Towards a Multi-Channel Service Delivery model in the data-driven public sector

Ebenezer Agbozo (iD)
E-mail: eagbozo@urfu.ru

Alexander N. Medvedev
E-mail: a.n.medvedev@urfu.ru

Ural Federal University
Address: 19, Mira Street, Yekaterinburg 620002, Russia

Abstract

The goal of e-government is to provide public services to end users – be it citizens or residents – of a given nation. Research has shown that there is the susceptibility of governments to check all the boxes so as to present an image of having e-government implementations, yet end users eventually do not benefit from these electronic services. Quality public service delivery is an issue of priority today and, with the increasing availability of modern technological tools and techniques, it is attainable. Data-driven e-government is a necessary ingredient in the modern day public sector due to the widespread availability and rapid production of data (i.e. big data) and it aims at value creation. This study proposes a novel research concept, using the Multi-Channel Service Delivery model as a catalyst to attain the data-driven ecosystem in the public sector. The model was developed based on recommendations from works of previous research to address the changing landscape of the public sector. By integrating the Multi-Channel Service Delivery model into e-government and public sector decision making, governments will be able to bridge the divide and offer services to end users with access to e-services, as well as those who do not. In doing so, the United Nations' Sustainable Development Goals (SDGs) which are aimed at leaving none behind will be arrived at.

Introduction

The goals of providing public sector services are to meet the needs of citizens and government by providing public goods and services, contribute to the financial sustainability and government effectiveness, and also to improve social effectiveness [1, 2] – thereby influencing every facet of a nation's socio-economic ecosystem. An improvement in public service delivery has the potential of enhancing governance and quality of life, as well as alleviating social conflicts [3]. When public services are at their optimal efficiency level, citizens and residents (end-users) are not the only beneficiaries, since service providers (public sector and government), as well as the private sector unanimously benefit from it.

Over the last decade, the digitization of public services – i.e. electronic government – has been adopted by most countries and today countries are at different levels of development in e-government. The United Nations' 2016 e-government survey delves deeply into the development of e-government, points out which countries are improving, stagnant and declining in the e-government sphere, as well as gives reasons why [4]. For e-government to function, certain necessary factors and components are vital. To mention a few, they are perceived usefulness of the system, perceived ease of use, perceived service quality, perceived risk, trust in government and the system, technological infrastructure such as telecommunications, literacy, and many more [5–7].

Modern technological advancement and its ubiquity have created the means for people to access these services via numerous sources. Private sector entities capitalize on digital tools such as self-service terminals, interactive response systems, smartphones, social media, email, video telephony services, web services, and much more as channels for delivering services. These initiatives encourage end-users to envision new forms of interaction with the desire that service providers be as accessible and responsive as modern technology allows [8]. Though governments are aware of such diverse channels for service delivery, many are not fully leveraging the full potential of these Multi-Channel Service Delivery schemes to serve their residents and citizens. This is especially true in developing economies [8]. Coupled with the rise in data creation and availability due to these modern technologies, the public sector is presented with numerous opportunities to take advantage of big data by employing analytical tools to gather insights into citizen engagement and electronic participation (e-participation) of e-government; i.e. the data-driven approach.

A United Nations (UN) report on e-government stated that in an era of rapidly changing technology public officials and policy makers still find it difficult to achieve the right balance between applications and devices and investing wisely on technical platforms when considering the design of multichannel service delivery systems [8]. A Multi-Channel Service Delivery (MCSD) model in the shifting technological climate, a data-driven public sector in this article's case, presents itself as a vital apparatus for more efficient quality service delivery. Without a doubt, e-government has brought about much change in the public sector sphere; by reducing bureaucracy, curbing corruption, and most important of all improving quality of public service delivery, among other benefits. Despite its benefits, research has shown that e-government has the potential of escalating these same issues it promises to solve when not governed appropriately [9]. Since no scholarly work has been done on the convergence of MCSD and data-driven public sector (DDPS), the aim of this study is to explore how the Multi-Channel Service

Delivery model can be adopted by developing economies as the public sector world shifts towards a data-driven one. The main question posed for this study is: *How can the Multi-Channel Service Delivery model be integrated into the data-driven public sector for effective public service delivery?*

