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# EXPLORING DIGITAL GOVERNMENT TRANSFORMATION IN THE EU

UNDERSTANDING PUBLIC SECTOR INNOVATION IN A DATA-DRIVEN SOCIETY

Gianluca Misuraca, Egidijus Barcevičius, Cristiano Codagnone



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## LIST OF ABBREVIATIONS

<b>AI</b>	Artificial intelligence	<b>ICT</b>	Information and Communication Technologies
<b>API</b>	Application Programming Interface	<b>IoT</b>	Internet of Things
<b>BOLD</b>	Big and Open Linked Data	<b>ISA<sup>2</sup></b>	Interoperability solutions for European public administrations
<b>BWC</b>	Body-Worn Cameras	<b>IT</b>	Information technology
<b>CDO</b>	Chief Data Officer	<b>JRC</b>	Joint Research Centre of the European Commission
<b>DDPS</b>	Data Driven Public Sector	<b>MR</b>	Mode of Regulation
<b>DEP</b>	Digital Europe Programme	<b>NGO</b>	Non-governmental organisation
<b>DGT</b>	Digital Government Transformation	<b>NPM</b>	New Public Management
<b>DLT</b>	Distributed Ledger Technology	<b>OECD</b>	Organisation for Economic Co-operation and Development
<b>e-ID</b>	Electronic Identification	<b>OGD</b>	Open Government Data
<b>EIF</b>	European Interoperability Framework	<b>RPA</b>	Robotic Process Automation
<b>ELISE</b>	European Location Interoperability Solutions for e-Government	<b>TMO</b>	Target Mechanism Outcome
<b>EU</b>	European Union	<b>UN</b>	United Nations
<b>GDPR</b>	General Data Protection Regulation		
<b>GIS</b>	Geographic Information System		



When I joined the European Commission's Joint Research Centre in Seville back in 2009, I had already experienced a decade of e-Government development from both a research and a practice point of view, as well as having been involved in policy support in the field of Electronic Governance at European and global level.

During the following ten years, I had the opportunity to monitor from a privileged viewpoint, the progress made by EU Member States in integrating ICTs into the public sector to improve service delivery and policy making. At the same time I have been following closely and contributing to the advances in the literature of what was emerging as the foundation of a new generation of research and practice on ICT-enabled governance.

So when in 2018 I was offered the opportunity to support the shaping of the JRC's new research agenda in the area of Digital Governance and Public Sector Innovation, it was clear to me that we needed to go beyond the rhetoric and hype of techno-deterministic approaches that often hindered the successful adoption of digital government.

The JRC research on '*Exploring Digital Government Transformation in the EU: understanding public sector innovation in a data-driven society*', in short DigiGov, was thus designed exactly to pursue such an ambitious aim and to contribute to shedding light on how ICT-enabled innovation in the public sector can transform governance systems and support policy makers to better address systemic and unexpected challenges.

The study was conceived within the framework of the ELISE Action of the ISA<sup>2</sup> Programme, which has been pioneering innovative data-centric approaches to digital government. I am thus delighted to present in this report an overview of the main results achieved, involving an amazing team and an extraordinary group of recognised experts and representatives of key stakeholders, as part of what is now the well-established 'DigiGov Community'.

Despite the fact that e-Government and the study of innovation in the public sector is not a new field, the journey towards Digital Government Transformation is an exploration into a *terra incognita*, as there is still limited robust evidence of the social and economic impacts of digital innovation in government and how to assess them.

To assist us in this endeavour, we have thus defined a mixed-method approach entailing a comprehensive and systematic review of the state of the art, conceptualisation work and empirical case studies, as well as engaging with a broad scholarship, practitioners and policy makers in order to gain insights and validate our findings.

First, the research achieved a much needed systematisation of the knowledge base that was required to face the challenges of Digital Government Transformation, reviewing a vast body of scientific literature, policy documents and practitioners generated reports in a broad range of disciplines and policy domains, with a focus on the EU.

Second, the study developed an original conceptual framework to help map the effects of Digital Government Transformation. The resulting DigiGov-F is a comprehensive theory-informed heuristic instrument, able to support the definition of change strategies within the institutional settings of public administration. At the same time it paves the way for further empirical research and policy experimentation.

Third, and precisely to fill the evidence gap in policy research on Digital Government Transformation, the project designed and conducted four case studies with experimental or quasi-experimental components. This part of the study had a twofold objective. On the one hand, it aimed to illustrate the possible impacts of Digital Government Transformation, identifying real-life drivers and barriers in diverse countries and policy domains. On the other hand, it served to validate and refine the outcome dimensions of the conceptual framework, namely: a) productivity and efficiency; b) effectiveness, inclusion and sustainability; and c) legitimacy and trust.

While a detailed discussion of the findings of the analytical, conceptual and empirical parts of the research is reported in the previously published JRC Science for Policy Report (Misuraca, Ed., Barcevičius et al., 2019) and JRC Technical Report (Misuraca, Ed., Codagnone et al., 2020), this report is a compendium for researchers and practitioners to assist policy makers in the demanding task of ‘reinventing governance in the digital age’.

As such, it comes at a very critical moment for the future of Europe and its role in shaping a new global governance. This is in part because during the implementation of the research we have been faced with the – not entirely surprising to some, but unexpected to many – outbreak of the Covid-19 pandemic, which revealed the unpreparedness of our society and governments to deal with complex crises and to find innovative solutions.

At the same time, the crisis raised hopes of exploiting the opportunities that emerged to achieve real Digital Government Transformation. Many have expressed the need to finally embrace the long-awaited digital revolution and to institutionalise innovation in the public sector, redefining governance mechanisms. Others instead express concern over the widening gaps and increased risks associated with digital acceleration in a ‘pandemic society’.



Most importantly, the results of our research follow the publication in February 2020 of the European Digital Strategy proposed by the von der Leyen Commission to realise the priority of making 'A Europe fit for the Digital Age', which strives to promote the European values of an open, democratic and sustainable digital society and calls for strengthening public service interoperability in the EU.

In this renewed policy context, the focus on building data-driven governance and a new generation of digital public services, which make full and ethical use of emerging predictive and cognitive technologies and applications, is at the core of the European Strategy for Data and the White Paper on Artificial Intelligence that are the first pillars of the approach proposed to ensure Europe's global competitiveness and digital sovereignty.

To this end, the concluding part of the DigiGov project is timely, as it provides insights and recommendations of direct relevance to the discussion on the structuring of the Digital Europe Programme (DEP) as well as the future Digital Government policy actions that the Commission and Member States are planning to define as successors to the e-Government Action Plan 2020 and the targets set out in the Tallinn Declaration in 2017.

For this purpose, the research has also engaged the DigiGov Community in a foresight Policy Lab exercise on how to shape Digital Government Transformation in the years to come. The resulting scenarios we developed and present in this report resonate well with the current discussion on policy and regulatory governance interventions to safeguard data protection and empower a truly digital citizenry, respecting fundamental rights at the global level and, at the same time, promoting European ecosystems for digital innovation.

Clearly this is only the beginning of a much longer excursion into the future, but indeed an important first stepping stone, as it contributes to today's policy debate on the governance 'with and of' ICTs in the era of Artificial Intelligence and the heralded advent of the 'Internet of everything'.

In this respect, as I had the privilege when I joined the JRC Seville – at the time, the Institute for Prospective Technological Studies (IPTS) – to envision the scenarios for Digital Europe 2030 (Misuraca et al, 2010), I am happy to contribute today, ten years later and at the end of my term at the European Commission, to set the directions and outline the coordinates for a further 'lifting off': destination Digital Europe 2040!

**Gianluca Misuraca**  
DIGIGOV SCIENTIFIC AND PROJECT LEADER FOR JRC





# ACKNOWLEDGEMENTS

This report presents the final results of the research *‘Exploring Digital Government Transformation in the EU: understanding public sector innovation in a data-driven society’*, DigiGov, directed by the Digital Economy Unit at JRC Seville, under the lead of Gianluca Misuraca. The research has been conducted in collaboration with the team of the consortium comprising PPMI, Open Evidence, Politecnico di Milano, Rand Europe and Martel Innovate, coordinated by Egidijus Barcevičius and with the scientific supervision of Cristiano Codagnone.

However, this report is the result of a truly collaborative effort as it involved a large team of researchers from the consortium, and the contribution of many colleagues of the JRC and other services of the Commission, who have provided inputs, reviewed intermediate outputs of the study, or participated in the various events organised to discuss and validate the findings of the research.

Special thanks go to the former Head of the Digital Economy Unit, Alessandro Annoni, whose vision and intuition have been instrumental to the origination of the DigiGov research. Likewise we are grateful to Francesco Pignatelli, ELISE Action Leader, for his support in the implementation of the project, and his commitment in enabling the transition towards the JRC’s new research agenda on Digital Transformation of Governance and Public Sector Innovation.

We are also very grateful to Natalia Aristimuño Pérez, Head of the Interoperability Unit at DIGIT and Georges Lobo, ISA<sup>2</sup> Programme Manager at DIGIT, who provided guidance on navigating into the territory of Digital Government Transformation, as well as colleagues from DG CONNECT who have assisted us in the journey, in particular Dietmar Gattwinkel of the eGovernment and Trust Unit, and Andrea Halmos of the Smart Mobility and Living Unit.

Finally, the research benefited enormously from the advice provided by the members of the DigiGov Community that has been established to accompany the research process and validate the outcomes of the study. This group of recognised experts and representatives of key stakeholders is a valuable result *per se* as it served to structure a rich discussion and bridge science with policy in the crucial area of Digital Government Transformation, at the crossroads between diverse sectors and actors, drawing on an array of academic disciplines and perspectives.

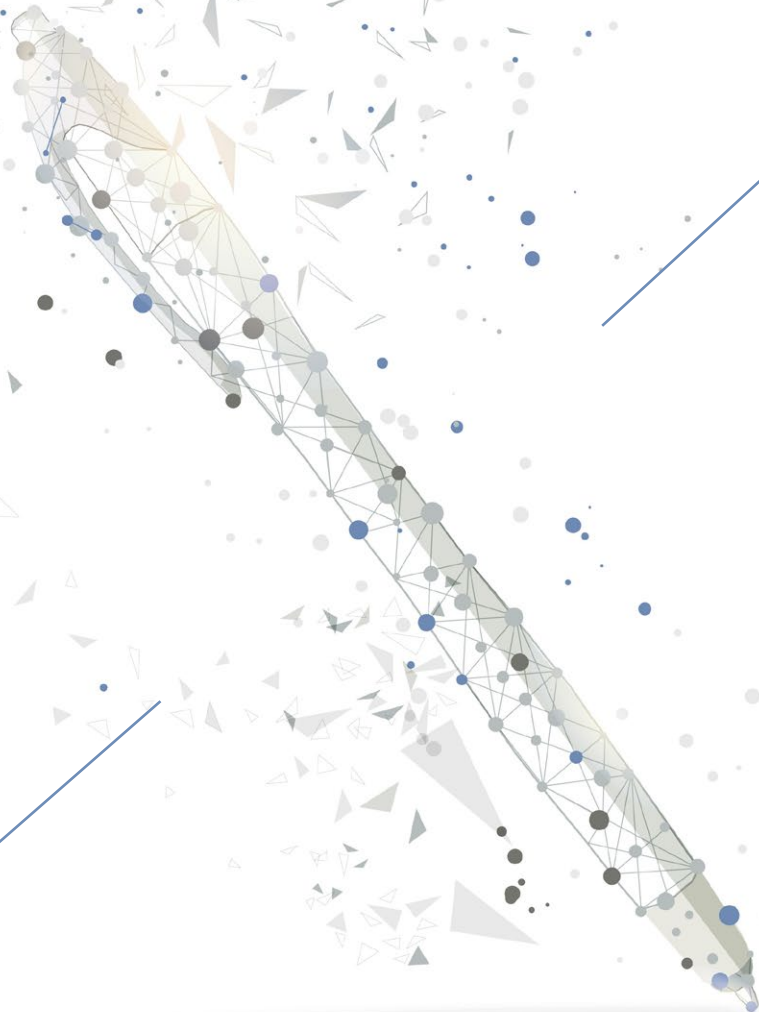
We are therefore obliged to all the ‘DigiGov fellows’ for the insights offered as part of the peer-review process, and the suggestions that contributed to the co-creating and refining of the research outcomes during the various consultation workshops and the foresight exercise. The inputs received have been extremely valuable for drawing up policy recommendations as well as to further orientate the design of scenarios for Digital Europe 2040.

From this perspective, the DigiGov Community will not end with the completion of this study, but it is expected to be engaged further in the future, to contribute to advancing Digital Government Transformation in the EU and beyond.



# O

# EXECUTIVE SUMMARY





This report presents the results of the research ‘*Exploring Digital Government Transformation in the EU: understanding public sector innovation in a data-driven society*’, in short DigiGov. The main goal of the research was to better understand how ICT-enabled innovation in the public sector can transform governance systems, and how governments can take advantage of emerging and future digital technologies in order to address systemic problems such as the inefficiency of public services, existing inequalities of access, and a decline in trust and in perceptions of the legitimacy of government. Compiled over a period of 18 months (from December 2018 to July 2020) using a set of different approaches, this final report of the study concludes with suggestions as to how the future research agenda and policy developments in this field could be shaped.

The first step towards achieving the study’s objectives was to define what is meant by ‘Digital Government Transformation’. Despite significant interest in the topic over recent years, definitions of this concept remain varied and sometimes contradictory. We started from the idea that transformation implies a radical change in terms of the forms, essential structure and functioning of an entity. It involves a change from a ‘current state’ to a ‘new state’, which is expected to produce an improvement. The definition that we present in the first part of this study therefore necessarily includes both a prescriptive and a normative dimension. However, whether the change actually produces such a transformation and achieves the promised impact remains an empirical question that can be ascertained only through further research.

The first chapter of this report introduces the rationale for the research and its policy relevance. It explains that the study addresses the need to consider governmental transformation in relation to new data-driven technologies such as Artificial Intelligence (AI), as well as related predictive and cognitive technologies and applications such as those providing geospatial/location data, for policy design and service delivery. The research was designed to explore the possible use and impacts of a combination of different technologies, both new and existing, that go beyond the applications traditionally considered the ‘nuts and bolts’ of e-Government and online public services. Throughout the report, we highlight the fact that very limited robust, empirical evidence exists on the effects of this new wave of digitalisation of the public sector. Measurement frameworks, where they are available, are often too focused on efficiency and effectiveness. However, in this report we show that in the current context of declining trust in both government and democracy, the public sector should leverage digital technologies to open up to all stakeholders, to become more responsive and transparent, and to engage with citizens in a joint effort to improve their wellbeing. There is an opportunity today for governments to achieve this through smarter policies and better targeted services, as well as greater openness and participation.





The overall approach and the methodologies used throughout the study are presented in Chapter 2. The logic of the study is based on three interconnected work streams: empirical, conceptual and consultative. The first of these, empirical, refers to our systematic review of the literature and the policy analysis that laid the foundations for the subsequent phases of the study. In addition to secondary sources, we also collected primary evidence by conducting four case studies concerning four different areas of policy making. The second, conceptual, stream refers to the development of the conceptual framework, which was inspired by the literature review and then validated by the case studies. Lastly, the consultative work stream included the three workshops with experts and stakeholders, and the establishment of an online community of practice for peer learning and knowledge sharing. This stream had a two-fold objective: a) to improve upon our work by employing the tacit knowledge of recognised experts and relevant stakeholders; and b) to ensure external review and scientific validation.

The first phase of the study, the literature review (Chapter 3), was based on almost 500 academic and 'grey' literature sources, as well as an analysis of digital government policies in the EU Member States. This provides a synthetic overview of the main themes and topics in the digital government discourse. Overall, the literature review revealed that many sources appear overly optimistic with regard to the impact of Digital Government Transformation, although the majority of these are based on normative views or expectations, rather than empirically tested insights. We therefore caution that Digital Government Transformation requires further empirical research that incorporates a due differentiation between evidence and hope. A digital transformation that involves the redesign of the tools and methods used in the machinery of government will, in fact, require a significant change to the institutional frameworks that regulate and help to coordinate the systems of governance within which such changing processes are implemented.

In Chapter 4, we present the conceptual framework developed as part of the research, DigiGov-F, which contributes to the systematising and reconceptualising of Digital Government Transformation within the scope of public sector innovation. It does so by highlighting the key dimensions and factors that should be further studied in order to understand how ICT-enabled innovation can transform governance and policy making. It also paves the way for a more in depth assessment of the effects of digital transformation. The rationale behind DigiGov-F is therefore to systematise insights from a multidisciplinary body of literature in order to shape future policy research and prepare the ground for the assessment of the effects of transformation. It is a theory-informed and scientifically grounded elaboration, resting on a clear definition of what a conceptual framework is, and on a step-by-step methodology for concept building. Avoiding a linear approach, but encapsulating a system in which everything is connected, DigiGov-F comprises three main blocks. The first of these consists of the external factors that shape the digital transformation, such as institutional settings and networks of influence. Second are the internal factors that are specific to the organisation, such as the attributes of its innovation and its organisational processes. Third, in the centre of the framework, we represent the key steps in the digital government initiative: public values, strategy, design, implementation and effects.

The DigiGov-F framework was used instrumentally during our analysis of the four case studies presented in Chapter 5. Each case study covers a different context (city management, education, privacy, policing), and their results have implications for most phases of the policy cycle. In analysing the cases and the findings of their experimental or quasi-experimental components, we pursued the twofold objective of validating and refining the conceptual framework. At the same time, we explored the real-life drivers and barriers in each case, as well as those outcomes actually produced, or which could potentially be achieved in the future. The four cases should be considered explorations that zoom in closely on the concrete aspects of the practice of Digital Government Transformation – although one can hardly generalise from just these four cases. Nonetheless, both taken singularly and in a cross-case comparison, the four cases yield interesting insights, such as the limits of automation and of immediate productivity gains; the strategic importance and twofold nature of legitimacy and trust; and the importance of the non-monetary effects of public sector innovations.

The entire research implementation process followed a consultative approach. Since the first of the three workshops with experts and stakeholders was organised in Ispra in May 2019, the research team has created a virtual community (DigiGov) that engaged continuously to provide insights on the ongoing results of the study. The results of the literature and policy review were presented at the first workshop, with experts providing suggestions on the very first draft of the conceptual framework developed. The second workshop, organised in Seville in October 2019, was set up as an interactive Policy Lab at which experts and stakeholders were prompted to provide specific advice on the conceptual framework and to discuss the preliminary findings of the case studies/experiments. The final workshop, held online as a foresight workshop in July 2020, focused on the development of the future scenarios that were prepared on the basis of the overall results of the study.

Finally, the last chapter of the report (Chapter 6) moves on from the results of the research to look at policy implications and recommendations. These relate mostly to applied policy research in the domain of Digital Government Transformation, and to a lesser extent to policy *per se*. They indicate the directions to be pursued in order to accumulate the evidence necessary to support those policy and regulatory approaches that maximise the positive effects of Digital Government Transformation, and minimise the negative ones. The final recommendations include the need to build human capacity to ensure a successful transformation, to make use of predictive analytics in order to improve public services and policy making, and to create a culture of digital transformation within public administration. The report's concluding remarks look to the future, introducing the final version of the four scenarios in relation to digital transformation and the role of digital governments in 2040, which are extrapolated from the current debates on ethics and policy in the digital age. The ambition of these scenarios is not to predict, but to describe possible future worlds that can help to shape research and policy recommendations and support the design of future policy actions.





# RÉSUMÉ + ANALYTIQUE +

Ce rapport présente les résultats d'une étude visant à mieux comprendre comment l'innovation permise par les Technologies de l'Information et de la Communication (TIC) dans le secteur public peut transformer les systèmes de gouvernance et comment les gouvernements peuvent tirer avantage des technologies numériques émergentes et futures pour faire face à des problèmes systémiques, tels que l'inefficacité des services publics, les inégalités actuelles d'accès et la baisse de confiance et de légitimité des gouvernements. Combinant une série d'approches différentes sur une période de 18 mois (de décembre 2018 à juillet 2020), ce rapport se conclut avec des suggestions sur la façon dont le futur programme de recherche et l'élaboration des politiques dans ce domaine pourraient être façonnés.

La première étape vers les objectifs de cette étude a été de définir la «transformation numérique gouvernementale». Malgré un intérêt marqué pour ce sujet ces dernières années, la définition de cette notion reste variée et parfois contradictoire. Nous sommes partis de l'idée que la transformation implique un changement radical à la fois dans les formes, la structure de base et le fonctionnement d'une entité. Un changement d'un état actuel à un état nouveau, supposé produire une amélioration. Par conséquent, dans la définition que nous présentons dans la première partie de l'étude, il y a nécessairement une dimension prescriptive et normative. Cependant, la question de savoir si le changement produit une telle transformation et l'impact promis reste une question empirique qui ne peut être vérifiée que par des recherches supplémentaires.

Le premier chapitre de ce rapport introduit le motif de l'étude et sa pertinence politique, expliquant que l'étude répond au besoin de considérer la transformation gouvernementale par rapport aux nouvelles technologies portées par les données, telles que l'Intelligence Artificielle (IA) et les technologies prédictives et cognitives liées, ainsi que par rapport à d'autres technologies et applications comme celles offrant des données «géospatiales/de localisation» pour la conception des politiques et la fourniture de services. L'étude a été conçue pour explorer l'usage et les impacts possibles de la combinaison de différentes technologies nouvelles et existantes, allant au-delà de celles traditionnellement considérées comme les «rouages» du e-gouvernement, tels que les services publics en ligne. Nous soulignons à travers notre rapport qu'il existe très peu de preuves empiriques solides sur les effets de cette nouvelle vague de numérisation du secteur public. Les cadres de mesure, lorsqu'ils sont disponibles, sont souvent trop axés sur l'efficacité et l'efficacité. Cependant, dans ce rapport, nous montrons que dans le contexte actuel de déclin de la confiance dans le gouvernement et la démocratie, les gouvernements devraient tirer profit des technologies numériques pour s'ouvrir aux citoyens, devenir plus réactifs et transparents et s'engager dans un effort commun avec toutes les parties prenantes pour améliorer le bien-être des citoyens. Ils ont cette opportunité aujourd'hui aussi grâce à des politiques plus intelligentes, des services plus ciblés et une ouverture et un engagement accrus.

L'approche générale et les méthodologies que nous avons utilisées tout au long de l'étude sont présentées au chapitre 2. La logique de l'étude repose sur trois axes de travail interconnectés :

empirique, conceptuel et consultatif. Par le premier axe, nous entendons l'étude systématique des documents et l'examen des politiques qui fixent le travail pour les phases ultérieures de l'étude. En plus des sources secondaires, nous avons aussi collecté des sources primaires en menant quatre études de cas dans quatre secteurs gouvernementaux différents. Le deuxième axe, conceptuel, renvoie au développement du cadre conceptuel, inspiré par l'analyse documentaire et validé par les études de cas. Enfin, l'axe de travail consultatif comprenait les trois ateliers avec les experts et acteurs. Cet axe avait un double objectif : a) l'amélioration de notre travail en utilisant les connaissances tacites de plusieurs experts et acteurs, b) la validation scientifique.

La première phase de l'étude, l'analyse documentaire (chapitre 3), s'est appuyée sur près de 500 sources universitaires et de littérature grise, ainsi que sur l'analyse des politiques gouvernementales en matière de numérique dans les États membres de l'UE. Elle offre un aperçu synthétique des principaux thèmes et sujets du discours gouvernemental en matière de numérique. Globalement, l'analyse documentaire montre que beaucoup de sources paraissent trop optimistes quant à l'impact de la transformation numérique gouvernementale, bien que la majorité d'entre elles reposent sur des opinions ou des attentes normatives plutôt que sur des connaissances vérifiées empiriquement. Nous mettons donc en garde sur le fait que la transformation numérique gouvernementale devrait faire l'objet de recherches empiriques et d'une différenciation appropriée entre les preuves et les espoirs. Une transformation numérique qui implique la restructuration des outils et des méthodes utilisés dans l'appareil gouvernemental va en réalité requérir un changement significatif des cadres institutionnels qui régulent et soutiennent la coordination des systèmes de gouvernance dans lesquels ces processus de changement sont mis en œuvre.

Dans le chapitre 4, nous présentons le cadre conceptuel, DigiGov-F, qui contribue à systématiser et reconceptualiser la transformation numérique gouvernementale dans le cadre de l'innovation du secteur public. Il agit ainsi en soulignant les dimensions et facteurs clés qui devraient être davantage étudiés pour comprendre comment l'innovation permise par les TIC peut transformer la gouvernance et l'élaboration des politiques et ouvrir la voie à une évaluation plus approfondie des effets de la transformation numérique. Par conséquent, la logique derrière DigiGov-F est de systématiser les idées provenant d'un ensemble documentaire pluridisciplinaire afin de façonner la recherche politique future et de préparer le terrain pour l'évaluation des effets de la transformation. Il s'agit d'une élaboration fondée sur la théorie et la science, reposant sur une définition claire de ce qu'est un cadre conceptuel et sur une méthodologie d'élaboration de concepts étape par étape. Sans utiliser une approche linéaire, mais dans un système dans lequel tout est connecté, DigiGov-F s'articule autour de trois axes principaux. Premièrement, les facteurs externes qui façonnent la transformation numérique, tels que les cadres institutionnels et les réseaux d'influence. Deuxièmement, les facteurs internes propres à l'organisation, tels que les attributs de l'innovation et les processus organisationnels. Troisièmement, au centre du cadre, nous représentons les étapes clés de l'initiative de gouvernement numérique : valeurs publiques, stratégie, conception, mise en œuvre et effets.

Le DigiGov-F a déjà été utilisé au cours de l'analyse des quatre cas qui sont présentés au chapitre 5. Chacune des études de cas couvre un contexte différent (gestion urbaine, éducation, vie

privée, maintien de l'ordre) et leurs résultats ont des implications pour la plupart des phases du cycle politique. En analysant les cas et les résultats de leurs composantes expérimentales ou quasi expérimentales, nous poursuivons le double objectif de valider et d'affiner le cadre conceptuel, tout en explorant les facteurs et obstacles réels dans chaque cas, ainsi que les résultats effectivement obtenus ou qui pourraient être atteints à l'avenir. Les quatre cas doivent être considérés comme des explorations qui s'intéressent de près aux «rouages» de la pratique de la transformation numérique gouvernementale, bien qu'on puisse difficilement généraliser à partir de ces quatre cas seulement. Néanmoins, pris isolément et dans le cadre d'une comparaison croisée, les quatre cas apportent des éléments d'information intéressants, comme les limites de l'automatisation et des gains immédiats de productivité, l'importance stratégique et la double nature de la légitimité et de la confiance, ainsi que l'importance des effets non monétaires des innovations du secteur public.

L'ensemble du processus a suivi une approche consultative puisque, depuis le premier atelier (sur trois) avec des experts et des acteurs organisé en mai 2019, l'équipe de l'étude a créé une communauté virtuelle (Digi-Gov) qui s'est engagée en permanence à fournir des informations sur les résultats partiels de l'étude. Lors du premier atelier, les résultats de l'analyse documentaire et de l'examen des politiques ont été présentés et les experts ont fait des suggestions sur la toute première version du cadre conceptuel développé. Le deuxième atelier, organisé à Séville en octobre 2019, a été conçu comme un laboratoire politique interactif où les experts et acteurs ont été encouragés à fournir des conseils spécifiques sur le cadre conceptuel et à discuter des résultats préliminaires de l'étude de cas/des expériences. Le dernier atelier, qui s'est tenu en ligne en juillet 2020 comme un atelier de prospective, s'est concentré sur les scénarios de prévision qui ont été préparés à partir des résultats généraux de l'étude.

