

## **E-DEMOCRACY: ARTIFICIAL INTELLIGENCE, POLITICS AND STATE MODERNIZATION**

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### **ABSTRACT**

The topicality of e-democracy and state modernization is undeniable, since millions of citizens' data are permanently collected, while its value goes far beyond its use. Advances in artificial intelligence technologies have made it possible to acquire new knowledge that was virtually inaccessible in the recent past, but which currently aims to contribute to informed political decisions, better resource management, and, consequently, improved citizens' quality of life. To illustrate the above, we present a series of case studies that identify the Portuguese government's approaches in obtaining new and innovative policies and services. Hence, this research identifies artificial intelligence technologies adopted by this European State, allowing to perceive the active role of governments in responding to the needs of their citizens. Future research may focus on analyzing the citizens' feedback on the identified technologies to understand which tools are most relevant from a political-social perspective. A third and important option involves developing a theoretical/conceptual framework that can help to get an overview of AI and State Modernization in Politics.

**Keywords:** Artificial Intelligence; e-Democracy; European Union; Modernization; Policy; Portugal.

## **RESUMO**

A e-democracia e a modernização do Estado é um dos tópicos mais atuais. Enquanto milhões de dados dos cidadãos nacionais são coletados permanentemente, o seu valor vai muito além do seu uso. Os avanços nas tecnologias de inteligência artificial possibilitaram a aquisição de novos conhecimentos que eram praticamente inacessíveis no passado recente, mas que atualmente visam contribuir para decisões políticas informadas, melhor gestão de recursos e, conseqüentemente, melhoria da qualidade de vida dos cidadãos. Para ilustrar os argumentos em cima, apresentamos uma série de estudos de caso que identificam as abordagens do governo português na obtenção de políticas e serviços novos e inovadores. Deste modo, este artigo identifica as tecnologias de inteligência artificial adotadas por Portugal, permitindo perceber o papel ativo dos governos na resposta às necessidades dos seus cidadãos. Pesquisas futuras devem-se concentrar em analisar o feedback dos cidadãos sobre as tecnologias identificadas para entender quais ferramentas são mais relevantes do ponto de vista político-social. Uma terceira e importante opção envolve o desenvolvimento de um modelo teórico/conceitual que possa ajudar a obter uma visão geral da IA e da Modernização do Estado na Política.

**Keywords:** Inteligência Artificial; e-Democracia; União Europeia; Modernização; Política; Portugal.

## **1. INTRODUCTION**

Artificial intelligence (AI) in political governance is currently at the center of academic and public debate (Wirtz, 2020; Ulnicane et al., 2022). The centrality of AI is mainly due to the benefits already known, such as economic development (Nadkarni and Prügl, 2020), social well-being (Shi et al., 2020) or even improvements in public health (Jiang et al., 2017), not to mention new opportunities for automating

low-value tasks, previously performed by humans (Huang and Rust, 2020; Wirtz et al., 2018). Like previous technological revolutions, AI also poses threats to political governance, such as the increasingly social disparities (Savona and Goos, 2020). An example of these threats is the new forms of work that undermine the effectiveness of traditional social security policies, the same to say that robots do not pay taxes. Therefore, it is not surprising that fears associated with job loss (Wirtz et al., 2018; Kirov et al., 2022), technological anxiety (Hsieh et al., 2020; Suseno et al., 2020), and the digital divide (Van Dijk, 2020; Kitsara, 2022) are calling the attention of academics and practitioners.

In order to avoid uncontrolled and unregulated growth, it is necessary to take significant steps to map and manage the AI technological advancements in public administration. Understanding AI in its real setting will enable the control of its activity and recognize its social and political repercussions. In this regard, our contribution is to carry out an exploratory research that will allow to empirically map the AI processes and capabilities that are being developed in the context of administrative modernization by the Portuguese State. The expected results will help to take a closer look at the AI applications being implemented and their relationship with citizens.

As far as we know, this is the first research of its kind, particularly considering the Portuguese and the European Union context. Related research has identified recent advances in AI that have helped political campaigns to prevail in electoral cycles. In that regard, Kane (2019) argued that there had been notable successes for campaigns using pioneering AI technologies, especially in 2016, for the Trump presidential campaign and during the Brexit referendum. Despite the questionable ethical use of AI in certain circumstances, we intend to argue that researchers around the world are currently seeking new ways to humanize the political act through AI; instead of

delegating the human decision to machines, novel approaches seek to meet the needs and expectations of the electorate through more informed and efficient decision-making methods. This argument is reinforced by the recognition-primed decision (RPD) model, which describes how people use their experience to make quick and effective decisions when faced with complex situations (Klein, 1993), i.e. when people make decisions, they can quickly combine this situation with patterns they have learned in the past (Klein, 2008). Thus, like other tasks that require empathic activity, it is predictable that, in the current state of AI development, it is unlikely that the policymaker's decision will be replaced by machines.

An early attempt to examine applications of AI in politics has been conducted by Duffy and Tucker (1995). Although in the mid-1990s, these authors argued that most of the first applications of AI in political science research addressed substantive issues related to political decision-making, they also began to see that political applications were starting to diversify. Therefore, the work of Duffy and Tucker (1995) launched the first foundations of a study program to map AI processes and applications. However, there is a gap in the literature as few articles have had the opportunity to investigate cases of AI applications within the framework of policies and state modernization programs by member states of the European Union. That said, we present the following research questions (RQ):

**RQ1:** How are AI applications used to support political decision-making under the Portuguese State's modernization program?

**RQ2:** How is AI influencing Portugal's national policy and its relationship with its fellow citizens?

The advancement of Portuguese AI has been remarkable, well evident when the country migrated from the so-called low-digitization to the break out zone in 2017, which means this country can evolve quickly with the potential to become a

sustainable digital economy (Chakravorti et al., 2015; Chakravorti et al., 2017; Linkov et al., 2018; Reis et al., 2020; Brodny and Tutak, 2022). This, in turn, can justify the selection of this country as a case to study. This argument is also supported by the OECD Digital Government Index, which places Portugal among the first ten countries (OECD, 2020).

This article is divided into five sections: the first section involves an introductory body of knowledge that emphasizes the relevance of the research, identifies similar studies in order to ascertain a research gap, and identify research questions; in the second section, a literature review is carried out, where the most relevant concepts are presented; next, we developed the articulation between the research questions and the methodological options; the fourth section presents the main results and discussion, focusing on cases that use of AI technologies adopted by the Portuguese State and emphasizes the extent which the gap in the literature is fulfilled; finally, the conclusion focuses on the theoretical and practical contributions of research, as well as the limitations and perspectives of future research.

