

The Use of Chatbots in the Czech Republic with Concentration on the Czech Public Administration

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Abstract

Chatbot represents a useful and widespread tool with great potential for public administration. We concentrate on their use in the Czech Republic. In accordance with the basic strategic Czech government material for the development and modernization of public administration "Client-oriented public administration 2030", all types of chatbots have a great benefit and revolutionary impact for public administration users. The text describes the basic characteristics of chatbots, examines in the form of a SWOT analysis the strengths and limits of this technology in the application to public administration, presents the practical use of chatbots in the public sector and translates the results of qualitative in-depth interviews with representatives of public administration authorities and institutions that use chatbots for their needs. Our analysis confirmed that chatbots (and their further modifications and development variants such as voicebots or digital assistants) will become a fixed part of the modern AI apparatus that the Czech public administration will use for public relations. Our study also shows how central state administration bodies should proceed when introducing chatbots into the practice of their offices.

Keywords: artificial intelligence; chatbot; public administration; public sector; SWOT analysis

1. Introduction

The use of artificial intelligence (AI) in the private and public sectors continues to grow (European Union Agency for Fundamental Rights 2021). Thanks to modern AI and other technologies, revolutionary changes are taking place mainly in the public sector in three areas:

the involvement of citizens in the management of public affairs, the adoption of political decisions and the management of national infrastructure. Although the field of AI has been researched and debated for more than 70 years, there is still no unanimously accepted definition (Kamolov, Molchanovskaya & Kaunov 2021); AI means different things to different people (Samoili et al. 2020). AI reflects current technological developments rather than specific applications. One of the definitions (Reis et al. 2019) describes AI as "intelligent systems with the ability to think and learn". Other authors (European Union Agency for Fundamental Rights, 2021) provide this definition of AI: "As artificial intelligence (AI), we refer to systems that exhibit intelligent behaviour by analysing their environment and deciding on next steps – with some degree of autonomy – to achieve specific goals. AI-based systems can be pure software, operating in a virtual world (e.g., voice assistants, image analysis software, search engines, speech and facial recognition systems) or AI can be built into hardware devices (e.g. advanced robots, autonomous cars, drones or IoT applications).

Artificial intelligence can cause qualitative changes in society, incl. improving government processes (Bertrand 2020). AI improves the functioning of the public sector and ensures economic development (Kamolov, Molchanovskaya & Kaunov, 2021). Politicians and civil servants should try to understand the possibilities of AI, which can greatly help them fulfil the set goals (Berryhill 2019). In the public sector, AI is expected (Reis et al. 2019) to have an impact on:

- employment (e.g., self-driving cars will spread in the field of urban transport (Agarwal, 2018 & Makridakis 2017), on the one hand, labour productivity will increase (Wirtz, Weyerer & Geyer 2018), but on the other hand, many employees will have to be retrained to other positions (Dhanabalan & Sathish 2018), to which the supply will have to respond with suitable study programs and courses,
- political leadership and public administration (e.g., in the push for the use of renewable resources (Poolla et al. 2014), in defence and security (Floreano & Wood 2015; Qingyuan et al. 2016) using drones, in a more accurate survey of public opinion through sensitivity analysis (Corallo et al. 2015),
- the quality of life of citizens (e.g., in the area of health and safety (Stanek & Drosio 2014; Mehr, 2017; Mohammady et al. 2014)).

As AI is likely to play a significant and important role in the future development of the public sector/public administration, some authors have investigated the readiness of states to implement various AI technologies to improve the provision of public services to their citizens (Oxford Insights 2022). Based on 42 indicators measuring the level of maturity/progress in three major areas (government, technology, data and infrastructure) divided into 10 categories, they compiled a ranking of countries (governments) in terms of their readiness to implement AI technologies in the public sector. In this regard, the five most prepared countries (and a great source of inspiration for others) are the USA, Singapore, Great Britain, Finland and the Netherlands.