Enfin, le dernier chapitre de ce rapport (chapitre 6) passe des résultats de la recherche aux implications et recommandations politiques. Celles-ci portent principalement sur la recherche politique appliquée dans le domaine de la transformation numérique gouvernementale et, dans une moindre mesure, sur la politique en tant que telle. Elles indiquent les directions à suivre pour que le cumul des preuves puisse soutenir ces approches politiques et réglementaires afin de maximiser les effets positifs de la transformation numérique gouvernementale et de minimiser les effets négatifs. Les recommandations finales incluent la nécessité de renforcer les capacités humaines pour garantir une transformation réussie, d'utiliser l'analyse prédictive pour améliorer les services publics et l'élaboration des politiques et aussi de créer une culture de la transformation numérique au sein de l'administration publique. Les remarques finales de ce rapport sont tournées vers l'avenir, en introduisant quatre scénarios sur la transformation numérique et le rôle des gouvernements numériques en 2040, qui sont extrapolés à partir des débats éthiques et politiques actuels. Ces scénarios n'ont pas une ambition prédictive, mais décrivent plutôt des mondes possibles qui peuvent aider à formuler des recommandations politiques et des actions politiques futures.



# 1

# INTRODUCTION







This report brings together the findings of the work carried out as part of the research ‘**Exploring Digital Government Transformation in the EU: understanding public sector innovation in a data-driven society**’, in short [DigiGov](#). This entailed defining the overall approach of investigation and specific methodologies for the study; carrying out a broad and comprehensive analysis of the state of the art in the field; developing a conceptual framework; selecting and developing four case studies with experimental components; engaging with a group of stakeholders and experts through consultation and validation workshops and the establishment of a dedicated online community; and formulating research and policy recommendations within the context of prospective scenarios at the horizon 2040.

In this introductory chapter we present the research rationale and objectives (§ 1.1); the definition of Digital Government Transformation adopted (§ 1.2); and its policy relevance (§ 1.3). Chapter 2 describes the overall approach of the study (§ 2.1), and the specific methodologies used (§ 2.2 and § 2.3). Chapter 3 presents the main findings of the review of the state of the art, together with an analysis of the transformative effects of digital innovations in government. In Chapter 4 we introduce the conceptual framework developed as part of the research (henceforth referred to as DigiGov-F). We begin by defining its purpose and scope (§ 4.1), then we go on to illustrate its underpinnings (§ 4.2). We conclude by presenting the final version of DigiGov-F (§ 4.3). Chapter 5 is divided into four sections, each briefly describing the case studies and presenting their main findings in relation to the conceptual framework. We conclude in Chapter 6 with a brief account of the main empirical findings from the study (§ 6.1) and an analysis of the current debate on digital transformation (§ 6.2). Combining these two sources we present the foresight scenarios for Digital Government Transformation at the horizon 2040 developed as part of the prospective analysis of the research (§ 6.3). We then finally outline recommendations for policy and future research (§ 6.4).

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THIS RESEARCH EXPLORES  
HOW ICT-ENABLED  
INNOVATION IN THE PUBLIC  
SECTOR CAN TRANSFORM  
GOVERNANCE SYSTEMS

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This final chapter integrates results from the debate and foresight exercise held during the final workshop on 9 July 2020. This report and the scenarios proposed are based on the review of the state of the art of research and policy in the field of Digital Government Transformation, published as a [JRC Science for Policy Report \(Misuraca, Ed., Barcevičius et al., 2019\)](#), as well as the findings of the conceptual framework and its application to four case studies, which are reported in great detail in a [JRC Technical Report \(Misuraca, Ed., Codagnone et al. 2020\)](#). While the reader can refer to these two reports for greater detail, in Chapters 3, 4 and 5 we provide a more concise account of the review of the state of the art, the development of the conceptual framework, and the findings of the case studies. An overview of the activities of the expert consultation and stakeholder engagement conducted as part of the research is also available in [JRC Conference and Workshops Report, Barcevičius et al., 2020](#).



## 01.1 RATIONALE AND OBJECTIVES

As the title of a famous piece in *The Economist* stated, ‘*the world’s most valuable resource is no longer oil, but data*’ (*The Economist*, 2017). In the same vein, more recently, the Council of Europe noted that the ‘digital economy’ has become a ‘data economy’ (Council of European Union, 2019, pp. 1-2) and the German Minister of Economics Peter Altmaier has been reported affirming that ‘*data are the resource of the future. That is why Europe needs digital infrastructures that ensure data sovereignty and enable the sharing of data on a broader and ‘secure basis*’” (in *The Straits Times*, 2019). The power of data is at the heart of what has been termed ‘digital transformation’

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EUROPE NEEDS DIGITAL  
INFRASTRUCTURES THAT  
ENSURES DATA SOVEREIGNTY

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– a pivotal element of the Fourth Industrial Revolution that affects all aspects of human reality (Floridi, 2014), blurring the distinction between physical, digital and biological spheres (Schwab, 2018). Several trends have brought data to the core of innovation. These include cheaper and more readily available storage and processing power, the increasing availability of data via on-line social networks and Internet of Things (IoT), and improvements in data analytics delivered through the ‘deep learning’ revolution. Modern Artificial Intelligence (AI) extracts value from data, and more data availability results in more accurate AI models. This in turn means greater potential benefits to government, society and business. A recent brief by the European Parliament reports the findings of several studies that project major breakthroughs in productivity thanks to the adoption of AI (European Parliament, 2019; 2020). Meanwhile, digital transformation is also at the centre of new geopolitical tensions, and of a debate about European technological sovereignty and digital strategic autonomy (EPSC, 2019; European Parliament, 2019; 2020; Timmers, 2018; Timmers, 2019a, 2019b, European Commission, 2020a; 2020b).

In this context, the new focus on data and data analytics has inevitably embraced the activities of governments – as illustrated, for instance, in the OECD working paper on public governance that focuses on the Data-Driven Public Sector or DDPS (van Ooijen, Welby and Ubaldi, 2019), and elaborated in great detail by the Commission in the recent European Strategy for Data and the White Paper on Artificial Intelligence that are the first pillars of the new digital strategy of the Commission, published in February 2020. In particular, the White Paper states that ‘*the European Strategy for Data aims at creating a single market for data that will ensure Europe’s global competitiveness and data sovereignty. Common European data spaces will ensure that more data becomes available for use in the economy and society, while keeping companies and individuals who generate the data in control*’. Combined with the orientations set out in the AI White Paper, the proposals advanced by the Commission emphasise the need to put people first in developing technology, as well as on the importance to defend and promote European values and rights in how we design, make and deploy technology in the real economy. Within this context, data is regarded an essential resource for economic growth, competitiveness, innovation, job creation and societal progress in general. Data driven applications are expected to benefit citizens and businesses in many ways, such as improving health care, creating safer and cleaner transport systems, generating new products and services, reducing the costs of public services and improving sustainability and energy efficiency.

Hence, the rationale underpinning the DigiGov research was to contribute to the current debate on digital transformation from the perspective of government and governance. The key objective of

the study was in fact to explore how innovation in the public sector, enabled by Information and Communication Technologies (ICTs), can transform governance systems, so that governments can better address systemic problems. More specifically, the research was designed to address the crucial need to consider governmental transformation in relation to emerging predictive and cognitive technologies including Artificial Intelligence, in combination with applications providing geo-spatial/location data for policy design and service delivery. The study thus contributed to structuring JRC research in the area of Digital Transformation of Governance and Public Sector Innovation, as well as providing insights for shaping future EU policy on Digital Government.

## 01.2 DEFINING DIGITAL GOVERNMENT TRANSFORMATION

The overall aim of this research, as formulated by the JRC in the technical specifications of the study<sup>1</sup>, was to systematise and reconceptualise Digital Government Transformation ‘within the scope of Public Sector Innovation... in light of the efforts conducted to enhance the quality of public services in a data-driven society’ and to ‘understand the way in which governments and governance systems adapt (or fail to adapt) to the rapid changes that have swept through the digital world’.

These broad aims were operationalised in terms of the specific objectives and expected results as summarised in **Table 1**.

**TABLE 1.** Summary of objectives and expected results

OBJECTIVES	EXPECTED RESULTS
To identify and conceptually categorise strategies and initiatives implemented to reform the public sector in the EU, with the support of digital technologies.	A systematisation of the state of the art on Digital Government Transformation in the EU.
To develop a conceptual framework to assess how ICT-enabled innovation can transform government, in order to pave the way for in depth analysis of its effects, with a specific focus on the social, economic and political impacts of such innovations on governments’ constituencies.	An original conceptual framework to understand how ICT-enabled innovation can transform government, and to assess the effects that can be generated by digital innovation within public sector organisations.
To test the framework against real-life case studies and experiments in order to determine the direct and indirect impacts of Digital Government Transformation.	The design, execution and analysis of four case studies / experiments that illustrate the possible impacts of Digital Government Transformation.
To outline future research and policy recommendations, in order to support the JRC in defining future research directions and policy implications for the EU beyond 2030.	A set of ‘actionable’ research and policy recommendations for the implementation of Digital Government Transformation in the EU beyond 2030.

Source: JRC, DigiGov Technical Specifications, 2018

1 See <https://etendering.ted.europa.eu/cft/cft-display.html?cftId=3608>

The first step to achieve the key objectives of the study, including the systematisation of knowledge and the development of a conceptual framework, was clearly to define what is meant by 'Digital Government Transformation' (DGT). Despite significant interest in DGT over recent years, in fact, definitions of what this concept refers to remain varied and sometimes contradictory. The same applies to the way in which digital transformation relates to other widely used expressions such as e-Government, ICT-enabled government, and also Transformational government (or T-government) – a concept introduced in the Netherlands and the UK around 15 years ago (as reported in Weerakkody, Janssen and Dwivedi, 2011), and which goes beyond earlier notions of e-Government. Before presenting our definition of Digital Government Transformation, it is therefore useful to consider what elements are peculiar to the most recent wave of discourse, policies and initiatives that fall under the broad banner of 'digital transformation' used across many domains, not just those concerning the public sector.

Certain recent definitions, such as the one developed by Gartner in a report delivered for the JRC (Williams and Valayer, 2018, p. 15) as well as those to be found in several OECD sources (OECD, 2019; van Ooijen, Welby and Ubaldi, 2019; Welby, 2019), stress the importance of data, data analytics and other new technologies as the hallmark of moving from e-Government towards digital transformation. While these definitions represent a good starting point, they require a better specification of what 'transformation' means – in particular, because putting into practice the vision of a data-driven public sector is no less challenging than previous waves of e-Government implementation. To achieve this, we began with the original, etymological meaning of the term 'transformation', and adapted to our purposes the definition of T-Government proposed by Weerakkody, Janssen and Dwivedi (2011, p. 322).

Transformation conveys the idea of a radical change in terms of the form, essential structure and functioning of an entity. The term implies a change from its current state to a 'new' state. This process may occur naturally, but in the context of intentional change, the current state is one that is considered in need of improvement – while the new state is expected to produce such improvements. There is, thus, a prescriptive and normative dimension that inevitably creeps into the definition of transformations that are launched intentionally. We will return to this after presenting the definition we adopt in this study. Ever since the first waves of e-Government, the current state has been defined as the classical siloed bureaucracy: inefficient, internally and externally uncollaborative, and unresponsive to citizens' needs. As long as new technologies are introduced without changes being made to the existing structures, processes, culture, cognitive frames and behaviours, no transformation can take place that encompasses form, essential structure and functioning.

While it is not our intention to engage in a normative ranking between different concepts and labels, we assume from the fact that new concepts such as T-government and Digital Government Transformation have emerged and gained momentum, that previous waves of e-Government had proved insufficient to achieve the necessary transformation in government. One could therefore interpret the early stages of e-Government as affecting the forms (e.g. the creation of national portals and introduction of some customer-facing processes and services), without changing the essential structure and functioning of government organisations, both in

terms of their internal processes and their external processes of collaboration with other public and non-public actors. This lack of structural change has prevented previous reforms from achieving the expected, desirable results. For citizens and businesses, these include better quality of services, greater inclusion, reduced administrative burdens, increased transparency and collaboration. For the government itself, as well as for the economy and society at large, they involve reduced costs, greater efficiency and productivity, and increased accountability. In line with this reasoning, we argue that transformation requires radical changes, in addition to incremental ones, in structures, operations, culture, cognitive frames and behaviour. As Weerakkody, Janssen and Dwivedi (2011, p. 320) put it: *'If e-Government is to be used to successfully transform the public sector (i.e. reduce cost and eliminate waste, improve efficiency, accountability, transparency and quality of service), public agencies will need radical changes in core processes across organisational boundaries, in a manner that has not been seen before in the public sector.'* By slightly adapting the definition of T-government proposed by these authors, we therefore define **Digital Government Transformation (DGT)** as follows:

**Digital Government Transformation (DGT)** is the introduction of radical changes, alongside more incremental ones, in government operations, internal and external processes, and structures, to achieve greater openness and collaboration within and beyond governmental boundaries, enabled by the introduction of a combination of existing ICTs and/or new data-driven technologies and applications, as well as by a radical reframing of both organisational and cognitive practices; it may encompass different forms of public sector innovation across different phases of the service provision and policy cycle to achieve key context-specific public values and related objectives such as, among others, increasing efficiency, effectiveness, accountability and transparency, to deliver citizen-centric services and design policies that increase inclusion and trust in government.

This general definition posits that true transformation involves radical changes at various levels. It is particularly suited to the scientific and evidence-based exploration required for this research, as it embeds many of the dimensions that scholars need to investigate either as barriers to or drivers of transformation. These include institutional, organisational, cultural, technological, cognitive and behavioural factors. All of these elements are discussed in Chapter 3, and some are used to produce a conceptual framework that serves as an interpretative map of the various possible forms of technology-enabled public sector innovation, which we present in Chapter 4.

As previously discussed, intentionally launched transformations have inevitably imparted a normative/prescriptive meaning to the concept, as well as the assumption of a linear direction of change. This is unavoidable if one employs the terminology of 'transformation', since the term itself means moving from one state to another. This prescriptive/normative colouration and linear direction are also present in our definition, although they moderated by the inclusion of at least three elements that provide room for a less rigidly normative use of the definition, and for its flexible empirical and non-normative adaptation to concrete domains of research.

First, the definition refers to a combination of technologies including both more traditional ICTs and new data-driven technologies and applications. This allows us to avoid the normative assumption that only initiatives based on AI and other data-driven technologies can produce transformation. The policy review conducted as part of the analysis of the state of the art of Digital Government Transformation in the EU shows that in most Member States, many ongoing initiatives still centre on traditional ICTs, along with some emerging elements of data-driven technology. Second, we stress that the public value and related objectives pursued are context-specific. This specificity can be at national or local level, or at the level of an individual agency. The way in which transformation is launched is the result of a combination of technological possibilities and of the visions, policies and strategy that characterise each specific context. Third, the definition mentions many different forms of public sector innovation that can embrace different stages in the cycle of service provision and policy making. It does not assume that in order to qualify as transformation, all forms of public sector innovation should be introduced at once across the entire cycle of service provision and policy making. While the definition of what elements of the current *status quo* require improvement (and what impacts the transformation should produce) are inevitably normative and linearly prescriptive, whether or not the change produces the intended transformation and the promised impact remains an empirical question to be ascertained only through research. The definition above, and the conceptual map presented in § 4.3, thus provide a useful mix of both normative elements and indications intended to guide future research and policy actions.

### 01.3 POLICY RELEVANCE

As documented in detail in our review of the state of the art published as separate JRC Science for Policy Report (Misuraca, Ed., Barcevičius et al., 2019), there is very limited robust empirical evidence on the effects of the new wave of digitalisation of the public sector. Certainly, measurement and evaluation frameworks have been developed to assess the first waves of e-Government, but none of these has been updated to take into account the specific characteristics of the new wave of innovation made possible by AI and data-driven applications. While some evidence and theoretical insights can be applied by analogy (from economics) on more traditional measurable effects such as productivity and efficiency, there is an almost total lack of evidence in relation to less measurable but equally important effects such as inclusion, trust in government, participation, openness, and legitimacy, for example. A fairly similar result is reported in the most recent systematic review of empirical work focusing on public sector innovation (De Vries, Bekkers and Tummers, 2016). The authors report that the most frequent objective for launching innovations, and their most frequently documented outcome, was to improve performance in terms of effectiveness or efficiency (De Vries, Bekkers and Tummers, 2016, p. 154 and pp. 159-160). Other objectives and outcomes such as citizen satisfaction, safety, equality and other typical public sector values were considered less often. The authors stress, however, that public sector innovation should focus not only on efficiency, but should also aim to enhance trust and legitimacy.

Indeed, as Max Weber concluded in his analysis of governmental bureaucracy (Weber, 1970, pp. 220-222), the function of government organisations is to instrumentally pursue both tangible performance objectives and symbolic ones, with the aim of increasing the legitimacy of the organisations, both within their own environment and with respect to their constituencies. Like all organisations, governments need to be perceived as legitimate within their environment (Di Maggio and Powell, 1991; DiMaggio and Powell, 1983). They are concerned to secure legitimacy, in the sense of meeting societal expectations about appropriate structures, practices, rhetoric or outputs (Scott, 1991, p. 169). Put differently, the public sector follows two logics: the logic of consequence, and the logic of appropriateness (March and Olsen, 1989). The former relates to tangible gains in performance, while the latter refers to the legitimacy of government and the trust of citizens that a government is capable of dealing with the problems about which they are concerned. The search for legitimacy and trust, while sometimes leading to copycat innovations (i.e. institutional isomorphism), is an important dimension to consider. It constitutes one of the potential positive effects that new technologies can produce, beyond efficiency and effectiveness.

For this reason, we introduced into our research two dimensions of the effects of Digital Government Transformation that go beyond efficiency and effectiveness: legitimacy and inclusion. In the current context of declining trust, both in government and in democracy itself<sup>2</sup>, governments need to do much more to increase their legitimacy and demonstrate their impact on citizens' wellbeing. Today, they have a chance to achieve this through 'smarter' digital policies, better targeted services, and greater openness and engagement. Public confidence – namely, the extent to which the general public trusts institutions to act competently and in support of the wider public interest – must be restored. Public confidence may, in fact, be the most consequential element of legitimacy: when it is lacking, large-scale or even cataclysmic changes may be possible within a society. Engaging stakeholders in the debate on policy design, development and implementation is therefore crucial to achieving good outcomes. Rising social and economic inequalities represent a second dire challenge, which makes the continuing provision of essential public services to all citizens – irrespective of their social status or income level – more important than ever (Bertot et al. 2016, p. 211). The increasing share of cultural, political, economic and other human activities that take place in the digital space also risks amplifying existing problems of division, inequity, exclusion, fraud, insecurity, the imbalance of power, and many others (Janowski, 2015, p. 221). Here too, digital government can step in, with better data allowing the delivery of more targeted and contextualised policies and services. In conclusion, digitally transformed government could successfully tackle both the challenges of democracy/legitimacy and of inclusion, as well as achieving gains in productivity and efficiency.

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2 As reported in Richardson and Emerson (2018), the 2017 World Values Survey documented a worrying shift in attitudes towards democracy: While in the 1960s, roughly three-quarters of respondents said it was essential to live in a democracy, less than one-third of millennials believe this today; OECD data on citizens' trust in government across its member states show that the level of trust in 2014 was just at 41.8%, compared with 45.2% in 2007 (<http://www.oecd.org/gov/trust-in-government.htm>)



In the path to achieving these results, governments face three challenges, and must play one important role in supporting digital innovation within government as well as across the economy and society as a whole. First, two black boxes must be opened simultaneously: the nature of ICTs (particularly data-driven / citizen-centric new digital government initiatives); and the nature of the work of public administration at an operational level. This challenge has not yet been sufficiently examined in previous studies of digital government. Second, there is a need to reconcile two aspects within the operation of government: universality and contextualisation. The mission of government should remain universalistic and bound to the rule

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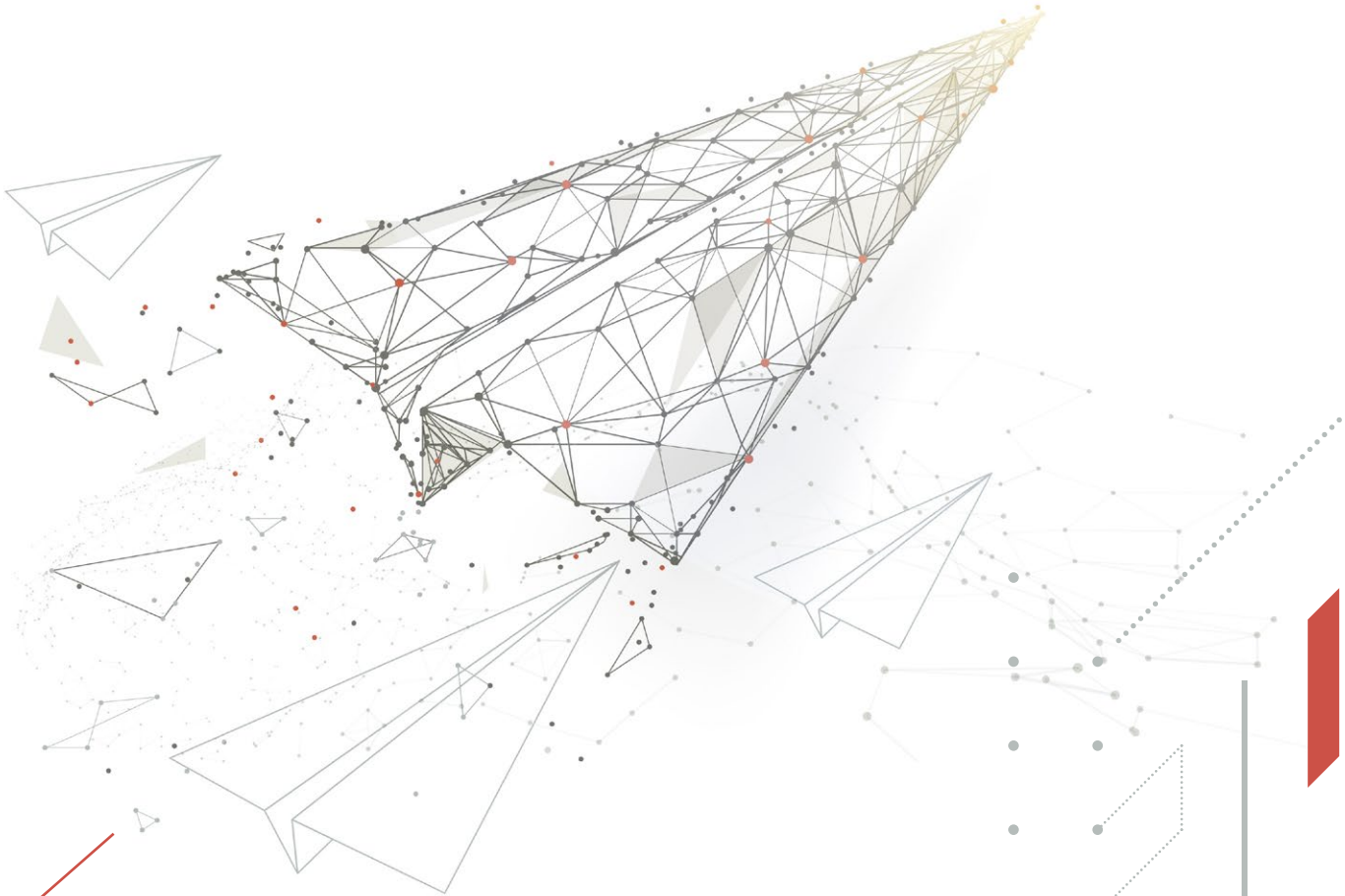
IT IS CRUCIAL TO CONSIDER  
THE DUAL DIMENSION  
OF GOVERNANCE  
‘WITH AND OF’ ICTS

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of law and democratic liberties. And yet, the potential offered by new digital technologies for contextualisation and personalisation should be used to produce better policies and services in order to achieve desirable outcomes, while avoiding discrimination or the infringement of privacy or democratic freedom. With regard to this issue, we have devoted a specific attention to discuss the potential side-effects and negative effects of the digital transformation of government that should be avoided (see for more details the JRC Technical Report, (Misuraca Ed., Codagnone et al., 2020). The reconciliation of universality and contextualisation calls for new forms of innovation, as well as collaboration between government agencies, businesses, non-profit organisations, universities, citizens and other actors, both in policy formulation and in the provision, consumption and intermediation of public service delivery. The third challenge facing Digital Government Transformation is the need for a two-sided reframing of both the institutional-organisational and of normative-cognitive models of how government functions. Here, governments can play an important role in solving the current regulator/innovator dilemma. It is typical for new technologies to be surrounded by risks and uncertainty. Some technologies are only just emerging, so regulators do not yet have answers to important questions, and do not know how best to regulate them. This regulatory uncertainty blocks innovators outside of government. A government that acts as a user of new technologies can set an example, establish good practices and, in collaboration with innovators, solve the dilemma and build the governance framework required to spur innovation and rebuild trust. In practice, it is crucial to address and consider explicitly the dual dimension of what has been defined as governance ‘with and of’ ICTs (Misuraca, 2012); within the study of Digital Government Transformation and public sector innovation (Misuraca, Codagnone, Rossel, 2013; Misuraca and Viscusi, 2015). This is important to better assess the public value generated by the combination of emerging digital technologies to provide data-driven services and redesign internal government operations, and to understand how to shape the policy mechanisms and regulatory frameworks needed to anticipate risks, especially in sensitive policy areas and domains of public interest that have direct and stringent implications on the relationship of trust between governments and citizens.