1. The data-driven public sector

E-government traditionally has been termed as delivery of government services and information to the public using electronic means [10] which aims at higher internal efficiency of government agencies and strives for better transactional services. This is then followed by a transition towards e-government 2.0 which creates opportunities for increasing participation of citizens, openness and accountability of governments, and thus enhances democracy; it promotes transparency by promoting the opening and release of public data [11]. E-government 3.0 is built upon the previous e-government versions and is gaining grounds due to an increase in the use of sensors and smart devices which produce big data ranging from human text to sensor data, combined with advanced analytics and modelling, and possibly ubiquitous services (i.e. cloud computing), allowing for smart governance and data-intensive decision making [11]. This is the foundation of the data-driven public sector (DDPS). The DDPS is capable of identifying, collecting and obtaining useful data for policymaking and service delivery within the public sector and for socio-economic development [12]. For example, analytical techniques, semantic methods such as text mining [13] and artificial intelligence methods can be employed in the extraction of knowledge from large corpora of text data from citizen complaints.

Studies have further extended the concept to build a data-driven e-government model which is a collection of digital public services which channels previously stored data back to citizens as solutions, decisions and reforms for accelerated national growth [14]. They further described this model as a paradigm shift that has the potential of steering any country that embraces the concept into digital maturity coupled with socio-economic development which is also capable of aiding in attaining the United Nations' Sustainable Development Goals (SDGs) [15].

While studies on the Data-Driven e-Government (DDeG) and the DDPS are in their elementary phases, recommendations for innovation research in the public sector have been suggested by researchers [16]. The scarcity of agile model research recommendations for the data-driven public sector and public service delivery expresses a cause for novelty. As such, this study aims at integrating an innovative model, the Multi-Channel Service Delivery model, into the data-driven public sector in order to improve upon service delivery, citizen trust and user satisfaction in e-government.

2. The Multi-Channel Service Delivery model as a data-driven public sector catalyst

In the world of business and commerce, the Multi-Channel Service Delivery (MCSD) model has been adopted by several corporations. Before further delving into the solution, it is appropriate that the concept of MCSD be explored. Research recommends that in order to further enhance e-services delivery in the public sector, MCSD should be explored [17] and as such, this study aims at fulfilling the recommendations.

Multi-Channel Service Delivery (MCSD) is defined as the provision of public services by various means in an integrated and coordinated way and in doing so end-users are able to select their most suitable channel based on their circumstances [18]. MCSD enables

organizations to provide the best all-around user experience across multiple communication channels by leveraging the integration of devices such as smartphones, interactive voice response systems, digital television, self-service terminals, and many other modern devices. Despite its benefits, the complexity of integrating it in the public sector increases due to existing bureaucratic culture, outmoded policies and standards, budgetary constraints, inadequate technical know-how and a lack of leadership [8].

Within the context of e-government research, MCSD has been explored by a few researchers. According to [19], a channel is capable of changing users' perception with respect to a service and user interests will always be aligned with the channel that realizes the highest relative value (i.e. high quality, accessibility, flexibility, and cost-efficiency and effectiveness). Their study examined whether new ICTs could enable service providers to re-engineer front and back-offices in order for them to adopt a flexible multi-channel open interoperable architecture which in turn increases service provision sustainability and consequently the end-user's quality of life [19]. The MCSD has been proposed Artificial Intelligence (AI) fuelled social robots as a service channel aimed at providing a richer service experience, somewhat similar to what human agents could offer. Their study pointed out that these social robots are capable of supplementing service providers to improve delivery, possibly replacing certain channels in the future, and creating currently non-existing opportunities [20]. Traditional public service delivery and the consequences of automation prevented and still prevents governments from transitioning to a stable e-government system. Thus, thorough research indicated that MCSD governed by transformational leadership was a necessary factor in reversing the negative attitude towards e-government [21]. The authors furthermore highlighted that

MCSD expands provision of services to the end users of public services in rural areas in China. A systematic review on channel choice with respect to e-service adoption discovered these factors as indicative of end users' choices: channel characteristics (e.g. interactivity, perceived ease of use, perceived usefulness), task characteristics (e.g. task type, problem complexity), personal characteristics (e.g. socio-demographics, experience with channel, habits), situational constraints (price, distance to channels), and satisfaction (e.g. satisfaction with service encounter) [22]. In light of the aforementioned research findings, this study proposes a model where both the MCSD and data-driven public sector interplay and integrate e-government competencies [23] such as legal, managerial, technical, socio-technical and organizational competencies.