The Czech Republic is ranked 27 out of 160 countries overall. It scores relatively well in measured factors such as innovation capacity (27th place) and the quality of human resources. Research and development of artificial intelligence, which is carried out by several public research institutions in the Czech Republic, is also at a relatively high level. Both basic and applied research and development are carried out at eight important academic workplaces (ASC, Charles University, Czech Technical University in Prague, BUT in Brno, Masaryk University, University of West Bohemia, Technical University in Liberec and Technical University in Ostrava). The results of research and development activities bear demonstrable

results. Artificial intelligence has found wide application across the breadth of the public sector. As examples it is possible to mention:

- data evaluation and diagnostics in medicine (General University Hospital in Prague),
- help in the prevention of pressure ulcers, i.e., bedsores (Bulovce Hospital in Prague),
- involvement of AI in receiving emergency calls (Ministry of the Interior of the Czech Republic),
- identification of persons committing criminal activity (Police of the Czech Republic),
- a weapon in the fight against drugs (Police of the Czech Republic),
- automatic study planning support (University of West Bohemia in Pilsen (Hvízdálová et al. 2020)).

Also worth mentioning is the ambitious initiative prg.ai (launched in May 2019 at the initiative of the Czech Technical University, UK, Academy of Sciences of the Czech Republic and the capital city of Prague), whose goal is to create an AI superhub from Prague and help the Czech Republic become an important European centre of excellence in the field of AI. It is also possible to mention the professional network Czech Women in AI or the event "Machine Learning Prague" focused on the practical use of artificial intelligence and machine learning, which brings capacities from all over the world to Prague.

Technologies that use elements of artificial intelligence can be divided into three areas:

- recognition (speech, computer "vision", Internet of Things (IOT)),
- understanding (natural language processing, data science),
- actions (robots).

The following technologies can be used in state and public administration (Engin & Treleaven 2019):

- chatbots and intelligent assistants for public engagement,
- robo-advisors (consultants) to support officials,
- real-time management of the national infrastructure using IoT and blockchain,
- automated compliance/regulation,
- online system of court decisions and findings,
- laws/norms protected by blockchain technology.

Table 1 lists the areas of public administration where it is possible to direct certain improvements and use the above technology.

Table 1: Automatization of government services

Area	Goal
Public services	Interaction with citizens, provision of services to citizens; answering questions, automating services, etc.
Support officials	Smart tools to support clerical work, performance monitoring
National Public Records	Development of public policy, support of officials and politicians, evidence-based

National (physical) infrastructure	Maintenance and operation of public infrastructure (smart environment, transport, communication, health, safety, education)
Legislative and regulatory materials	Court management, law enforcement and statute
Development of public policy	Keeping public records and correspondence, forms, personal data policy (data, experts, public opinion)

Source: Engin, Z., & Treleaven, P. (2019).

This study focuses on one type of AI technology with great potential for use in public sector/public administration agendas: chatbots/voicebots. This technology is quite widespread and often used. The purpose of our text is to explore the potential of chatbots/voicebots (including the identification of possible limits to the implementation and development of this technology) for their use in public administration (as certain areas for the implementation of chatbots). Among other things, areas of public administration are sought in which the use of chatbots is most effective. The research question is viewed from three sides: implementation (What are the practical experiences with the implementation of chatbots in public administration and offices from the user's point of view?), organizational (What impact did the implementation of chatbots have for the organization?), or also relevance (Is a chatbot a relevant tool for use in public administration?).

Table 2 divides, in accordance with the principles of SWOT analysis, the questions regarding the potential of chatbots for their implementation in public administration into four groups, i.e., in the rows for internal (strengths + weaknesses) and external (opportunities + threats) factors, respectively. in columns for positive impacts (strengths + opportunities) and negative impacts (weaknesses + threats).

Table 2: SWOT analysis of chatbots in the form of desk research

<p>STRENGTHS</p> <ul style="list-style-type: none"> • What makes the use of chatbots unique and innovative? • What can chatbots do? • What are the advantages of implemented chatbots? • What are the main benefits of chatbots for public administration? 	<p>WEAKNESS</p> <ul style="list-style-type: none"> • What should be avoided in the practical implementation of chatbots? • Is the database of information provided by chatbots sufficient? • What needs to be improved about chatbots and their use? • What are the disadvantages of chatbots?
<p>OPPORTUNITIES</p> <ul style="list-style-type: none"> • What external changes will create new opportunities? • What are the current trends in public administration? • Can chatbots fill a certain deficit towards public administration clients? 	<p>THREATS</p> <ul style="list-style-type: none"> • What negatively affects the public administration environment in terms of the introduction of chatbots? • What is the political support for introducing this technology into public administration? • What are the obstacles that the authorities will face in implementing

<ul style="list-style-type: none"> • Do the current technological changes and trends affect efforts to implement chatbots in public administration? 	<p>this technology in the practice of their authorities?</p> <ul style="list-style-type: none"> • Are there any legislative amendments or government regulations that could negatively affect the successful functioning of chatbots in the practice of public administration offices?
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Source: Denecke et al. (2019).

