



## **ALGORITHMIC GOVERNANCE IN PUBLIC SECTOR: IS DIGITIZATION A KEY TO EFFECTIVE MANAGEMENT**

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### **ABSTRACT**

While algorithmic governance in the public sector can lead to increased efficiency and cost-effectiveness, the implementation of those digital innovations can also result in multiple forms of harm: data bias can lead to reinforcement of inequality, discrimination, and criminalization of already marginalized populations; lack of accountability and transparency in decision-making can lead to injustices; societal trust and the legitimacy of public sector institutions may suffer; privacy and fundamental human rights may be threatened, ethical standards challenged. Digital transformation, leading to algorithmic governance, may be challenged in times of crisis, such as the recent pandemic outbreak, as new technologies in public sector institutions and forms of data-driven surveillance and intrusive monitoring are introduced in the name of public security and social need. This research focuses in affirming the assumption that the effective management in the public sector, first of all, is determined by the ability of this sector to transform the perception of the services delivered;



secondly, it requires strategic actions to enable the systemic and coherent digital transformation of the public sector; and lastly, the new strategies of human resources management in the public sector should be considered. The focus is concentrated on understanding how the implementation of digital tools to the public sector and public services correlate with algorithmic governance concept and what impact digitization has on the effectiveness of management in the public sector.

**Keywords:** Algorithmic governance; Public sector; Digitization; Human rights, Management

## 1. INTRODUCTION

The digitalization of all sectors of life, including public service sector, is presumed as being a positive one. It is however clear, that the evolution of digital tools is a 21st-century opportunity, challenge and phenomenon that affects all dimensions of social life - philosophical, social, legal, administrative. Digital technologies pose new requirements, expectations and challenges for the public sector.

It is obvious that the public sector has recently faced an inevitable transformation, among other equally complex ones: the economy and society are undergoing a major digital transformation, including but not limited to new business and work models, public services, leisure and even democratic participation. Governments and the public sector as a whole face the need, firstly, to understand the necessity and possibilities of digitization and, secondly, the inevitable need to assess their human resource management to meet new societal, social, economic, educational trends.

According to the data of European Commission, in 2019 both the quality and usage of digital public services increased in the EU, 67 percent of people who otherwise use the internet who submitted forms to their public administration reported that they now use online channels (up from 57 percent in 2014) (EUROPEAN COMMISSION, 2020).

For example, in Lithuania, more than 90 percent of public services are available on the Internet. More than 80 percent of citizens in Lithuania use e-government services, it should be noted that figures among business sector are even better: 97 percent of them use the electronic services of the public sector (LITHUANIAN MINISTRY OF ECONOMY AND INNOVATIONS, 2020).

Therefore, now the goal of Lithuanian public sector is no longer electronic, but a digitized public service. This trend corresponds to smart administration, development of human



capital and related ICT of administrative and public services, which were seen as a fundamental requirement for economic growth and jobs already with renewed Lisbon agenda in the European Union level already in 2005, and later affirmed in other strategic documents (Europe 2020 (EUROPEAN COMMISSION, 2010), Europe 2030 strategy being created at present, in alignment with United Nations 2030 Agenda).

The similar trends could be seen all over the world, the goal now is to step forward - the transition from e-government to a fully developed open, and efficient, digital government is the aim. However, digitization (and digital transformation) is going faster than the reflection on its impacts on society, security, and rights; this in itself represents a potential threat to society. There is, therefore, an urgent need to analyse the process carefully to avoid the unforeseen, un-modelled and potentially detrimental consequences.

Another concept related to the digitalization of public institutions that should be here mentioned is a widely analysed “algorithmic governance” approach. The term “algorithms” was previously associated only with the exact or technological sciences, with the terms big data, machine learning, or artificial intelligence. In the last decade, this category has also moved to the social sciences, leading to regular disputes over the real or potential consequences of new algorithms.

Technology has both reflected and reorganised society (BIJKER; LAW, 1992; LATOUR, 2005; BAACK, 2015), therefore it has changed the way states, societies and communities are governed. Public administration eliminates forms of incidental agreements that are undesirable because they do not allow for reliance on specific rules; rules and agreements in society are the minimum guarantees of stability and security. Thus, algorithmic governance is a form of public control based on rules and involves particularly complex computational epistemic procedures (KATZENBACH; ULBRICHT, 2019), but the essential word remains “governance”.

However, yet the algorithmic governance potentially increases the effectiveness of public services, applying algorithmic measures often imply new forms of population monitoring, raise human rights concerns, and questions the strategies and means of management in public institutions, requiring changes in the highest policy and strategic level (MEJIAS; COULDRY, 2019; LYON, 2014; NOBLE, 2018).