Figure 1 illustrates the data-driven public sector where the MCSD model is realized. Here the harmonization of all stakeholders involved in the design process is observable, thereby agreeing with the stakeholder theory [24]. In the concept of co-creation, primarily the multi-stakeholder approach is adopted in this model due to the fact that it provides a robust analytic structure for exploring and evaluating the impact of e-services on both the experience and performance of public service systems with the involvement of all actors necessary [25, 26].

The duplex channel concept is introduced into the Multi-Channel Service Delivery model whereby end-users are capable of also communicating with service providers instead of the unreliable unidirectional mode of communication [27]. Thus, the system is made human-centred and balance is enforced since the views and contributions of end-users are welcomed by providers.

In Figure 2, the formal representation of the MCSD from Figure 1 in the data-driven public sector is illustrated in BPMN using
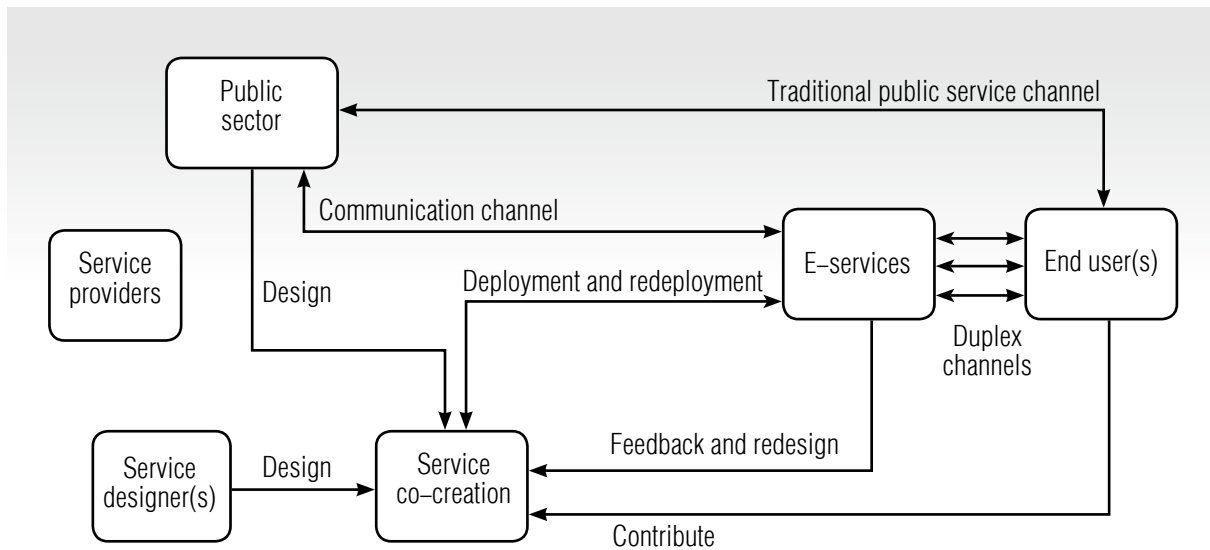
Fig. 1. A Multi–Channel Service Delivery model in the data–driven public sector