## **2. LITERATURE REVIEW**

AI's roots go back several decades ago, and there is now a clear consensus on the relevance of intelligent machines with the ability to learn, reason, and adapt (Arrieta et al., 2020). It is common to find several definitions of AI in the literature. Still, the most suitable for this research may be the definition proposed by the European Commission (2020) that identifies AI as “a collection of technologies that combine data, algorithms and computer power” (p. 2). In the light of the aforementioned concept, the European Union member states came to define their national AI strategies. A clear example is Portugal that described AI as “the scientific area and the suite of technologies that use programs and physical devices to mimic advanced

facets of human intelligence” (INCoDe, 2019; p. 16). The Portuguese government's strategy also makes clear that the increasing use of AI should strengthen society through a set of tools that improve democracy in a clear, equitable, and transparent way (INCoDe, 2019). However, the use of digital technologies in public policies is still received with disbelief by most politicians, public servants, and citizens. That is, from initial enthusiasm to pessimism, the use of digital technologies in politics has had its ups and downs over time (Chadwick, 2008). However, we have witnessed the worldwide adoption of information and communication technologies (ICT) in the public sector to improve service delivery, increase transparency, facilitate access and remove pressure from physical services (Mosweu et al., 2017). Thus, thanks to the adoption of ICT's in public services, new forms of interactions and concepts such as e-democracy and e-government emerged.

E-democracy is seen in a holistic perspective and goes beyond e-government, as it allows citizens to participate online and allows the public to get involved in the political decision-making process (Mishra, 2019). Defining e-democracy is not a straightforward task since several terms are used indistinctly in the literature (i.e., e-government, e-participation), but, in our understanding, they are not precisely synonymous. In general terms, we identify e-democracy with the use of ICT to increase the effective participation of citizens in political and governance processes for the benefit of democracy (Hujran et al., 2020). Essentially, the concept appeared as a new form of democratic practice that allows democratic actors in society to communicate with the electorate through the Internet, social networks, and mobile technologies (Linder et al., 2020). According to Kneuer (2016), there are three dimensions of e-democracy: basic conditions, e-government, and e-participation. The first dimension draws upon two central prerequisites: the technical infrastructure to access digital media and Internet freedom. Moreover, e-government term is often

used indistinctly as no definition has been widely accepted by the academic community. However, the Organization for Economic Co-operation and Development's (OECD) definition has received some support; thus, e-government is defined as the use of ICTs, particularly the Internet, as a tool to achieve better government (OECD, 2003a). Regarding e-participation, there is also no consensus in the literature, although the OECD proposed a three-level approach: information, consultation, and active participation (OECD, 2003b). This was followed by other authors, such as Macintosh (2004), who proposed the e-enabling, e-engaging and e-empowerment, which is in line with the terms defined by the OECD. According to OECD (2003b), the conceptualization is as follows: the information is identified by the communication of a relevant data in a unilateral government-citizens' way; consultation is a transversal relationship between the government and the citizens, where the latter are invited to share their opinion on certain issues; and active participation refers to the citizens' participation in policy making, although the final decision is the responsibility of the government. With regard to Macintosh (2004), e-enabling is characterized by accessibility of technology to all citizens and the comprehensibility of the provided information which must be clear; e-engagement is identified as an attempt to reach as wide an audience as possible to stimulate debate on political issues; e-empowerment is concerned with supporting active participation and in relation to the previous concept it differs in that it presents a bottom-up perspective, where citizens are co-producers of public policies, that is, they participate and influence the policy making. Moreover, Kneuer (2016) stresses that UN also distinguishes e-participation in three-level approach, where e-government is subsumed under "e-engagement" and includes e-information, e-consultation and e-participation, which illustrates the existence of several variants of e-participation.

Regarding the concepts mentioned above, we present below two relevant cases, one from Portugal and the other from Belgium. About Portugal, Fedotova et al. (2012) revealed that e-participation initiatives were used at the local level (City Hall) and were generally limited to e-informing activities, where ICTs were used to obtain information on policy-making initiatives. With regard to e-consultancy, ICT allowed collecting citizens' opinions on topics defined by the governmental authorities, having a narrow focus centered on issues of spatial planning and budget. At the national level, Fedotova et al. (2012) also identified an e-participation program called “O Meu Movimento”, where each registered user was allowed to send their ideas or movements on 43 different topics such as Education, Economy, Sports, Culture, Energy, etc. The most voted movement had the opportunity to present its arguments in an audience with the Prime Minister. For about two months, 1007 ideas were presented; however, data collection and processing still fail to include AI technologies, unlike other countries. In this case, we are referring to Belgium, which has positioned itself on the European stage with an ambitious AI strategy. In this regard, AI4Belgium, composed of a multidisciplinary team of experts, created CitizenLab to develop AI technologies to increase political participation and assist political decision-making; it was not enough for them to make a digital participation platform because analysis of data by humans is slow and inaccurate. CitizenLab is, therefore, a civic technology company that aims to train civil servants and provide improved machine learning processes that help them analyze citizens' opinions and make better decisions (OECD, 2019). In this regard, Belgian citizens often present ideas, comments, and votes on certain initiatives online, and CitizenLab classifies those ideas using AI technologies, grouping contributions by demographic, geographic similarities, etc., allowing better political decision making. It is possible, in some cases, to see that a neighborhood in a large city can prioritize a greater

number of green areas, while the neighboring municipality, its neighbor, calls for greater cycle paths. In short, through e-democracy, governments can become more responsible and transparent, regaining the confidence of their citizens by seeking public opinion through deliberation and online consultation (Hujran et al., 2020). The observations mentioned above are in line with an article published by a renowned researcher, formerly in the Journal Policy Sciences, that advocates citizen participation to democratize the policy-making process and improve the quality of information provided for policy decision-making appropriate (Wagle, 2000).

Although the use ICT has been increasing interest in politics, Barack Obama's presidential campaign in 2008 being an excellent example of this (Hujran et al., 2020), there are other episodes that have been undermining citizens' confidence in the use of technologies in the context of e-democracy. For example, Cambridge Analytica acquired data on Facebook users, who were targeted before the 2016 US presidential election (Sundberg, 2019).