To fulfil the above-mentioned goals, the context (macro-environment) that can support (or on the contrary hinder) the development of AI technologies in the Czech public administration is critically described in the next chapter. This context is usually determined by the political forces (the will to promote and therefore support) certain topics that are formulated in certain strategic government materials and the applicable legislation. The AI technology of chatbots is characterized and described in third chapter including certain typification and categorization of chatbots, its advantages and certain limits. Fourth chapter and fifth chapter describe the use of chatbots by public institutions and an analysis of the Czech market for chatbots (or companies offering chatbot technological solutions). Recommendation and conclusion concentrate what should be done for other development of chatbots in Czech public administration and the main points of the article are summarized.

2. AI technology in strategic government materials of the Czech Republic

Chatbots are widely deployed in e-shops and banks. However, their great commitment is also in public administration. These digital assistants have tremendous potential here, as they increase the quality and speed of care provided to citizens; is available 24 hours a day via a web interface and a mobile application, it helps solve questions that can be uploaded to a central, continuously updated database of information and knowledge (i.e. the most frequent questions and answers are stored here, from which the digital assistant can choose the most suitable solution and present it to the user. Public administration offers great potential for the development of digital assistant technology. In this way (as in companies), the lack of qualified specialists and labour in general could be solved. Thanks to chatbots, it is possible to get quick answers in case of threats, to solve complaints and problems, getting detailed answers or explanations, finding the appropriate client support contact, making a reservation or paying a bill.

The government of A. Babiš placed great emphasis on the use of AI for the needs of the public sector (Hvízďalová et al. 2020). In the Czech Republic, the issue of AI became one of the government's strategic topics in 2018 following the European Commission's initiative Artificial Intelligence for Europe (European Commission 2018). Three strategic documents are of fundamental importance for the development of AI in the Czech Republic. The first important document is the government program Digital Czechia (Vladimír Dzurilla and the Digital Czech Republic team 2018) from 2018, which concerns all the effects of digitization on the economy and society. It is a set of concepts ensuring the prerequisites for the long-term prosperity of the Czech Republic. Its content can be defined as a strategy of coordinated and comprehensive digitization of the Czech Republic. Digital Czechia encompasses three pillars (sub-concepts) that form one logical whole. It covers areas from the interaction of the Czech

Republic in the European Union in the digital agenda through digital public administration to the preparation and interaction of society and the economy of the Czech Republic for digitization.

Another important document is the Innovation Strategy of the Czech Republic 2019–2030 (Council for Research, Development and Innovation 2019), whose nine pillars include, among others, the digital state, production and services. The strategy summarizes the current situation in each pillar and contains the main goals and framework tools to fulfil them. However, the most important strategic document in terms of AI development is the ambitious National Artificial Intelligence Strategy in the Czech Republic (NAIS) from 2019 (Ministry of Industry and Trade 2019). Similar strategies have been adopted in other countries around the world (Wilson 2022).

NAIS is based on the assumption that current trends in artificial intelligence, automation, robotization and related to them, for example electromobility, data economy or 5G networks, are key to the further development of industry, services and the entire economy. The main horizontal goals of NAIS are therefore to move Czechia towards an innovative economy thanks to these state-of-the-art technologies, to support domestic companies and brands and further economic growth. Strengthen the safety and security of residents, increase their comfort in everyday life and ensure fast, efficient and friendly communication with the state. The overall goal is to help return Czechia to the top of the most developed countries in the world. The use of AI in public administration will require certain legislative changes, as existing legislation and general legal principles regulate the activities of human beings, not machines. As part of the preparation of the National AI Strategy, an analytical study of the legal and ethical aspects of the development of artificial intelligence and its applications in the Czech Republic was created (Krausová et al. 2018). This study created a certain regulatory framework for the development of AI in the Czech Republic.