the ARIS Express software. In the design and implementation of e-government and digital services for the public sector, design requirement specifications are made and in the case of the model presented, the bottom-up approaches of co-production and co-creation which involve consultation and ideation (design phase); crowdsourcing and co-delivery (execution phase); and service monitoring by means of citizen reporting (monitoring phase) [28] are all integrated. Co-production and co-creation of services are evolving research fields and studies have called for the need to create the appropriate governance structures; linking and integrating the worlds inside government, but also with those outside
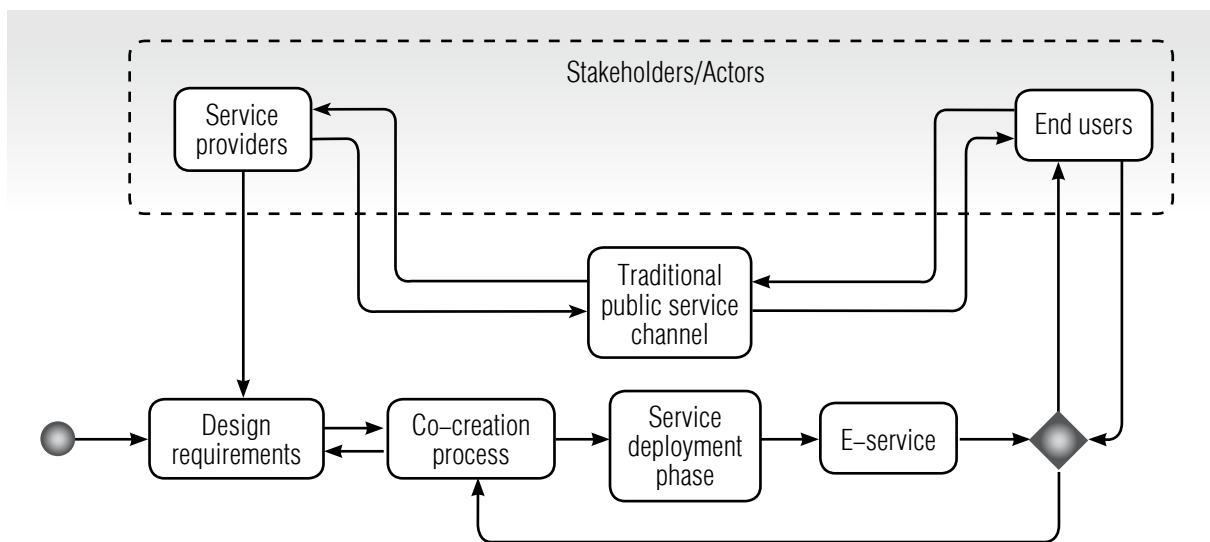

Fig. 2. Business process model and notation (BPMN) representation of proposed model

government [29]. Thus, this research sought to model the linkage and feasibility of a co-production model which involves MCSD and data-driven e-government. It adopts the public value theory which not only inquires into what the public sector values but. most importantly, what brings value to the public sector and is defined as value created by government through services, law regulations and other actions addressing issues such as equity, ethos and accountability [30].

Due to the nature of the MCSD model (Figure 2), the data-driven approach is optimized and enabled in the following ways so as to improve upon public service delivery:

Service design, co-creation and deployment phases: Gathering of data from varying sources through qualitative and quantitative means aided by modern technology such as IOT devices and sensors, data streaming tools linked to pre-existing systems (i.e. web platforms). Recommended frameworks based on agile development and continuous improvement can utilize open government data in co-producing services for effective and efficient service delivery [31];

Service engagement: Authorized tracking of non-personal data is fed back to service providers, by virtue of the duplex communication mode in the MCSD model, to create dashboards and reports which will inform decision-making at all levels of government. Gamification is also encouraged as a means of boosting e-participation, thereby contributing to building better societies [32];

Decision-making: Data-informed and evidence-based decision-making to support not only design and implementation of e-services but governmental decisions to improve citizen/resident livelihood. Research suggests data/knowledge driven policy-making where a shared platform for policy intelligence is integrated, thereby creating opportunities for multi-stakeholder contribution to decision making [33];

Evaluation and assessment: Public service providers and government, considering the metrics made available from analysed data from the ecosystem, are able to assess the well-being of e-government initiatives, government programs, user satisfaction, engagement, infrastructure efficiency, return on investments and many other deliverables.

As pointed out by studies, a lack of involvement of all stakeholders in the design of e-Government solutions as well as the lack of responsive evaluation and monitoring lead to e-government failure [34]. Another study also indicated that ICT development in developing countries still remains low and authors attribute this to insufficient stakeholder involvement [35]. In an example of co-designing to bridge design-reality gaps for developing citizen-centric projects in Uganda, involvement of public opinion brought to light the benefits economically marginalized citizens could derive should patients be given the freedom to make decisions with regard to online appointment payment [36]. The study indicated that in doing so, quality and improved healthcare delivery will be available to approximately 70% of poor non-paying citizens.