### **3. METHODOLOGY**

As we mentioned before, to the best of our knowledge, this is the first attempt to analyze e-Democracy in light of AI, politics, and state modernization. This article follows a qualitative, exploratory, and empirical-descriptive case research. The selection of a case study design is justified by the need to investigate a contemporary phenomenon in its real-life context, over which we had little or no control (Given, 2008; Martins et al., 2022). Moreover, Yin (2018) argues that there is no formula to justify the use of a case study, but it largely depends on the research questions. That is, the more the research questions seek to explain some present circumstance (e.g. "how" or why), the more a case study will be relevant, it will also become more

relevant if the research requires an extensive and in-depth description of the phenomenon we want to analyze (Lauer, 2021).

This research also relies on multiple sources of evidence, with the collected data converging to triangulation and corroboration (Curini and Franzese, 2020; Reis et al., 2022). In that regard, this case research drills down the path by collecting data from semi-structured interviews, participant observation, and official documents. The semi-structured interviews were applied with the support of a previously prepared protocol. Over an 8-month period (late 2021 and early 2022), seventeen interviews were conducted via video call at Zoom, and which lasted between 40 to 60 minutes each. The interviews were conducted with AI, Strategic and Political Planning professionals working within the Portuguese government and which were selected according to convenience and snowball sampling (Lewis-Beck et al., 2003). The interviews were recorded and verbatim transcribed in order to capture every spoken word into text (Johnson et al., 2015). In some cases, we resorted to the digital board tool—Miro's online Mind Map, to improve brainstorming between authors and the interviewees in order to deepen knowledge through a precise mapping of the processes described by the respondents. This research was carried out in light of the Declaration of Helsinki, which advises that participants be presented with a document with relevant and detailed information about the research objectives, together with a declaration of informed consent, signed by both parties. This process was very relevant as ethical concerns are among the most fundamental issues of a social scientist's work (Bruter and Lodger, 2013). In the context of participant observation, the research team played an active role in participating and organizing several academic seminars and webinars. Participant observation has been widely used to study small groups in face-to-face situations (Lewis-Back et al., 2003) and where relevant information can be collected more easily than in the context of formal

interviews. In this sense, it was easier to carry out data collection because it was carried out in a relaxed environment, which made respondents feel more comfortable to collaborate. The principal researcher used a field diary (Barakso et al., 2013; Dumont, 2022) to register all activities and interactions (Mills et al., 2010), aiding to clarify less developed issues and deepening issues that had been less explored in the formal interviews. After the seminars and webinars, the principal researcher conducted four focus groups with small groups of less than six participants (Breen, 2006). These focus groups included AI specialists and professionals with an intermediate position of direction, management and coordination in the Portuguese public administration. The purpose of the focus groups was to stimulate brainstorming (Barakso et al., 2013) to provide new discussion opportunities for everyone in the seminar. Focus groups were relevant as informal conversations were held with experts experienced in political science and AI technologies. However, it did not provide data on broader aspects beyond those discussed, such as visits to places where the technologies are used by the government. Due to the impossibility of visiting different places during the period of the research project, this limitation was alleviated with the scheduling of parallel research that will allow to increase knowledge on the subject under study. Finally, the third source of data collection consisted of official documents that yielded 1.143 pages. As recommended by Halperin and Heath (2020), these documents considered government or administrative reports, such as the European Commission's JRC Technical Report (Van Roy, 2020), OECD 2019 Digital Government Index (OECD, 2020), FCT Research in Artificial Intelligence for Public Administration (FCT, 2022a) or the AI Portugal 2030 Strategy (INCoDe, 2019). In addition, information collected on the websites of the Portuguese government was used, such as the Agency for Administrative Modernization (<https://www.ama.gov.pt>), the Public Administration

(<https://www.iap.gov.pt>), ePortugal ([ePortugal.gov.pt](https://ePortugal.gov.pt)) or BUPi (<https://bupi.gov.pt/en/>), just to mention a few examples.

After collecting the data, we carried out a thorough data analysis consisting of two distinct phases. In the first phase, we conducted a descriptive and thematic analysis, a combination that is increasingly gaining more attention (Reis et al., 2020). In a second phase, a content analysis (Manheim et al., 2002; Mey, 2022), a technique often used in qualitative research (Given, 2008), was also carried out. Concerning descriptive analysis, a deductive approach was employed to classify scientific articles, most of which were selected from the Scopus and Web of Knowledge databases. These scientific platforms made it possible to provide graphics and bibliometric analysis that, together with an exhaustive reading of the documents, allowed for an analytical interpretation of the data and identification of existing patterns. It also ensured inductive reasoning by enabling a systematic selection of scientific articles, which allowed for a synthesis of information on the topic and an overview of the use of AI technologies in policy. In a second phase, the data provided by several data collection sources were analyzed using the content analysis technique. This analysis was carried out through initial readings of the entire text collected, that is, through transcriptions, field notes, and official documents. To assist in analyzing a large volume of qualitative data, we used a computer-assisted data analysis software NVivo–QSR International (Version 11). We then identified the most relevant phrases and ideas that emerged from the coding analysis (McNabb, 2015); this process considered the results of the first analysis phase (descriptive/thematic). After this process was completed, we identified the categories and subcategories (Moses and Knutsen, 2019). We moved on to the next step, which was identifying patterns until a map was generated that could provide an overview of the data. Thus, the content analysis technique allowed to code and classify a large volume of qualitative data

until new patterns/dimensions and emerging ideas could be identified (Manheim et al., 2002). Data collection only stopped when theoretical saturation was achieved, which means that respondents generated repetitions and redundancies (Curini and Franzese, 2020; Reis et al., 2022), which is equivalent to the moment that nothing else could have been added (McNabb, 2015).

Reliability refers to the consistency and solidity of the results of a research and, together with validity, allows rigorous and credible investigations (Mills et al., 2010). In general, reliability assesses the extent to which case study results can be replicated by other researchers (Merriam and Tisdell, 2015; Shively, 2017). To this end, we established a series of measures that guarantee the possibility of reaching the same results in identical research circumstances, namely: (1) data triangulation from multiple sources to confirm the findings; (2) the establishment of a protocol so that all interviews were carried out consistently; and (3) co-authors' verification of the entire data analysis process (audit) to identify possible inconsistencies. Validity is associated with quality control and to some extent with reliability (Kellstedt and Whitten, 2018; Pollock III and Edwards, 2019). One of the researchers' concerns was related to the fact that the findings were really demonstrative of reality. By way of example, and to mitigate possible misinterpretations, the interview transcripts were sent by email to all interviewees in order to verify that we really understood what the interviewees meant. Although several researchers may experience phenomena in different ways, we believe that the relationship between reliability and validity helped to support this research in a logic of reading data as close to reality as possible.