On the other hand, despite great ambitions in formulating the National Strategy for Artificial Intelligence in the Czech Republic (announced in 2019), the public administration in the Czech Republic is rather at the start in this regard (Hvíždálová et al. 2020), or its current readiness for the implementation and use of specific AI applications is rather small (e.g. due to insufficient funds, lack of motivation and the persistent routine of "paper agendas", the need to implement often lengthy tenders with pressure for the lowest possible price, or unresolved issues of ethics, responsibility and legal framework). This is even though many beneficial projects based on artificial intelligence have been launched thanks to the crisis caused by the covid-19 pandemic, such as a chatbot informing about support in the framework of anti-virus measures on the website of the Ministry of Labour and Social Affairs. Currently, the greatest readiness for the use of artificial intelligence technologies can be found in the healthcare sector. The Ministry of Health has identified key areas for the use of AI (such as analysis and evaluation of big data, text analysis, object, voice or image recognition) that require direct or indirect support, appropriate legislation, or also promotion. Other technological solutions of public administration based on artificial intelligence are the document anonymization tool available on the Public Administration Portal or the transcription of recordings of court proceedings (the Olympus dictation console is also used by the Czech Telecommunications Authority). AI technology is also used by the Police of the Czech Republic to increase security, e.g., for deciphering currencies, tracking cryptocurrencies, etc.

Funding of new projects in public administration usually takes place in the form of a public contract or within mechanisms of public support for research, development and innovation (e.g., through the programs of the Technology Agency of the Czech Republic or individual departments), when public administration bodies and other public institutions

participate in the role of research projects so-called application guarantors, who on the one hand provide a real environment and database for the development of artificial intelligence applications and on the other hand test and verify the developed solutions in practice. The Office of the Government of the Czech Republic supports expert initiatives such as the AI Observatory and Forum (an expert platform and forum of the Czech Republic for monitoring legal and ethical rules for artificial intelligence). The Czech version of the online course "Elements of AI" is also offered to those interested in artificial intelligence.

3. The potential of using chatbots

3.1 General characteristic of chatbots

Various names have been used for chatbots: conversational AI bot, AI assistant, intelligent virtual assistant, virtual customer assistant, digital assistant, etc. These are "intelligent conversational computer systems designed to mimic human conversation to enable online guidance and support" (Caldarini et al. 2022). Chatbots have become popular among customers all over the world, because thanks to modern (mobile) technologies, they make it possible to get information about practically anything, at any time (day, night) and anywhere. They revolutionized customer service. After these services were automated, some business organizations handled up to 70% fewer calls and emails than before (Aivo 2021).

Chatbots have proven themselves in the banking industry (e.g., chatbot WIDIBA in an Italian bank), in the insurance industry (see chatbot LEO in the insurance company Generali České pojišťovna), in the automotive industry (e.g., chatbot LAURA in company Škoda), in retail and e-commerce (e.g., chatbot SHISEIDO in the cosmetics industry), in telecommunications (e.g., chatbot Julia in Vodafone), in energy (e.g., virtual assistants Emma and Ethan). But chatbots also have other uses, e.g., in e-commerce (Oguntosin & Olomo 2021) and the integration of payment portals directly into the bot, in pre-onboarding operations with new employees (the new employee can go through important documents and approve them from the comfort of their own home). for storing a large amount of diverse data, integration into other systems. Chatbots build on two methods and algorithms from the field of artificial intelligence: natural language processing and machine learning. Chatbots use elements of artificial intelligence to varying degrees, i.e., some involve more intelligence in their activities, others less. In this regard, four types can be distinguished: 1) low use of AI (Chess, Apple SIRI, FAQ answers or accepting various orders), 2) moderate-sized use of AI, 3) evolutionary use of AI, 4) higher use of AI. The first type is designed and programmed to perform certain tasks, when it is not able to go beyond the given (pre-set limits); the second type is intelligent enough to find a solution without human help (intervention); human abilities increase, examples from e.g., neuroscience, linguistics, psychology are used. In the third type, there is machine simulation of simple creatures (bees, ants). For the fourth type of machines, people guide them, they can communicate both with people and with each other

The history of chatbots dates to the 1950s and begins with the so-called Turing test (Artificial Solutions 2019). Several chatbot prototypes were then developed. Each of them could do something different and in that respect was an improvement on its previous version. Artificial Solutions (2019) distinguishes two types of chatbots:

1. linguistic (based on rules or based on decision trees),
2. AI chatbots

The first type is programmed to answer certain questions defined at the beginning, they are limited to certain pre-inserted questions, the conversation works based on if-then logic, a

set of defined rules is created for certain types of problems and their possible solutions, when the types of questions matter. These types of bots are not capable of learning from real-time conversations. They are suitable for smaller organizations and companies with a certain specific workload. They are also good for FAQs (must learn limited conversational patterns).