The pervasive nature of technology creates new multidisciplinary realities for research in social sciences. Digital solutions can play a key role in creating a new, more transparent, simpler, more efficient, a more inclusive and more user-friendly public administration model.

## 2. LITERATURE REVIEW

Digitization of the society is a huge improvement in technology and it has become an inseparable part of our everyday lives which has undoubtedly influenced and changed the way we function (RASSOOL and DISSANAYAKE, 2019; MAYER-SCHÖNBERGER and CUKIER, 2013; HILDEBRANDT, 2015).

However, if digitization could be described as “paperless” (WADE, 2015) alternative of the physical existence of services (KITCHIN, 2014), business models, etc., meanwhile digitalization is usually understood as a broader perspective. Scholars, for example, KAPLAN, WASTE, WOOD-HARPER and DEGROSS (2004) define digitalization as the changes associated with the application of digital technology in all aspects of human society, which consequently means that we are facing a complete digital transformation in the way we communicate, consume, receive services.

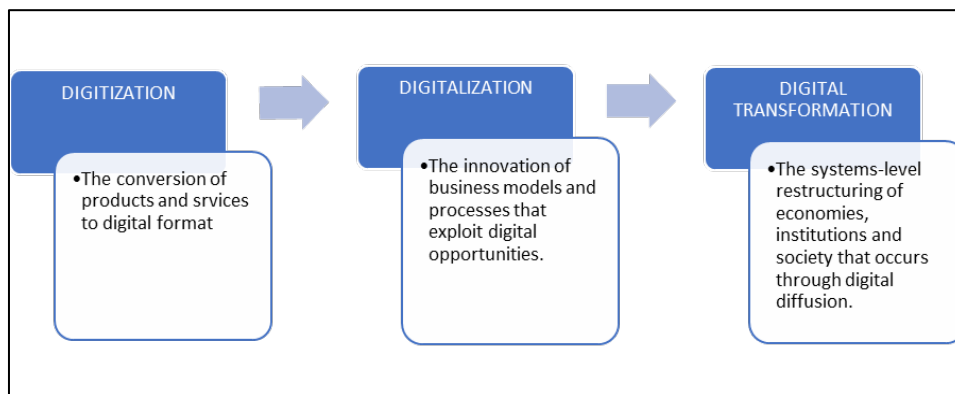


Figure 1: Transformation in the perception of the use of digital means

Source: UNRUH; KIRON, 2017, elaborated by the authors

A very precise and noticeable to the public example of the above-mentioned transformation is a concept of algorithmic governance, which explains how algorithms create social order, i.e. how governance is implemented by algorithms instead of the governance of algorithms (MUSIANI, 2013; JUST; LATZER, 2017; SAURWEIN, et al., 2015). Algorithmic governance in the public sector can broadly be understood as an extension of traditional institutional steering and monitoring by public institutions (CHRISTOU; SIMPSON, 2011), in the horizontal (involves non-governmental subjects, requires an adequate understanding of technological processes, self-regulation and self-restriction imposed by institutions to respect

human rights, determines the need of additional competences of employees and strategic decisions of the leaders) and vertical (requires focusing on multilevel governance) dimensions.

The research shows, that the transformation in the public sector organizations only superficially may seem to be about technologies and finances. When processes of public administration and public services are digitized, models to describe procedural knowledge are needed, and such models consist of algorithms, work processes and capacities of public authorities (GRAY; RUMPE, 2015). With no doubt, public sector depends on state financing policies and mechanisms, political will and even demands from the citizenry, but the main factors determining ability to make changes in management and workstyle are people and their competences, processes and inner procedures, organizational structure and leadership (SUNDBERG, 2019; SÖDERSTRÖM, 2019; REASCOS; CARVALHO; BOSSANO, 2019). As analysed by Ruud in a survey from 2015, two out of three top managers in public sector stated that lack of digital competence is a barrier to succeeding with digitalization (RUUD, 2017).

According to BERMAN, KORSTEN and MARSHALL (2016), for traditional public sector organizations, digital reinvention involves a fundamental re-conception of strategy, operations, technology, and management of human resources, and to succeed organizations should pursue a new strategic focus, build digital competence with a holistic view of products, services, processes, redefine customer-user experience, establish new ways of working (identity, retain, and develop the right talent to create and sustain a digital organization).

Digitization in the public sector requires an integrated approach to technology, process, and people to manage the availability and sustainability of processes (ALHAQBANI ET AL., 2016).