#### **4. RESULTS AND DISCUSSION**

This section presents a set of cases that illustrate the Portuguese government's approach to creating innovative policies and services through the use of AI. The two

selected cases presented in this article do not exhaustively illustrate all existing technologies but, on the other hand, seek to create a distinct body of knowledge about these practices. This knowledge is distinct, as it concerns the Portuguese reality; however, the same AI technologies can be used by analogous countries that want to achieve the same results and, for that reason, can be identified as good practices.

#### **4.1. USING AI TO IMPROVE PUBLIC SERVICES IN PORTUGAL – CHATBOT (SIGMA)**

Governments are working to develop citizen-oriented policies and services, and the Portuguese Ministry of Modernization is no exception. Therefore, it created the Agency for Administrative Modernization (AMA), which is currently responsible for developing and managing new service models that allow better interaction with citizens, enterprises and public administration (AMA, 2016). To this end, AMA provides services through ePortugal–[ePortugal.gov.pt](https://www.eportugal.gov.pt), an intuitive public service portal that aims to migrate citizens from on-site services to online ones, eliminating pressure from physical channels, which are channels where some kind of human interaction exists e.g., face-to-face or phone. The AMA has also developed and currently manages the new interoperability in Public Administration (iAP) website (<https://www.iap.gov.pt>), which is the preferred means of exchanging information between the State bodies, services, and agents, being extended to the private section. Therefore, iAP is based on a concept of service delivery shared between different State organizations so as to simplify the delivery of these services to the public (iAP, 2022). Thus, the e-democracy should not be seen as a transformative tool but rather consider technology as a means of preserving the separation of power, making the State more resilient to authoritarianism (Sundberg, 2019); for example, preserving interoperability instead of integration (Bannister and Connolly, 2018).

The ePortugal portal, which aggregates most of the public services in the Portuguese Republic, also uses SIGMA, an AI-based virtual assistant (chatbot) that answers questions, supports website navigation due to different channel attributions and complexity, and executes services. This conversational software agent is a new digital channel that uses Natural Language Processing (NLP) to help machines (chatbots) to understand the language of human beings (Bird et al., 2009; Shawar and Atwell, 2007; Shenoy et al., 2022) so that SIGMA can answer citizens' questions. In addition, SIGMA also has the ability to learn from citizen feedback by using supervised training.

In other words, by monitoring conversations and recording user feedback, it is possible to train the machine and improve the interpretation of the chatbot, which, over time, improves its ability to provide services. Therefore, training is critical to rise the likelihood of interpreting and responding accordingly. By collecting specific telemetry data and designing relevant queries, it is possible to understand how different users interact and what types of questions can be incorporated into the training data (Valverde and Vasconcelos, 2019). SIGMA services are divided into two major phases: the informative phase aids users to collect useful information (e.g., information about the driver's license revalidation); performative phase, which executes services after obtaining the necessary information (e.g., change the address on citizens' identification card). If SIGMA finds it difficult to answer a question, it registers a contact request to refer the person through the call center.

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Citizen writing: "I will be 50 soon, what is the price to revalidate my driver's license?"

Citizen writing : "I lost my wallet, how can I request a duplicate of the citizen card?"

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The light gray means the **intention**, which is the action the citizen wants to perform, and the dark grey refers to the **entity** that is the parameter to perform the action.

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### **Table 1.** Use of AI technology in chatbots

**Source:** Own authorship

SIGMA works by interaction processes, executing dialogue flows after interpreting the users' intention, and subsequently makes a relationship with the entities existing in the system (Table 1). In the first phase, through a Spell Checker, SIGMA validates spelling errors to understand the subject better. Then, it interprets and extracts information from the text coming from the user's messages. SIGMA also has a set of information, such as a thesaurus, to identify citizen's intentions so that they do not have to master the language of public administration. The following process is known as Microsoft Language Understanding (LUIS), where through NLP the text is processed, while the Machine Learning technology performs the interpretation through supervised training (Ruane et al., 2020; Rass et al., 2022). This training allows the software to identify relevant keywords, such as the intentions and entities. For example, imagine that SIGMA identifies three entities, but it cannot understand the intention. Thus, SIGMA makes questions to understand better what the intention is through a selection of entities. In the second phase, a QnA Maker is used, where SIGMA finds the most convenient answer for any entry in the personalized Knowledge Base (KB) that lists the available services (Tenemaza et al., 2020). That is, the chatbot searches the QnA list of services to see if there is a match between the intention with those entities. If SIGMA does not find the entity, the citizen will probably be contacted by the call center. Basically, ePortugal presents a classification

of services, which serves as an information repository that assists the chatbot and citizens decide. At this point, the objective is to: harmonize concepts; simplify the language; semantic classification; organization in life events (e.g., “I am getting married, what do I need?”); and to find interoperability at a European level. In the Report and Analytics of the second phase, a sample of telemetry data is monitored to allow a better analysis of the software through interactions with users, which supports the chatbot training process.

In 2019, SIGMA held 96.554 conversations (89% of such, information about services), and 454 changes of addresses. Moreover, throughout that year, an engineer trained the chatbot about 3 to 4 times a week, which resulted in 1.169 trained speech utterance classifications; the most common phrases and expressions used by citizens were identified; 2.475 keywords were trained, and 229 synonyms groups classified. In the first quarter of 2020, ePortugal had 125.607 registered users, 801.918 sessions / month (including unregistered users), and has information from 590 entities, 2.400 public services, and 7.000 public service points. Overall, SIGMA satisfaction rate was 66.4%, which contrasted with the degree of satisfaction of ePortugal portal which was around 60%. Although this technology is not yet mature to cover all possible scenarios and complex situations presented by citizens and which end up being resolved in traditional channels, SIGMA can continue to evolve through supervised training systems or unsupervised learning (Hancock et al., 2019).

Overall, it is paramount to recognize how AI technologies enable the optimization of public services through citizens’ participation, ensuring transparency and preserving individual rights and freedoms. SIGMA contributes to preserving citizens’ rights and freedoms by allowing public services to be permanently available to all citizens, regardless of their geographic location or time of access. It also allows for the improvement of public services since public participation grows data acquisition

through citizens-state interactions, improving public service delivery. Finally, in presented systems AI services allow for greater transparency and equity since robots are programmed to treat all citizens equally, regardless of gender, race, and religion. Some readers may feel that the above statement is too far removed from current debates about the application of AI. For AI applications are also known to be susceptible to the gender or race precepts that exist in the datasets they were trained on (Owens and Walker, 2020). However, recent advances in science have also allowed to raise awareness of these issues, presenting the contradictory (Daugherty et al., 2019; Crear-Perry et al., 2020) and perhaps bringing fairer systems. Therefore, we feel that although the interview results are in the line that "SIGMA treats users equally regardless of race or gender", this hypothesis may well be a research question that deserves independent study in and of itself.