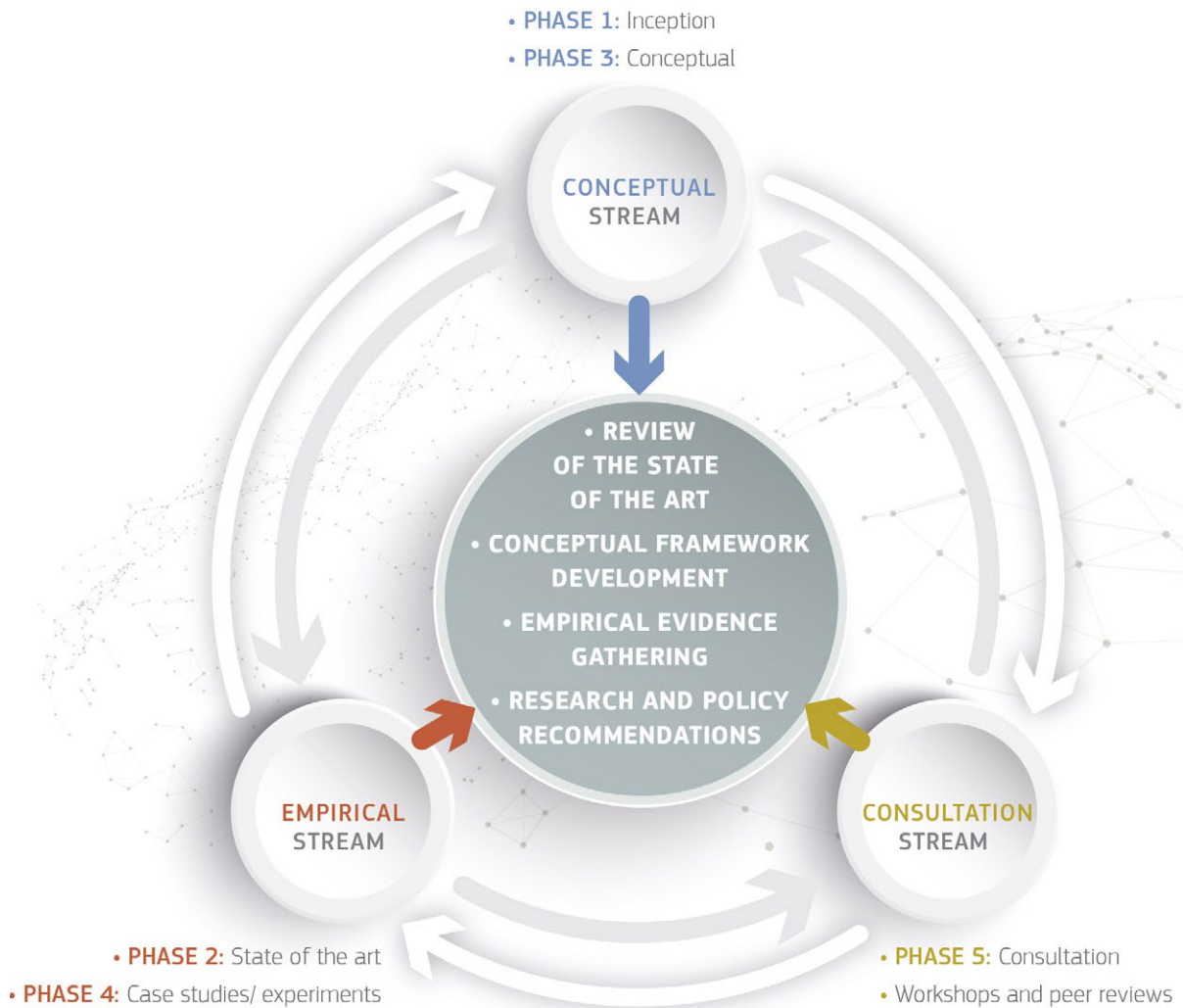
# METHODOLOGY





## 02.1 DESIGN

The diagram depicted in **Figure 1** summarises the overall design of the research, describing in a stylised fashion the logic underlying the three main work streams employed to address the specific objectives of the study.



**FIGURE 1.** Research design

Source: Own elaboration



The empirical stream of the research included the gathering and systematisation of both secondary evidence through a review of the literature and relevant policy documents across EU Member States, and of primary evidence through field work and experimental case studies. The conceptual stream was intended broadly, as it entailed both conceptual-analytical and theoretical elaboration to pave the way for more in depth analysis of the effects of digital government and for the design of a framework within which to map evidence from the case studies/experiments. The consultation stream refers to the engagement of experts and stakeholders, through peer review and discussion in workshops and via the DigiGov online community, with the two-fold objective to both improve the findings by using tacit knowledge and insights from key experts and stakeholders' representatives, and to validate the results of the research and their relevance for practice and policy.

The diagram also conveys the mixed-methods triangulation approach that inspired this study, and which has been adopted throughout the various streams of the research. Mixed-methods

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THE RESEARCH ADOPTED  
A MIXED-METHODOLOGY  
APPROACH TO STUDY  
POLICY INTERVENTIONS  
IN COMPLEX ECOSYSTEMS

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research, which combines and triangulates different methods and sources (both primary and secondary), is particularly appropriate for applied policy research on policy interventions in complex ecosystems as it allows explorations that contribute to the emergence of categories, theories and hypotheses (instead of reliance upon *a priori* concepts and ideas), as well

as to the description of interventions in their real context from the perspective of those being studied, thus giving the subjects of research a 'voice'.

Hence, the use of mixed methods was considered the best approach in order to address the multiple objectives of this study: to explore novel technological possibilities from various different disciplinary perspectives (institutional, cultural, behavioural); to consider the views of the stakeholders involved; to experiment with them; and to engage both stakeholders and experts in interactive discussion and validation activities. This flexibility was also instrumental in the development of the recommendations and future scenarios on Digital Government Transformation.



## 02.2 APPROACH

### 02.2.1 REVIEW OF THE STATE OF THE ART

During the first phase of the research we performed a systematic review of the literature, a web search of 'grey' literature, and a mapping of policy initiatives across the EU. Because the literature review covers a variety of concepts, both generic (e.g. digital transformation) and more specific (e.g. particular technologies), we combined a systematic literature review with a 'snowball' approach.

A systematic review consists of a comprehensive search for evidence on a specific question. It should follow clear and reproducible criteria, including a critical appraisal of items for quality and the synthesis of results according to a pre-determined, explicit and transparent method (Grant and Booth, 2009). **Figure 2** presents the process map used to guide our approach to the systematic review.



**FIGURE 2.** Literature Review Process Map  
Source: Adapted from Petticrew and Roberts (2006)



In **Stage 1**, the research questions and the purpose of the literature review were set out, according to the following questions:

- 1 How has the literature on the topic developed over the past decade, particularly in relation to the conceptual transition from e-Government towards digital government?
- 2 What are the drivers and objectives leading to the introduction of digital government innovations?
- 3 What are the barriers or conditions for success at implementation level?
- 4 How can transformative innovations be identified? What distinguishes disruptive projects, initiatives and policies from technical and incremental ones?
- 5 Based on the answers to the previous question and/or other parameters, what typologies/taxonomies have been developed in the literature to describe the types of innovations or the change to which they refer?
- 6 Given the typologies found in the literature and their elements, does there exist in the literature any analysis (theoretical or empirical) of causal relationships among the components of the typology and/or of the relationships between drivers, objectives, barriers and conditions for success?
- 7 What are the effects of digital government innovations? What typologies/taxonomies have been developed in the literature to describe them?
- 8 Do any theoretical and or empirical analyses exist that link different types of digital innovation to different types of effects? How can we identify transformative effects/transformations brought about by digital government innovations? What antecedents and types of innovations are related to transformative effects?

In **Stage 2**, we identified the sources to be searched, including both academic and 'grey' literature. Search **keywords** were formulated on the basis of the research questions and the inclusion/exclusion criteria. These are presented in **Table 2**.

TABLE 2. Inclusion and exclusion criteria

CATEGORY	INCLUDED		EXCLUDED
KEY CONCEPTS	Artificial Intelligence	Geospatial/location data	Data exchange
	Automation	ICT-enabled participation	e-Government 1.0 and 2.0, in the sense of basic services and top-down data provision
	Data use/re-use	Innovation in service provision	
	Data-driven government/society	Online platforms	
	Digital Governance	Policy cycle	
	Digital Government Transformation	Public sector innovation	
	Ecosystem view	Smart government	
	e-Democracy		
AREAS/FUNCTIONS OF GOVERNMENT	Citizen engagement	Public services	
	Policy making	Social services	
	Public management		
TYPES OF E-GOVERNANCE	Government-to-Citizen (G2C)		Government-to-Government (G2G)
	Government-to-Business (G2B)		
	Government-to-Employee (G2E)		
TECHNOLOGIES	Artificial Intelligence (as an umbrella term)	• Open API	Basics – internet, mobile communications, etc.
	'Intermediary layers', such as:	• Predictive analytics	
	• Blockchain	• Robotics	
	• Internet of Things	• Use of geospatial/location data;	
	• Machine learning, big data		
DISCIPLINES	• Modelling		
	Public administration	Data science	Computer science
	Sociology	Finance	Engineering
	Psychology	Law and ethics (the limits of AI)	
METHODOLOGICAL APPROACHES	Behavioural economics		
	Interviews	Case studies	
	Surveys	Experiments	
PUBLISHING ORGANISATIONS ('GREY' LITERATURE)	Literature reviews		
	National governments	OECD	
TIME SPAN	EU bodies	UN bodies	
	2009 and after		Before 2009
GEOGRAPHICAL COVERAGE	European Union		

In **Stage 3**, we ran a search against the source databases and websites that had been identified, as well as via major search engines such as Google (for ‘grey’ literature) and Google Scholar. Some of the databases searched to identify qualitative and quantitative academic literature are presented in **Table 3**.

**TABLE 3.** List of databases consulted

SOURCE	DESCRIPTION
ISI WEB OF SCIENCE	Provides access to the world’s leading citation databases, with multidisciplinary information from over 12,000 high-impact journals and over 160,000 conference proceedings from around the world.
SCOPUS	The largest abstract and citation database of peer-reviewed literature: scientific journals, books and conference proceedings. It delivers a comprehensive overview of the world’s research output in the fields of science, technology, medicine, social sciences, as well as the arts and humanities.
SCIENCEDIRECT	Leading platform of peer-reviewed, scholarly literature, compiled by publisher Elsevier. University libraries and institutions offer ScienceDirect access to their communities of researchers. It contains millions of publications, from full-text journal articles to authoritative books. Stringent publishing standards guarantee the quality of publications.
NATIONAL BUREAU OF ECONOMIC RESEARCH (NBER)	A non-profit research organisation ‘committed to undertaking and disseminating unbiased economic research among public policymakers, business professionals, and the academic community’.
JSTOR	Digital library founded in 1995. Originally containing digitised back issues of academic journals, it now also includes books and primary sources, as well as current issues of journals. JSTOR provides full-text searches of almost 2,000 journals.
SPRINGERLINK	Online collection of over 1,200 peer-reviewed journals and 25 book series published by Springer, covering a variety of topics in the sciences, social sciences and humanities.
SOCIAL SCIENCE RESEARCH NETWORK (SSRN)	SSRN is a repository devoted to the rapid dissemination of scholarly research in the social sciences and humanities. Since 2017, it has expanded into the life, physical, health, and applied sciences.

In **Stage 4**, the search results were screened by title and by abstract against the inclusion and exclusion criteria. Items that did not meet the inclusion criteria were discarded.

In **Stage 5**, full texts of the included sources were critically reviewed. The data extraction template (see **Table 4**) was structured around the research questions used for the literature review. It included sections specifically tailored to ensuring a thorough investigation of relevant topical areas, and a section describing the main characteristics of the source being reviewed.

**TABLE 4.** Data extraction template example

NARRATIVE SYNTHESIS SUMMARY DATA	
1	Study details (author, year, type)
2	Study design
3	Dimension and sub-dimension(s) related to RQs (e.g. institutional settings, governance principles, public sector reform approaches, resources and tools adopted for public sector innovation and digital government implementation)
4	Indicator(s)/guideline(s)
5	Main finding(s)/conclusion(s)
6	Implications (for policy makers)
7	Strength of evidence

In addition, the bibliographies of key sources in the literature were screened to identify any additional relevant sources in **Stage 6**. Following this, in **Stage 7**, the refinement of a narrative synthesis of data was developed.

Online desk research and web searches were conducted in addition to the systematic review of the literature gathered from scientific databases. This part of our review of the state of the art was performed following the same logic described above. However, the desk research of 'grey' literature focused on data and documents published within the last two years. Whereas systematic reviews focused on scientific publications, the complementary desk research enabled us to gather materials and publications that do not feature in established journals or databases, but are found in online sources such as websites, repositories of practices and official policy documents and analyses. This complementary review was particularly important for this study, as the topic and the technologies analysed are very recent. Academic 'time to publication' may result in a lag of one or two years, while policy documents and practitioner-generated reports often address the latest technological developments, frequently from a prospective standpoint. Given the scope of the study, the desk research was in fact intended to identify very recent trends in technology and innovation that may not yet have been analysed in depth academically. The review of 'grey' literature was therefore an essential source of up-to-date research on the topic of Digital Government Transformation.

## 02.2.2 CONCEPTUAL FRAMEWORK

Below, we briefly explain the steps followed in developing the conceptual framework for understanding and assessing Digital Government Transformation, in short **DigiGov-F**.

### 1 MAPPING OF SOURCES

We selectively mapped the sources first gathered as part of our review of the state of the art, then integrated them with additional sources that were considered relevant (e.g. general theory of innovation, literature on public sector innovation, literature on public administration features and reforms, literature on evaluation and measurement, etc.).

### 2 READING AND EXTRAPOLATION OF RELEVANT AND APPLICABLE INSIGHTS

We extensively analysed the sources, categorised them in terms of the relevance of their contribution to the understanding of Digital Government Transformation, and extracted key elements (e.g. building the institutional and cognitive dimension, identifying applicable elements from innovation theories, etc.).

### 3 DECONSTRUCTING AND RECONSTRUCTING CONCEPTS/ELEMENTS

We consolidated and reviewed the selected data and analyses to deconstruct, reconstruct, and ‘discover’ concepts and elements relevant for our purpose. This is the main inspiration from a ‘grounded theory’ approach applied to secondary sources. For instance, using numerous (and, at times, contradictory) concepts and definitions of innovation and transformation, we elaborated our own definition of four types of public sector innovations, from which we developed a typology of digital innovation in a syncretic fashion (i.e. integrating insights from public sector innovation with those coming from the literature on digital government – building in particular on Janowski, 2015).

### 4 INTEGRATING CONCEPT/ELEMENTS AND MAKING SENSE

To reduce complexity and produce a manageable conceptual framework, we grouped together concepts/elements that displayed similarities. In doing so, however, we have attempted to be as exhaustive as possible, in order to include the most important elements from all of the literature reviewed. Using an analogy from the quantitative technique of data envelope analysis, we have tried to ‘envelope’ the reviewed literature in order to define a sort of ‘frontier’ that incorporates all the most important insights from the reviewed sources. In doing this, we strived also to ensure the framework remained ‘indeterminist’ and ‘non-linear’.

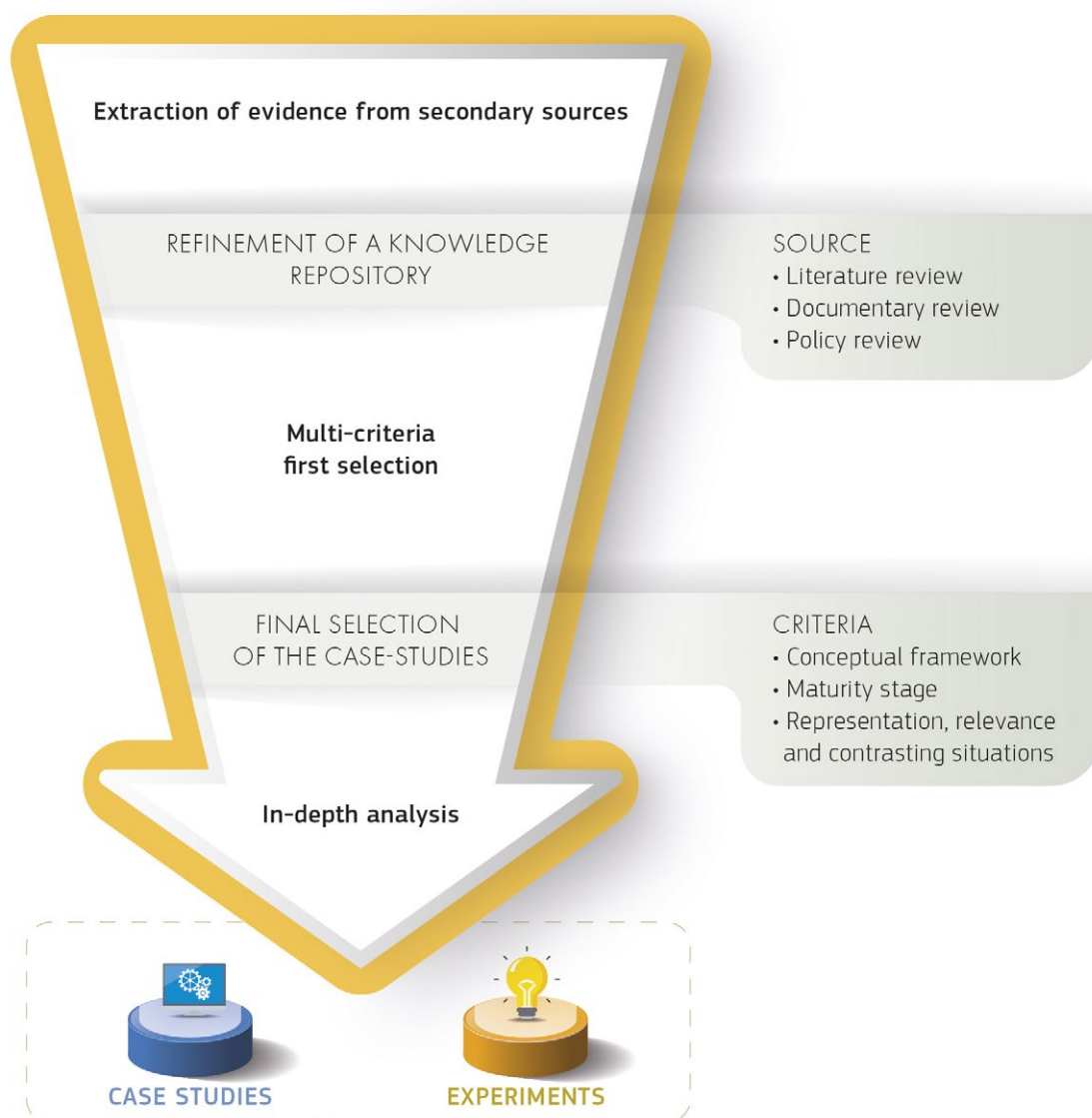
### 5 VALIDATION

The process of producing the conceptual framework was iterative. One form of validation came by comparing the framework against the case studies. A second, equally important source of validation came from our interactions with academic experts and practitioners during workshops and via the DigiGov online community.



### 02.2.3 CASE STUDIES

To test and validate the conceptual framework proposed, as well as to gather empirical evidence, four in depth case studies were carried out, incorporating some experimental components. A number of hypotheses were defined for each case study, relying both on the policy and literature review and on the dimensions underlying the conceptual framework. In addition, a set of variables to be tested when carrying out the case studies were extracted from the conceptual framework, and data to assess the effects on specific policy areas were gathered. In this way, results from the different activities of the research, and in particular the review of the state of the art and the conceptualisation phase, served to prepare the empirical component of the research and assist in conducting the case studies and experiments in various countries and policy areas, as illustrated in **Figure 3**.



**FIGURE 3.** Case studies and experiments: selection and analysis

Source: Own elaboration

Drawing on the secondary data collected and on the conceptual framework, we selected the subjects for the case studies by using a *funnel approach*. Our approach is summarised in the steps below:

- **Step 1:** A number of suitable policy initiatives were identified.
- **Step 2:** Secondary sources were used to carry out a preliminary analysis of the cases identified and to assess the extent to which they covered different contexts and phases of the policy-cycle.
- **Step 3:** The cases were analysed to assess the extent to which the criteria (developed with the conceptual framework) were present. This step was intended to facilitate the preliminary ranking of cases, as well as providing a first opportunity to assess the maturity of the various policies.
- **Step 4:** We checked the regional coverage across Europe and classified cases according to the different typologies and dimensions developed as part of the conceptual framework.
- **Step 5:** Four case studies were selected and analysed in depth, using a common approach to ensure consistency in the design and the reporting of findings.
- Insights from the case studies and experiments were discussed with experts, representatives of stakeholders and colleagues from the Commission to validate the results and better understand their implications for research and policy. These are briefly presented in Chapter 5.

#### 02.2.4 EXPERT CONSULTATION AND STAKEHOLDER ENGAGEMENT

To identify and define effective approaches to policy design and the co-creation of public services, it was essential for the study team to consult and engage with experts and representatives of relevant stakeholders from its very outset. Such consultation was used as an input to identify relevant activities in Europe (and beyond), and to validate the findings of the research. Depending on their specific area of knowledge, various experts and stakeholders were engaged to:

- validate the approach and the results generated by the research;
- provide insights and suggestions for improvements in the work conducted; and
- contribute to shaping the research and policy recommendations.

Three main events were organised as part of the research, to discuss the key findings and gain insights for further work:

- The first workshop, which took place in Ispra in May 2019, had the objective of reviewing and validating the results of the analysis of the state of the art of research and policy in the field, and jointly outlining the proposal for a conceptual framework to understand how ICT-enabled innovation can transform EU governance and policy making. This workshop was attended by over 60 participants and served to structure the DigiGov community as an active component of the research through systematic consultation online and regular digital discussions.
- The second workshop was held in October 2019 in Seville, and focused on further co-designing and validating both the final proposal for the DigiGov conceptual and assessment framework, as well as the findings of the experimental case studies conducted as part of the empirical component of the research. For this purpose, a structured Policy Lab involving over 40 participants in interactive discussions and role-playing was organised and successfully contributed to the final outcomes of the project, paving the way for the defining of a set of actionable policy recommendations in the field.
- Finally, due to the Covid-19 outbreak and travel restrictions, the Final Conference and Foresight Workshop, which was planned to take place in Brussels, was no longer possible. An online Foresight Workshop was therefore organised in July 2020. This event was designed to be highly interactive and involved almost 50 participants, who contributed to discussions on how to shape Digital Government Transformation at the horizon 2040, while also validating the final results of the research.

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EXPERT CONSULTATION  
AND STAKEHOLDER  
ENGAGEMENT HAVE BEEN  
AN ESSENTIAL PART  
OF THE RESEARCH PROCESS

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In addition to the key activities of consultation and engagement conducted as part of the study, the results of the research have been discussed at several scientific and policy events during the course of the project. These included presentations to formal meetings of representatives of EU Member States such as the ISA<sup>2</sup> Committee and the eGovernment Action Plan Steering Board, as well as the dedicated Working Group of the ELISE Action, and the Steering Committee and Advisory Board of the Innovative Public Service – IPS Action, which aims to lay the foundations for the EU Innovative Public Service Observatory (IPSO).

The DigiGov project has also been presented at several conferences and events organised by the Commission or other international organisations, in order to consult and inform a broader scholarship and engage with practitioners and policy makers, to further test the validity of its findings and gather additional insights.

## 02.3 IMPLEMENTATION

As presented in **Figure 4**, the research was implemented in several iterations. The first phase began with the gathering and systematisation of secondary evidence, a process that resulted in the preliminary version of the conceptual framework. This framework was used as the initial basis for the selection and design of cases/experiments, whose results were then used to revisit the framework and develop a new version. Similarly, repeated iterations have occurred between the empirical and conceptual streams on the one hand, and the consultation stream on the other. The latter involved engaging experts and stakeholders in the process of co-designing the instruments used for the investigation, and of scientifically validating the findings gathered and the results of their analysis, through the lenses of the co-developed instruments themselves.



**FIGURE 4.** Research implementation process

Source: Own elaboration

In summary, the research proceeded according to the following steps:

- After the kick-off meeting in Seville in December 2018, the inception phase enabled the refinement of the methodological approach and the operationalisation of the work plan.
- The second phase of the research included gathering secondary-source information via reviews of the existing scientific literature, policy documents and practitioner-generated reports. The information collected was structured and elaborated to provide an overview of the state of the art in Digital Government Transformation in the EU.
- Using the main findings from the analysis of the state of the art, a proposal for a conceptual framework was developed. The aim was to provide a theory-informed framework to better understand the potential consequences of Digital Government Transformation and public sector innovation. This also served as a platform for discussion with experts and stakeholders on how to operationalise it further.
- After consolidating the framework for analysis and the review of the state of the art, case studies and experiments were selected and carried out. These empirical activities provided primary-source information for the overall analysis and allowed the specific dimensions and hypotheses underpinning the consolidated version of the conceptual framework to be tested.
- All of the outputs of the research have been used to interactively engage with experts and representatives of key stakeholders, to obtain their inputs and suggestions, as well as to validate the results of the study. This included a large consultation workshop in Ispra in May 2019, and a Policy Lab session in Seville in October 2019, as well as a Foresight Workshop organised online in July 2020.
- Finally, integrating all the findings of the theoretical and empirical analysis with the insights gained through consultation and co-deliberation with experts and colleagues, the final phase of the research included the elaboration of the final report with recommendations for future research and policy, drawing on foresight scenarios for Digital Government Transformation in the EU at the horizon 2040.



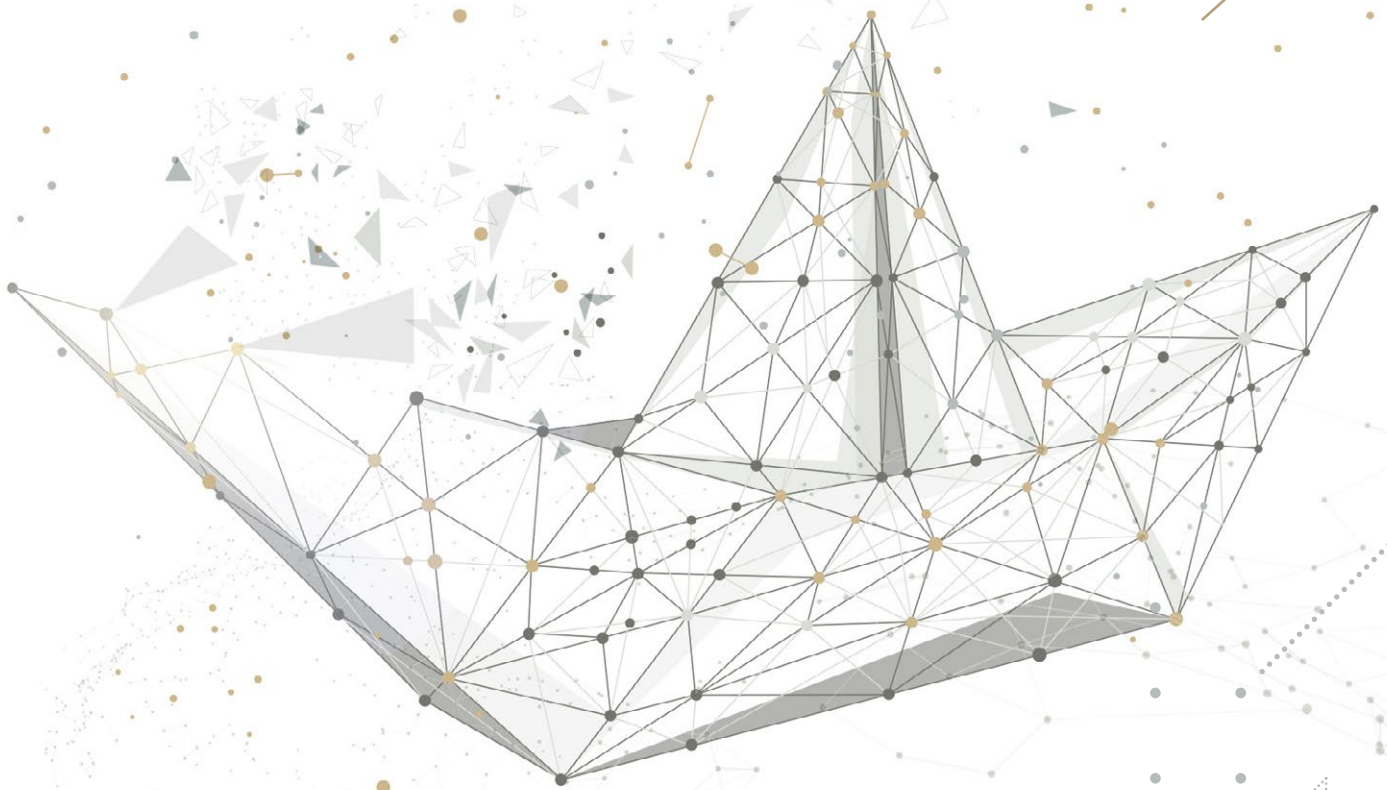




≡ **3**

**STATE**

**OF PLAY**







### 03.1 FROM E-GOVERNMENT TO DIGITAL GOVERNMENT

The public sector has been experiencing a rapid transformation affecting governance, public service delivery, citizen engagement and budgetary decisions. Historically, technological change has always influenced the public sector – but the current wave of innovation, which draws on Artificial Intelligence (AI); Geographic Information Systems (GIS); Big, Open and Linked Data (BOLD); Application Programming Interfaces (APIs) and other emerging technologies, both separately and in combination, is probably the most pervasive yet. Furthermore, this transformation is happening in the context of fundamental demographic, environmental and public health challenges in which the public sector has a crucial role to play. While their individual approaches have varied greatly, national and local governments have engaged actively with digital technologies, albeit with differing levels of success.