Algorithmic governance recently is analysed in different contexts and disciplines, choosing different objects of inquiry, however, the research is overlapping, multidisciplinary and interdisciplinary, and complex, as the phenomenon itself. Some scholars analyse how algorithms act in a specific social environment, emphasising the contradiction of their reactive or pre-emptive nature (YEUNG, 2018; KITCHIN, 2016; SEAVER, 2017; ZIEWITZ, 2016) and what impact they have on social inclusiveness, diversity and democratic responsiveness (KÖNIG, 2019; SCHRAPE, 2019); others focus on technologic aspects of implementation of algorithms in a social context, with a common goal of translating social context into computable processes (GILLESPIE, 2014; SCHMIDT AND WIEGAND, 2017; BINNS ET



AL., 2017); another important domain of inquiry is related to how search engines and social media platforms organise and structure information, this research paradigm is wide and may involve areas from academic (such as plagiarism checks in academic writing) to commercial and industrial (such as analysis of consumers' behaviour and commercial marketing) (GILLESPIE, 2018; GORWA, 2019; INTRONA, 2016).

The most relevant for this research discussions are in the field of correlation between public sector governance modernization using digital mechanisms and AI, and the effectiveness of public management. Those topics are raised in the scientific publications of political scientists, sociologists, even anthropologists, and legal scholars, who investigate automated procedures for state service delivery and administrative decision-making. Already cited Yeung (2018) provided a taxonomy of three dimensions in which algorithmic governance manifest itself: standard-setting, monitoring, and sanctioning. The most recent works are far from being only enthusiastic and over-estimating the value of algorithmic systems in the public sector, on the contrary, the research shows that the deployment of algorithmic solutions in the public sector resulted in many non-intended and non-disclosed consequences (VEALE & BRASS, 2019; DENCİK, ET AL. 2018). At the same time, it should be noted that applying algorithmic tools in government often relies on new forms of population surveillance and classification by state and its actors, especially in law enforcement area of activities (NEYLAND; MÖLLERS, 2017; LUPTON, 2016; BENNETT, 2017), such as combating tax evasion and fraud, policing (predictive policing concept is another related field of the research) and terrorism prevention, border control, and migration management (EGBERT, 2019; RATCLIFFE; TAYLOR; FISHER, 2019; BENNETT MOSES; CHAN, 2018).

There are not too many research directly related to the impact of algorithmic governance on the effectiveness of public management, and the ones that are dedicated to the topic most often focus on automatization of the systems in public decision-taking procedures (VEALE; BRASS, 2019; MARGETTS, 1999; WILLCOCKS; LACITY, 2016), on bias and discriminatory nature of algorithms used in the public governance, on the sorting and ordering of populations (BAROCAS; SELBST, 2016; COURTLAND, 2018; ENSIGN ET AL., 2018; CHOULDECHOVA, 2017). Just recently scholars shifted their attention from technological issues using digital tools and AI in public sector administration to a conceptual evaluation of categories of values and implementation of new public management (NPM) conception (HOOD, 1995; SUNDBERG, 2019; BERTOTA; ESTEVEZ; JANOWSKI, 2016), and further, to opportunities for automation through the decomposition of administrative procedures



(ETSCHEID, 2019). Critical voices are raised, defending the unique way in which public institutions operate, and asserting that bureaucracy should be preserved and enhanced where e-government policies and algorithmic governance are concerned (CORDELLA; TEMPINI, 2015), however, is undoubted that a vector of comprehensive transformations from e-government to digital government and towards the future system-level restructuring of the whole public sector is directed (BARCEVIČIUS, et al., 2019).

***The purpose of the article.*** This research focuses in affirming the assumption that the effective management in the public sector, first of all, is determined by the ability of this sector to transform the perception of the services delivered; secondly, it requires strategic actions to enable the systemic and coherent digital transformation of the public sector; and lastly, the new strategies of human resources management in the public sector should be considered. The focus is concentrated on understanding how the implementation of digital tools to the public sector and public services correlate with algorithmic governance concept and what impact digitization has on the effectiveness of management in the public sector.