In the second case, chatbots were programmed to interact with users as real beings. Chatbots can keep in touch and use the same vocabulary. Natural language processing technology is used, as well as the ability to constantly learn from the conversation and generate better answers based on this. AI chatbots are based on intelligent understanding (e.g., the user's request, his previous preferences, geolocation), remembering previous information about the user, sentiment analysis (Artificial Solutions, 2019) (allowing the chatbot to perceive the mood of the questioner) or jumping from one topic to another. Research is currently moving in this direction. In the beginning, more time is needed for training, but in the long run it saves time. AI chatbots can, for example, fill in forms, recommend procedures, services, book appointments or connect with other information systems in order to efficiently perform other tasks. The chatbot (specifically UniCredit chatbot) is also able to represent a personality during an interview (recruitment chatbots collect basic information about candidates, in UniCredit Bank the chatbot during the first round of interviews with candidates, he talks for 20-30 minutes (finds out the candidate's capabilities, his real interest in work, whether (s)he will fit into the organization's culture, examines the candidate's key competencies, efforts and way of thinking), analyses their data and sorts them according to how suitable for the given position (Sovová 2021).

Another categorization of chatbots based on the search for user response requirements:

- Text-to-text bot (TTT): input in the form of text (words or sentences) is returned by the chatbot in the same form (e.g., ELIZA, Facebook Messenger, WhatsApp),
- Text-to-speech bot (TTS) (Beal 2002): more interactive than the first type, suitable for visually impaired people (e.g., Snatch-bot),
- spoken word-to-text bot (STT): responds and displays its responses in a text to the spoken word (voice) of the user; technology for automatic speech recognition is used (Artificial solutions 2019); this type of chatbots is suitable for several situations such as conferences (e.g., SIRI from Apple),
- spoken word - spoken word bot (STS): it is a new type of chatbot with expertise like humans. These are voice assistants used in education that are currently being tested.

In terms of operation, chatbots are divided into button-based (with a tree structure), designed for text recognition, and contextual. The button chatbot is the most basic version, it is the most used for its simplicity both in terms of production and communication with the user. The conversation is firmly established and given (so the user cannot deviate from it). The conversation proceeds based on decision trees: the user uses sub-answers to get deeper to the final goal of the conversation. The second type of chatbot tries to recognize keywords, according to which it evaluates the correct answer (a list of keywords is created in advance and AI algorithms are used). The third type of bot (contextual) is the most complex and the most modern, because so-called Machine Learning and other AI technologies (such as voice recognition, speech-to-text) are used to recognize the user's intent. A contextual chatbot tries to understand the user and independently formulate the right answer using its access to various databases and integrated systems. This bot is constantly learning and evolving based on user input. Barker (2017) states the orientation of chatbots toward service, business, entertainment or consulting, Nuruzzaman and Hussain (2018) differentiate between goal, knowledge, service

and question answering orientation; in a rough typification, task- and non-task-oriented chatbots. The company Feydou Agency, which is currently one of the largest chatbot manufacturers in the Czech Republic, divides chatbots as follows: FAQ chatbot (e.g. chatbot Komorník of the Chamber of Commerce of the Czech Republic), HR chatbot (focusing on human resources, e.g. chatbot from Pilsen Prazdroje) and sales chatbot.

3.2 SWOT analysis of chatbots

A SWOT analysis of chatbots and their use in the private and public sector has been carried out in a number of studies. E.g., one analysis of strengths, weaknesses, opportunities and threats focused on conversational agents in patient health care (Denecke et al. 2019), psychiatric care (Cameron et al. 2018) and so on. To the advantages of chatbots, from our point of view based on the mentioned studies, belong:

- They are a valuable source of information about customers (their needs, requested services, products).
They are able to promote services (products), work as an assistant during the service.
- They offer new ways of customer service support: fast in answering specific questions, 24/7, always on call, accuracy (up to 98% in answers to questions (Artificial Solutions, 2019)), compliant with regulations and legislation, simultaneous service of multiple customers + immediate response, consistency of answers, multilingualism.
- They help in cost optimization (potentially for clients VS no cost) and in the improvement of customer satisfaction.