The literature analysing the role of technology in government is vast and varied. It has focused on questions such as the impact of technology upon government and society, and explored how different actors within the public sector harness technology for their own goals. In effect, the literature has constantly meandered between two poles: technological determinism and sociological multi-directionality. Determinist thinking gives prominence to technology and assumes that it is bound to have a relatively foreseeable impact, based on some internal, functional logic. The sociological view begins with the actors and assumes that they will appropriate technology in their own idiosyncratic ways, and thus the impacts of the very same technology in government may vary significantly. Deterministic thinking about technology is usually (albeit with important exceptions) more positive, normative, advice-oriented and more prominent in the ‘grey’ literature, which is written by consultants, think tanks, interest groups and policy practitioners. The sociological approach is quite common within the academic literature, which is less concerned with providing advice, but is more inclined to examine the meanings, interests and conflicts that emerge from different organisational or cultural settings.

Since the early 2000s, a prominent feature of the literature on e-Government has been the assumption that e-Government progresses in stages, from simpler forms to more sophisticated and advanced ones. The starting point is thus always some sub-optimal situation – whether actual or imagined – in which the technology used is very basic and the public sector is inflexible, backward-looking, bureaucratic and unfit to address the social challenges of the time. With the introduction of more sophisticated technology, the public sector can then progress, in phases, towards an advanced state in which it engages innovative solutions to address the most complex societal needs. The starting point here is usually deterministic; however, the view of many authors is nuanced by emphasising the ‘intervening’ variables, such as values and culture, organisational changes and internal procedures that must be implemented in order to take advantage of the opportunities offered by technology.



Examples of this determinist thinking include models by the Gartner Group (Baum and Di Maio, 2000); PwC (Hiller and Bélanger, 2001); Deloitte (2001); Layne and Lee (2001); Moon (2002) and others. In early 2001, CapGemini developed a four-stage framework for measuring the

availability of public services online that is very characteristic of the thinking at the time: (1) information; (2) one-way interaction; (3) two-way interaction; (4) full electronic case handling. This framework was used for the EU's eEurope Action Plan, then reviewed multiple times and used to measure the progress of e-Government in the EU. In 2010, Lee produced a 'qualitative meta-synthesis' of various stage models that had been developed during the previous 10 years, and suggested '*a common frame of reference*'. This combined the themes of operation/technology and citizen/service, and suggested a number of stages under each theme that would ultimately lead to e-Governance, which was defined as an '*ideal stage, where the business processes of administrative and political services can be reconfigured almost real-time based on citizens' actual involvement in decision-making of the government, actually utilising the full capability of advanced Information and Communication Technologies*' (Lee, 2010).

Over the last 10 years, the discourse concerning e-Government has evolved in the light of rapid advances in technology such as social networks, collaboration tools, big data analytics, search technologies and others. Concepts such as Government 1.0, 2.0, 3.0 and 4.0 have been introduced into the literature. Given that the use of the Internet within the public sector has become ubiquitous and public services have become digitalised, the terms used to describe how to leverage technology in the public sector have also changed. For example, the e-Government Benchmark by Capgemini et al. (2018) drew on four dimensions: user-centricity, transparency, cross-border mobility and key enablers. Different countries were assigned to different clusters according to the level of e-Government achieved: non-consolidated e-Government, unexploited e-Government, expandable e-Government, or fruitful e-Government.

Various authors have thus begun to use terms such as 'digital government' and 'digital government transformation', which are key to our study. For example, Janowski (2015) presented a four-stage Digital Government Evolution Model. This consists of digitisation (technology in government), transformation (electronic government), engagement (electronic governance), and contextualisation (policy-driven electronic governance). The OECD (2016) presented a three-stage path to digital transformation: from digitalisation, via e-Government, to digital government. Digitalisation describes the predominant focus at the time: greater use of digital technologies to improve cross-government activities and data/information management, focusing on efficiency and productivity. According to the OECD, the ultimate phase of digital government is characterised by the integration of digital technologies and user preferences into the design and receipt of services and broad public sector reform. Later, Gartner developed for the JRC the Digital Government Transformation Framework (Williams and Valayer for JRC, 2018). According to this framework, digital transformation begins with e-Government, which is technology-driven and concerned primarily with 'basic efficiency objectives'. The further stages are: open government, data-centric government, fully transformed government, and smart government. According to Gartner, smart government is achieved when '*[t]ransformation gives way*



*to the new normal, i.e. sustained continuous improvement of digital services. AI and advanced machine learning become essential to deal with high volumes of data to understand, learn, predict and adapt, using them to act in ways that weren't explicitly programmed.'* Our research builds on this work and extends the conceptualisation of Digital Government Transformation, taking into consideration the needs of public sector innovation and the further requirements of advanced data-driven services and more recent policy orientations.

## 03.2 CONTEXTUALISING DIGITAL TRANSFORMATION AND INNOVATION IN THE PUBLIC SECTOR

During the last 10 years, the term 'digital transformation' has been used in a variety of ways with reference to the public sector. For example, it may describe a process or transformation 'journey' the end result of which is, for example, digital government (OECD, 2016) or smart government (Williams and Valayer for JRC, 2018), or a specific stage of digital government evolution (as in Janowski, 2015; Williams and Valayer for JRC, 2018). Sometimes, transformation is also positioned as an end-result, which includes the 'radical reframing of both organisational and cognitive practices', as indicated in our own definition presented in § 1.2.

The concept of digital innovation has frequently been used in parallel with digital transformation, often as a pre-condition, an antecedent, or a generic term describing practices that ultimately lead to transformation. It draws on a wealth of concepts and frameworks as well as a variety of empirical analyses and case studies. For example, digital innovation has been classified as incremental or disruptive (radical); top-down vs. bottom-up (Misuraca and Viscusi, 2015; Saari, Lehtonen and Toivonen, 2015). A related concept, Open Innovation 2.0, emphasises networking, collaboration, co-creation and shared value creation (ESPON, 2019). The type of innovation can significantly affect its development, success, scaling and impacts (Nagy, Schuessler and Dubinsky, 2016; Gobble, 2016; Neumeier, 2017). While classifications vary, we make a distinction between the following domains of innovation (Misuraca, Ed., Barcevičius et al., 2019):

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THIS RESEARCH FOCUSES ON THE MOST RECENT 'GAME-CHANGING' TECHNOLOGIES, SUCH AS AI, IOT OR BLOCKCHAIN

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- internal innovation (administration, organisation, internal processes);
- external process innovation (governance, stakeholder involvement, co-creation);
- policy innovation; and
- service innovation.

The object of our research concerns all of the types of innovation mentioned above, specifically when they are enabled by digital technologies. Some frameworks, such as Gartner's Hype Cycle (introduced in 1995), illustrate how technological solutions are adopted by government organisations: from initial enthusiasm, through a period of disillusionment, to an eventual understanding of the technology's relevance and role in government, as well as its productive use (Linden and Fenn, 2003). The Hype Cycle has been applied by a number of scholars to

explain digital innovation in government (Bannister and Connolly, 2012) and to investigate specific digital government initiatives such as open government in the USA (Linders, Wilson and Bertot, 2012); ICT-enabled modes of government-citizen interaction (Schellong, 2009); e-Government 2.0 (Boughzala, Janssen and Assar, 2015); and cloud computing in e-Government (Dash and Pani, 2016), among others. The most recent edition of the Hype Cycle (Holgate, 2018) refers to technologies such as AI, IoT and blockchain. Other recent studies focus largely on these technologies as game-changers in government and governance (e.g. Engin and Treleaven, 2019).

In our review of the state of the art, we analysed sources that explored the following technologies in relation to recent governance, policy and process innovations around the world and in the EU:

- artificial intelligence (in the broad sense);
- behavioural and predictive analytics;
- robotics and automation;
- the Internet of Things;
- geo-spatial data;
- blockchain; and
- open government data and applications.

As illustrated in more detail in the JRC Science for Policy Report published as outcome of the first phase of the research in December 2019, the results of the review of literature, based on almost 500 academic and grey literature sources, as well as the analysis of digital government policies in the EU Member States showed that many sources appear overly optimistic with regard to the impact of digital government transformation. The majority of them are based on normative views or expectations, rather than empirically tested insights and it is therefore suggested to research Digital Government Transformation empirically and with a due differentiation between evidence and hope (Misuraca, Ed., Barcevičius et al., 2019).

### 03.3 UNDERSTANDING THE EFFECTS OF DIGITAL GOVERNMENT TRANSFORMATION

In this section, we briefly present insights from the analysis of the literature on the effects of Digital Government Transformation. These are structured in terms of the four types of digital innovation presented in § 3.2 above: internal processes, external processes (governance), policy innovation, and service innovation. Although the four types are not entirely mutually exclusive, they still provide a useful way to summarise insights and structure evidence, with the aim of conceptualising and contextualising the likely effects and provide empirical examples. Importantly, given the novelty and the ongoing nature of these innovations, the literature leans towards emphasising the conceptual aspects and the expected effects. While significant empirical research has also been undertaken (for example, via specific case studies), the evidence is often inconclusive. In our overview of the state of the art, we attempted to present a balanced picture, highlighting the

observed and expected positive effects as well as the potential risks and downsides (for more details see Misuraca, Ed., Barcevičius et al., 2019).

### 03.3.1 INTERNAL PROCESS INNOVATION: MANAGING EFFICIENCY AND QUALITY OF SERVICES

Internal processes are often viewed as a quintessential feature of bureaucracies within the public sector. These processes have been imagined as slow, inflexible, costly, and prone to red tape. In response, the literature on digital innovation and digital transformation tends to regard technology as a tool that can be used to optimise bureaucratic processes, making them quicker, reducing staff and internal costs, generating savings for clients and stakeholders, and improving transparency and accountability.

Numerous sources present examples in which technology has been used to create efficiencies and generate internal savings. These are achieved by redesigning and streamlining internal processes, making them quicker, more flexible, eliminating duplications, reducing the incidence of human error, and better targeting policy measures. The streamlining of internal processes has become necessary as a result, for example, of the introduction of new electronic public services. Such services can be better targeted by joining up data from different public agencies, and using big data and predictive analytics to extract policy-relevant insights. There is evidence that technology-based solutions have replaced some staff roles and led to redundancies. In some cases, redundant staff were redeployed to other, more productive roles (World Government Summit and Kinetic CS, 2018). Analysis by Deloitte shows that even a low level of AI adoption could save government agencies between 2% and 4% of their staff working hours. A more determined effort could lead to savings of up to 30% (Viechincki and Eggers, 2017).

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THE USE OF ICTs  
TO STREAMLINE  
THE INTERNAL PROCESSES  
OF PUBLIC ADMINISTRATION  
HAS GREAT POTENTIAL,  
BUT ALSO RISKS

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Internal process innovation has also generated savings for public sector customers and society as a whole. This may be achieved by reducing the complexity of administrative procedures, as well as the administrative burden and waiting times. For example, the Estonian government estimates that X-Road – a technology platform that makes all government services available in one place (Eggers and Hurst, 2017) – saves 1,400 years of working time annually. In addition, the country used Application Programming Interfaces (APIs) to create a network of applications which, according to World Bank estimates, saved the country a total of 2.8 million working hours in 2014, or 3,225 years of time (Aherne, 2017). According to the Italian Digital Transformation team (2018), the single payment platform, PAgoPA, developed by the Italian public administration, offers error-free service provision, a standardised user experience, fast and easy payment collection, and reduced management costs. A study of the Hong Kong immigration office showed that the algorithm it uses to approve, reject or classify into grey areas millions of passport and visa applications, improves the office's administrative efficiency and eliminates backlogs (Griffin et al., 2016).

Finally, digital technology in public administration has been linked to increased transparency, fairness, security and trust. This is due to a number of reasons. First, transparency has been increased by the opening up of public data (Bertot, Jaeger and Grimes, 2010). Second, technology helps to

make administrative processes more consistent or impartial, due to reduced human involvement. Third, transparency is often part of a broader optimisation of internal processes whereby, for example, electronically delivered public services allow their clients to follow the status and outcomes of their requests. Technology can also render government activities more transparent by making public records traceable and accessible. For instance, transactions carried out through the use of blockchain technologies are automatically recorded, so that any government transaction can be traced and checked (Shen and Pena-Mora, 2018). For example, the Danish blockchain project Vehicle Wallet is said to ease supply chain management processes by collating all information about a vehicle's history. A single distributed ledger therefore contains all data on the car, and remains accessible throughout the entire supply chain (Berryhill, 2018).

The use of ICTs to streamline internal processes within public bureaucracies also presents some important risks. First, internal process optimisation can generate social tensions if it leads to significant lay-offs within the public sector. Whereas a number of case studies recount positive stories of public sector officials being redeployed to more productive roles, it is still unclear whether this will be true at a more aggregated level in the medium to long term. In essence, large-scale personnel redeployment necessitates significant training and upskilling, just as it does in industry in the context of Industry 4.0. But while countries have invested in training public sector officials, it is uncertain whether this has been carried out on a scale sufficient to counter the trend towards automation. Second, the expected savings may not necessarily be realised if the public sector continues to provide services via multiple channels that include both online and offline interaction. Third, numerous examples have demonstrated that AI-based solutions are prone to biases, and that algorithms may be arbitrary and opaque, leading to the opposite of transparency. Finally, significant security-related concerns exist in relation to the use of ICTs in the public sector. These include personal data protection, privacy violations, and the unwanted surveillance of citizens by governments.

### 03.3.2 GOVERNANCE INNOVATION: INVOLVING CITIZENS AND ENGAGING STAKEHOLDERS

Traditionally, public organisations have played a central role in making decisions on behalf of the public, and in implementing public services. This view is changing, due to a reconceptualising of the role of the public sector *vis-à-vis* the public, and to the emergence of new digital tools that empower citizens and other stakeholders to contribute to or even lead the creation of public value (Janowski, Estevez and Baguma, 2018). Many authors suggest that we are entering a period of ubiquitous civic engagement, enabled by social media and mobile devices, open data and big data analytics, crowdsourcing, visualisation, gaming and more. Janowski et al. (2018) framed this shift in terms of changing governance paradigms: from the impartial application of rules and regulations by an administration to exercise its authority over citizens (the bureaucratic paradigm), through the provision of public services by an administration to fulfil the needs of its citizens (the consumerist paradigm), to the sharing of responsibility for policy and service processes between the administration and its citizens (the participatory paradigm).

The literature identifies both positive and negative effects of digitalisation on the governance of democratic systems. On the beneficial side, many authors support the idea that digital technologies may serve as a catalyst for citizen engagement (UN Department of Economic and Social Affairs, 2018), including by individuals from groups whose levels of political participation have generally been lower (Dubow, 2017). It is expected that such engagement may arise from better awareness of political and policy issues; easier access to the exercising of democratic rights through e-voting, and from the co-creation/co-production of public services.

Better awareness of political and policy issues has been based on the increased availability of information and data, both from official, public channels as well as from citizen-driven sources. Examples include AI chatbots used to follow up on citizens' inquiries, informing them of what actions have been taken to address their enquiries (Mehr, 2017). Data analytics have been employed to spot anomalies in the spending of members of Congress (Savaget, Chiarini and Evans, 2018), enabling citizens to gain more information about politicians. Data could be used by policy makers themselves to better understand public opinion and citizen needs, based on data extracted from blogs, forums and the press (Milano, O'Sullivan and Gavanelli, 2014). Since the late-2000s, EU countries and the United States have used social media in government, mostly to disseminate information to the wider public (Chun et al., 2010; Mossberger, Wu and Crawford, 2013).

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AT POLICY LEVEL, IT IS EXPECTED THAT ICT-ENABLED CO-CREATION CAN SUPPORT THE DEVELOPMENT OF BETTER AND NEW PUBLIC SERVICES

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Internet voting has achieved some success in Estonia, Canada, Brazil, France and Switzerland, although evidence from Norway also points to security concerns regarding election fraud (Warkentin et al., 2018). Some authors are excited about the prospect of blockchain-based e-voting systems (Boucher, 2016). It is expected that Distributed Ledger Technologies (DLTs) may be able to address the security concerns that have hampered the more widespread adoption of e-voting; some work has also been undertaken on the design of blockchain-based on-line voting (Tarasov and Tewari, 2017; Riemann and Grumbach, 2017; Shaheen, Yousaf and Jalil 2017; Moura and Gomes, 2017; Hsiao et al., 2017; Hanifatunnisa and Rahardjo, 2017) and several prototypes have been developed (Noizat, 2015; Yavuz et al., 2018; Wang et al., 2018). For example, systems for corporate and local voting have already been tested in Estonia and South Korea (Ojo and Adebayo, 2017). Nevertheless, the continuing issue with regard to blockchain-based e-voting systems is that authentication at a personal level must occur outside of the blockchain (Shen and Pena-Mora, 2018).

At policy level, many authors expect ICT-enabled co-creation, co-production and crowdsourcing to bring together the public sector with its customers and the citizens, resulting in better public services or the development of new services (Morabito, 2015; Misuraca and Viscusi, 2014). This may help to overcome the challenges posed by scarce resources, as well as the multiplicity of clients and objectives (Alves, 2013). Numerous open government data initiatives have been launched, and so-called 'linked data' technologies have emerged to allow the publication of structured data on the web in such a way that it enables interoperability, uniform access and data analysis. This provides scope for joined-up governance by the public sector and citizens, in order to apply innovative solutions to the most pressing issues.



On the negative side, it is far from certain whether ICT-based innovation will necessarily lead to greater social inclusion. Some authors argue that digital technologies are simply a substitute for offline participation, facilitating deeper engagement by those who are already active. Baykurt (2011) argues that such technologies encourage passive and individualistic, rather than collective, action by citizens. Our review of the literature points to widening digital divides (Andreasson [ed.], 2015), and to discrepancies in the use of digital technologies by different population groups (UN Department of Economic and Social Affairs, 2018), which pushes 'some voices to the margins' (Dubow, 2017). In fact, some empirical evidence shows that online government is not reaching the most excluded, and that for some people, technological forms of exclusion can reinforce and deepen existing disadvantages (Helsper, 2008).

Some scholars have also questioned whether democracies will survive the potential threats posed by AI and big data analytics (Helbing et al., 2019). AI can, and already has been, used to undermine democratic systems. In Germany, the UK, France, Brazil and the USA, bots have been used during elections to create false images of policy support and thus influence, or even manipulate public engagement on specific issues (Savaget, Chiarini and Evans, 2018). AI has been used to spread misinformation (Polonski, 2017) and has enabled large-scale surveillance (Helbing et al., 2019). While AI-enabled behavioural techniques have shown some success in achieving outcomes that do align with the public interest, some scholars question whether it is possible to prevent 'nudging' that is contrary to the public good (Helbing et al., 2019). Adequate regulation is therefore considered necessary by many (Winfield and Marina, 2018). Given the mixed effects of AI with regard to public participation and citizen engagement, the ultimate effects of the technology on governance will depend on who designs AI-powered tools, and how they are used (Mittelstadt, 2016).

Furthermore, the use of social media is associated with a number of risks (Mergel, 2012) and requires not only a good implementation strategy (Mergel, 2013), but also the updating of laws and regulations, as well as the promotion of changes in government culture and organisational practices (Picazo-Vela, Gutiérrez-Martínez and Luna-Reyes, 2012). Sceptics point to mass citizen surveillance (Bekkers, Edwards and de Kool, 2013), fake content, privacy violations and other threats (Jaeger and Bertot, 2019). Social media tends to filter content according to a user's political preferences, lowering the chance of meaningful political discussion (Parise, 2011). Personal data submitted by social media users is managed by third parties (Alarabiat, Soares and Estevez, 2017) and, as evidenced by the Cambridge Analytica scandal in 2018, it can be used to manipulate public opinion. AI-based systems used by social media platforms to deliver content can lock users into 'echo chambers' and 'filter bubbles' that may exert a polarising effect on society and compromise social cohesion (Helbing et al., 2017). Governments, intelligence services and political movements are increasingly using social media to influence the public (Bradshaw and Howard, 2017).

Finally, a systematic review of 122 articles and books on co-creation/co-production, published between 1987 and 2013, found a lack of studies focusing on outcomes (Voorberg, Bekkers and Tummers, 2015). The review reveals that co-creation and co-production are often simply assumed to be a positive development. Similarly, in his review of the literature, Lember (2017)

concluded that there is a great deal of ambiguity as to the way in which digital technologies shape co-production. Such technologies can enable, frame, but also, at times, reduce co-production, thus minimising its 'bottom-up' potential. Other studies also show that the effective co-creation of new Open Government Data (OGD)-driven public services depends upon important pre-conditions. These include a new understanding of the role of stakeholders, proper communication, agile implementation and well-developed OGD solutions (McBride et al., 2019), among others.

### 03.3.3 POLICY INNOVATION: HARNESSING THE POTENTIAL OF DIGITAL TECHNOLOGIES TO IMPROVE POLICY MAKING

Digital technologies have been used to improve policy making, from agenda setting, to implementation and budgeting, to policy evaluation. Many of these changes have been gradual and incremental. Nevertheless, various authors point out to the fact that a transformation is possible that encompasses both changes that have already happened and, more importantly, changes that are expected in the future. This process is also labelled 'Policy Making 2.0' (Mureddu et al., 2012; Misuraca, Mureddu and Osimo, 2014). Following this approach, authors such as Ferro et al. (2013), Fredriksson et al. (2017) and Barbero (2016) highlight the fact that the analysis of big data enabled by algorithmic modelling and machine learning can be used by government agencies for generating:

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AI AND BIG DATA ANALYTICS  
CAN GREATLY ENHANCE  
POLICY MAKING, PAVING  
THE WAY TO ALGORITHMIC  
GOVERNANCE

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- faster and better macro insights, hidden pattern recognition, automatic correlations;
- effective, productive, economically valued decision making;
- efficient, accurate, reflective policy making;
- performance benchmarking;
- engaging citizens' opinions directly;
- development of data-based, personalised and responsive public services; and
- smarter implementation of law enforcement.

When it comes to the identification of problems and agenda setting, the literature suggests that changes are taking place in at least two directions. First, the role of citizens in policy making has increased due to crowdsourcing and co-creation. Policy development is no longer limited to governments, and has increasingly become a multi-stakeholder effort. Citizens now undertake a much more significant role in identifying problems, which previously was mostly played by traditional media. Second, digital technologies have also enabled governments to rely less on public servants and their human biases in generating insights on relevant issues. Technologies can do this job more quickly and (usually) more accurately, by analysing the evidence and data in its entirety. Some authors note that by combining various data sources (including citizen reports, data from IoT and the web, among others) and using appropriate analytical techniques (including AI-based ones), governments can identify individuals, entities,

and regions that are at risk and in need of public support (Tito, 2017), in order to zoom in on specific situations and design tailored policies (Williamson, 2014; Jun, 2018).

In relation to policy formulation, some authors expect that, in the near future, governments will employ algorithms to design and propose policies, with public officials undertaking final assessments and deciding between different/alternative policy options (Tito, 2017). However, while computer algorithms are good at sorting out data, generating analyses, predicting interactions and producing insights for policy suggestions, human decisions are necessary to take into account social, historical and political contexts (Ministry of Defence, UK, 2018).

Policy implementation is also being transformed as a result of big data, improved data processing and analytical capacities, and better foresight. Some authors argue that data analytics improves the fairness, efficiency and effectiveness of budgeting and public procurement – for example, due to the faster and more accurate checking of records (Höchtel, Parycek and Schöllhammer, 2016). At the same time, AI and machine learning can be used to change traditional budget allocation methods, enabling better targeting of financial resources towards areas where such intervention is most necessary and effective (Pencheva, Esteve and Mikhaylov, 2018).

Several authors anticipate that big data, AI and other technologies will be used to enable more timely and useful policy evaluation (Tito, 2017; Pencheva, Esteve and Mikhaylov, 2018). The use of dig data analytics could generate insights that previously could only be gained from interviewing or surveying large numbers of stakeholders. Digital technologies also enable citizen-driven evaluation, in which the general public makes a direct contribution to government policies, ideas, programmes and project monitoring and assessment.

Notwithstanding, during our review process, we did not encounter any sources that provided conclusive evidence or robust empirical analysis demonstrating the functioning of the ‘Policy Making 2.0’ concept. Some sources argued that the paradigm shift towards ‘Policy Making 2.0’ is subject to several preconditions. For example, Charalabidis et al. (2012) point out a number of challenges that must be overcome, including model-based collaborative governance, data-driven collective intelligence, the need for improved government service utility. Misuraca et al. (2014) point out several risks, including insufficient privacy protection, fabricated evidence and biased data interpretation. Policy making that draws on unrepresentative or manipulated data sets would actually undermine the policy making process and potentially lead to negative outcomes.

### 03.3.4 SERVICE INNOVATION: BUILDING A NEW GENERATION OF DIGITAL PUBLIC SERVICES

New and emerging digital technologies such as AI, IoT and DLT, and their combination, create opportunities for service innovation that would not previously have been possible. Our review of the literature reveals that service innovation is expected to lead to three types of transformative effects: cost savings, resulting from more efficient and effective service delivery; higher service quality and user satisfaction; and broader positive outcomes, such as the improved health of the population or lower pollution, among others. On balance, it is the first of these that receives the most attention in the literature. Nevertheless, many authors point out that

the three effects are interrelated. Importantly, a significant body of literature also points out a number of risks relating to high reliance on ICTs in public service delivery. For example, as we have already mentioned, AI-based solutions are susceptible to biases, and may create a sense of ‘losing control’ among citizens and public sector officials (Tinholt, Carrara and van der Linden, 2017; Devlin, 2016).

As the literature relating to service innovation is usually service-specific, our analysis concentrates on the three areas that have been discussed most extensively in the literature: health-care; public safety and security; and smart city services.

Some authors argue that health care and long-term care is the area of public service in which AI can have the most transformative impact (PwC, 2017, Misuraca, Pasi and Urzi Brancati, 2017). AI-enabled innovations are expected to improve health outcomes and quality of life for millions of people (Horvitz, 2016). With the wide adoption of online medical consultations, patient portals, and other care delivery channels enabled by digital innovations, recent trends in the health care sector include shifts from traditional face-to-face care to e-health, mobile health (m-health) and ‘ubiquitous health’ (u-health), characterised by real-time information collection about the patient (Jung and Padman, 2015). Precision or stratified medicine is also on the rise (Love-Koh et al., 2018). This is characterised by the tailoring of health care towards specific patients or sub-groups throughout the patient pathway (advice, diagnosis, referral or treatment).