### **3. DATA AND METHODOLOGY**

In our research, we take the methodologic decisions to use term “algorithmic governance” as a governance method used by institutions of the public sector (having certain prerogatives of public administration and providing administrative services to the society) in a process of social ordering that is based on rules and incorporates particularly complex based on technologies, artificial intelligence (AI) and digital solutions. In 2020, the EU published a white paper entitled “On Artificial Intelligence - A European approach to excellence and trust” (EUROPEAN COMMISSION, 2020), therein it not only recognized the tremendous potential of digitalization and use of artificial intelligence - increasing efficiency, productivity, and predictive capacities in all areas of our lives - but also the potential risks and societal harms associated with artificial intelligence. Opaque decision making, multiple forms of discrimination, intrusiveness and negative impact on privacy and fundamental rights, freedom of speech and assembly, are among the mounting concerns. As AI is most often used as a tool digitalizing processes of public services, the ability to properly evaluate all possible consequences of using AI and more general – use of all digital tools is of utmost importance, as an only sustainable and systemic restructuring of the whole activities in the public sector may be beneficial and trustworthy. It could be reasonably expected that many technological systems put in place during the COVID-19 crisis will continue to play a key role in ensuring public services (in a broad meaning of this term – from ensuring public security to public health



and educational services) in the future. While algorithmic governance in the public sector can lead to increased efficiency and cost-effectiveness, the implementation of those digital innovations can also result in multiple forms of harm: data bias can lead to reinforcement of inequality, discrimination, and criminalization of already marginalized populations; lack of accountability and transparency in decision-making can lead to injustices; societal trust and the legitimacy of public sector institutions may suffer; privacy and fundamental human rights may be threatened, ethical standards challenged. Therefore, effective management as a criterion of good administration could be achieved only foreseeing, understanding all possible positive and negative outcomes of digital transformation, leading to algorithmic governance, and the use of AI in public sector institutions.

The article is organized as a concept paper, the researched issues are interdisciplinary and require the systematic approach, therefore legal and managerial aspects will be analysed. The research methods reflect this diversity of disciplinary approaches and include legal analysis, policy and document analysis, critical discourse analysis. Critical, comparative and systemic analysis of the previously conducted studies in the field, and the existing policy level legal acts internationally will be carried out to construct main theoretical/conceptual frameworks regarding the effectiveness of management in the public sector in the digitalized modern socio-economic environment. In this research, the authors follow a deductive approach where the explanations and arguments are supported by empirical evidence and associated theories.

The main question to be answered is whether there is a direct link between the digitization of the public sector through the introduction of algorithmic management tools and the efficiency of public sector management. To answer this question and confirm or refute the assumption that the appropriate, timely, innovative, sustainable and conscious implementation of digital tools in public institutions correlates with the increase in the efficiency of public administration. It is important to mention, that there are quite an ample amount of different data related to digital government, the boost of those have been noticed just recently, as COVID-19 pandemia raised new challenges and obliged governments to take innovative decisions delivering public services, however, due to the incompleteness of the newest data we shall not focus our findings on those surveys (for example, UN E-Government Survey 2020, European Commission Digital Economy and Society Index (DESI) 2020, European Commission eGovernment Benchmark 2019). As an empirical basis for gathering, statistic data of the OECD (Organization for Economic Cooperation and Development) survey was used,





which focuses on progress made by OECD countries in achieving people-centricity in public management and evaluates good governance practices in public service delivery. OECD determined indicators analysing whether public sector institutions, whose strategic and institutional management is characterized by hierarchically, verticality, specifics of management, are ready to use the advantages of digitization. The data used is reliable and trustworthy, as data on public management and governance practices are collected by OECD survey instruments from government officials, validated by OECD experts (OECD, 2019).

Finally, the authors discuss and conclude the paper postulating future research directions in line with the synthesized discussions. This research was planned as a theoretical basis for further empirical research, which will include interviews with managers at the level of the heads of the relevant public sector institutions to determine the readiness of the institutions to work in the digital environment, to assess the legal framework on which these institutions apply digital solutions, and to identify factors leading to misuse of digital tools creating algorithms and further on to potential human rights violations.

#### **4. RESULTS AND DISCUSSIONS**

The main goal in a broader sense of this research is to determine how public institutions and social context are going to interact with digitalization, that most obviously is going to increase even more, and how algorithmic governance reflects in the efficiency of management in public institutions. The benefits of digitization in the public sector are evidenced by different factors: it could reduce the costs of providing public services (transport, education, energy, waste management, etc.), improve the sustainability of products and services, and, more specifically, it is especially seen in law enforcement sector, where using appropriate digital tools enables to better ensure the security of citizens, with proper safeguards to respect their rights and freedoms. However, recent events show that digital solutions cannot be viewed only positively. On February 5th, 2020, a court in the Netherlands ruled that a government system that uses artificial intelligence to identify potential welfare fraudsters is illegal because it violates laws that shield human rights and privacy. The program uses an algorithm to predict a citizen's likelihood of committing fraud by tapping vast pools of personal data collected by the Dutch government like employment records, personal debt reports, education and housing history - information that was previously kept separately (JACOBSON, 2020). The ongoing fight against coronavirus pandemia in the People's Republic of China has revealed the unprecedented use of different digital tools that could be attributed to the concept of artificial



intelligence (facial recognition systems and high-end cameras, computerized systems that track ID cards), and numerous violation of human rights have been recorded.