#### **4.2 DIGITAL PARTICIPATION PLATFORMS TO IMPROVE GOVERNMENT'S RESPONSIVENESS (BUPi)**

Digital citizenship participation platforms in Portugal have been instrumental in improving the government's responsiveness. The analysis of large volumes of data provided by citizens was invaluable in mitigating the delay in data handling by government officials. Therefore, the creation of digital platforms is not enough, as the data analysis process is time-consuming, and, in this regard, the public participation of citizens is vital. In other words, service co-production allows a better and faster service, in addition to making the decision of public servants more efficient with the help of AI through more informed decisions.

BUPi (in Portuguese *Balcão Único do Prédio*) was a project financed by the Portuguese State resulting from a partnership between several areas of public administration such as finance, environment, agriculture, and justice, is in line with



the BUPi platform (vide <https://bupi.gov.pt/en/>) or, alternatively, a file with the geographical coordinates should be uploaded. While this process may be complex and time-consuming for less familiar citizens, a qualified technician can also perform the georeferenced graphical representation, which can be found at BUPi branches in the local Municipalities. After the geographical sketch has been submitted on the platform, its validation will always have to be carried out by a qualified BUPi technician. Once this information is validated, it is cross-checked with other public institutions to ascertain its veracity, such as the Institute of Registry and Notary. After this first part of the process is completed, it becomes possible for the municipalities to know the boundaries and ownership of properties, ensuring better management of public-private resources. For example, knowing the owners allows the State to manage and control private natural resources to encourage deforestation and prevent forest fires. Within the scope of public administration, this system also supports information sharing, enabling the "Only Once" principle, since the citizen is exempted from submitting this information successively to the different State services (BUPi, 2022b). At the same time, the information crossing and data processing using AI generates the opportunity to speed up the identification of the territory and minimize service times at the BUPi branch using deductive self-learning algorithms that can predict the location and shape of the land. Another relevant aspect is the territory's Wiki, that is, the development of a platform that allows sharing data with institutions and citizens, providing a layer of open geographic data so that knowledge can be extracted. In that regard, several entities benefit from this platform, such as universities, as enriching BUPi database creates new sources of information for scientific research and knowledge production.

## **5. DISCUSSION OF THE MAIN RESULTS**

Faced with disenchantment in politics, e-democracy can be a solution to regaining citizens' trust in political institutions. The study by Fedotova et al. (2012) analyzes public participation resulting from initiatives promoted by government authorities in Portugal at local and national levels. While this study revealed that local e-participation initiatives were predominantly informative at the local level and non-existent at the national level, our research reinforced the previous results, albeit with some particularities.

Given the above and in order to answer the RQ1, we found that the promise of greater transparency and responsiveness by the State, together with the growing inclusion and participation of citizens, seems to be compelling. A strong argument was made pointing to the potential of AI and State modernization to bring citizens closer to politics. Examples such as the SIGMA chatbot or the BUPi platform proved to play an essential role within the scope of the Portuguese State's modernization program and, to that extent, AI has contributed to the policy of bringing citizens closer and vice versa. However, we have not yet identified concrete evidence of AI applications that assist in political decision-making in Portugal at higher levels. Although SIGMA (national) and BUPi (local/regional) have been successful, none of these instruments aim at citizen participation in formulating public policies at a national level. As SIGMA is based on AI, it allows the optimization of public services through citizens' participation, ensuring the preservation of individual rights and freedoms, but we found no evidence about aiding political decision-making. The same cannot be said for BUPi in that it brings the possibility of managing land use and forests, which has helped to formulate policies at local/regional level. For instance, from an internal administration point of view, BUPi allows landowners to be identified and held responsible for misuse, abandonment, and lack of land cleaning. On the judiciary side,

it can aid in resolving conflicts of overlapping property lines. And, within the scope of municipal management, it allows recognizing which properties without an owner will be under the responsibility of the State. The latter opportunity enables political decision-making, while helping local political agents to determine the necessary policies and measures to be taken in order to prevent forest fires in coordination with national authorities (e.g., civil protection).

The expansion phase of BUPi is in progress, which includes more than eight million properties not yet georeferenced in the Center and North of Portugal and which do not have a registry. In BUPi's expansion phase, the intention is to add other types of technologies to obtain new layers of information that will be worked by the AI in order to create new knowledge (LiDAR, 2022). Overall, it might appear that there is an imbalance between the two case studies. SIGMA is explained in more detail because while it requires a 'sophisticated' form of AI data processing, it uses fewer interactions and is therefore less complex. On the other hand, BUPi seems to be just an ICT platform that allows data interoperability between different sources, but it is not; as this tool uses algorithms and AI to e.g. avoid overlapping existing polygons.

Answering the RQ2, there was no relevant evolution since the study by Fedotova et al. (2012); this minor progression can be explained by the recent transition from digital transformation to public administration advocated by Reis et al. (2018). Reis et al. (2018) argued that digital transformation (i.e., artificial intelligence) has migrated from information systems (34%) and business economics (22%) to government (1%). Note that the percentages refer to scientific research in digital transformation in 2018, where only 1% of the research was carried out in the public sector. Nevertheless, in Portugal we expect further growth in AI research in public administration, as seen by the high investment in research projects promoted by the Portuguese State since 2018 (FCT, 2022b; INCoDe, 2019).

As crucial findings of this research, we were able to identify that: (1) citizens' participation is critical for the success of e-democracy but, as it was demonstrated, citizens' participation has been centered on its needs and not so much on the issue of voluntary participation; (2) the results are promising at the local and regional levels, as municipalities and first-rate public services have been a catalyst for civil mobilization and participation. Clearly, the responsiveness of local authorities surpassed the national government, perhaps due to proximity issues; (3) most respondents considered that AI technologies have contributed to the emergence of democracy and mobilization in Portugal. In that vein, the empirical research has identified greater transparency and equal treatment of AI tools, actions highly valued by Portuguese society.

In short, there still seems to be a need for further debate on the impact of AI technologies on e-democracy. It also seems fair to conclude that local e-democracy projects have successfully mobilized civil society than actions examined at the national level. However, these may be the first steps to pave the way for new government e-democracy projects and initiatives.