Nonetheless, empirical evidence is scarce and inconclusive, especially with respect to assessments of actual health outcomes. A systematic literature review carried out by Goldzweig et al. (2013) on the effect of patient portals on clinical care found mixed evidence about the effect of portals on patient health outcomes, service satisfaction, health care utilisation and efficiency. Aside from the desired effects, the literature indicates multiple challenges linked to the adoption of AI in public health care. Based on interviews with stakeholders, Sun and Medaglia (2018) group these challenges into seven dimensions: social; economic; ethnical; political, legal and policy-related; organisational and managerial; data-related; and technological. A number of authors also highlight issues relating to privacy and security, as well as the poor quality of data being fed into AI algorithms, resulting in misinterpretations (Science and Technology Committee, 2018). Also noted is the exacerbation of existing disparities in the accessibility of health care (Jung and Padman, 2015; Goldzweig et al., 2013). Issues exist on the demand side, too: the results of online surveys show, for example, that not all people are comfortable with having a robot providing them with services and companionship when infirm or elderly (European Commission, 2017).

In relation to public safety and security, the reviewed literature examines the use of predictive analytics in services such as policing and fire protection. Predictive technologies, powered by machine learning, enhance the ability of law enforcement authorities to predict crimes and establish the identities of offenders and perpetrators as well the victims of crime (Horvitz, 2016). While little formal evaluation of predictive policing methods has been carried out, findings based on practitioners’ experience point to both positive and negative effects. On the one hand, predictive technologies allow police to work more proactively with limited resources (Telep, 2009), and to undertake interventions that are better tailored to the actual problems (Perry

et al., 2013). On the other hand, the reported benefits are accompanied by risks: policing may become overbearing or overly pervasive, raising concerns over widespread surveillance and the invasion of privacy (Horvitz, 2016). Scholars also disagree as to whether AI-based predictive tools can remove or reduce human bias rather than reinforcing or perpetuating it. Research suggests that poor neighbourhoods are disproportionately susceptible to discrimination stemming from the analysis of big data sets (Gangadharan, Eubanks and Barocas, 2014; Newman, 2014; Barocas and Selbst, 2016; Madden et al., 2017).

Cities and regions have been at the forefront of digital innovation and transformation, as reflected in the vast body of literature on 'Smart Cities'. Many definitions of smart cities exist, but

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CITIES AND REGIONS  
ARE AT THE FOREFRONT  
OF DIGITAL INNOVATION  
AND TRANSFORMATION

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most underline the use of ICT-enabled innovations to improve or radically change various aspects of city life. For example, according to the OECD (2019) definition, smart cities are *'initiatives or approaches that effectively leverage digitalisation to boost citizen well-being and deliver more*

*efficient, sustainable and inclusive urban services and environments as part of a collaborative, multi-stakeholder process'*. Cities have been described as 'living laboratories' (Naafs, 2018) and 'innovation hubs' (JRC, 2019). Technologies such as IoT, GIS, AI, API, blockchain, open data, big data and others have been used to improve governance and public service delivery. Specific examples include smart city platforms, co-creation with citizens, smart grids, smart mobility, smart building systems, sustainable housing, smart health care, and many others<sup>3</sup>. On the negative side, smart cities face numerous risks that stem from the pervasive nature of technology, citizen surveillance and the invasion of privacy. In Toronto, for example, Alphabet's subsidiary Sidewalk Labs and publicly funded organisation Waterfront Toronto made plans in 2017 to develop a 12-acre area into a smart neighbourhood. The project was rebuked by the public when Sidewalk Labs failed to convince them that personal data would not be accessible to third parties (Bass, Sutherland and Symons, 2018). Similarly, in 2013, Seattle's Police Department implemented wireless sensors throughout the city to provide better emergency response, but faced backlash because the sensors could also be used to track residents' wireless devices (Crump, 2016).

### 03.3.5 OUTLOOK FOR THE TRANSFORMATIVE EFFECTS OF DIGITAL INNOVATION ON GOVERNMENT

In summary, the analysis of the state of play of Digital Government Transformation and public sector innovation conducted as part of the DigiGov research points to three key transformative effects, brought about by the application of the most recent digital technologies and innovations in government:

- **Efficiency, productivity gains and cost-savings.** Applications of ICTs allow public resources to be saved or allocated more efficiently. Effects such as reducing operational and

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3 Many relevant examples are presented by networks of cities or stakeholders, for example, Open & Agile Smart Cities (OASC); Eurocities; the European Network of Living Labs (ENoLL) and initiatives such as the European Innovation Partnership on Smart Cities and Communities.



labour costs in public administrations, allowing staff to focus on more important tasks, and delivering services more quickly and cheaply, are more immediate and comparatively easier to measure than effects on, for example, government accountability or inclusion. At the same time, these direct effects are among the main drivers for introducing digital innovations.

- **Effectiveness and quality improvements.** Many of the sources reviewed also highlight – directly or indirectly – that digital innovations in government contribute to the increased effectiveness and quality of public sector operations, functions and services. With more accurate prediction, real-time detection and tracking, improved resource allocation, better decision making, and personalised context-aware and context-smart services, powered by AI and other technologies, governments can develop better, more inclusive and empowering services and policies. These can, in turn, increase user satisfaction and help to resolve problems of collective action.
- **Transparency, accountability, trust and legitimacy.** Whereas the empirical measurement of impacts relating to this dimension remains a challenge, it is expected that the better operation of government – in terms of administrative effectiveness, better public services and citizen involvement in decision making – should lead to greater transparency, accountability and, ultimately, increased legitimacy and trust.

Many authors have discussed the preconditions, drivers, facilitators and success factors for digital government initiatives. According to the literature and practice in the field, the key drivers or facilitators include political and managerial leadership, sufficient financial resources, administrative capacity, citizen pressure, the involvement of stakeholders, cross-sectoral coordination, the adoption of relevant strategies, a functioning digital infrastructure, agile implementation and open data. Interoperability between different information systems is often emphasised as both a key precondition and an important operational goal. Conversely, the key barriers include administrative silos, fragmented decision making, insufficient resources, overdependence on external service providers, disregard for user experiences and other more specific and often context-dependent factors.

Measuring Digital Government Transformation in terms of the actual changes introduced via ICT-driven innovations remains a challenging task. In their systematic literature review of 181 articles published between 1990 and 2014 on innovation in the public sector, De Vries et al. (2016) found that 40% of studies did not report outcomes from such innovation, while many articles mainly focused on the positive effects of digital technologies and concluded that innovation is valuable in itself. Our review of the literature focused on more recent research, but the trends we observed are remarkably similar. The majority of the sources reviewed are generally positive about the current and future impacts of digital transformation. A lack of innovations (especially disruptive ones) is frequently framed as being the main problem. Fewer sources point out the actual and potential problems caused by algorithmic biases, insufficient data protection or privacy violations. Yet those sources that do undertake such analysis come

to some rather dark conclusions. These include the risk of overarching technocratic control as the result of *'growing and troubling unchecked global consensus around the merits of technocratic governance and data-driven decision making'* (Medhora et al., 2018). The literature also highlights the issue of the public sector being 'hollowed out' as governments purchase proprietary products from the private sector that they do not understand and cannot build themselves. In fact, democracies and societies may be at risk due to the unscrupulous exploitation of ICT-based technologies by rogue governments and corporations (Zuboff, 2019).







In conclusion, transformative technologies clearly present both opportunities and risks. Their actual effects largely depend on how technologies are introduced and used. In **Table 5** below, we provide a qualitative assessment of the robustness of the effects extracted from the literature, and of the balance between positive and negative effects as it is currently reflected in the relevant body of research. We offer this only in relation to a few selected areas, and this assessment must be understood only as a heuristic tool that can help future research to move towards the operationalisation of the conceptual framework proposed, as an indication for the further identification of the key impacts to be measured.

Our assessment is expressed on a five-point scale from 0 (lowest score, white dot) to 4 (highest score, black dot). We reiterate that this assessment is preliminary and based on a qualitative and to some extent subjective assessment performed by the research team. The highest score of 4 is given to effects for which both the robustness of the evidence and the balance in favour of positive effects (as opposed to negative side effects) has been assessed as high; conversely a score of 0 suggests an effect is not strongly documented, or that its benefits are outweighed by negative side-effects. In certain cases, however, the assessment may be based only on one dimension. This is the case, for instance, with regard to distributed ledger technologies, about which the literature surveyed reports only positive effects, with no indication of negative side-effects; however, this technology is given a score of 2 because evidence is very limited and mostly prospective rather than empirical.

TABLE 5. Effects of digital innovations in government: outlook

DOMAIN	TECHNOLOGY/ AREA OF APPLICATION	POSITIVE EFFECTS	NEGATIVE EFFECTS	ASSESSMENT
INTERNAL PROCESSES	<i>AI and automation</i>	Reduced human errors, speeding up of repetitive tasks, increased efficiency and productivity	Lay-offs, precarisation, social exclusion, algorithmic 'black-boxes', loss of control and decreased transparency	
	<i>Distributed Ledger Technologies</i>	Improved privacy and security, reduced transactions costs, increased transparency, counters centralised platformisation	<i>N/A - insufficient coverage in the literature. In this case, assessment is based only on the robustness of the evidence</i>	
	<i>Internet of Things</i>	Real-time monitoring, more optimal use of resources	Invasion of privacy, loss of control	
GOVERNANCE	<i>AI and automation</i>	Increased citizen engagement, reduced information asymmetries	Misinformation, risk of manipulation	
	<i>Distributed Ledger Technologies</i>	Improved voter turnout, improved privacy and transparency	In the case of e-voting, authentication at the personal level must occur outside the blockchain	
	<i>Social media</i>	Wider dissemination of information, increased citizen engagement	Violation of privacy, misinformation, loss of democratic control	

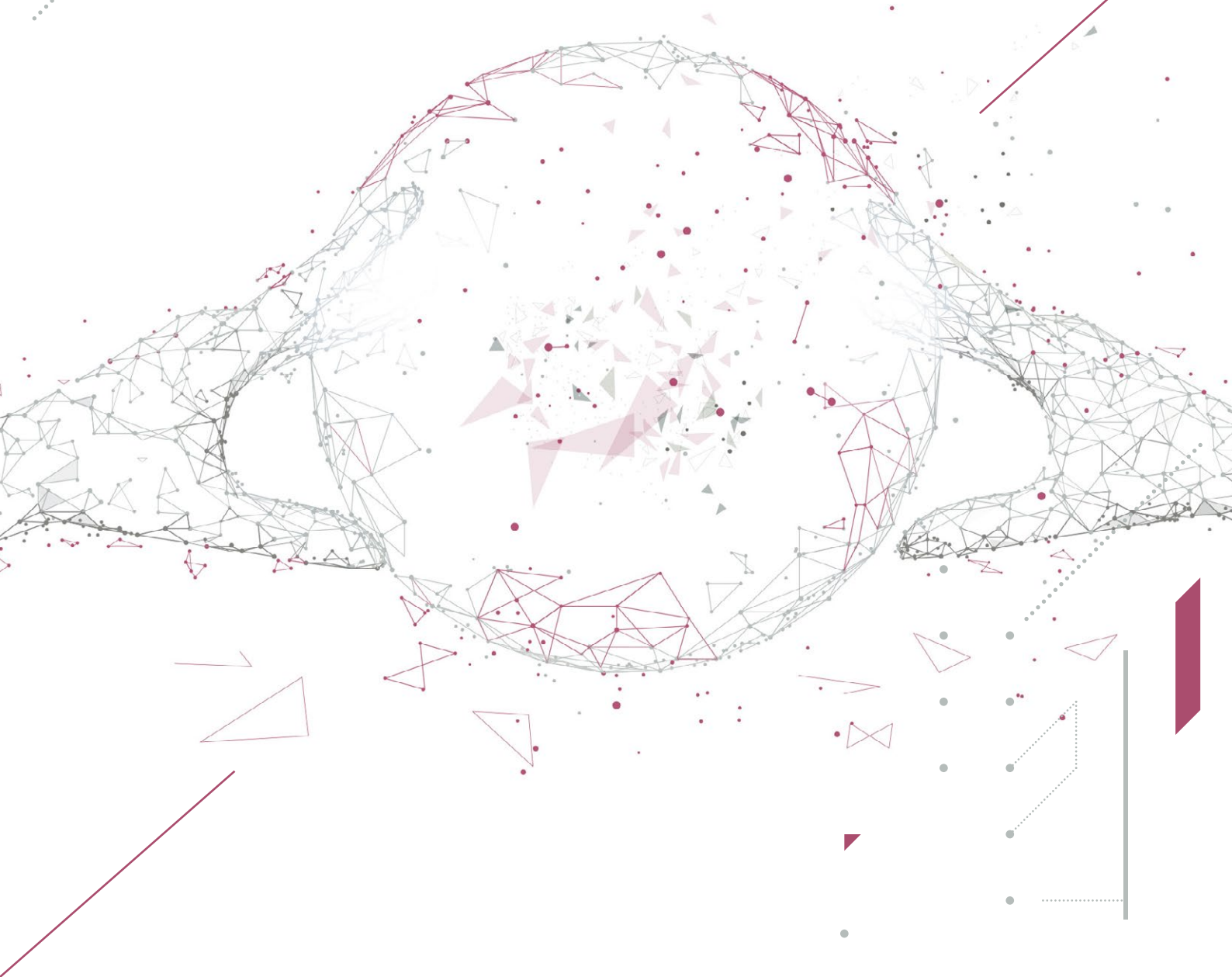
**TABLE 5 [CONTINUED].** Effects of digital innovations in government: outlook

DOMAIN	TECHNOLOGY/ AREA OF APPLICATION	POSITIVE EFFECTS	NEGATIVE EFFECTS	ASSESSMENT
POLICY MAKING	<i>Problem definition and agenda setting</i>	Detailed assessment and more precise identification of problems, better predictions of trends		
	<i>Policy formulation, adoption and implementation</i>	More inclusive policies, more targeted budget allocation, evidence- based implementation	'Hollowing out' of the public sector, loss of democratic control, decreased sensitivity to political/social context	
	<i>Policy evaluation</i>	More accurate evaluation, real-time monitoring, citizen involvement		
SERVICES	<i>Health care</i>	Improved efficiency through prevention, improved service quality, better monitoring and evaluation	Privacy and security issues; poor data quality; misinterpretations of data; exacerbation of existing disparities in access to health care; weak demand	
	<i>Public safety</i>	Improved prediction of crime, better identification of offenders, more tailored interventions	Pervasive control and surveillance, biased decisions	
	<i>Smart cities</i>	Optimal use of resources, increased security through better monitoring	Privacy violations, loss of democratic control, social exclusion	

Source: Own elaboration



# CONCEPTUAL FRAMEWORK









## 04.1 PURPOSE AND SCOPE OF DIGIGOV-F

The conceptual framework developed as part of the research, in short DigiGov-F, contributes to the systematising and reconceptualising of Digital Government Transformation within the scope of public sector innovation. It does so by highlighting the key dimensions and factors that should be further studied in order to understand how ICT-enabled innovation can transform governance and policy making. The framework thus paves the way for a more in depth assessment of the effects of digital transformation in the public sector. Its elaboration has been informed by theory and is scientifically grounded. It rests on a clear definition of what a conceptual framework is, and on a step-by-step methodology for concept building. It follows the literature that specifically discusses conceptual frameworks (Jabareen, 2009; Imenda, 2014; Rocco and Plakhotnik, 2009), as well as more general and classic sources on the epistemology and methodology of social research (Creswell, 2003; Fox and Bayat, 2007; Glaser and Strauss, 1967; Levering, 2002; Liehr and Smith 1999; Merriam, 2001; Miles and Huberman, 1994; Strauss and Corbin, 1990; Wacker, 1998).

First, it is important to clarify that a conceptual framework is not the same thing as a theory, a model, or a theoretical framework. Although informed by theory and science, our framework does not aim to provide a theoretical explanation of '*what causes what*' within the broadly defined ecosystem of digital government. Conceptual frameworks are usually the first step when dealing with very complex phenomena, where knowledge is spread across different bodies of literature that must be pulled together to provide an interpretative map and understanding of the given phenomenon. Whereas a theoretical framework is used to investigate a specific theory, a conceptual framework is extracted from relevant theoretical and empirical works (Rocco and Plakhotnik, 2009). As Jabareen (2009) argues, one can build a conceptual framework by taking a 'grounded theory' approach (Glaser and Strauss, 1967; Strauss and Corbin, 1990). Indeed, we have applied grounded theory as an inspiration by developing our proposed framework from secondary sources, gathering feedback from expert consultations and, in the final validation step, contrasting these sources against primary sources derived from field work (i.e. results from the case studies and experiments).

The proposed DigiGov-F must thus be seen as a comprehensive and exhaustive theory-informed, and scientifically robust, heuristic conceptual framework. It systematises and reconceptualises digital government within public sector innovation and the institutional settings of public administration. It serves to better understand and categorise the possible effects of Digital Government Transformation and enables the generation of new hypotheses for their empirical assessment.

Nevertheless, we make no claims as to explanation and prediction. We are not presenting a specific theory to be tested, because this would require a much more restricted and clearly defined domain of application, as well as the definition of a set of hypotheses concerning the relationships between a limited set of variables.

However, although the use by governments of technology in general, and of ICTs in particular, has been studied for decades, our research is a novel exploration for two reasons.

First, it focuses on a set of radically different and potentially transformative technologies that are currently raising many hopes and fears.

Second, it is one of the first attempts to bridge different disciplines and perspectives.

These two reasons, we believe, justify the consideration of our analysis as an exploration of *terra incognita*. Therefore, we regard DigiGov-F as a first map of this unknown territory that will be improved by more focused explorations and deep dives in the future.

DigiGov-F systematically maps the key antecedents and processes that are important to consider in understanding and assessing Digital Government Transformation initiatives. Yet, a conceptual framework is by definition a conceptual simplification of reality.

We propose, therefore, a high-level general and generic framework with a number of pillars that have gone through a first empirical testing and refinement with the results of the four case studies and experiments we have conducted, but are suitable of further validation through future policy research studies that are more focused and less exploratory. The

framework in fact provides building blocks that will need to be tailored to the specificity of concrete digital government initiatives. These may vary depending on country-specific contexts, as well as on their level (national, regional, local) and domain (service provision, internal administrative processes, policy making) of analysis, as well as other specific context-dependant and technology-related factors.

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DIGIGOV-F IS  
A COMPREHENSIVE  
HEURISTIC CONCEPTUAL  
FRAMEWORK TO HELP ASSESS  
ICT-ENABLED INNOVATION  
IN THE PUBLIC SECTOR

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## 04.2 UNDERLYING DIMENSIONS: THE NEED TO REFRAME PUBLIC SECTOR INNOVATION

DigiGov-F was built starting from the analysis of three dimensions extracted from the review of literature on innovation<sup>4</sup>.

In particular, to build the framework, we looked at the concept of public sector innovation, both from an institutional and a technological perspective. First, our discussion of the innovation dimension brings together insights from a vast body of literature<sup>5</sup>, reviewing different types of innovation. These include insights concerning the intrinsic attributes of innovations, as well as organisational and environmental/contextual attributes. Each of these elements can function either as a driver or a barrier depending on the specific configuration (of their presence/absence). Second, to better define the institutional dimension of the framework, we have analysed all of the different models of public administration, from the Weberian model to New Public Management (NPM) and New Public Governance, together with their characteristics and underlying features. In our review we explained how the specific peculiarities of the public sector can shape the introduction of innovations. Third, we considered the technology dimension in order to understand which emerging or consolidating data-driven technologies characterise the new wave of Digital Government Transformation. Together, the three dimensions represent the building blocks from which the conceptual framework has been built.

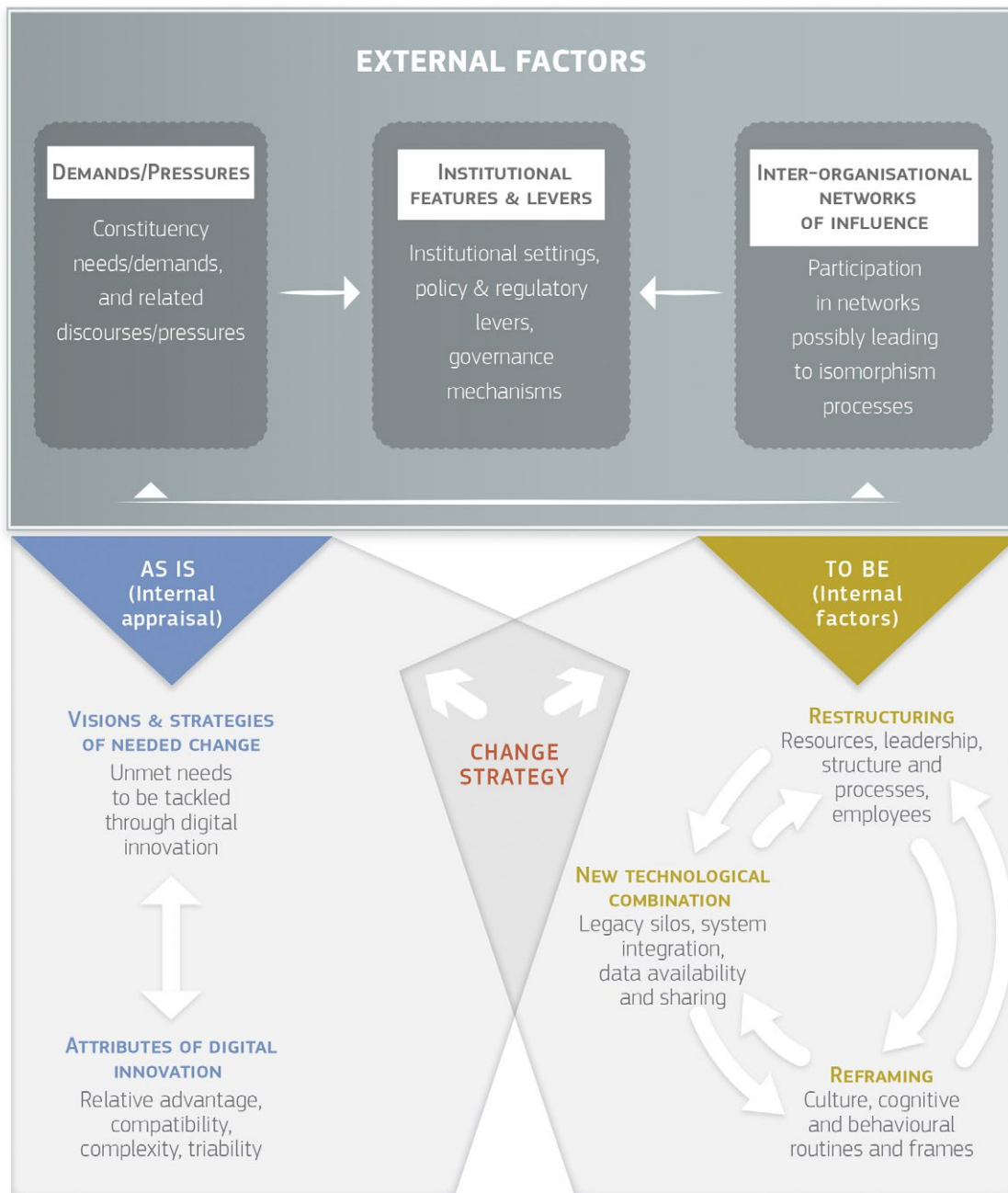
Having briefly recalled the scope and key elements of the conceptual framework, in the next sections we first integrate our analysis of the three dimensions considered (innovation, institutions and technology) with the notion of organisational change as it pertains to digitalisation (§ 4.2.1). We then present the final version of DigiGov-F (v2.0) as it was revised after taking into consideration the results of the co-design sessions of the Policy Lab organised in Seville in October 2019, and further modified after being mapped against the empirical findings of the case studies (§ 4.2.2). In § 4.3, we then present a typological map of digital government innovation, and discuss briefly how this could be used to assess the effects of Digital Government Transformation.

4 In the JRC Technical Report outcome of the second phase of the research, (Misuraca, Ed., Codagnone et al., 2020) we provided a deep discussion of each specific dimension considered to build the DigiGov Framework. Here we do not explain the theoretical reasoning behind the antecedents of the conceptual framework, but directly introduce the framework itself. We will limit ourselves to a very brief description, but we invite the reader to consult the JRC Technical Report in order to fully understand the logic behind DigiGov-F.

5 The discussion of the antecedents builds on an earlier analysis produced by the authors of this report (Codagnone, Baum, Maghiros, Lluçh and Lupiáñez-Villanueva, 2012, Misuraca, 2012, Misuraca and Viscusi, 2015, Misuraca et al., 2017), integrated with some systematic reviews on public sector innovation (Bason, 2010; De Vries, Bekkers and Tummers, 2016.; Greenhalgh, Robert, Macfarlane, Bate and Kyriakidou, 2004; Greenhalgh, Robert, Macfarlane, Bate and Kyriakidou, 2005; Osborne and Brown, 2011; Sørensen and Torfing, 2011; Walker, 2014). It also takes into account some seminal contributions on innovation in general such as Rogers (2003) and Damanpour (1991). Although not all sources are cited in this report, the previous work conducted by the authors and the JRC Reports outcomes of the first phases of this research (Misuraca, Ed., Barcevičius et al., 2019, and Misuraca, Ed., Codagnone et al., 2020), and the various systematic reviews used and cited above collectively cover and summarise hundreds of different sources.

### 04.2.1 INNOVATION AND ORGANISATIONAL CHANGE: KEY FACTORS FOR DIGITAL GOVERNMENT TRANSFORMATION

**Figure 5** below integrates the analysis of innovation antecedents, institutional settings and technology, with the organisational change perspective applied to the ICT-enabled transformation of government (see for instance Weerakkody, Janssen and Dwivedi, 2011; Misuraca and Viscusi, 2015).



**FIGURE 5.** From antecedents of innovation to internal and external change factors

Source: Own elaboration

If we consider a hypothetical public agency, the starting point for aiming at Digital Government Transformation is the appraisal of the 'as is' situation as being not entirely satisfactory. For instance, based on the internal vision and strategy, a certain need of a given constituency may be identified as being not fully met. More generally, the agency may decide to become more responsive to its user base by reorganising itself from siloed functions to a demand-driven horizontal organisation of activities, while also pursuing a reduction in costs and an increase in efficiency. The agency's internal vision and strategy will certainly be based on evidence, but will inevitably be influenced by external factors such as pressure from the media and politicians and/or responding to policy/regulatory directives and levers. The decision to change may also be prompted by networks of influence that lead to processes of convergence towards what other, similar organisations are doing, or what consulting companies advise that the organisation should do. A strategic appraisal leading to a strategy for change will entail the consideration of factual or perceived attributes of digital innovation (e.g. relative advantage, compatibility, etc.). These will include some kind of *ex-ante* vision as to how the organisation can achieve the desired transformation (the 'to be' state), with improved performance. An important motivating factor when considering an innovation's attributes will be the perception of how the innovation could increase the legitimacy of the innovating organisation. In this way, external pressures and influence can shape both the appraisal of the innovation's attributes and the strategy for change chosen by the agency. Should the innovation's relative advantage not be clear and supported by evidence, this could lead to the moral hazard of under- or over- investment. Policy and governance levers (incentives and top-down mandatory directives) can, however, positively impact the agency's motivation and offset the risk of this moral hazard. Political leadership and public administration norms and values (considered part of the institutional setting) together with the presence of champions from previous successful experiences (organisational readiness) are also important factors. Networks and influence-shaping public discourse on innovation can increase the perceived legitimacy of an innovation, which may lead to its adoption as a result of institutional isomorphism. Strong societal demands and needs have in fact a clear impact on how the relative advantage of an innovation is framed and, subsequently, evaluated.