The presumption expressed in his paper is that algorithms potentially increase the efficiency and efficacy of state services, for example by rationalising bureaucratic decision-making, by targeting information and interventions to precise profiles or by choosing the best available policy options (OECD, 2014). An institutional perspective identifies algorithmic governance as norms and rules that affect behaviour not only of those who use the services but also on those who provide the services. This dimension is especially important in the public sector, as it could both limit activities and create new room for manoeuvre, which in a vertical hierarchy nature of public institutions could be mean to a pro-active and less- bureaucratic behaviour of public officials. Just less than 20 years ago the researches haven't took into consideration the influence of digital solutions on good administration and effectiveness of public sector, most often decentralisation of political power and spending responsibility to subnational governments, appropriate human resource management practices, and in some sectors (such as education and healthcare) increasing the scale of operations was indicated as substantive factors improving efficiency in public institutions (CURRISTINE; LONTI; JOUMARD, 2007).

The public sector is traditionally aligned with the vertical administrative culture, therefore effective management applying algorithmic governance concept relies on the managerial capacities agencies have to implement digital government policies, resulting in fragmented efforts of sector-specific solutions to systemic policy challenges. As the OECD surveys indicate, good decision-making requires knowledge, experiences, views, and values of the public, and unless citizens themselves understand and are engaged in the decision-making, trust is easily lost. In its own turn, digital transformations also allow the public sector to be more universal and contextualized, not linear and can be an impulse for innovative solutions in different areas of public management (human resources, building new competencies, etc.). It is important to notice that implementation of innovations in public institutions does not have boundaries, as it is developing in reflection to changing geopolitical environment in the macro, micro and local levels, socio-economic context and other factors (Figure 2).



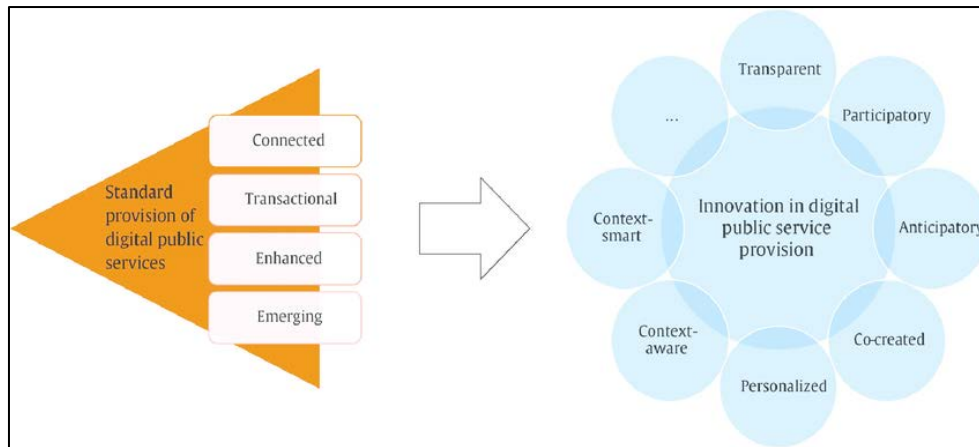


Figure 2: Digital public service innovation framework  
Source: BERTOTA; ESTEVEZ; JANOWSKI, 2016

Digital public services are routinely produced in different levels by the national, state or local governments and delivered to citizens, businesses and other entities under their jurisdictions, and their efficiency are usually aligned with minimizing the waste of public resources. Digital public service innovations are conceived as open-ended - innovations are expected to be continuously added over time, and generally non-linear - one innovation may or may not depend on another innovation.

According developed by United Nations The Policy Recommendations on Digital Public Sector Innovation (UNITED NATIONS, 2017) (though criticised by researches because of interpretation of digital services as the four linear instead of open-ended stages), the efficiency could be evaluated from a methodological perspective based on a holistic view of e-government that incorporates three important dimensions that allow people to benefit from online services and information: the adequacy of telecommunication infrastructure, the ability of human resources to promote and use ICTs, and the availability of online services and content. Bearing in mind this dimension of efficiency, public service delivery to citizens is determined through the application of digital technology and thus transcend the government, political, and other issues of governance.