To engage citizens in the co-design process as well as collecting data, feedback and issues relevant to a city by its citizens, researchers recommended the Gather-Share-Govern (GSG) model and cited examples of e-government initiatives such as ImproveMyCity and the Riyadh Wiki Information and Complaining System (RWICS) in the case of Saudi Arabia [37]. In the RWICS, citizens are involved in the development process rather than the government due to the ease of use. Thus, establishing co-design and in turn promoting trust and transparency.

For these reasons and more, the proposed model is a panacea to the existing ailments in public sector e-service design, implementation and delivery because stakeholder involvement is a core value necessary for the agile e-government development process/cycle.

At the heart of this model, is the human-centric factor. Thus, user privacy is of great value to governments and all forms of personal data is treated with a high level of caution. The European Union's General Data Protection Regulation (GDPR) is one of such regulations recommended.

Advantages of the amalgamation of the MCSD into the data-driven public sector include: offering services to all groups of individuals and not only the technology-savvy, the continued value and reuse of data, creation of interoperable synergy in the case of highly decentralized public sector systems, enforcing a value co-creation and co-production perspective, and optimization of public service delivery.

Conclusion

This paper explored the concept of Multi-Channel Service Delivery and married it with the data-driven public sector. The Multi-Channel Service Delivery approach in the data-driven public sector ecosystem has the potential to achieve the human-centric desire of research in the sphere of public service delivery as well as optimizing public service business processes, end-user engagement with e-services, decision-making at all levels of government, evaluation and assessment of the service sector. The proposed model is hinged on the public value theory and a human-centric core value which aim at delivering quality service, creating value for both service providers and beneficiaries.

With respect to contributions to theory and practice, the model adds to the extant literature on e-government and the public sector transformation studies, as well as new information with regard to the duplex mode of communication in the Multi-Channel Service Delivery approach.

The study presented a general overview of the model and benefits of the model based on the fact that studies have revealed that a lack of stakeholder involvement in e-government design and delivery is detrimental to the development of e-government. For the purpose of future studies, it is recommended that a metric model be developed to ascertain the level to which various countries are utilizing the Multi-Channel Service Delivery in the data-driven public sector. ∎

References

1. Bisogno M., Cuadrado-Ballesteros B. (2019) The role of public sector accounting on financial sustainability and governmental effectiveness. *Financial Sustainability of Public Sector Entities*. Cham: Palgrave Macmillan, pp. 123—144. DOI: 10.1007/978-3-030-06037-4_7.

2. Zaheer A.N., Rashid A. (2017) Analyzing the role of public sector marketing in improving social effectiveness: a case study from Anhui province, China. *International Review on Public and Nonprofit Marketing*, vol. 14, no 1, pp. 57—71. DOI: 10.1007/s12208-016-0162-y.

3. Smoke P. (2015) Rethinking decentralization: Assessing challenges to a popular public sector reform. *Public Administration and Development*, vol. 35, no 2, pp. 97—112. DOI: 10.1002/pad.1703.

4. Peña-López I. (2016) *UN e-government survey 2016. E-government in support of sustainable development.* United Nations.

5 Mensah I.K., Vera P., Mi J. (2018) Factors determining the use of e-government services: An empirical study on Russian students in China. *International Journal of E-Adoption*, vol. 10, no 2, pp. 1—19. DOI: 10.4018/IJEA.2018070101.

6. Joseph B.K. (2017) Determining factors influencing e-government development in the developing world: A case study of Zambia. *Journal of e-Government Studies and Best Practices*, vol. 2017, Article ID 143795, pp. 1—16. DOI: 10.5171/2017.143795.

7. Roy M.C., Chartier A., Crête J., Poulin D. (2015) Factors influencing e-government use in non-urban areas. *Electronic Commerce Research*, vol. 15, no 3, pp. 349−363. DOI: 10.1007/s10660-015-9193-4.

8. UN DESA (2012) *E-government survey (2012). E-Government for the people.* Department of Economic and Social Affairs, United Nations, New York. Available at: https://publicadministration.un.org/egovkb/Portals/egovkb/Documents/un/2012-Survey/Chapter-4-Supporting-multichannel-service-delivery.pdf (accessed 20 November 2019).

