations of compatibility with different devices or software, may also restrict their use. For example, it is not possible to have identical access as a natural person and a legal entity at the same time.

4. Limited adoption in some sectors: While data mailboxes are mandatory for certain entities, such as public institutions and certain legal entities, they are not mandatory for everybody. This may lead to lower adoption in some sectors or in certain user groups, which may reduce their effectiveness. In many cities, people are informed about local fees exclusively via paper bills or, if the number of participants is high, e.g., when applying for a building permit, the permit is delivered on an official notice board, not via a data mailbox.

5. Security concerns: Some users may be concerned about the security of data mailboxes, especially when it comes to storing sensitive information and private data. Concerns about potential risks, such as data leaks, abuse, or hacking, may affect the willingness of some users to use data mailboxes.

6. Low interoperability: Data mailboxes in Europe are operated by different entities, which can lead to limited interoperability among different mailboxes. When users have mailboxes from different providers, it may be difficult to communicate with them and exchange documents, which can reduce the effectiveness and convenience of data mailboxes.

7. Legislative changes: Rapid changes in the legislative environment regarding the use of data mailboxes can also cause problems. Changes in requirements, obligations, or technical specifications may require that data mailbox systems and the way they are used be updated and customized, which users may find difficult. For example, in the case of measures that turn out to be unpopular, their effectiveness is often postponed until both the expert and non-expert public "forgets".

8. Lack of integration with existing systems: Integration of data mailboxes with existing internal systems and organizational processes can be technically challenging and costly. Some organizations may have limited resources or technical infrastructure which does not allow full integration of data mailboxes, and this may make them difficult to use.

9. Lack of support and technical assistance: Lack of technical support and help for data mailbox users can be another problem. If users need help with registration, setup,

and use of data mailboxes or with resolving technical issues, it may be difficult to find appropriate support or services. The author's personal experience includes spam in the data mailbox, and blocking such spam can be complicated.

10. Specific issues: There is also a problem with the automatic generating of new data mailboxes—in exceptional cases, the system creates very vulgar or even racist names for data mailboxes. It is not officially possible to change the data mailbox identifier.

The above-mentioned author's conclusions are also confirmed by the Audit Conclusion from the audit action of the Supreme Audit Office No. 19/14 *The Introduction of Electronic Identification and the Provision of Electronic Access to Public Administration Services* (Vedral 2019 or Peterka 2020), which states, for example:

➢ The Ministry of the Interior failed to provide a wide range of available services or significantly expand the circle of citizens who actively use them.

➢ The reason for the low number of users may also be the lack of promotion of the existing e-government tools. The Ministry of the Interior failed to launch a planned complex information campaign until the end of the inspection, despite the fact that low awareness of citizens about the offer and functions of electronic public administration services was identified in the final evaluation of the Smart Administration strategy already in 2016, etc.

The Government, specifically the newly established Digital and Information Agency, the Czech central administrative office for electronic identification from 1 January 2023, should, in the author's opinion, focus primarily on addressing the current problems of the electronization of public administration instead of launching a wide range of new financially and time-consuming projects (e.g., replacement of the birth number, key identifier of persons containing information about age or gender, and meaningless 32-digit code identifier of a natural person). There are several ways to improve the data mailbox system in the Czech Republic. As regards data mailboxes in particular, the areas of improvement should be as follows:

1. User interface: Improving the user interface of data mailboxes could significantly increase user-friendliness. It should be simple and intuitive so that users can easily access important features and manage their documents more efficiently. For example, many users have several data mailboxes (as a natural person, as a legal entity, etc.), and the system cannot switch between them.

2. Integration with other public administration systems: The data mailbox system should be integrated with other state systems, such as the electronic notice board system or the public administration information system. This would allow better communication between different authorities and easier data sharing.

3. Mobile application: Creating an official mobile app for data mailboxes would allow users to access their documents and manage them using their smartphones or tablets. This would significantly increase the availability and convenience of using data mailboxes.

4. Safety precautions: It is also important to improve the security measures of the data mailbox system. This includes the introduction of mandatory two-factor authentication, data encryption, and regular updates to security protocols to minimize the likelihood of data leakage and mailbox misuse.

5. Education and support of users: Providing adequate education and support to users is essential for the efficient use of the data mailbox system. Creating manuals, tutorials, and the availability of technical support would allow users to get acquainted with the system's functions and use it effectively.

6. Automation of processes: The data mailbox system should be more automated to minimize manual work and increase efficiency. For example, automatic sorting and tagging of incoming mail or the ability to automatically send reminders and notifications could make document management easier.

7. Other measures: Allow more flexibility for users of data mailboxes (possibility of changing the name of the data mailbox, possibility for individuals to send documents physically by mail without using data mailboxes, etc.).

These proposals could contribute to a significant improvement of the data mailbox system in the Czech Republic. It is important for the government, state institutions, and service providers to cooperate to implement these changes and invest in upgrading the system. It is also important to continuously listen to the feedback of users and respond to their needs and comments (e.g., SPAM in data mailboxes). Only in this way can the data mailbox system be truly effective and useful for all stakeholders.

All in all, despite the different approaches of individual countries and a number of problems with implementation, data mailboxes can be expected to perform an important role in the digital transformation of public administration and the business sector in the Czech Republic and the European Union. The development of technologies, digitization, reducing bureaucracy and simplifying processes, and increased emphasis on data security and protection, are factors that can positively affect the future of data mailboxes and bring additional benefits to entities using this modern form of electronic communication (see for example Drahošová and Čajková 2022). The EU also seeks to create a unified digital market which will facilitate free movement of digital services within its member states. Data mailboxes can play an important role in this initiative by providing a uniform and standardized way of communicating and exchanging documents between actors in different EU countries. It is not possible to ignore the environmental benefits or connections with new technologies, such as artificial intelligence, blockchain, or augmented reality, which can bring new possibilities and benefits. In the Czech Republic, in terms of further research on this issue, the author recommends focusing on reducing the number of public administration systems and on their mutual integration or feedback from users of data mailboxes in order to bring the user interface closer to the level of cloud services. An important area of study would be the international comparison of data mailbox systems in terms of the scope of services provided to natural persons and legal entities.

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