The efficiency is directly linked to digital government implementation level existing in a certain public institution, which is determined by different perceptions of involvement of digital tools in governance, from simple digitization to transformation, engagement and contextualization (ROSE ET AL., 2014; JAEGER; BERTOT, 2010) (Figure 3).

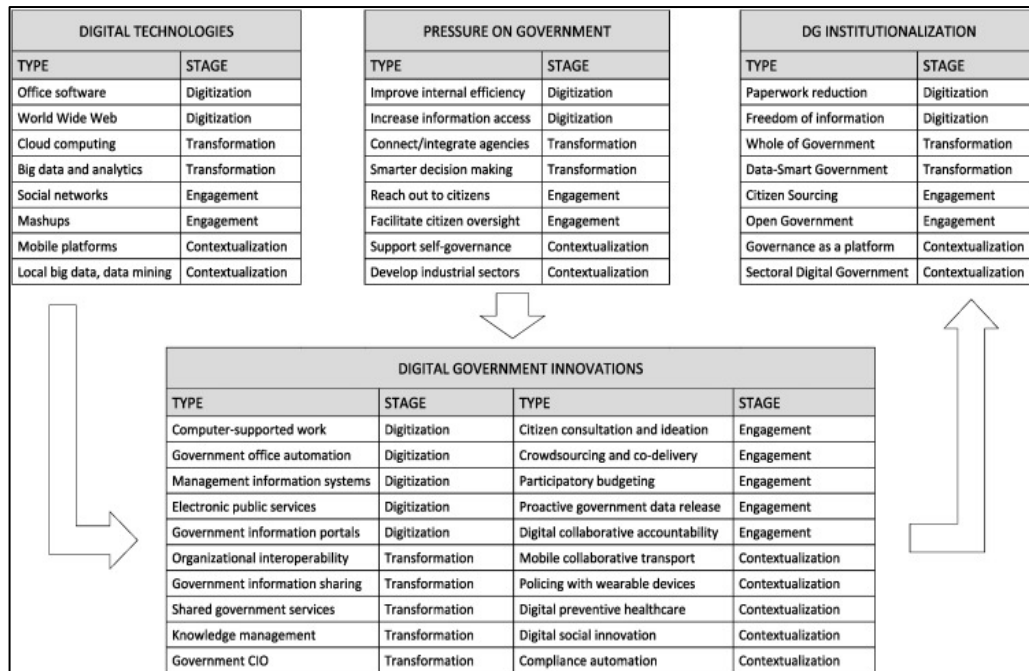


Figure 3: Digital government innovation flow  
 Source JANOWSKI, 2015

It is obvious, that simply using digital tools as an alternative is not an option that would help to achieve effectiveness, the challenge also is not to introduce digital technologies into public administrations; the main goal should be their integration into public sector modernization contextualizing the transformations. Some tools of the digitalized public sector are considered as a basis and minimum standard of effective public sector management (such as E-Government, that refers to the use by the governments of information and communication technologies, as a tool to achieve better government), however other concepts are quite ambiguous (such as digital government, which refers to the use of digital technologies, as an integrated part of governments' modernization strategies). OECD (2016) has established six interrelated dimensions of the digital government framework, that could be used as an indicator of the digitalized governance effectiveness (Figure 4).

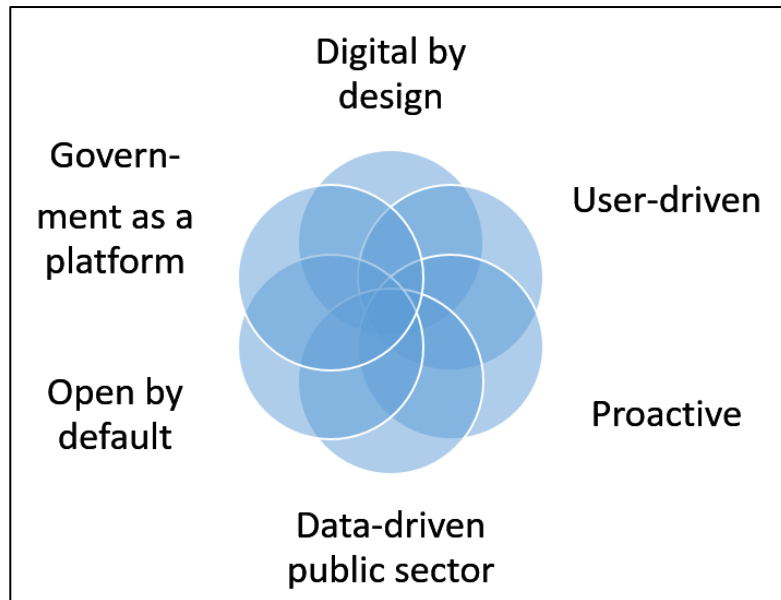


Figure 4: Six dimensions of the digital government framework  
Source: developed by the authors of the article

Public sector institutions need to ensure that their human resources and capacities, organizational structures and management culture, risk management models and internal legal acts are aligned with their strategic digital government vision, and vice versa.