9. Hasnain Z. (2017) *E-bureaucracy: Can digital technologies spur public administration reform?* Available at: https://blogs.worldbank.org/governance/e-bureaucracy-can-digital-technologies-spur-public-administration-reform (accessed 16 September 2019).

10. Jayashree S., Marthandan G. (2010) Government to e-government to e-society. *Journal of Applied Sciences (Faisalabad)*, vol. 10, no 19, pp. 2205−2210. DOI: 10.3923/jas.2010.2205.2210.

11. Lachana Z., Alexopoulos C., Loukis E., Charalabidis Y. (2018) Identifying the different generations of e-government: An analysis framework. Proceedings of the *12th Mediterranean Conference on Information Systems (MCIS), Corfu, Greece, 28−30 September 2018*, pp. 1−13.

12. Ubaldi B., Van Ooijen C., Welby B. (2019) A data-driven public sector: Enabling the strategic use of data for productive, inclusive and trustworthy governance. *OECD Working Papers on Public Governance*, no 33. Paris: OECD Publishing.

13. Karpov N., Babkin E., Demidovskij A. (2016) Evolvable semantic platform for facilitating knowledge exchange. Supplementary Proceedings of the *5th International Conference on Analysis of Images, Social Networks and Texts (AIST-SUP 2016), Yekaterinburg, Russia, 7−9 April 2016*, pp. 62−72.

14. Agbozo E., Spassov K. (2018) Establishing efficient governance through data-driven e-government. Proceedings of the *11th International Conference on Theory and Practice of Electronic Governance*, Galway, Ireland, 4−6 April 2018, pp. 662−664.

15. Agbozo E. (2018) The role of data-driven e-government in realizing the sustainable development goals in developing economies. *Journal of Information Systems & Operations Management*, vol. 12, no 1, pp.70−77.

16. Androutsopoulou A., Karacapilidis N., Loukis E., Charalabidis Y. (2017) Towards an integrated and inclusive platform for open innovation in the public sector. *E-democracy − Privacy-preserving, secure, intelligent e-government services: 7th International Conference on e-Democracy, Athens, Greece, 14-15 December 2017*, pp. 228−243. DOI: 10.1007/978-3-319-71117-1_16.

17. Voutinioti A. (2013) Determinants of user adoption of e-government services in Greece and the role of citizen service centres. *Procedia Technology*, no 8, pp. 238−244. DOI: 10.1016/j.protcy.2013.11.033.

18. Ruppel K. (2014) *Multi-channel service delivery*. Available at: https://blogs.oracle.com/content/multi-channel-service-delivery (accessed 16 September 2019).

19. Germanakos P., Samaras G., Christodoulou E. (2005) Multi-channel delivery of services −The road from e-government to m-government: Further technological challenges and implications. Proceedings of the *First European Conference on Mobile Government (Euro mGov 2005), Brighton, UK, 10−12 July 2005*, pp. 210−220.

20. Pieterson W., Ebbers W., Madsen C.O. (2017) New channels, new possibilities: A typology and classification of social robots and their role in multi-channel public service delivery. *Electronic Government, 16th IFIP WG 8.5 International Conference (EGOV 2017), St. Petersburg, Russia, 4-7 September 2017*, pp. 47−58. DOI: 10.1007/978-3-319-64677-0_5.

21. Mahmood K., Nayyar Z., Ahmad H.M. (2018) Switching to electronic government through transformational leadership: Implications of multichannel and digital divide. *Journal of Internet Technology and Secured Transactions*, vol. 6, no 1, pp. 534−540. DOI: 10.20533/jitst.2046.3723.2018.0066.

22. Madsen C.O., Kræmmergaard P. (2015) Channel choice: A literature review. Proceedings of the *14th International Conference on Electronic Government (EGOV), Thessaloniki, Greece, 30 August – 2 September 2015*, pp.3-18. DOI: 10.1007/978-3-319-22479-4_1.

23. Distel B., Ogonek N., Becker J. (2019) eGovernment competences revisited – A literature review on necessary competences in a digitalized public sector. Proceedings of the *14th International Conference on Wirtschaftsinformatik, Siegen, Germany, 24–27 February 2019*, pp. 286–300.