However, there are also some disadvantages of chatbots, for instance:

- The “inhuman approach” of chatbots can hurt customers.
- Mistakes caused by chatbots (not understanding requests, not understanding the subtleties of human dialogue, inaccurate completion of tasks, problems understanding accents, providing inaccurate information, setting off a false alarm, using inappropriate/offensive language).
- Implementation of chatbots takes time.
- They need maintenance (perhaps continuously adding new data)-
- Lack of training data of chatbots (Help Net Security 2019) that can lead to a reduced ability for conversational nuances.

The advantages (including the procedure for introducing chatbots) that the use of chatbots offers to companies can be, in the case of the Czech Republic, demonstrated by the example of the awarded (e.g. in the "Golden Mean" competition) chatbot Leo, which has been helping clients of Generali Česká pojišťovna since April 2020. During that time, Leo has successfully handled 150,000 discussions on recurring questions (such as forgotten passwords, reporting an insurance claim, retail order status), i.e., 62.5% of all web chats. The chatbot thus frees the hands of operators, who can devote themselves to answering more complex questions. The actual implementation of the chatbot into the company's services was preceded by the identification of recurring cases (those are the situations in which the chatbot is most beneficial) such as attaching documents (photos, scans) (from the beginning to 2021, users used the chatbot's services in this case in 94 % of cases), reporting insurance events (chatbot used by users in 92 % of cases), insurance contract (chatbot used in 95 % of cases), logging into the client zone (in 80 % of cases), payment of insurance premiums (in 63 % of cases). The chatbot

can be used at any time, in case of specific questions it can refer to a human operator. The chatbot is also used for PR and company image.

Table 3: SWOT analysis of chatbots

	Strengths	Weakness
Internal factors	<ul style="list-style-type: none"> • automation of standardized conversation, • simplicity without the need to use an external application (+extensibility) compared to other AI technologies, • low costs, • gradual improvements over time, • great potential for use (conversation, education) • other advantages mentioned above 	<ul style="list-style-type: none"> • correct data, • artificiality (not naturalness) of conversation, • unemphatic technology, • lack of AI technology equipment for more sophisticated conversation, • wrong answers due to mixing of keywords with bots working on the principle of text recognition
	Opportunities	Threats
External factors	<ul style="list-style-type: none"> • technology progress → interaction with the chatbot more natural and easier, • voice assistants, • virtual agents, • new technologies (RCS), • friendly and welcoming approach of public administration towards younger generations and technologically based individuals 	<ul style="list-style-type: none"> • negative attitudes of users towards chatbots, • inherently conservative public administration, • heterogeneous composition of public administration clients (chatbots will certainly not suit everyone)

Source: own work.

4. Chatbots in Czech public administration

The smartification of public services and national infrastructure is very important because it has an impact on businesses and every citizen. In addition to the above-mentioned advantages of chatbots (such as increased availability of services, relief for overloaded contact lines, efficiency, cost reduction, speed of communication between citizens and state administration offices, local governments and state organizations), another advantage is

counted in public administration: elimination of discrimination. These advantages have led to the massive implementation of chatbots in public services. The chatbot has become an intuitive advisor and helper on the often very complex website of public institutions. In general, chatbots help with registration (e.g. Hradecky chatbot on the citizen portal or new members to the Chamber of Commerce) or provide information (e.g. support options related to the COVID-19 pandemic). Virtual assistants can be deployed in public administration in the following situations (Feedyou 2021):

- solving life situations (weddings, lost ID card, paying fees for a pet),
- crisis communication (crisis communication solution, connection to the call centre and the possibility to transfer communication to live operators as needed),
- feedback (collection and evaluation of opinions on new topics or feedback from citizens and own employees),
- drawing subsidies (faster and more accurate, more efficient submission of subsidy applications using virtual assistants),
- information about opportunities in the region (possibility of applying in the region),
- recruitment of workers (for state organizations, ministries, etc., such as the recruitment of nurses at IKEM),
- internal communication (various topics such as vacation, education, frequently asked questions within the given organization).