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REFRAMING COGNITIVE  
BEHAVIOURS  
AND ORGANISATIONAL  
ROUTINES CAN LEAD  
TO NEW AND INNOVATIVE  
SOLUTIONS TO TRANSFORM  
GOVERNMENT

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When an innovation is adopted and the process of implementing the change begins, internal change factors come to the fore. If we assume that the starting point is a siloed organisational structure and fragmented information systems and data storage, the challenging job of re-designing organisational processes and structure will go hand in hand with the integration of ICT-systems, as well as the engineering and structuring of data sources. This task becomes even more challenging when the digital innovation is not self-contained within a single public agency but involves other actors across government, and possibly also non-governmental actors and data sources. In this scenario, levers of policy and regulation, together with governance mechanisms, are an external strategic input that can provide both incentives for sharing and collaborating, and a regulatory and ethical framework for the use of personal data. The availability (or lack) of slack resources, leadership and committed and skilled employees can function as a driver (or barrier) to these processes.



Aside from the tangible internal factors described above, equally important are changes in organisational culture towards sharing and collaboration and, in particular, to the organisation's cognitive and behavioural frames and routines. We refer here to the introduction of new concepts, as well as to normative and cognitive routines concerning the internal function and external environment. These help to reframe the definition of problems and their solutions, leading to new ways of thinking that could change the thoughts or behavioural intentions underlying the development and deployment of policies and services. This can lead to improvements in the identification of the needs of constituents, as well as reducing the time required to develop, test, implement and diffuse a policy, and promoting the adoption of new 'languages' and concepts, and new methods to influence behaviour.

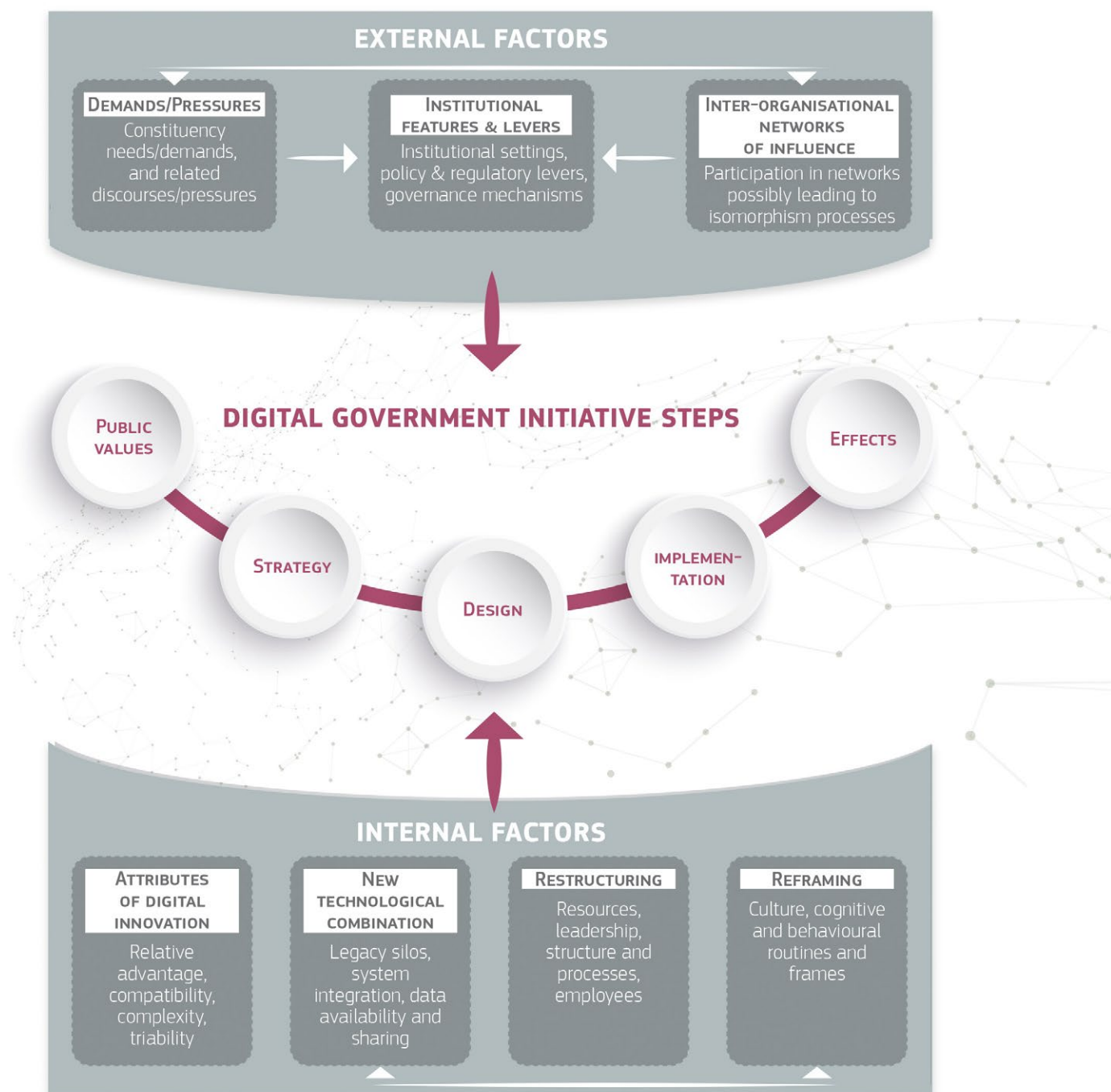
This process of reframing is crucial, since the digital transformation of government will only occur: (a) when there is access to a constellation of different sources of information that can be linked together; and (b) new analytical techniques are employed using a new and appropriate frame of mind. This is to say that the transformative potential of new technologies is linked to the introduction of new concepts and new ways of thinking that challenge the underlying assumptions behind administrative processes, services delivered and products offered. It also requires a shift in the behavioural intentions that underpin policy development. For example, big data must be handled using new analytical techniques that require a profound change in the modelling approach, and entail extensive algorithm-based analysis (Veltri, 2017). Previously, research into citizens' needs, attitudes and behaviours has been based on limited sample methods, most of which (other than experiments) has relied on self-reported information that could suffer from biases. Big data now provides real-time information about what people *really* do (e.g. transactional and activity-generated data) or think (social media). New analytical and data processing techniques can thus improve policy implementation by better targeting different audiences and combining the power of big data analytics with insights from behavioural economics and the 'nudge' approach. To take advantage of this, the public sector must develop a new culture of data gathering and engineering (alongside improvements in its internal analytical capacity and a restructuring of the underlying sourcing and storing processes). There is also a need for a paradigm shift in the way new insights are sought and used. This must be combined with new approaches to data governance that ensure security and privacy. Finally, cognitive change is also required in the way governments view collaboration and co-creation, in order to advance beyond hype and rhetoric. Such change entails creating trust and opening up to insights and contributions from outside the government, embarking on a structured dialogue and partnership with private companies, civil society organisations and citizens.

#### 04.2.2 FROM DIGIGOV-F 1.0 TO DIGIGOV-F 2.0

**Figure 6** presents a stylised graphical representation of the initial proposal for the conceptual framework, DigiGov-F 1.0, advanced as a result of the conceptualisation based on the analysis of the different streams of literature and theoretical orientations summarised in the previous sections. As such, it requires only a very concise narrative explanation that highlights a few key points.

Most importantly, DigiGov-F 1.0 is not to be considered a linear and prescriptive framework, and does not present a theory of causation that connects all factors and follows a deterministic logic.

Figure 6 concisely maps those elements reviewed as part of the research, and briefly presented in the previous sections, that merit attention when considering Digital Government Transformation, noting probabilistic relations between them. These elements are included in the graphical representation of the conceptual framework, with only a general indication of their possible influence. The circles at the centre of Figure 6 indicate the steps involved in a digital government initiative. Above them are external factors; below, internal ones.



**FIGURE 6.** Graphical representation of DigiGov-F 1.0

Source: Own elaboration

Once a strategy for change has been decided, we assume that the first priority to be set is the identification of the public values to be sought. From these values and priorities flow the strategic objectives, design, implementation and eventually, when the initiative is embedded into 'business as usual', the effects. The lines connecting the various steps at the centre of

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DIGIGOV-F SUPPORTS  
THE DESIGNING  
OF EFFECTIVE DIGITAL  
GOVERNMENT CHANGE  
STRATEGIES, IDENTIFYING  
KEY PUBLIC VALUES  
AND PRIORITY OBJECTIVES

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the diagram have no arrows, and only convey possible linkages without assuming any deterministic or linear flow. The red circles are placed linearly only because they are considered to be different phases, one following another. In practice, there could be substantial lag between one phase and the next. Although it cannot be rendered graphically, the possibility cannot be excluded that at a certain time the initiative may be stopped and will therefore not reach the subsequent phases. While

the combination of technologies/applications adopted can contribute to the achievement of transformative effects, it cannot do so alone, but only when integrated with and supported by other elements of the framework. The fact that strategic objectives are defined first, and only afterwards is the combination of technologies selected, may be a conceptual simplification (they may in fact occur together), but it is adequate for our purposes of systematisation and reconceptualisation.

When the four case studies were completed, we mapped the framework described above against the empirical findings of the cases and experiments. Overall, the results of the cases corroborated the good fit of DigiGov-F. They did, however, inspire several adjustments, which were further combined with insights from consultations with experts and stakeholders, gained in particular during the Policy Lab session in Seville and through the engagement in the DigiGov Online Community. The main changes included in the revised version 2.0 of DigiGov-F are presented here below:

- Giving greater prominence to inputs (efforts/investments): a new box relating to input has been added into the graphical snapshot of the new version.
- Introducing a dynamic feedback loop between implementation, service in production, first results and following iterations. A new box labelled 'delivery', denoting either the provision of a new service or the application of a new policy, has been added into the graphical snapshot of the new version, together with a new arrow notation aimed at conveying the dynamics of possible multiple iterations.
- Giving more emphasis to user adoption: a new box relating to adoption has been added into the graphical snapshot of the new version.
- The issues of trust and legitimacy are further underscored, not only as outcomes but also as drivers and facilitators; this is done discursively.

Furthermore, given the lessons learned from the case studies, strategies for change should also carefully consider, plan, and steer three important aspects:

- The allocation of adequate resources in terms of the personnel and funds needed for the relevant technological investments (broadly defined input).
- The initiatives should start from users' demands and needs, and define actions that could increase adoption and avoid new forms of digital divide.
- The initiatives should define key strategic actions aimed at building trust in AI and other new or emerging technologies that touch upon privacy issues and require the use of personal data.

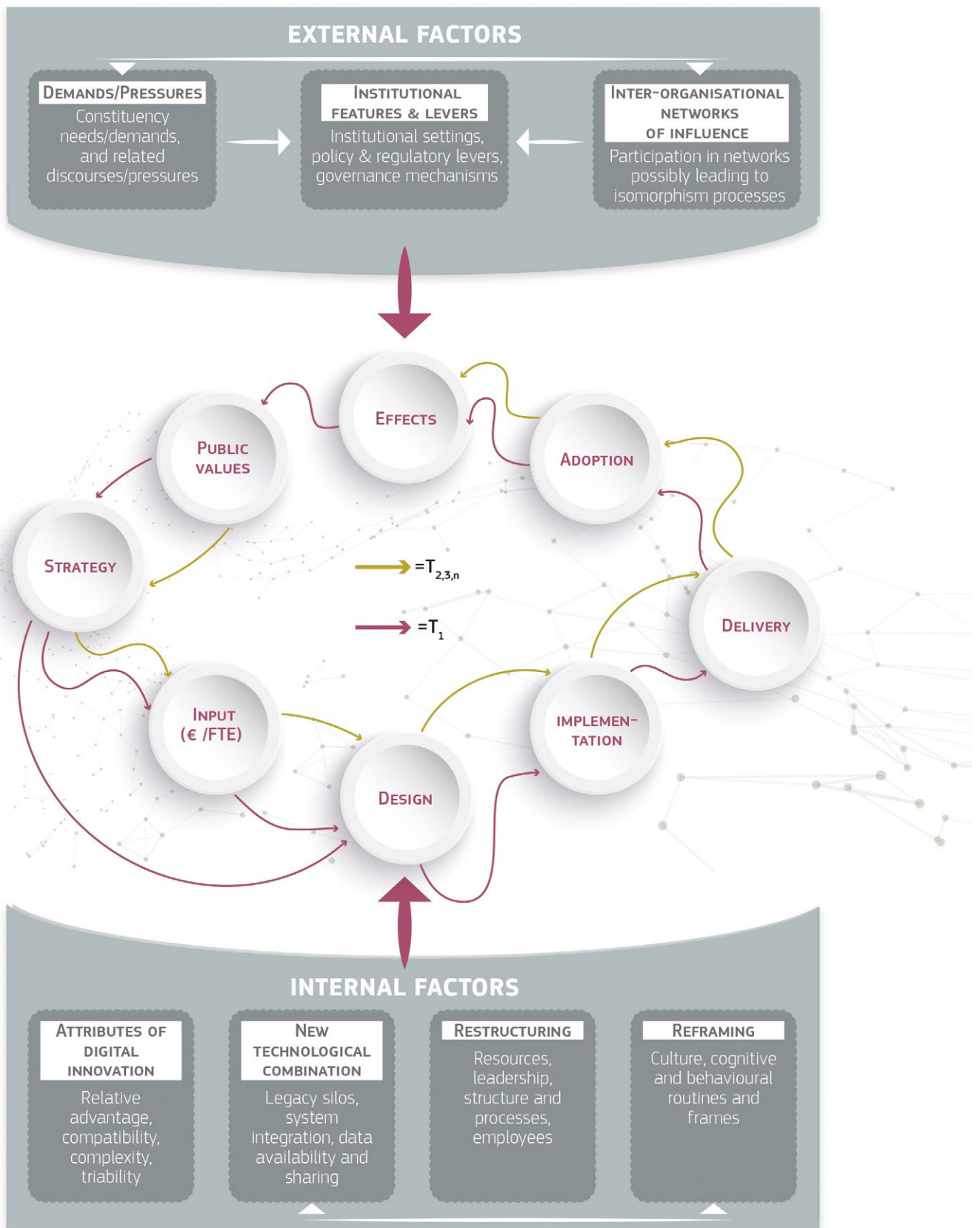
The latter two points will, of course, be influenced by external factors, but they also concern policy and service design, implementation and delivery, and should be concretely followed both in the choice of technology and in the process of the internal reframing of the organisation, as well as with regard to the actions taken to interact with its constituency.

**Figure 7** below provides a graphical representation of the revised proposal for the conceptual framework, DigiGov-F 2.0, as amended in line with the inputs obtained from the case studies/experiments and the consultation with the DigiGov community of experts and stakeholders. The two differently coloured lines aim to convey the dynamic nature of the process of Digital Government Transformation and the various iterations that may take place. In particular, in line with the insights obtained from the case studies and experiments, we convey the idea that after a given period of time, depending on the final effects of the transformation, changes may be decided both at the level of public values and of strategy definition. These changes may entail the decision to increase investment in human resources and in technology to improve delivery, increase adoption and, as a consequence, eventually produce more desirable impacts and avoid negative side-effects.

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TESTING DIGIGOV-F  
AGAINST THE CASE  
STUDIES UNDERLINED  
THE IMPORTANCE OF  
FOCUSING ON CITIZENS'  
NEEDS AND PRIVACY

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**FIGURE 7.** Graphical representation of DigiGov-F 2.0

Source: Own elaboration



### 04.3 MAPPING DIGITAL GOVERNMENT INNOVATIONS AND THEIR POTENTIAL EFFECTS

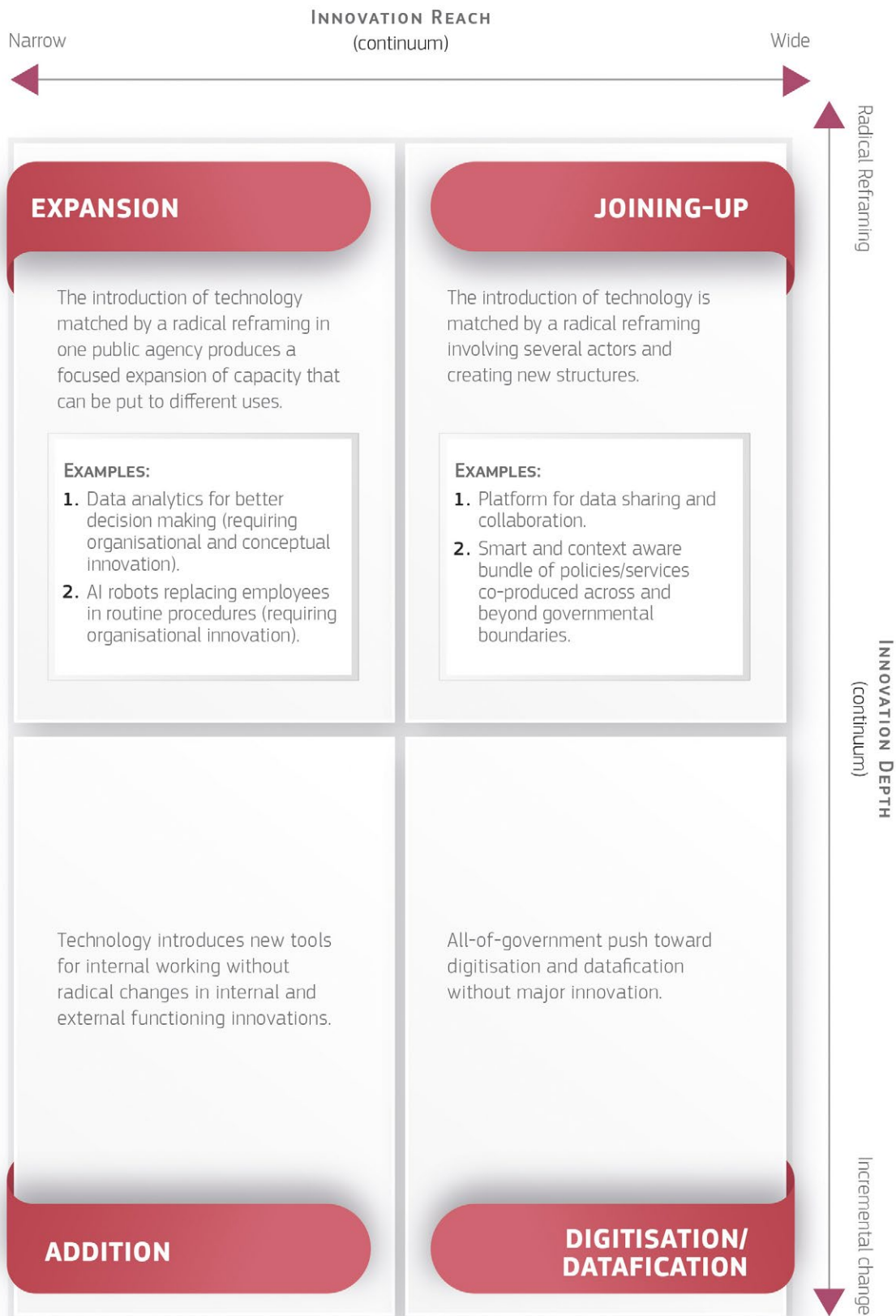
As a complementary element to the conceptual framework, with the aim of suggesting practical tools to understand and form the basis for the assessment of Digital Government Transformation, we have elaborated a set of instruments that may serve as a starting point for the evaluation of the effects and impacts of digital government initiatives within the realm of public sector innovation. While the suggested toolkit is presented in detail in the JRC Technical Report produced as part of the second phase of the research (Misuraca, Ed., Codagnone et al., 2020), we discuss here a conceptual map to better understand digital government innovations. This map does not attempt to rank and label different forms of digital innovation as being more or less transformative and impactful. The definition of Digital Government Transformation provided in the introduction to this report, and reproduced below, must in fact be regarded as ‘dynamic’, that is something that can be approached but probably never fully achieved.

**Digital Government Transformation (DGT)** is the introduction of radical changes, alongside more incremental ones, in government operations, internal and external processes, and structures, to achieve greater openness and collaboration within and beyond governmental boundaries, enabled by the introduction of a combination of existing ICTs and/or new data-driven technologies and applications, as well as by a radical reframing of both organisational and cognitive practices; it may encompass different forms of public sector innovation across different phases of the service provision and policy cycle to achieve key context-specific public values and related objectives such as, among others, increasing efficiency, effectiveness, accountability and transparency, to deliver citizen-centric services and design policies that increase inclusion and trust in government.

This definition serves as a benchmark to strive for, achievable to varying degrees and from multiple angles via different forms of digital innovation. Furthermore, the map is a conceptual, *ex-ante* instrument that can be put to use and tested empirically. Possible forms of digital innovation are organised conceptually in such a way that hypotheses about their transformative potential and impacts may be generated and then explored empirically.

To reconceptualise the phenomenon of DGT within the scope of public sector innovation, we thus build on the discussion presented in the previous sections. There, we have defined four types of public sector innovation: organisational innovation, service/policy innovation, governance innovation, and conceptual innovation. In doing so, we attempted to align our typology to some extent with that of Janowski (2015). The typology, illustrated graphically in **Figure 8**, combines two dimensions that should be considered a continuum rather than a binary combination, in order to accommodate the nuances that will surely emerge when the typology is applied to empirical cases. We call these two dimensions ‘Innovation Depth’ and ‘Innovation Reach’.





**FIGURE 8.** Typology of digital government innovation

Source: Own elaboration

**Innovation Reach**, in practice, incorporates within itself what could be several distinct dimensions that cannot be accommodated within a simple and intuitive 2x2 matrix. Reach can be understood in at least three distinct ways, with regard to the domains affected by digital initiatives. First, it can be seen as the potential number of citizens affected; in this sense, it represents 'reach' also in terms of potential. Second, it can be seen as referring to how many different players from different domains are involved (e.g. different government verticals, civil society, industry, academia), both inside and outside government – not as recipients of the services or policy produced by the innovation, but rather as stakeholders possibly collaborating and involved in various ways in the realisation of the innovation. Third, reach can be interpreted functionally with regard to the various phases of the service provision and policy making cycle (design, implementation, evaluation, etc.). In our map, we use Innovation Reach primarily to refer to instances where a combination of new technological capabilities is introduced on a large scale and affects stakeholders from different domains. We reasonably assume that this definition coincides to some extent with a notion of reach that encompasses the pool of citizens and businesses potentially affected. Such a wide reach inevitably involves an open governance approach, and probably repeated iterations of the service provision and policy making cycle.

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DIGITAL GOVERNMENT  
TRANSFORMATION CAN BE  
MAPPED ACCORDING TO  
A TYPOLOGY BASED ON TWO  
DIMENSIONS: INNOVATION  
'REACH' AND 'DEPTH'

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**Innovation Depth** is the extent to which a digital government initiative is implemented alongside one or more types of public sector innovation (e.g. organisational, service/policy, governance and conceptual innovations). In other words, it represents the extent to which the implementation of a digital government initiative entails a reframing of internal and external functioning, or simply an addition to 'business as usual'. Reframing entails changes to both tangible (structures and processes) and intangible aspects (the institutionalised conceptual and cognitive repertoire for governmental action). We define 'radical reframing' as the combination of all four types of innovation. 'Incremental change' refers to a situation in which no substantial innovation accompanies the introduction of new technologies. We consider conceptual innovation as being possibly the most crucial and strategic type of innovation. In defining the dimension of Innovation Depth in this way, we combine elements from public sector innovation literature with the work of Janowski (2015) in a syncretic manner. In a sense, the dimension of reframing also includes the internal organisation of governments and the ways in which they interact with external actors. These include citizens and interest groups, as well as other governmental stakeholders. Reframing also captures Janowski's distinction between those changes to internal functioning that also affect external relationships, and those that do not. When reframing occurs, we can observe what we define also as 'transformation', 'expansion', 'contextualisation', and 'enablement', in decreasing order of the depth of reframing. When reframing does not occur, we see simple 'addition', as defined by Janowski (2015). This involves the introduction of new elements to internal working without radically affecting or changing practices and structures. As depicted in the figure above, when simple addition is applied to cross domains, we can observe mirrored 'copycat' digitisation, possibly as a result of pressure to conform with a hyped trend, or – for instance – to perform better in an international benchmarking exercise (institutional isomorphism).

The illustrative boxes below present three cases that we can preliminarily map on the basis of the proposed typology. The Vilnius case (**Box 1**) links several domains and entails a reframing with regard to the use of data, the attempt to introduce behavioural changes, as well as in the way

collaboration and data sharing are harnessed beyond the borders of the public actor involved. At the opposite end, the Trelleborg case (**Box 2**) appears limited to service provision. As such, the reframing involved is limited to the internal functioning of a single government agency. The Slovenian initiative (**Box 3**) lies somewhere in between: to some extent it is sectoral, but it also entails a clear reframing in the adoption of data-driven decision making.

**BOX 1.** Improving transportation services in Vilnius (Lithuania)

In recent years, municipal agency Susisiekimo paslaugos (Transportation services) has undertaken multiple initiatives using data analytics to improve the provision of public transport in the city of Vilnius. Examples include an open data platform that allows the public to see all data relating to the use of public transport, heavy traffic conditions, sensor-enabled counting of passengers on municipal buses, and a partnership with private company Trafi, which combines data on public transport with that from other modes of transport (including bikes, car-sharing and taxis), and uses real-time traffic and geo-spatial data to provide passengers with travel recommendations. Civic engagement has followed from this initiative to share municipal data: a group of coders called Code for Vilnius are using open data and IoT technologies to create open-sourced projects that improve the quality of public transport.

This is a truly integrated initiative covering service, policy and governance issues, and using big data and behavioural analysis in a new way. It targets several forms of interaction: Government-to-Citizens (G2C), Government-to-Business (G2B) and Business-to-Government (B2G).

The transformative elements of the initiative include data-driven decision making, the opening and sharing of data to enable co-creation, and personalised service recommendations. The following new technologies are deployed: open data, big data analytics, geo-spatial data, IoT, and machine learning algorithms.

The expected outputs and outcomes are: co-creation, improved public transport planning, behavioural change towards the increased use of public transport, reduced traffic congestion, and improved air quality. These initiatives can improve the efficiency (lower costs of data collection for decision making) and effectiveness of policy design (geo-spatial and big data analysis allows better prediction of traffic patterns and issues), while at the same time increasing the transparency of the municipality's choices. Their implementation can reduce the burden on the municipality through crowdsourcing (efficiency), as well as improving personalised recommendations through data sharing (effectiveness), and fostering civic engagement (legitimacy). The use of big data can make evaluation quicker, less expensive and more accurate, as well as fostering accountability and transparency.

**BOX 2.** Automated social support and welfare services in Trelleborg (Sweden)

Trelleborg municipality employs Robotic Process Automation (RPA) into the administration and management of welfare support services, such as home care applications, sickness, unemployment benefits, tax and duties. Thanks to RPA, some administrative tasks such as the calculation of home care fees are now executed by a case handler program. In the future, Artificial Intelligence (AI) will allow the case handler program to learn how to perform more complex tasks, widening the scope of process automation within the Swedish public sector. The success of the Trelleborg programme has led the National innovation agency, Vinnova, and the Swedish Association of Local Authorities and Regions, to create a partnership with Trelleborg municipality with the goal of implementing automation in other Swedish municipalities.

This is a more vertical and delimited innovation, mostly concerning the back office of service provision and targeting Government-to-Citizens (G2C) and Government-to-Government (G2G) interactions.

Its transformative element is limited to process automation, and it is realised by deploying AI systems, and more specifically RPA.