24. Jensen M.C. (2010) Value maximization, stakeholder theory, and the corporate objective function. *Journal of Applied Corporate Finance*, vol. 22, no 1, pp. 32–42. DOI: 10.1111/j.1745-6622.2001.tb00434.x.

25. Osborne S.P., Radnor Z., Strokosch K. (2016) Co-production and the co-creation of value in public services: a suitable case for treatment? *Public Management Review*, vol. 18, no 5, pp. 639–653. DOI: 10.1080/14719037.2015.1111927.

26. Bryson J., Sancino A., Benington J., Sørensen E. (2017) Towards a multi-actor theory of public value co-creation. *Public Management Review*, vol. 19, no 5, pp. 640–654. DOI: 10.1080/14719037.2016.1192164.

27. Prem E. (2015) A digital transformation business model for innovation. *ISPIM Innovation Symposium* (p. 1). The International Society for Professional Innovation Management (ISPIM).

28. Linders D. (2012) From e-government to we-government: Defining a typology for citizen coproduction in the age of social media. *Government Information Quarterly*, vol. 29, no 4, pp. 446–454. DOI: 10.1016/j.giq.2012.06.003.

29. Halmos A., Misuraca G., Viscusi G. (2019) From public value to social value of digital government: Co-creation and social innovation in European Union initiatives. Proceedings of the *52nd Hawaii International Conference on System Sciences (HICSS 2019), Maui, Hawaii, 8–11 January 2019*, pp. 2974–2983. DOI: 10.24251/HICSS.2019.360.

30. Kelly G., Mulgan G., Muers S. (2002) *Creating public value: An analytical framework for public service reform*. London: Strategy Unit, Cabinet Office.

31. Toots M., McBride K., Kalvet T., Krimmer R., Tambouris E., Panopoulou E., Kalampokis E., Tarabanis K. (2017) A framework for data-driven public service co-production. Proceedings of the *16th International Conference on Electronic Government (EGOV), St. Petersburg, Russia, 4–7 September 2017*, pp. 264–275. DOI: 10.1007/978-3-319-64677-0_22.

32. Al-Yafi K., El-Masri M. (2016) Gamification of e-government services: A discussion of potential transformation. Proceedings of the *Twenty-second Americas Conference on Information Systems, San Diego, California, US, 11–14 August 2016*, pp. 1–9.

33. Misuraca G., Viscusi G. (2015) Shaping public sector innovation theory: an interpretative framework for ICT-enabled governance innovation. *Electronic Commerce Research*, vol. 15, no 3, pp. 303–322. DOI: 10.1007/s10660-015-9184-5.

34. Joseph B.K. (2018) Designing effervescent e-government solutions: Lessons from a developing world context. *International e-government development*. Cham: Palgrave Macmillan, pp. 187–211. DOI: 10.1007/978-3-319-63284-1_8.

35. Boonmee C. (2017) Mail–doc–web: A technique for faster, cheaper and more sustainable digital service development. Proceedings of the *17th European Conference on Digital Government (ECDG 2017), Lisbon, Portugal, 12–13 June 2017*, pp. 36–46.

36. Kyakulumbye S., Pather S., Jantjies M. (2019) Towards design of citizen centric e-government projects in developing country context: the design-reality gap in Uganda. *International Journal of Information Systems and Project Management*, vol. 7, no 4, pp. 55–73. DOI: 10.12821/ijispm070403.

37. Al Helal E., Mokhtar H. (2018) Towards smart Riyadh: Riyadh Wiki information and complaining system. *International Journal of Managing Information Technology*, vol. 10, no 2, pp. 95–106. DOI: 10.5121/ijmit.2018.10206.

About the authors

Ebenezer Agbozo
Senior Lecturer, Ural Federal University, 19, Mira Street, Yekaterinburg 620002, Russia;
E-mail: eagbozo@urfu.ru;
ORCID: 0000-0002-2413-3815

Alexander N. Medvedev
Cand. Sci. (Tech.);
Associate Professor, Ural Federal University, 19, Mira Street, Yekaterinburg 620002, Russia;
E-mail: a.n.medvedev@urfu.ru