The OECD has developed criteria (data availability, accessibility, and government support for reuse) measuring state policies related to digitalization - Open, Useful and Re-usable (OURdata) Index, which benchmarks open government data policies and their implementation (Figure 5).

OURdata Index increased in 2017 compared with data from 2014 and that reflects improvements in all the indicators, and that correlated with increased trust in governments from their citizens (LAFORTUNE; UBALDI, 2018).

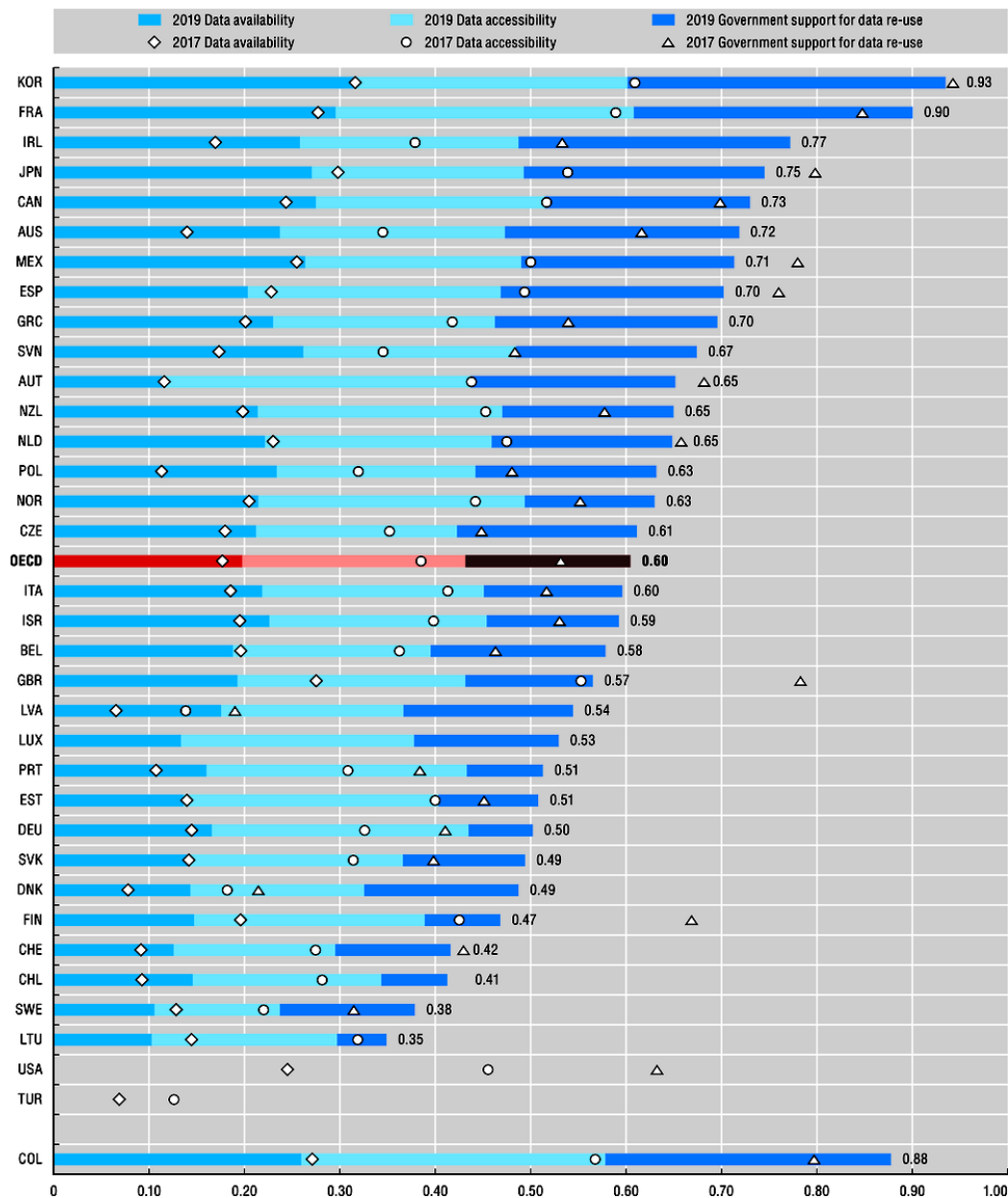


Figure 5: Open Government Data  
 Source: OECD (2016, 2018), Open Government Data Survey

Stronger policy frameworks, and an increasing understanding of the value of stakeholder engagement, have increased data availability, accessibility and re-use almost in all European OECD countries, consequently the effectiveness of public sector management in 2019 (Figure 6). The authors of this paper took the methodologic decision to consider the index of trust in their government by societies as one of indicator of effective management in the public sector and vice versa.