The expected outputs and outcomes of the initiative are: faster processes and potential savings in labour costs, an increase in the amount of time employees spend on core services and direct contact with citizens, and the increased effectiveness (fewer errors) of the services provided, resulting in reduced welfare-related costs. The initiative has no relevance for policy design, but affects implementation through the timely handling of applications and faster procedures by freeing up financial and human resources (efficiency), by allowing employees to focus on core services and specifically on direct relationships, enabling services to become more personalised and effective (effectiveness), and by ensuring the impartial and legally secure handling of applications (legitimacy).

**BOX 3.** Using big data to improve the efficiency of public administration (Slovenia)

The use of big data analytics to improve the efficiency of human resources management is a pilot project aimed at exploring potential efficiency gains in public administration. It is part of the Slovenian national strategy for the promotion of data-driven decision making in public administration. The project began in 2017 within the Ministry of Public Administration, in collaboration with an external private partner. Anonymised internal data relating to employees, together with data on finance and procurement and some external data (weather and geographical location) were used to pinpoint employees' behaviour patterns and average performance; to conduct predictive analytics on the use of facilities; and to perform text analytics in order to identify purchasing behaviours across the ministry.

While limited to Government-to-Government (G2G) interactions, the Slovenian case is an 'all-of-government' initiative focusing on policy making and the overall innovation of public administration, with a strong governance innovation dimension, at least within government.

Its transformative element is data-driven decision making in public administration, realised via the deployment of big data analytics (predictive analytics, text analytics, etc.)

The expected outputs and outcomes of the initiative are: lower public procurement costs, the increased efficiency of public administration, and the creation of a favourable environment for economic development. The initiative improves policy design by: (a) lowering the cost of data collection for decision-making purposes (efficiency); (b) enabling the identification of organisational patterns and the identifying of critical aspects, allowing public administration to formulate measures to improve its functioning (effectiveness); and (c) increasing the transparency of public administration through the adoption of data-driven decision making (legitimacy). Since being implemented, the initiative has reduced the cost of public procurement and highlighted promising potential productivity gains in many other areas of the organisation (efficiency). Big data analytics has provided a solid and effective basis for the process of prediction, planning policies and decision making at all managerial levels in public administration (effectiveness). It can also reduce the cost and increase the accuracy of evaluations, increasing accountability.

In concluding this section, it is worth stressing that the typology presented above is a theory-informed, conceptual typology that will need to be corroborated by empirical evidence. It makes the assumption, derived from the literature and also from common wisdom, that the real potential of the various technologies and the innovations they enable springs from their combination and aggregation. One would expect, therefore, that moving towards the top-right quadrant would



deliver greater effects than, for instance, different forms of expansionary innovation, and certainly compared to mere addition or digitisation/datafication. Based on this typology, we have generated specific testable hypotheses and, according to the objectives of the research, we have further elaborated on the potential effects – in terms of outcomes and impacts – that could be produced by Digital Government Transformation. In the best traditions of socio-economic research, we are, however, ready to be surprised by the evidence. Perhaps we may discover that a well-defined and delimited initiative focusing solely on service provision can deliver more tangible, better measurable, and higher effects. Questions such as whether an intervention to which this framework is applied entails a radical reframing or constitutes a simple addition, and whether it can be described as a transformative or an enabling digital innovation, remain to be ascertained empirically through field work. For this purpose, as we will see in Chapter 5, four empirical case studies with experimental components have been designed and conducted to test and validate specific dimensions of the conceptual framework developed.

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DIGIGOV-F IS FLEXIBLE  
ENOUGH TO BE ADAPTED  
FOR THE ASSESSMENT  
OF THE EFFECTS OF AN  
AMPLE SET OF DIGITAL  
GOVERNMENT INITIATIVES

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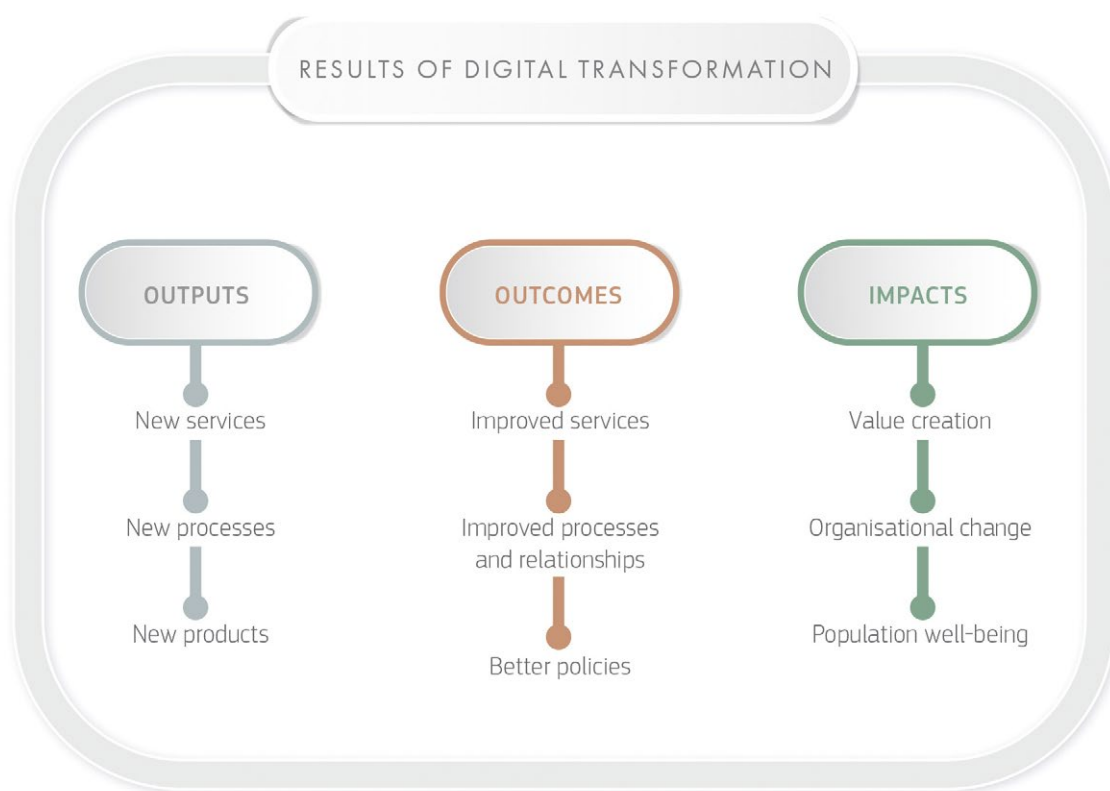
One of the objectives of the proposed framework, and of this research as a whole, is in fact to pave the way for the assessment of the effects of digital government innovation and of Digital Government Transformation (where a set of innovations qualify as transformation). In this regard, we have identified some high-level and very preliminary sketch of possible effects. These remain generic and flexible enough to be applied, after opportune operationalisation, to most digital government initiatives.

The potential effects are discussed separately from the overall framework, both to reduce complexity and to ensure that no determinism can be read into our approach. Effects are not linked to specific technologies or factors but are simply presented using the well-known distinction made in logical frameworks between outputs, outcomes and impacts. The question of what causes what in a domain in which everything is linked to everything else is beyond the scope of our framework, and points instead to the application of complexity approaches. Aside from complexity, several other methodological challenges surround the issues of evaluation and measurement. However, a thorough discussion of these challenges, as well as a proper presentation of all the effects considered, can be found in the JRC Technical Report (Misuraca, Ed., Codagnone et al. 2020) mentioned previously. Here, we provide only a summary graphic representation of the effects discussed.

As anticipated, using the findings from the literature review conducted by Misuraca, Ed., Barcevičius et al., 2019, we distinguished between outputs, outcomes and impacts, following the definitions used by Mergel et al. (2019). Here, we define ‘output’ to mean a quantitative result, following the definition of Boyne (2002): ‘*Outputs include the quantity of a service and its quality (as indicated for example by speed of delivery, and accessibility of provision, both in terms of geography and opening hours).*’ The outputs of digital transformation therefore include concrete and measurable services, products, processes or skills. Next, we define ‘outcome’ (Bretschneider et al., 2004) as the effect that results from a new service, or from a change in processes or the quality of the organisation’s relationships with others (such as increased simplicity, accessibility, quality, advantages, efficiency, speed, inclusion, responsiveness, competitiveness, security or transparency). Following the distinctions made in Misuraca, Ed., Barcevičius et al., 2019, we also include within ‘outcomes’

the results of innovations that contribute to the development of (better) policies and the digital environment. When defining outcomes, we distinguish between the three dimensions that were identified in the first version of the conceptual framework: productivity and efficiency; effectiveness, inclusion and sustainability; and legitimacy and trust. Finally, we also refer to long-term ‘impacts’. These include changes across the whole organisation or public administration, as well as the ways in which transformation leads to the creation of public value, or strengthens democratic principles (e.g. supporting citizen inclusion, regulation, legal and political frameworks) (Alford and O’Flynn, 2009). In brief, the impacts refer to the ways in which digital transformation brings about a whole range of societal and environmental benefits that are experienced by different stakeholders and may not be as immediately visible as some of the outcomes we can describe (e.g. the reduction of operational costs, personalised services), but which are nevertheless important long-term effects in the areas of social inclusion and civic participation (European Commission, 2018a).

Finally, in describing the outputs, outcomes and impacts generated by digital transformation, we have considered the stakeholders affected by such results. In line with the OECD report, ‘The impact of digital government on citizen well-being’ (OECD, 2019), we stress that digital transformation has the potential to impact every aspect of our lives. While this provides opportunities to improve lives, there is also a risk that it may disrupt things in ways that negatively impact people’s well-being. Many of these potential negative effects or side effects are discussed in the previously cited JRC Science for Policy Report (Misuraca, Ed., Barcevičius et al., 2019).



**FIGURE 9.** The results of digital transformation

Source: Own elaboration



# 5

## CASE STUDIES







In this chapter we briefly present the main highlights of the four case studies conducted as part of the research. These contain an experimental or quasi-experimental dimension, so as to illustrate the possible impacts of Digital Government Transformation. The complete presentation of the four case studies can be found in the JRC Technical Report (Misuraca, Ed., Codagnone et al., 2020). Each of the case studies covers a different context (city management, education, privacy, policing), and their results have implications for most phases of the policy cycle. In analysing the cases and the findings of their experimental or quasi-experimental components, we pursued the twofold objective of validating and refining the conceptual framework, while at the same time exploring the real-life drivers and barriers in each case, as well as the outcomes actually produced, or which could potentially be achieved in the future, according to the proposed DigiGov-F 2.0, namely: a) productivity and efficiency; b) effectiveness, inclusion and sustainability; and c) legitimacy and trust.

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WE CONDUCTED FOUR  
CASE STUDIES TO ILLUSTRATE  
THE POSSIBLE IMPACTS  
OF DIGITAL GOVERNMENT  
TRANSFORMATION  
IN DIFFERENT CONTEXTS  
AND POLICY DOMAINS

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The four cases are to be considered as explorations that zoom in closely on the ‘nuts and bolts’ of the practice of Digital Government Transformation – although one can hardly generalise from these four cases alone. Nonetheless, taken individually and in a cross-case comparison, the four cases provide important insights and lend themselves to the formulation of hypotheses for new research, or appear to confirm theories and hypotheses presented in the literature analysing previous waves of e-Government activities.

## 05.1 TVARKAU VILNIŲ:

### A CITIZENS’ ENGAGEMENT PLATFORM IN LITHUANIA

This case study explores the use of mobile applications to report non-emergency issues to local government. The Tvarkau Vilnių platform was originally launched in 2012 by Vilnius municipality in order to streamline the process of gathering information from the public regarding issues in the city. Such applications have been lauded for bringing various democratic advantages. Some scholars argue that they make government more accountable by giving citizens a tool to pressure the authorities into addressing public issues (Meijer et al., 2009; Rumbul, 2016). Local councils provide public responses to the reports, enhancing transparency and trust in decision-making and resource-allocation processes (Baykurt, 2011; Chun et al., 2010; Nam, 2012). On the other hand, some scholars have also criticised such applications. Most notably, Baykurt (2011) argues that they encourage passive and individualistic rather than collective citizen action, in which the government plays the role of a service provider and the citizen acts as a client.



The results of the case study, presented in depth in the JRC Technical Report (Misuraca, Ed., Codagnone et al., 2020) are only briefly summarised below, with particular regard to the conceptual framework and its main components. In the JRC Technical Report, we discussed in greater depth the effects of the introduction of this innovation in terms of outcomes of efficiency, effectiveness and inclusion, and legitimacy. Here, we undertake a discussion of these main outcomes, together with other relevant issues such as the need for digital investments, the shift from e-Government to digital government, and the need to protect privacy and personal data.

Our evidence shows in fact that simply using the Tvarkau Vilnių platform does not directly enhance a person's trust in municipal government, although there is some evidence linking the way people perceive the accessibility and effectiveness of municipal institutions with their perceptions of the municipality's response to reports submitted using the online system. In other words, as corroborated by open responses to our surveys, it is important whether users consider the municipality's response to be standard/vague or specific/to-the-point, and whether or not the issue was fixed. This is in line with some of the literature on accountability and co-production, and is pertinent both to the development of ICT-based public services and to broader discussion of the use of digital government to address systemic issues. In essence, our study shows that citizens are willing to play their part in joined-up service delivery; however, a systemic effect in terms of, for example, higher trust and legitimacy, is only likely to be achieved if participants can monitor implementation and feel that their contribution makes a difference. This finding resounds perfectly with many socio-economic and socio-technical scientific works that have analysed previous waves of e-Government investments: namely, that technology by and of itself does not produce the expected outcomes.

*It is not sufficient to provide a smart application to increase engagement and/or trust, unless users can monitor and be informed about what happens following their contribution. Unless we expect all citizens to become experts in big data analytics, a lot of important work still requires direct human interaction.*

Another angle from which the example of Tvarkau Vilnių can be used to discuss the relationship of trust between government and its constituency, is the question of reporting issues anonymously vs. revealing personal details. The use of the platform increased significantly after anonymous reporting was introduced in 2017. Most respondents (62%) in our research group opted to submit their reports anonymously, and one-third of respondents said they would not use the app if they were required to log in. We found that those who lack trust in the municipality would be less likely to submit reports if they had to provide their name. This reveals several things. First, as demonstrated by numerous articles, the level of trust within Lithuanian society is low (this trend is common in most CEE countries). In this context, platforms such as Tvarkau Vilnių are all the more important if they can increase trust by helping to fix issues, as discussed above. However, such trust may easily be breached due to, for example, legal complications concerning anonymity, as was the case in Vilnius. Personal data management is an increasingly sensitive issue and may undermine even the most

well-meaning ICT-based solutions, if it is not handled properly. If privacy is compromised, an ICT-based platform may become a factor undermining legitimacy, rather than contributing to enhancing it.

*The issues of trust and privacy, already prominent in earlier stages of government digitalisation, are becoming even more salient given both the great potential and major risks presented by the use of data-driven technologies such as AI, IoT and big data analytics, among others.*

The analysis of the Tvarkau Vilnių case study also aimed to contribute to the discussion as to whether such platforms provide sufficient opportunity for meaningful civic engagement – or, on the other hand, whether they foster a more individualistic, client-provider relationship between citizens and public institutions. According to our evidence, when asked to make a choice between deliberative engagement on the one hand and the straight provision of inputs on the other, people choose a point somewhere in-between. In other words, they are not necessarily eager to engage in discussion with others, but they support functionalities that would allow them to help the municipality select the most urgent issues (e.g. through voting), or would allow them to engage in more direct contact with public officials (e.g. the ability to respond to the municipality’s response). This does not necessarily cancel out the argument in favour of community engagement; however, based on the findings of this and other studies, meaningful engagement requires significant effort, while people naturally differ in their propensity to offer the necessary commitment. In addition, the effect of engagement depends greatly on the process and facilitation mechanisms. It can be argued that platforms such as Tvarkau Vilnių offer a favourable setting for testing engagement, but this depends less on the technology itself (relevant functionalities can be added relatively quickly), but more on the administrative capacity and priorities of the organisation running the platform.

*While an active portion of citizens will benefit from new technological possibilities, civic disengagement and lower political participation cannot be reversed simply by deploying new and more potent technological means.*

We also considered the Tvarkau Vilnių app from the perspective of efficiency, which is often the starting point for the consideration of most ICT-based solutions. Our study shows clear efficiency gains (e.g. in the form of reduced administrative burden) from the perspective of city residents, as it enables them to report an issue relatively quickly, pin-pointing the exact location. From the perspective of the municipality, the evidence is mixed. In the past, receiving complaints and requests from city residents was certainly more complex and cumbersome. Nonetheless, Tvarkau Vilnių has not become a ‘one-stop shop’ for reporting issues. It has been developed as a useful and convenient way for citizens to provide their inputs, but the municipal administration now has to deal with more input channels than it did previously. In addition, the quality of reports tends to be low, especially since anonymous reporting was introduced, and includes numerous instances of duplicates as well as spam.

*ICT investments yield productivity effects with a time lag, and only when combined with complementary organisational and cultural changes. Furthermore, in the short to medium term, the duplication of efforts and the stratification of delivery channels may increase rather than decrease efforts and costs on the part of the public administrations.*

In view of these issues, various solutions are being considered. These include the introduction of machine learning and AI-enabled systems to help the municipality to prioritise issues, assign responsibilities and react more quickly. In line with the conceptual framework of this study, this means the Tvarkau Vilnių platform is moving from the realm of e-Government to Digital Government. The study also provided some pertinent evidence concerning the practicalities of such a shift. First, the key driver can in fact be the administrative complexities, inefficiencies and lessons learned from previous e-Government solutions. Second, the upfront investment required may be significant and difficult to obtain – not least because it is not easy to provide a convincing, evidence-based case for the cost-effectiveness of such a solution. Finally, the familiar argument of AI-based solutions leading to job redundancies and thus being unfeasible politically was also brought up in some interviews. However, previous rounds of automation by the municipality have not led to workers being laid off, with employees instead being assigned to other tasks.

*The shift from e-Government to Digital Government entails a number of practical issues pertaining to the implementation process, and to the corresponding antecedents of innovation. Greater emphasis should be placed on efforts and investments, and for a feedback loop to be built into the process to take into account the dynamic and iterative nature of Digital Government Transformation.*

The results of this case study lead to a number of policy recommendations that could enhance the use of ICT-based solutions to address systemic issues.

First, the impact of ICT-based solutions is less about the sophistication of the technology itself and more about proving to users that it will help to ‘get things done’. It is therefore important to ensure users can easily monitor the progress of their inputs. People should be informed when their report has been solved – this would potentially both enhance trust and reduce the number of duplicate reports. If users’ contributions are not acted upon in full, the reasons for this must be explained in clear and plain language. The public or (non-governmental) sector could also aim for better civic engagement and joined-up responsibility rather than a client-provider relationship. While an ICT solution to achieve this could be designed relatively quickly, the key challenge is to ensure the process is well-facilitated, open to various inputs, and conducive to finding common ground in the face of conflicting interests.

Second, trust-building starts with the protection of privacy and personal data at the level of the ICT-based solution. Anonymous communication is always an option at the beginning. Nevertheless, it is important that at some point users are encouraged to identify themselves and

provide inputs using their real identity. This adds to the quality of submissions and is more likely to lead to a responsible dialogue. The personal data that results from this switch to non-anonymous communication must be treated (a) transparently (i.e. every user must know what data is being collected and how it may be used); and (b) with caution (i.e. data must only be used to the extent that is necessary in order to achieve meaningful engagement). As shown by the case study, instances will occur in which different streams of legislation, such as personal data protection law and administrative law, will come into conflict. In such a case, legislative action is necessary to update the regulatory framework and ensure that public trust is not breached.

Finally, it may be difficult (especially at the beginning) to make the case for the cost-effectiveness of an ICT-based solution – particularly if it operates alongside other, more traditional channels of public service provision. As demonstrated by the findings of the analysis of the case study, the original, experimental initiative may come from the voluntary sector. This shows that public officials should be open to such cooperation and engage in partnerships through hackathons, e-Government labs and other formats. At some point, however, the public sector must become fully involved and make the ICT-based solution an integral part of its operations. Further and more substantial investment in digital government initiatives may be difficult to justify, given that innovative solutions are always subject to risk and uncertainty, and may be developed through trial and error. Nevertheless, the Tvarkau Vilnių case revealed that the *status quo* may become untenable – due in part to the success of the ICT-based solution, as an increasing number of submissions may lead to backlogs. This creates pressure for further innovation, such as the introduction of AI-based solutions. In order to justify this, however, a more fundamental revision of internal procedures is necessary. This may include streamlining the organisation’s public service channels, with savings being used to fund the introduction of the innovation and set the road to a true transformation of government operations and public service delivery.

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THE TVARKAU VILNIŪ CASE REVEALED THAT TO SUCCESSFULLY ADOPT ICT-ENABLED INNOVATION, A MORE FUNDAMENTAL REVISION OF INTERNAL PROCEDURES IS NECESSARY

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## 05.2 BODY-WORN CAMERAS: STRIVING FOR BETTER POLICING IN THE UK

This case study examined the direct and indirect implications of (potential) digital transformation in policing in the UK through the use of Body-Worn Cameras (BWCs), as well as the drivers and barriers to its implementation. We have drawn lessons from a series of experiments carried out in the UK to test the effectiveness of digital transformation in policing using BWCs. We have also considered developments in few other EU Member States that have recently piloted or implemented BWCs.

As noted in Chapter 3, the three main effects of Digital Government Transformation in terms of outcomes are defined in the DigiGov-F conceptual framework as: productivity and efficiency; effectiveness, inclusion and sustainability; and legitimacy and trust. Here, we offer some remarks in relation to these outcomes.

The effects on productivity and efficiency of the introduction of BWCs in the UK are not straightforward. It is perhaps best to think of BWCs in the UK context not as an automating technology (which is usually understood as driving productivity gains by reducing costs/increasing outputs), but as an augmenting one. BWCs currently ‘automate’ one thing very well – namely, recording visual data for use in evidence processing, comparable to the previous task of incidents being written up by a human scribe. However, it cannot currently automate the full process in and of itself: there are aspects of this process (e.g. the interpretation of context and reasoning) which must currently be carried out by a human. Therefore, many of the processes involving a camera – such as the generation of evidence – still require a human process (such as supplying a statement) to operate alongside. As highlighted in the analysis of the case study findings, in the context of BWCs *‘machines are replacing police manual labour with more powerful sensory capacities than human beings. The machines never tire and have infinitely greater memory, search, data-processing, data-linking and analytical capacities. In other instances, to paraphrase Arendt, machines are guiding the hands of the police, transforming the nature of police work such that human beings and machines work together seamlessly.’* (Bowling and Iyer, 2019).

*From a different angle, this case – like the previous one – demonstrates that not every task can be automated. Hence, strictly defined productivity and efficiency gains are not as linear and straightforward as one might expect.*

There is, however, some evidence relating to the potential of BWCs to speed up specific processes. This includes taking witness statements, reducing the overheads relating to complaints, and reducing court time thanks to an increase in early guilty pleas. However, these relationships are not clear-cut or well-evidenced at present (particularly in relation to other criminal justice stakeholders), and some interviewees tended to focus on more effective policing outcomes as the key driver, in comparison to cost-benefit analyses (and, indeed, cost remains an often-cited barrier to the wider use of BWCs). Similarly, because these effects are felt at system level (including the wider criminal justice system) rather than at organisational level (e.g. individual police forces), understanding overall productivity gains is complex. Therefore, it could be reasonable to assume that BWCs will lead to efficiency gains with regard to some specific processes. However, the nature of policing as an iterative public service means that such efficiency gains may not necessarily translate into the other outcomes often associated with digital technology, such as the ability to reduce human work hours, costs and throughput. In the future, more advanced functions – such as the integration and use of facial recognition – may bring further efficiency gains but at the same time raise additional concerns in terms of the trade-off between privacy and security.

*It is important to stress that sectoral gains may not be visible but may contribute to system-level impacts rather than at organisational level.*



Stronger evidence exists in relation to the potential impact of BWCs on the effectiveness of policing. While it is difficult for experimental research to explore specific outcomes relating to crime and justice, there is evidence that BWCs are able to produce better-quality evidence than before, although norms surrounding the use of such evidence may not be fully developed at this stage. The use of BWCs in training may also improve service delivery by developing officers' skills. Future capabilities such as the linking of data and live streaming may also enable more effective policing in this regard, by enabling analytics in relation to BWCs footage.

*Effectiveness gains appear more prominent, but there is still a lack of knowledge and capacity to measure them the use of better-quality evidence produced by BWCs.*

Compared with the first two outcomes (productivity and efficiency; effectiveness, inclusion and sustainability), a stronger, clearer link exists between the use of BWCs and legitimacy goals. One of the main mooted benefits of BWCs is their ability to act as a check on the behaviour of police officers ('guarding the guardians') and therefore, in theory, encourage better application of the law by ensuring that officers follow and are accountable to legal protocols. This is unsurprising, as such a hypothesis is at the heart of any surveillance – although questions remain regarding the extent to which this kind of surveillance is legitimate in the context of policing, and this may not be consistent across EU countries. For example, an observational study of the implementation of BWCs in a US police department found that use of BWCs strengthened what they termed the 'people-processing' aspects of policing practice, by encouraging greater adherence to processes and policies, and making processes (such as the complaints procedure) more efficient. However, BWCs had less impact during the study period on what was termed the 'people-changing' aspects, such as new forms of training, supervision or behaviour, as the BWCs did not alter the overarching structures (such as performance measurement processes) to incentivise this.

THE ANALYSIS OF THE USE OF BODY-WORN CAMERAS FOR POLICING CONFIRMED THAT KEY ETHICAL QUESTIONS REMAIN ABOUT THE USE OF FACIAL RECOGNITION TECHNOLOGIES

Conversely, BWCs may also strengthen accountability in the opposite direction, by changing citizen behaviour and, as hoped by some interviewees, enabling greater understanding on the part of the public about the reality of police work. However, key ethical questions remain about the future use of technologies such as facial recognition. The way in which these are used and introduced to the public may be a key factor in the future impact of BWCs on police legitimacy and trust in the use of such technologies. As noted by researchers placing BWCs in the context of future, deeper automation: *'The integration of video cameras into police uniforms provides an indication of how police robots will function and offers an opportunity to think about public awareness and perceptions of automated policing and the mechanisms that are required to regulate it'* (Bowling and Iyer, 2019).