## **6. CONCLUSIONS**

Computer scientists have studied AI early on, but, as far as political science is concerned, it has remained in darkness. In that regard, academics are developing efforts to shed some light on political science, providing an interdisciplinary view through the association of new and sophisticated contributions from other areas of knowledge. To reduce the existing gap, the contribution of this research starts by presenting a conceptual description of the main theories around e-Democracy, and, then, it extends the extant empirical research to present real cases of AI in the public sector of a European state.

The relevance of AI to e-democracy and state modernization is undeniable, as it raises participation, transparency, and preservation of citizens' rights and freedoms. Given that e-services have made it possible to migrate citizens' interactions from traditional public platforms to online ones, this service migration has also contributed to the preservation of rights and freedoms, as public services must be always accessible to all citizens. On the other hand, it has also led to the improvement of services, since public participation helps the technology to learn from interaction and the large volume of data, which leads us to conclude the value of AI technologies in public administration goes far beyond its use. Moreover, it is worth noticing that AI-enabled services can allow greater transparency, given these systems may treat all citizens equally regardless of their gender, race, and religion if they are designed to do so; although due care must be taken with ethical and privacy issues (Hartmann and Wenzelburger, 2021). To increase citizen participation, other data acquisition tools that allow for more informed policy decisions at the local level have been developed. The most significant contribution to policy of this article is related to the validation of the use of AI tools to support local political decision-making in Portugal; specifically, those that have a greater impact on the real-life of citizens (e.g., BUPi) and that, consequently, convey greater confidence in the concept of e-democracy. However, at the same time, there is still a skeptical message from respondents. Which is about how the tools of e-Democracy have shown promise but, which despite all efforts, have still not managed to be applied in real decision-making environments that really stimulate the mobilization of citizens for politics beyond the two cases presented.

This article has some limitations inherent in case studies. First, the research was carried out in Portugal so that the results can be limited, and generalization should be observed with caution. Second, the two cases analyzed do not exhaustively illustrate

all AI tools used in Portuguese public administration. Although these two cases are considered by the interviewees as good examples, it is necessary to create a more solid ground on the phenomenon in Portugal and in the European Union. Thus, it is possible that some readers are left with the feeling that the results of the interviews (e.g., focus group, interviews) were little explored or highlighted in the findings or in the discussion sections. This is explained insofar as we avoid bringing overly technical issues of AI and data science into the field of discussion. Our main priority was to reach a wider audience of researchers and for that we used a comprehensive approach. Despite these limitations, we hope that this article stimulates and encourages further research and contributes to a broader perspective of AI in politics. Future research may also focus on analyzing the citizens' feedback on the identified technologies in order to understand which tools are most relevant from a political-social perspective. A third and important option involves developing a theoretical/conceptual framework that can help to get an overview of AI and State Modernization in Politics.

## **REFERENCES**

- AMA (2016). Agência para a modernização administrativa, I.P. (AMA). Agência de Modernização Administrativa. <https://www.ama.gov.pt/web/agencia-para-a-modernizacao-administrativa/a-ama> Accessed 06 Nov 2020.
- Arrieta, A., Díaz-Rodríguez, N., Ser, J., Bennetot, A., Tabik, S., Barbado, A., Garcia, S., Gil-Lopez, S., Molina, D., Benjamins, R., Chatila, R., & Herrera, F. (2020). Explainable Artificial Intelligence (XAI): Concepts, taxonomies, opportunities and challenges towards responsible AI. *Information Fusion*, 58, 82–115.
- Barakso, M., Sabet, D., & Schaffner, B. (2013). *Understanding political science research methods: the challenge of inference*. Routledge, New York, NY, USA.

- Bird, S., Klein, E., & Loper, E. (2009). *Natural language processing with Python: Analyzing text with the natural language toolkit*. O'Reilly Media, Inc.
- Breen, R. (2006). A practical guide to focus-group research. *Journal of geography in higher education*, 30(3), 463-475.
- Brodny, J., & Tutak, M. (2022). Digitalization of Small and Medium-Sized Enterprises and Economic Growth: Evidence for the EU-27 Countries. *Journal of Open Innovation: Technology, Market, and Complexity*, 8(2), 67.
- Bruter, M., & Lodge, M. (Eds.). (2013). *Political science research methods in action*. Palgrave, New York, NY, USA.
- BUPI (2022a). O projeto piloto. <https://plano.bupi.gov.pt> Accessed 07 April 2022.
- BUPI (2022b). Quem pode aderir ao BUPi? <https://bupi.gov.pt/como-funciona/> Accessed 02 January 2022.
- Chadwick, A. (2008). Web 2.0: New challenges for the study of e-democracy in an era of informational exuberance. *I/S: A Journal of Law and Policy for the Information Society*, 5, 9.
- Chakravorti, B., Bhalla, A., & Chaturvedi, R. (2017). 60 countries' digital competitiveness, indexed. (1–10) <https://hbr.org/2017/07/60-countries-digital-competitiveness-indexed> Accessed 17 Aug 2020.
- Chakravorti, B., Tunnard, C., & Chaturvedi, R. (2015). Where the digital economy is moving the fastest. *Harvard Business Review*, 19, 102–101.
- Crear-Perry, J., Maybank, A., Keeyes, M., Mitchell, N., & Godbolt, D. (2020). Moving towards anti-racist praxis in medicine. *The Lancet*, 396(10249), 451-453.
- Curini, L., & Franzese, R. (Eds.). (2020). *The SAGE Handbook of Research Methods in Political Science and International Relations*. Sage Publications, Thousand Oaks, CA, USA.