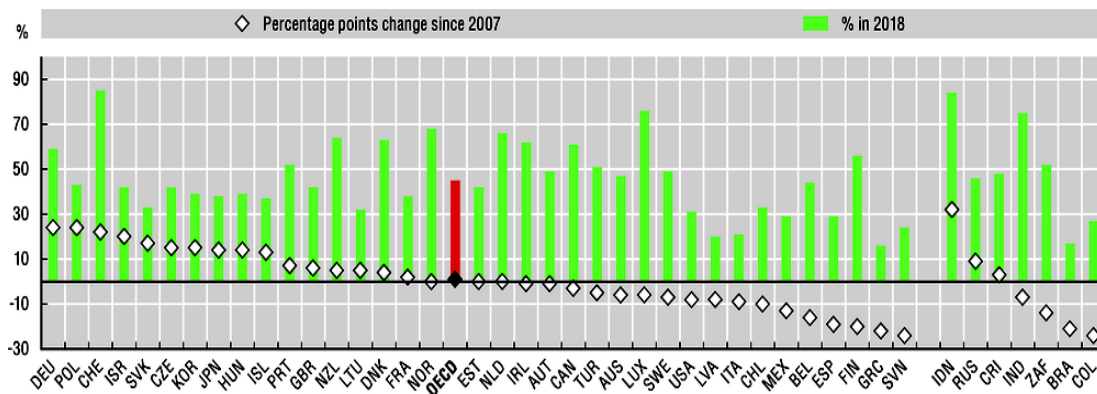


Figure 6: Confidence in national government in 2018 and its change since 2007  
 Source: OECD (2019), Government at a Glance

We shall not evaluate other factors having an impact on societal trust in governments (corruption, the existence and degree of social capital present in the society, social and demographic factors, such as the level of literacy and education, gender, and age) (Blind, 2010), however, the presumption is raised, that the higher is the involvement of digital strategies in the management of the public sector, the higher is an interaction between public institutions and society using digital tools, the higher increase is observed in transparency and accountability of the public sector. Therefore, innovative governance methods (including algorithmic governance) could be one of the most effective instruments promoting trust and involvement of the society in the governance of the states.

In summary, it can be argued that opened to the society public sector institutions, providing secure access to their data, using sustainable digital tools and algorithms are the important factor increasing transparency and efficiency. Therefore, strengthening digital inclusion and the diffusion of digital services is a priority area, that leads to systemic transformation and reflections on possible development of algorithmic governance, however, timely facing the challenges, raising to public institutions, as well as to more theoretical paradigms (such as possible violation of human rights, bias and discriminatory nature of digital mechanisms).

## 5. CONCLUSIONS

Implementing systemic structural changes and empowering innovative digital public services requires building technical, organizational and policy capabilities within government organizations. The necessity of creation of new organisational forms, the introduction of new management methods and techniques, enabling new working methods are crucial reaching the goal of systemic transformations.

In order for public sector institutions to be able to fundamentally change the nature of their governance, cultural and organizational habits, it is necessary to fully understand the advantages and benefits of digitization and algorithmic governance for both society and the public organization itself. Several groups of advantages can be distinguished: economic value (cost-effectiveness, rational management of external and internal resources), social value (promoting citizens' self-empowerment, social participation and engagement), improved governance value (improving accountability, transparency, responsiveness, pro-active governance, and building trust among society and government). An opportunity to increase public trust should be a prevailing argument and motive.

The authors of this article believe that digital transformations and improvements in algorithmic governance would help to address specific emerging societal problems in a collaborative way, involving stakeholders to interactive and inclusive cooperation. As it was pointed by different scholars, algorithmic governance and digital tools enable to reduce human involvement in the procedures of public administration, and consequently it decreases the incidence of human error and time-consumption, improves accuracy, transparency, and effectiveness of public services. The outcomes of digitalisation in terms of more trustworthy governments would be beneficial to societies, governments, and public sector institutions themselves.

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