Chatbots can start to be used at any time and on any scale (e.g., in the form of providing current information or commonly repeated topics). Chatbots are used abroad to facilitate communication between authorities and the public in the form of FAQs. Thanks to this technology, citizens can easily and quickly get reliable information about administrative issues without having to contact employees, who can then attend to other matters. Examples of chatbots used by public administrations abroad are Vienna's WienBot (2017), to share information related to natural disasters in Japan, chatbot Emma used by the US Citizenship and Immigration Office, virtual assistant chatbot SIGMA, which works on the principle of NLP and helps Portuguese people with questions related to with tax issues, personal and travel documents, health insurance or registration at the employment office. In Finland, a trio of chatbots (Kamu, Patrek, VeroBot) help citizens and companies with a residence permit in Finland or provide information on the possibilities of setting up a company as well as tax advice. These chatbots are interconnected, which means that a question asked to the wrong chatbot is redirected to a chatbot that will help solve the problem. In this way, it is possible to build a massive system for direct communication with the authorities.

In the Czech Republic, chatbots have proven themselves as handy helpers for managing crisis communication during the coronavirus emergency on the portal of the Ministry of Health or the Ministry of Industry and Trade. During the COVID-19 epidemic, thousands of entrepreneurs had to deal with many obstacles to save their businesses. The volume of questions became unbearable and call centre operators stopped handling them. The Czech Chamber of Commerce responded to this situation by developing and deploying a chatbot called "Komorník" on its website and FB pages in just ten days, to which users could ask a predefined set of frequently asked questions and get quick questions. The average time to answer a question was about 30 seconds, and 64 % of respondents said that the chatbot helped them.

Another use for chatbots is the legal environment, where it is possible to standardize the entire range, or the healthcare sector (e.g., information from hospitals for blood and blood plasma donors). However, in this segment of the public sector, the development of the use of

this technology is hampered by very strict regulations. Currently, the IRENA chatbot relieves the overloaded lines of non-profit organizations and helps answer the questions of refugees from Ukraine. On March 23, the Czech Social Security Administration also launched its specialized chatbot (virtual assistant) (Czech Social Security Administration 2022). This chatbot helps interested parties answer questions regarding the current change in their life situations as a result of the introduction of government measures against the coronavirus (with topics such as the effects of the coronavirus epidemic on social insurance, options for parents, entrepreneurs, employees, self-employed persons in this context; clients are constantly provided with up-to-date information from the field social insurance.

Chatbots help in digitizing communication between municipalities and regions with their citizens. E.g., the company Kordis IDS of the South Moravian Region was looking for the best application of a chatbot that would help citizens find their way around certain recurring questions and topics that are not easily searchable. Three areas were identified: 1) FAQ support, 2) automation of communication during the collection of requests for exposure of delays, 3) automation of obtaining and processing orders for the provision of individual mass transport. The chatbot was also deployed by an ICT operator in Prague for the *Lítačka* project, when it served as support for *Lítačka* users. The chatbot proved to be a great help especially during non-working hours and on weekends – 40 % of the total communication (Feedyou, 2021). Prague 5 also launched its chatbot with the aim of automating repeated topics of life situation, forms, COVID-19, etc.) to improve communication with citizens. This chatbot can connect with the chatbot for the *Lítačka* project. In the Pardubice region on the website "A great region in the middle of the future" (<https://paradnibudoucnost.cz/>) the chatbot functions as a guide for primary and secondary school students and their parents to choose the right strategic field suitable for staying in the region. Chatbots can also be used in real estate management (e.g., city rental apartments or properties rented by the city or region) for crisis communication, conflict prevention (e.g., noise disturbing residents near the Pardubice airport), feedback collection (e.g., at <https://pravdaovafo.cz/>) etc.

5. Case study of use chatbots in Czech public administration

5.1 Methodology

Experience with the introduction of chatbots (this technology is seen as a certain type of innovation) in public administration offices was verified by this text with the help of several case studies. Answers to the following questions were found in them:

- What was the purpose and reason for introducing a chatbot in the office?
- How was this innovation implemented?
- What change did this innovation bring about?
- What was the benefit of this innovation?
- What was the feedback (critical) on the introduced innovation?
- How the communication took place externally (inwardly) about this innovation?

The chosen method for data collection was interviews. In March 2022, representatives of the following institutions were contacted: the municipality of Hradec Králové, the Chamber of Commerce, the Police of the Czech Republic (PČR) and the Prague 5 district. These were employees who were authorized by their office to communicate with the company Feedyu about engaging and creating a chatbot. The first contact was made by phone, then questions were sent to the respondents by email.