- Daugherty, P. R., Wilson, H., & Chowdhury, R. (2019). Using artificial intelligence to promote diversity. *MIT Sloan Management Review*, 60(2), 1.
- Duffy, G., & Trucker, S. (1995). Political science: Artificial intelligence applications. *Social Science Computer Review*, 13(1), 1–20.
- Dumont, G. (2022). Immersion in Organizational Ethnography: Four Methodological Requirements to Immerse Oneself in the Field. *Organizational Research Methods*, 10944281221075365.
- eBUPI (2021). A arquitetura do BUPi. <https://plano.bupi.gov.pt> Accessed 01 July 2021.
- European Commission. White Paper on Artificial Intelligence. A European Approach to Excellence and Trust. Available online: [https://ec.europa.eu/info/publications/white-paper-artificial-intelligence-european-approach-excellence-and-trust\\_en](https://ec.europa.eu/info/publications/white-paper-artificial-intelligence-european-approach-excellence-and-trust_en) (accessed on 4 August 2020).
- FCT (2022a). Research in Data Science and Artificial Intelligence Applied to Public Administration. [https://www.fct.pt/media/docs/Brochura\\_ResearchinDataScienceandAIappliedtoPA.pdf](https://www.fct.pt/media/docs/Brochura_ResearchinDataScienceandAIappliedtoPA.pdf). Accessed 18 June 2022.
- FCT (2022b). Call for Projects. Fundação para a Ciência e a Tecnologia. <https://www.fct.pt/apoios/projectos/concursos/datascience/2018/index.phtml.en>. Accessed 11 July 2022.
- Fedotova, O., Teixeira, L., & Alvelos, H. (2012). E-participation in Portugal: evaluation of government electronic platforms. *Procedia Technology*, 5, 152–161.
- Given, L. (2008). *The SAGE Encyclopedia of Qualitative Research Methods*. Sage Publications: London, UK.

- Halperin, S., & Heath, O. (2020). *Political research: methods and practical skills*. Oxford University Press, USA.
- Hancock, B., Bordes, A., Mazare, P., & Weston, J. (2019). Learning from dialogue after deployment: Feed yourself, chatbot! *arXiv preprint arXiv:1901.05415*.
- Hartmann, K., & Wenzelburger, G. (2021). Uncertainty, risk and the use of algorithms in policy decisions: a case study on criminal justice in the USA. *Policy Sciences*, 54(2), 269–287.
- Hsieh, Y., Tsai, W., & Hsia, Y. (2020). A study on technological anxiety among different ages and genders. In *International Conference on Human-Computer Interaction*, Denmark, Copenhagen, 19-24 July 2020; Springer: Cham, Switzerland, 241–254.
- Huang, M., & Rust, R. (2020). Engaged to a Robot? The Role of AI in Service. *Journal of Service Research*. <https://doi.org/10.1177/1094670520902266>.
- Hujran, O., Abu-Shanab, E., & Aljaafreh, A. (2020). Predictors for the adoption of e-democracy: an empirical evaluation based on a citizen-centric approach. *Transforming Government: People, Process and Policy* 14(3), 523–544.
- iAP (2022). Interoperabilidade na Administração Pública. Sobre a iAP. <https://www.iap.gov.pt/web/iap/sobre-a-iap> Accessed 02 Nov 2021.
- INCoDe (2019). AI Portugal 2030. Portuguese National Initiative on Digital Skills. <https://www.portugal.gov.pt/pt/gc21/comunicacao/documento?i=estrategia-inteligencia-artificial-2030> Accessed 12 July 2021.
- Jiang, F., Jiang, Y., Zhi, H., Dong, Y., Li, H., Ma, S., Wang, Y., Dong, Q., Shen, H., & Wang, Y. (2017). Artificial intelligence in healthcare: Past, present and future. *Stroke and Vascular Neurology*, 2(4), 230–243.

- Johnson, J., Reynolds, H., & Mycoff, J. (2015). *Political science research methods*. Sage Publications, Cq Press, Thousand Oaks, CA, USA.
- Kane, T. (2019). Artificial intelligence in politics: Establishing ethics. *IEEE Technology and Society Magazine*, 28(1), 72–80.
- Kellstedt, P., & Whitten, G. (2018). *The fundamentals of political science research*. Cambridge University Press, New York, NY, USA.
- Kirov, V., & Malamin, B. (2022). Are Translators Afraid of Artificial Intelligence? *Societies* 2(12), 70.
- Kitsara, I. (2022). Artificial Intelligence and the Digital Divide: From an Innovation Perspective. In *Platforms and Artificial Intelligence* (pp. 245-265). Springer, Cham.
- Klein, G. (1993). A recognition-primed decision (RPD) model of rapid decision making. *Decision Making in Action: Models and Methods*, 5(4), 138–147.
- Klein, G. (2008). Naturalistic decision making. *Human Factors*, 50(3), 456–460.
- Kneuer, M. (2016). E-democracy: A new challenge for measuring democracy. *International Political Science Review* 37(5), 666–678.
- Lauer, J. (2021). Methodology and political science: the discipline needs three fundamentally different methodological traditions. *SN Social Sciences*, 1(1), 1-29.
- Lewis-Beck, M., Bryman, A., & Liao, T. (2003). *The Sage encyclopedia of social science research methods*. Sage Publications, Thousand Oaks, CA, USA.
- LiDAR (2022). How LiDAR can help acquire more information about the Portuguese territory. <https://www.youtube.com/watch?v=Gx0c8LN0PB4>. Accessed 11 July 2022.

- Lindner, R., & Aichholzer, G. (2020). E-democracy: Conceptual foundations and recent trends. In *European E-Democracy in Practice* (pp. 11-45). Springer, Cham.
- Linkov, I., Trump, B., Poinssatte-Jones, K., & Florin, M. (2018). Governance strategies for a sustainable digital world. *Sustainability*, *10*(2), 440.
- Macintosh, A. (2004). Characterizing e-participation in policy-making. In *37th Annual Hawaii International Conference on System Sciences, 2004. Proceedings of the* (pp. 10-pp). IEEE.
- Manheim, J., Rich, R., & Willnat, L. (2002). *Empirical political analysis: Research methods in political science*. Longman Publishing Group. Routledge, New York, NY, USA.
- Martins, P., Pinto, A., Costa, E., & Abreu, A. (2022). Digital Transformation in the Teaching and Learning Process: Case Study of a School of the Future. In *Perspectives and Trends in Education and Technology* (pp. 1015-1025). Springer, Singapore.
- McNabb, D. (2015). *Research methods for political science: Quantitative and qualitative methods*. Routledge, New York, NY, USA.
- Merriam, S., & Tisdell, E. (2015). *Qualitative Research: A Guide to Design and Implementation*. John Wiley & Sons: Hoboken, NJ. [SEP]
- Mey, G. (2022). Qualitative methodology. In *International Handbook of Psychology Learning and Teaching* (pp. 1-26). Cham: Springer International Publishing.
- Mills, A., Durepos, G., & Wiebe, E. (2010). *Encyclopedia of case study research*. Sage Publications: London, UK.
- Mishra, S. (2019). Testing the antecedents to e-democracy towards citizens' happiness: a structural equation modelling approach to 'MyGov' initiative, India. *International Journal of Public Administration* *43*(15), 1293–1303.

- Moses, J., & Knutsen, T. (2019). *Ways of knowing: Competing methodologies in social and political research*. Macmillan International Higher Education, New York, NY, USA.
- Mosweu, O., Bwalya, K., & Mutshewa, A. (2017). A probe into the factors for adoption and use of electronic document and records management systems in the Botswana context. *Information Development* 33(1), 97–110.
- Nadkarni, S., & Prügl, R. (2020). Digital transformation: A review, synthesis and opportunities for future research. *Management Review Quarterly*, 1–109. <https://doi.org/10.1007/s11301-020-00185-7>.
- OECD (2003a). The e-Government imperative. [https://www.oecd-ilibrary.org/governance/the-e-government-imperative\\_9789264101197-en](https://www.oecd-ilibrary.org/governance/the-e-government-imperative_9789264101197-en) Accessed 14 Nov 2020.
- OECD (2003b). Promise and problems of e-democracy: Challenges of online citizen engagement. <http://www.oecd.org/governance/35176328.pdf> Accessed 02 Nov 2020.
- OECD (2019). OECD Working Papers on Public Governance. [https://www.oecd-ilibrary.org/governance/hello-world\\_726fd39d-en](https://www.oecd-ilibrary.org/governance/hello-world_726fd39d-en) Accessed 02 Nov 2020.
- OECD (2020). Digital Government Index: 2019 results. OECD Public Governance Policy Papers, 3, OECD Publishing, Paris. <https://doi.org/10.1787/4de9f5bb-en>.
- Owens, K., & Walker, A. (2020). Those designing healthcare algorithms must become actively anti-racist. *Nature medicine*, 26(9), 1327-1328.
- Pollock III, P., & Edwards, B. (2019). *The essentials of political analysis*. Cq Press, Thousand Oaks, CA, USA.

- Rass, S., König, S., Wachter, J., Egger, M. & Hobisch, M. (2022). Supervised Machine Learning with Plausible Deniability. *Computers & Security, 112*, 102506.
- Reis, J., Amorim, M., Melão, N., & Matos, P. (2018). Digital transformation: A literature review and guidelines for future research. In *World Conference on Information Systems and Technologies* (pp. 411–421). Springer, Cham.
- Reis, J., Melão, N., Costa, J., & Bohuslav, P. (2022). Defence industries and open innovation: ways to increase military capabilities of the Portuguese ground forces. *Defence Studies*, 1-24. <https://doi.org/10.1080/14702436.2022.2033117> (accessed on 06 April 2022).
- Reis, J., Santo, P., & Melão, N. (2020). Impact of Artificial Intelligence Research on Politics of the European Union Member States: The Case Study of Portugal. *Sustainability*, 12(17), 6708.
- Ruane, E., Young, R., & Ventresque, A. (2020). Training a Chatbot with Microsoft LUIS: Effect of intent imbalance on prediction accuracy. In *Proceedings of the 25<sup>th</sup> International Conference on Intelligent User Interfaces Companion* (pp. 63–64).
- Savona, M., & Goos, M. (2020). Special issue: The governance of artificial intelligence. *Research Policy*, Elsevier. <https://www.journals.elsevier.com/research-policy/call-for-papers/the-governance-of-artificial-intelligence>. Accessed 27 Sept 2020.
- Shawar, B., & Atwell, E. (2007). Chatbots: Are they really useful? In *Ldv Forum* 22(1), 29–49.
- Shenoy, A., Bhoomika, M., & Annaiah, H. (2022). Design of chatbot using natural language processing. *Knowledge Engineering for Modern Information*

- Systems: Methods, Models and Tools, 60.  
<https://doi.org/10.1515/9783110713633> (accessed on 4 April 2022).
- Shi, Z., Wang, C., & Fang, F. (2020). Artificial Intelligence for Social Good: A Survey. <https://arxiv.org/pdf/2001.01818.pdf>. Accessed 26 Sept 2020.
- Shively, W. (2017). *The craft of political research*. Routledge, New York, NY, USA.
- Sundberg, L. (2019). Electronic government: Towards e-democracy or democracy at risk? *Safety science*, 118, 22–32.
- Suseno, Y., Hudik, M., Fang, E., & Guo, Z. (2020). Employee attitudes, technological anxiety, and change readiness for artificial intelligence adoption. In *Academy of Management Proceedings*.  
<https://doi.org/10.5465/AMBPP.2020.20045abstract>.
- Tenemaza, M., Luján-Mora, S., de Antonio, A., Ramírez, J., & Zarabia, O. (2020). Ekybot: Framework Proposal for Chatbot in Financial Enterprises. In *International Conference on Intelligent Human Systems Integration* (pp. 254-259). Springer, Cham.
- Ulnicane, W., Leach, T., Stahl, B., & Wanjiku, W. (2022). Governance of Artificial Intelligence: Emerging international trends and policy frames. *The Global Politics of Artificial Intelligence*. Chapman and Hall/CRC, 2022. 29-56.  
<https://www.taylorfrancis.com/chapters/oa-edit/10.1201/9780429446726-2/governance-artificial-intelligence-inga-ulnicane-william-knight-tonii-leach-bernd-carsten-stahl-winter-gladys-wanjiku> (accessed on 30 April 2022).
- Valverde, M., & Vasconcelos, A. (2019). Chatbot in the online provision of government services. CAPSI Proceedings. <https://aisel.aisnet.org/capsi2019/41>  
Accessed 02 Nov 2020.
- Van Dijk, J. (2020). *The digital divide*. John Wiley & Sons, Cambridge, England.

- Van Roy, V. (2020). *AI Watch-National strategies on Artificial Intelligence: A European perspective in 2019* (No. JRC119974). Joint Research Centre (Seville site). Available online: <https://publications.jrc.ec.europa.eu/repository/handle/JRC119974> (accessed on 4 August 2020).
- Wagle, U. (2000). The policy science of democracy: The issues of methodology and citizen participation. *Policy Sciences*, 33(2), 207–223.
- Wirtz, B., Weyerer, J., & Sturm, B. (2020). The dark sides of artificial intelligence: An integrated AI governance framework for public administration. *International Journal of Public Administration*, 43, 818–829.
- Wirtz, J., Patterson, P., Kunz, W., Gruber, T., Lu, V., Paluch, S., & Martins, A. (2018). Brave new world: Service robots in the frontline. *International Journal of Service Management*, 29, 907–931.
- Yin, R. (2018). *Case study research and applications: Design and methods*. Sage Publications: Los Angeles, CA, USA.