5.2 Results

The interest in using a chatbot in office services is usually born from the internal need to provide citizens with unlimited support, ideally in 24/7 mode, or provide quickly accessible up-to-date information on a particular topic. The inspiration for the introduction of chatbots can also be their use in other offices. If the reasons for the introduction of chatbots are found to be justified and the authority accepts this idea, a meeting is usually held with a supplier or with a selected company that offers similar solutions, requirements for the implementation of the order are formulated and a pilot project is agreed upon.

E.g., savings measures clearly spoke for the introduction of a chatbot by the municipality of Hradec Králové. Before the introduction of the chatbot, Hradec citizens had to find information in the written instructions or obtain it from the phone number provided. The phone line was constantly busy. Now 99 % of all inquiries are handled by a chatbot, only a small circle of people contact the phone line. They only need to make sure that they have chosen the correct procedure, remove an error, etc. The chatbot has clearly proven itself in Hradec Králové. The chatbot significantly eases the work of telephone line workers, citizens receive structured information at any time. Orientation in the portfolio of e.g., authentication services has become much easier for citizens, and it is easier for them to obtain the necessary information. As a result, an organization that brings its services closer to the public through electronication appears to citizens as innovative and modern. On the other hand, communication with a chatbot may not suit everyone, some users may find the information incomplete and piecemeal.

6. Recommendation and conclusion

Based on the collected information, it is possible to answer the questions contained in Table 2. Chatbots can become a very useful and valued helper in public administration, because it is a relatively low-cost and simply implemented technology that can perform a variety of things such as answering questions, getting detailed answers or explanations, handling a complaint or solving a problem, providing customer service, paying bills, booking a place (e.g., at a restaurant), scheduling a meeting, buying goods (services), for inspiration. In addition, chatbots bring several other advantages to public administration and its users, such as continuous client support, immediate response, flexibility, etc. Chatbots can relieve the overloaded lines in call centres and free up the workforce to perform more creative work with greater added value.

On the other hand, chatbots are not without error and have their shortcomings. At the beginning, the organization must decide on a certain type of chatbot. The chosen type of chatbot brings with it various advantages, but also disadvantages. Implementing chatbots can be time-consuming, and training data may be missing. In addition, the information needs to be continuously supplemented and updated. The aim of the developers of this technology is to make chatbot communication with its users as close as possible to human communication. Although there is clear progress in this field, there are still noticeable shortcomings in this respect (the chatbot's language is sometimes rude and inappropriate, it has problems understanding accents, etc.).

However, technological progress moves forward unstopably. It is expected that in the future, chatbots will be a regular part of many websites, citizens will be relatively well used to them and will use their services (mainly in e-commerce) more and more. It can also be assumed that the technology will be replaced by the technology of so-called voicebots or digital agents, which will operate entirely on the principle of machine learning and will learn from

communication experiences with users. Moreover, as part of the government's Digital Czechia strategy, it is possible to state that external political pressures and technological changes currently support the implementation of chatbots in public administration. However, this trend can be hampered by specific features of public administration. First, public administration is inherently conservative and less flexible than the private sector. Therefore, the introduction of these technological innovations may be slower, also due to possible mistrust of the innovations on the part of senior management. Furthermore, it is necessary to realize that the public administration must provide to all its citizens, not only to a certain segment of society. And chatbot technology may not suit users who prefer human contact, for example.

In its material from 2018 (European Commission 2018), the European Commission recommends at the government level to create an (inter-departmental) network of chatbots focused on certain goals (such as providing different information across integrated systems of state administration and offering public services). This technological cloud solution could be implemented with relatively low resources. In the beginning, only the general principles of network operation are established; then only limited cooperation of the actors involved in this network will be required. New departments (or their unions, departments) will have the option (but not the obligation) to join the network. The recommended cloud platform for the integrated chatbot system is the websites of individual ministries. This platform can also be extended for mobile devices. Voice assistants should be added to chatbots at a later stage.

Chatbots in public administration should include as many relevant functionalities as possible (e.g., for payment). The European Commission also recommends implementing the possibility of authentication in relevant chatbots (e.g., via mobile applications). It is advisable to use multilingual chatbots, or a chatbot that combines native language(s) with English, which can be useful for people who do not speak Czech well. Many companies such as Amazon Lex, Dialogflow (Google), IBM Watson, Luis (Microsoft), Wit.ai (Facebook) offer public administration a cloud-based solution for a platform on which bots can run (i.e., an ecosystem). Chatbots will be probably further used in public administration.

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