*BWCs appear to contribute to increasing legitimacy through better policing behaviour and better accountability; however, the prospect of further automation will need to be well conceived if it is to avoid creating new concerns and distrust.*

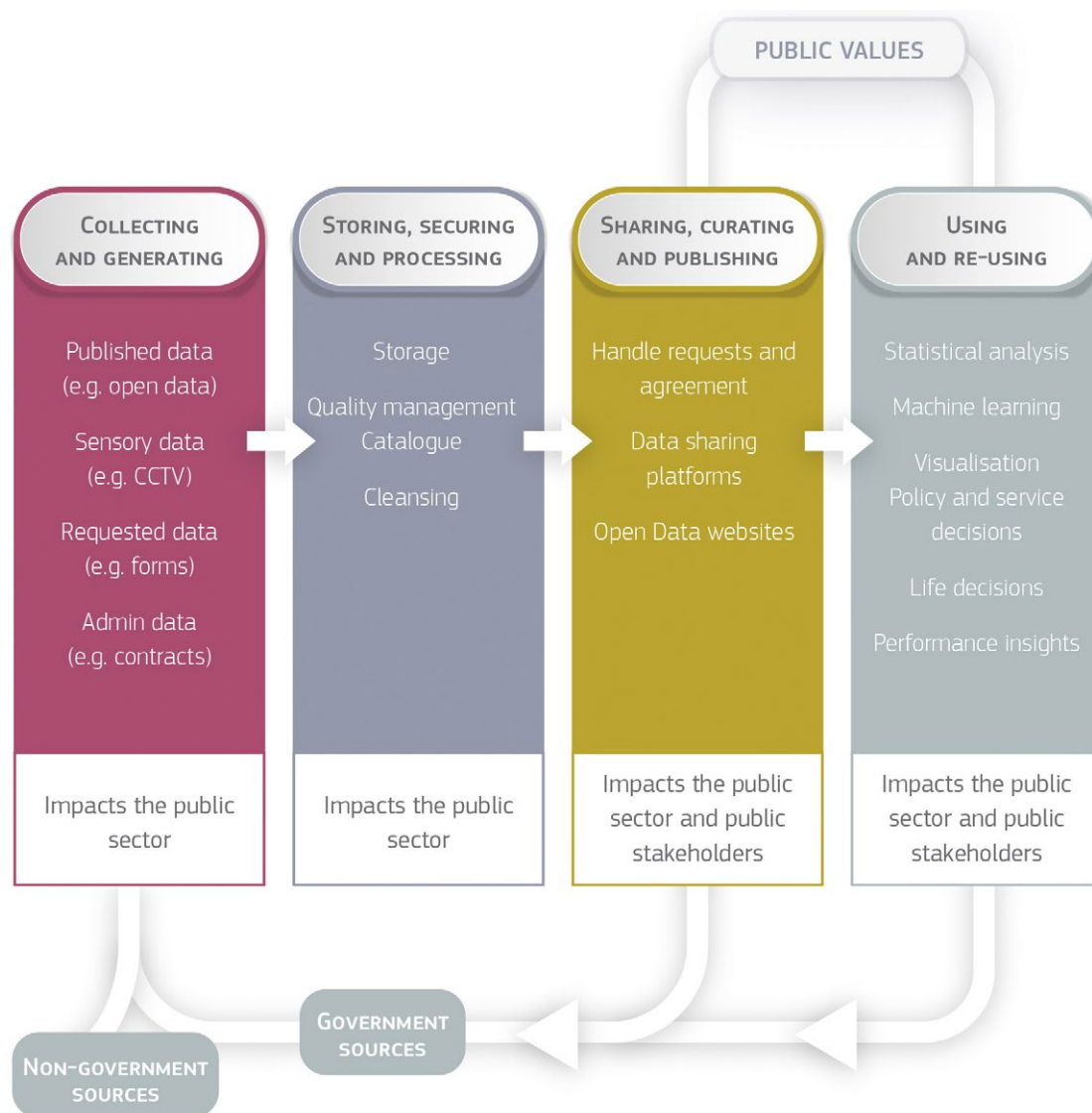
### 05.3 PRIVACY AND TRUST IN NEW DIGITAL PUBLIC SERVICES: AN ONLINE EXPERIMENT IN GERMANY AND SPAIN

This case study examines the relationship between privacy and trust in relation to the introduction of new digital public services. We addressed this key aspect of Digital Government Transformation through an analysis of the demand side. In contrast to the other three case studies, this investigation was conducted as an online experiment in two countries (Germany and Spain), focusing on the introduction of new technologies to improve public services in four different policy domains (transport, health, security and voting). We collected primary data from 1,400 respondents, applying stated preference techniques to the challenge of trying to understand the trade-offs that people may face when confronted with choices about their privacy. To this end, we aimed to link the objectives and results of the case study to some of the key aspects that are addressed by our conceptual framework. Our analysis of this case study specifically addressed the potential privacy issues experienced by citizens when new technologies relying on the extensive use of personal data are introduced in order to improve public services. In doing so, we have placed particular attention on understanding the perceptions of users with regard the potential negative effects or side-effects that digital innovations may produce.

In line with the conceptual framework, we explored one of the four essential prerequisites for Digital Government Transformation: legitimacy and public trust concerning the ethical use of data by public sector organisations, as well as privacy, transparency and the risks of which governments and citizens need to be aware. More specifically, our experiments aimed to: (a) understand what role trust in the public sector plays in the adoption of such services; (b) identify under what conditions citizens are willing to adopt new digital public services; and (c) explore the trade-offs citizens make between privacy and the benefits that stem from the use of new digital public services in various domains.

*Beyond efficiency and effectiveness, the search for legitimacy and trust represents an important dimension for governments to consider when introducing service innovations. On the one hand, this can represent a significant barrier to digital transformation; on the other, it constitutes one of the potential positive effects that new technologies can produce.*

The four hypothetical scenarios presented to the participants in the experiment all fell under the definition of what we termed, in our conceptualisation, ‘service innovation’ (see § 3.3). This refers to the creation of new public services or products (De Vries, Bekkers and Tummers, 2016), or a significant improvement to an existing service (Windrum, 2008). At the core of the digital innovations considered in this experiment lies what the OECD defines a Data-Driven Public Sector (DDPS) (van Ooijen, Welby and Ubaldi, 2019). **Figure 10** identifies the data value chain in a non-linear, recursive manner, with a feedback loop within the necessary steps, and involving the creation of public value. After the first two steps is a loop that goes between sharing and using/re-using data which, once launched, can retroactively positively feed and reinforce the first two steps. For the digital transformation promise of a DDPS to be realised, intensive work is required to make use of available data. However, other prerequisites are also extremely important – and the lack of these may significantly hinder the promised transformation and its related, positive outcomes.



**FIGURE 10.** The data-driven public sector value cycle  
Source: Adapted from van Ooijen, Welby and Ubaldi, 2019, p. 11

The results of the experiment show that trust plays a key role in the introduction of new digital services that rely on the use of personal data. The most direct effect is on the type of organisations that process the data. Overall, respondents were strongly opposed to private companies processing their data. This becomes relevant given that, as presented in the conceptual framework, the liter-

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THE RESULTS OF THE ONLINE EXPERIMENT ON PRIVACY SHOW THAT TRUST PLAYS A KEY ROLE IN THE INTRODUCTION OF NEW DIGITAL SERVICES THAT RELY ON THE USE OF PERSONAL DATA

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ature on AI-enabled public services shows that the private sector plays a leading role in the development and delivery of public services, which often involves the processing of data (for more on this, see Misuraca and van Noordt, 2020). An extremely low level of trust in private companies may become problematic once citizens realise their involvement in delivering digital public services promoted by the government. The basis for these

concerns is clearly shown in the example of the Danish Ministry of Tax, which admitted in 2014 to having no control of over more than 200 systems that used machine learning algorithms for policy making that directly affected citizens. However, our evidence shows that those respondents who were generally more distrustful and concerned about privacy also tended to prefer having their data processed by independent organisations rather than public authorities or government. This trend was particularly significant in relation to two sensitive domains: health and voting. This evidence shows that governments cannot consider themselves immune from citizens' concerns over privacy. It may be that governments and public authorities are sometimes perceived by the public as being not entirely reliable in managing their data, thus raising pressing questions over accountability.

*ICT-enabled transformation of public services should carefully take into account the perceptions of citizens and, where necessary, raise awareness and build trust not just through regulation, but also via direct consultations and awareness/education campaigns.*

The results of the experiment also show that participants were unwilling to make trade-offs when it comes to personal data and privacy. When given the choice, irrespective of the type of benefits offered, the respondents preferred to provide anonymised data, and not to have their data processed by private companies. Moreover, the general view that citizens are more willing to adopt new digital services when they receive more direct and personalised benefits was not borne out by our results. In terms of the benefits that stem from new digital services, in the domain of health an equal number of participants demonstrated preferences for personalised treatments (direct benefit) and advances in health research (an indirect, societal benefit). Somewhat surprisingly, in the domain of transport, participants showed a preference for a societal benefit, the reduction of emissions, compared with the individual benefit of reduced travelling time.

*The assumption that users are willing to trade off privacy and personal data in return for receiving services should be reconsidered. This may be the case for services such as social media, to which users have become accustomed and are therefore unwilling to give up, but is not necessarily true for other types of service.*

When it comes to privacy and the processing of personal data, what appears to be relevant is not the type of benefit provided by the improved services, but the level of trust citizens have in the type of organisation that accesses their data. In the current context of declining trust in both government and democracy, governments need to do much more to increase their legitimacy and accountability in processing personal data to improve public services. This aspect seems to be more important to many respondents than the impact that any new services may have on citizens' wellbeing.

*Transparently engaging stakeholders and citizens in the debate on privacy and data protection is crucial to achieving good outcomes in terms of legitimacy and trust.*

The results of the case study also provide some interesting insights into the adoption of public sector innovations that involve new technologies. First, there are two signals from the results that reveal a potential new form of digital divide. Similar challenges have previously been documented in the literature, such as the potential exacerbation of existing disparities in the accessibility of health care (Jung and Padman, 2015) due to the digital divide (Goldzweig et al., 2013). However, our results suggest something other than a digital divide in terms of access and skills (Andreasson [Ed.] 2015). We observe that those who reported the highest level of distrust at the same time exhibit the lowest level of adoption (measured by the 'opt-out' preference in the experiment). This group contained older people, who may not be comfortable with these new digital services, as already observed by another survey (European Commission, 2017). However, the group also includes those with a lower level of education and with lower socio-economic status, confirming that trust is lower among disadvantaged groups. Interestingly, we noticed that the two domains in which hypothetical adoption is lower (i.e. there are more opt-outs) are security and voting. This means, as reported by the literature, that people are generally wary about the privacy threats involved in using digital technologies such as facial recognition or e-voting.

*Greater consideration should be given to the issues of adoption, and of a potentially new form of digital divide and exclusion of disadvantaged groups in society.*

These last results on the adoption of new ICT-enabled services confirmed what has been previously discussed: that governments and other organisations must address legitimacy and trust in order to deliver beneficial outcomes. On its own, the promise of potential efficiency gains stemming from the introduction of new digital services is probably not enough where these new services rely heavily on the use of personal data. Citizens – in particular, those who are disadvantaged – are more likely to provide their data in exchange for improved public services if they perceive the institution to which they give the data to be trustworthy.

*Legitimacy and trust are simultaneously an important process-level prerequisite, and an end outcome of Digital Government Transformation. Clear and transparent communication concerning the nature of new data-centric technologies used by government, public agencies and officials is the starting point for building trustworthy relationships with citizens.*



## 05.4 KIDS GO GREEN: PROMOTING SUSTAINABLE MOBILITY THROUGH GAMIFICATION IN ITALY

This case study examined the impacts of Kids Go Green (KGG), a project designed and implemented by Fondazione Bruno Kessler (2019) (hereinafter FBK) in the schools of the city of Trento, the autonomous province of Trento, and the city of Ferrara. The project uses a tech-based educational game that involves the school, the children and their families in an educational adventure around the world, and promotes more sustainable mobility. The case study employed a mixed approach, which combined theory-based evaluation (using realistic evaluation and the theory of generative mechanisms) with process-tracing. It also used target-mechanism-outcome (TMO) theoretical architectures, whose robustness was evaluated through both interviews and surveys. The case study therefore analysed not only what works, but also for whom, how, and in what circumstances.

The results of this case study can be mapped against some of the outcomes of our conceptual framework. The results of the KGG case study indicate that the project: (a) fosters inclusion, improving learning process and creating a community network (inclusion); (b) modifies the teaching approach, offering new and innovative methods (teaching approach); and (c) improves the digital skills of both children and teachers. These results are particularly important in relation to two of the main value drivers of the conceptual framework, namely: effectiveness, inclusion and sustainability, and legitimacy and trust.

*The use of gamification to incentivise children's journey from home to school has fundamentally altered their learning experience*

The case study explored an unusual policy sector, seldom considered in traditional e-Government research, which demonstrated potentially promising results with respect to the manner in which KGG provides a new outlook on administrative processes and governance.

The use of gamification to incentivise children's journey from home to school, and its link to the teaching programme and learning experience, has fundamentally altered the way in which this journey is thought about. Once their carers drop them off in the morning, children fall within the legal responsibility of the institution (the school). From that moment, the school is in charge both of children's safety and their education and personal development. While KGG has not extended the scope of schools' responsibility, by turning the journey to school into the focus of teaching activities it has broadened the time and space within which the institution interacts with its community. While KGG is in operation, the planning of educational activities, integration into ministerial programmes, and the involvement of families and the community, all depend *de facto* on the school managing (without additional legal burden) the way its users reach its gates.

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THE KIDS GO GREEN CASE STUDY HIGHLIGHTED THE POTENTIAL OF GAMIFICATION TO IMPROVE THE INCLUSION OF MORE DISADVANTAGED GROUPS OF CITIZENS AND PROMOTE SUSTAINABLE BEHAVIOURS

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From the point of view of governance transformation, the results showed that KGG generates new dynamics among the interested actors, by deepening the involvement of families in school-promoted activities, and increasing the cooperation of teaching staff with each other and with the management.

*The use of the educational game has changed the relationship between the educational institution and the actors involved with it, for the benefit of the users of its main service – the children.*

Looking at the outcomes that gamification has triggered (and which it is expected to further promote), the results point to the need for deeper investigation of KGG's success in bolstering inclusion and sustainability. The case study highlighted in fact the project's potential to improve the inclusion of more disadvantaged groups of citizens and users. On the one hand, all families are engaged equally by the programme, instead of participation being limited to the most proactive parents. On the other hand, the secondary output of the programme (i.e. the content and methods of teaching) has proved, according to teachers, more effective than traditional methods in relation to less able clusters of pupils.

*The gamification approach underpinning 'Kids Go Green' has brought about an adjustment in mobility habits towards a more sustainable lifestyle, as well as stimulating debate about environmental issues.*

In conclusion, despite the impossibility of statistically testing the hypotheses (due to the limited number of respondents in the trials conducted during the period of the research), the case study showed some positive effects. This provides new evidence on the way in which digital innovations, if properly implemented and adapted to context, can be a useful instrument for improving the overall school experience and creating benefits for all the actors involved, and in turn lay the foundations for creating digital ecosystems and nurturing the process of Digital Government Transformation at different levels of governance.







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# 6

# CONCLUSIONS







In this final chapter, we first present the main empirical findings from the study (§ 6.1). We then consider the broader debate on digital transformation (§ 6.2) and combine these two sources to present the foresight scenarios for Digital Government Transformation at the horizon 2040 developed as part of the prospective analysis of the research (§ 6.3). We conclude by outlining recommendations for policy and future applied research (§ 6.4).

### 06.1 MAIN FINDINGS

By combining the results emerging from the two empirical streams of the study, namely the review of the state of play and the analysis of case studies, we have identified the following main findings, which have also been reflected upon in the discussion that served to refine and validate the DigiGov-F conceptual framework.

#### **The limits of automation and the corroboration of our conceptual framework**

There are limits to automation using AI, and achieving results still requires human interaction. As it has now been well known for decades, productivity gains from technological innovation occur with a time lag, and only when combined with changes in organisation and culture. For example, although they emerge from different domains, the cases of Tvardkau Vilnių (Lithuania) and of Body-Worn Cameras (BWCs) in the UK both converged on the observation that outcomes are at times difficult to isolate at sectoral level, and should be considered at systemic level. This empirical finding corroborates the importance that we place in our conceptual framework on the need to 'reframe' organisational practices and cognitive routines. The movement from e-Government to Digital Government Transformation is a steady process that entails a number of practical issues pertaining to the implementation process and to the innovation antecedents.

#### **Digital Government Transformation is a dynamic, non-linear process**

The cases show that in the short to mid-term, duplication of efforts and stratification of delivery channels may increase rather than decrease the efforts and the costs of public administrations. When services are up and running, new needs emerge, requiring new investments and a new iteration is therefore necessary to improve the service. This finding translated into the emphasis placed in DigiGov-F on efforts and investments and on feed-back loops. This also suggests that future policy research should tackle complexities and emergent solutions in the domain of Digital Government Transformation and public sector innovation.



## The strategic importance and two-fold nature of legitimacy and trust

Despite the potentially positive effects stemming from the use of technologies to deliver public services and to improve government operations, some important challenges related to trust and legitimacy need to be addressed. The analysis of results from the case studies shows in fact that legitimacy and trust are, at the same time, an important process-level prerequisite as much as an end outcome of the digital transformation of governance systems and policy making mechanisms.

## 'Repetita juvant': users' needs and persisting risks of digital divide

However much this may not sound new in 2020, the cases unequivocally show, albeit from different angles, that users' needs and adoption still remain an issue not fully addressed by digital innovation initiatives, and should be given more consideration, particularly in relation to new AI applications. These new technologies may generate new forms of digital divide, as evidenced in the online experiments conducted in Germany and Spain on privacy perception linked to new digital public services. The issue of AI adoption and acceptance by users, and that of potentially new form of digital divide, should be given greater salience and attention in both applied research and policy initiatives. This finding underlines once more the importance, implicit in our conceptual framework, of reframing the governance processes and cognitive routines of public administrations to better focus on citizen-centric services.

## Realism about engagement, open governance and co-production

The findings from the Tvarkau Vilnių case suggest that the claims heralded by the supporters of open governance, co-production and civic engagement should be approached with more caution. While there is an active part of citizenship that will no doubt benefit from new technological opportunities, civic disengagement and lower political participation is a secular trend in advanced democracies that cannot be reversed simply by deploying new and more potent technological means.

## The importance of generating public value

Both the analysis of the literature and the results from the case studies confirm the importance of outcomes beyond productivity and efficiency gains. Specifically, they point to the importance of effectiveness, legitimacy and trust, as well as inclusion and sustainability. For instance, effectiveness gains appear prominently in the BWC case, but they contribute to the important outcome of increasing legitimacy and trust through better police behaviour and better accountability. The Kids Go Green case in Italy shows that the project fosters inclusion by improving learning processes and creating a community network. It also offers innovative teaching methods which improve the digital skills of both children and teachers, as well as modifying the relationship with parents and, in turn, increasing awareness of the impact of sustainable mobility, nudging a positive change of behaviour.

## 06.2 TAKING ON BOARD THE WIDER POLICY DEBATE ON DIGITAL TRANSFORMATION

In the past five years, the debate on digital transformation has engaged scholars and policy makers both in Europe and worldwide, and has to some extent caused an unprecedented transatlantic rift. Digital transformation assumed a high relevance in the global governance agenda, and became object of geopolitical tensions. In addition, in the aftermath of the Covid-19 pandemic and lockdown, narratives exaggerating either the benefits or the dangers of digitalisation and remotisation have emerged. This is unsurprising, given that cutting across all the new technologies and digital infrastructures, there is a critical dimension underlying digital transformation: cybersecurity.

In this section we provide a selective account of this debate, including a few considerations on the effects of the Covid-19 crisis, as these emerged when the empirical components of our study had already been completed. We discuss these issues in general and not with specific regard to Digital Government Transformation, with the purpose of setting the stage for the prospective analysis and contextualisation of the scenarios that we will present in the next section.

The wider policy debate on digital transformation focuses around the opportunities and challenges provided by new technologies such as 5G, IoT, cloud computing, broadly defined Artificial Intelligence (AI), as well as on the growing oligopolistic power of the biggest online platforms that control the majority of personal and non-personal data. While all these dimensions are of great relevance, we focus below on online platforms and AI, as these two topics have attracted most attention in the recent policy discourse.

Non-EU online platforms have scaled to dominance and have monopolistic access to users' data (Faravallon et al., 2016; Lee et al., 2017) and to the 'behavioural surplus' that can be extracted from it (Zuboff, 2019). As a result, for instance, 80% of all new online advertising revenues is concentrated in the hands of Google and Facebook alone (Devaux et al., 2019). Recently, online platforms have been the object of competition scrutiny both in Europe and the USA. In 2019, Elizabeth Warren, at the time a Democratic contender for America's presidency, proposed that online marketplaces that generate annual global revenues of more than \$25bn should be declared 'platform utilities' (*The Economist*, 2019). In July this year a new anti-trust grilling in the US was launched against the tech giants (*The Economist*, 2020).

New policy tools would need to consider companies' data assets when assessing merger requests, with the price being seen as a signal of an incumbent buying an emerging threat. They must also identify colluding algorithms, and give more control over data to those supplying them. The most radical solution would be to impose on dominant online platforms a common carriage/public utility regulatory regime. Public utility regimes for social media have been however criticised on the basis that they would stifle the innovations that large online platforms produce (Thierer, 2012).

The European Commission expects AI to significantly improve the lives of EU citizens and bring major benefits to society and the economy through better health care, more efficient public administration, safer transport, a more competitive industry, and sustainable farming (European

Commission, 2018b). The potential for AI to overcome the limitations of humans when dealing with computationally intensive tasks, and to augment intellectual and perhaps even creative capabilities, opens up new application domains, with impacts on productivity and performance. At the same, it raises issues of accountability, fairness and bias (Craglia, M., Ed. Annoni et al., 2018).

In general, AI presents several economic (e.g. need for funds, impact on employment and performance) and organisational (e.g. changing working practices, cultural barriers, need for new skills, data integration, etc.) challenges (Dwivedi et al., 2019). At a societal level, AI may challenge cultural norms and face resistance. In Europe there is an ongoing discussion about the legal and ethical challenges posed by the greater use of AI. One key point is the transparency, or lack thereof, of the algorithms on which AI applications rely. There is a need to study and understand where algorithms may go wrong, in order to adopt adequate and proportional remedial and mitigation measures. On the other hand, as technology advances more instruments may become available to quantify the degree of influence that input variables exert over algorithm outputs (Buiten, 2019). Research is also underway to render algorithms more amenable to *ex-post* and *ex-ante* inspection. The European Commission has been particularly active in relation to AI, beginning with the AI White Paper (European Commission, 2020a) and its 'Data Strategy' Communications (European Commission, 2020b). The main vision characterising the Commission's initiative is the creation of 'human-centric AI', while at the same time supporting the EU's technological and industrial capacity and AI uptake across the economy, as well as preparing for socio-economic changes (a three-pronged approach).

The White Paper describes a strategy aimed at creating both an 'ecosystem of excellence' and an 'ecosystem of trust', making AI systems 'ethical by design'. In line with this, the European data strategy aims to establish a path for the creation of European data spaces whereby more data becomes available for use in the economy and society, but under the firm control

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THE COMMISSION  
IS PROMOTING THE  
DEVELOPMENT OF A 'HUMAN-  
CENTRIC AI' INSPIRED BY  
EUROPEAN DEMOCRATIC  
VALUES AND RESPECT FOR  
FUNDAMENTAL RIGHTS

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of European companies and individuals. The current Commission, under the presidency of Ursula von der Leyen, is largely promoting this approach, placing digital transformation as a policy priority for the future of Europe. In this, the Commission has three key objectives: a) technology that works for people; b) a fair and competitive economy; and c) an open, democratic and sustainable society. In other words, a digital

transformation inspired by European democratic values and respect for fundamental rights, and which contributes to a sustainable, climate-neutral and resource-efficient economy.

Meanwhile, the lockdown imposed as a response to the Covid-19 pandemic emergency forced the closure of schools, businesses, public administrations and made 'smart' working, distance teaching and learning, digital public services, and remote meetings and collaboration a necessity. In the media, many pundits have heralded the end of the analogue world and the speeding up of the full digitalisation of life, welcoming this as a positive side-effect of the pandemic. Indeed, there are empirical signs of an acceleration of digital technology adoption and particularly of AI. A very recent survey by the European Commission (2020c) shows that 42% of enterprises in Europe have adopted at least one AI application, which is a big jump from previous measurements. Yet, a very balanced assessment of the effect of Covid-19 produced

by the JRC (Craglia et al 2020) presents as its key finding the fact that Covid-19 has acted as a booster, and as an amplifier of potential opportunities and concerns. It has boosted AI adoption and data sharing by creating new opportunities, but it has also increased the relevance of major threats and risks such as those concerning democracy (privacy, personal data protection, risk of fake news manipulation), fairness and inclusion (impacts on vulnerable groups such as elderly, children, and other digitally excluded groups), and for the vulnerability of Europe, including in the domain of cybersecurity, given the dependency on non-European platforms that have quasi-monopolistic control over data.

Finally, there are two broader considerations that cut across the debate on digital transformation, one regarding digital sovereignty, the other concerning on the two poles between a precautionary and a cost-benefit approach to regulation. The unbalanced situation with respect to the control of data has led European policy circles to reflect on digital strategic autonomy and sovereignty (EPSC, 2019; Timmers, 2018; Timmers, 2019a, 2019b).

An example is a high-level report by an advisor to former Commissioner Ansip, which focuses on digital media sovereignty (Klossa, 2019). This aspect also inspires the European data strategy, as noted in a recent parliamentary brief (European Parliament, 2020), expressing the concern that, while Europe is at the forefront in terms of research and on a par with its global competitors, it nonetheless lags behind the US and China when it comes to private investment. To address these concerns the data strategy proposes the construction of an EU data framework that would favour and support the sharing of data for innovators, particularly in the Business-to-Business (B2B) or Government-to-Citizens (G2C) domains.

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THE COVID-19 CRISIS HAS ACTED AS A BOOSTER FOR AI ADOPTION AND DATA SHARING, AND AS AN AMPLIFIER OF POTENTIAL OPPORTUNITIES AND CONCERNS

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From a foresight perspective, one wonders to what extent this is a tactical trend or a strategic one that will stay. A second aspect concerns, in fact, how to find a just mix between managing risks/concerns and boosting innovation. In this debate, one key discourse is that any attempt to regulate the current digital transformation would stifle innovation. The opposing view is that in the face of uncertainty, a strong regulatory approach could be applied, based on the precautionary principle (Cohen, 2019). Although reasonable *a priori*, the precautionary approach is usually contested on the ground that, if regulation is defended on the principle of the worst scenario, then a lack of regulation can be defended by the same argument when the consequences of strict regulations are potentially very negative. Precautionary regulation runs the risk of becoming the source for a 'law of fear' approach (Sunstein, 2005). Opponents of the precautionary approach consider it inferior to the approach of a cost-benefit analysis of policy issues on a case-by-case basis. In the domain of AI, the precautionary principle claims that dangers should not be downplayed, but this exposes the risk of building a negative public discourse that may undermine innovation. As was recalled in the closing session of the final DigiGov workshop, the famous saying by Niccolò Machiavelli may well apply to the dilemma European policy makers are confronted with today: *'...there is nothing more difficult to take in hand, more perilous to conduct, or more uncertain in its success, than to take the lead in the introduction of a new order of things. Because the innovator has for enemies all those who have done well under the old conditions, and lukewarm defenders in those who may do well under the new.'*

## 06.3 SHAPING DIGITAL GOVERNMENT TRANSFORMATION AT THE HORIZON 2040

In light of both our findings and the broader debate on digital transformation, we have elaborated – as part of the prospective component of our research – future scenarios for Digital Government Transformation 2040. These scenarios were first presented to the final DigiGov workshop held on 9 July 2020 and further refined after discussion with experts and stakeholders’ representatives. This allowed the integration of additional insights that emerged from the co-design session organised at the structured online Policy Lab. At the same time it served to validate the underlying assumptions and generate ideas to enrich the storyboards and approximate them to possible realities through retro-planning and embracing the opinions of multiple actors and different stakeholders with conflicting views.

The resulting scenarios are very different from what was presented for thought-provoking discussion at the Foresight Workshop in July. As such, they can be considered not only the outcome of the creative elaboration of the authors of this report, but also as a collective effort crowdsourced by the DigiGov Community.

The four scenarios for Digital Government Transformation 2040 are depicted in **Figure 11**. The scenarios are defined by the following two dimensions: a) the **Digital Transformation landscape**, ranging from ‘regulated’ to ‘unregulated’; and b) **Digital Citizenry**, ranging

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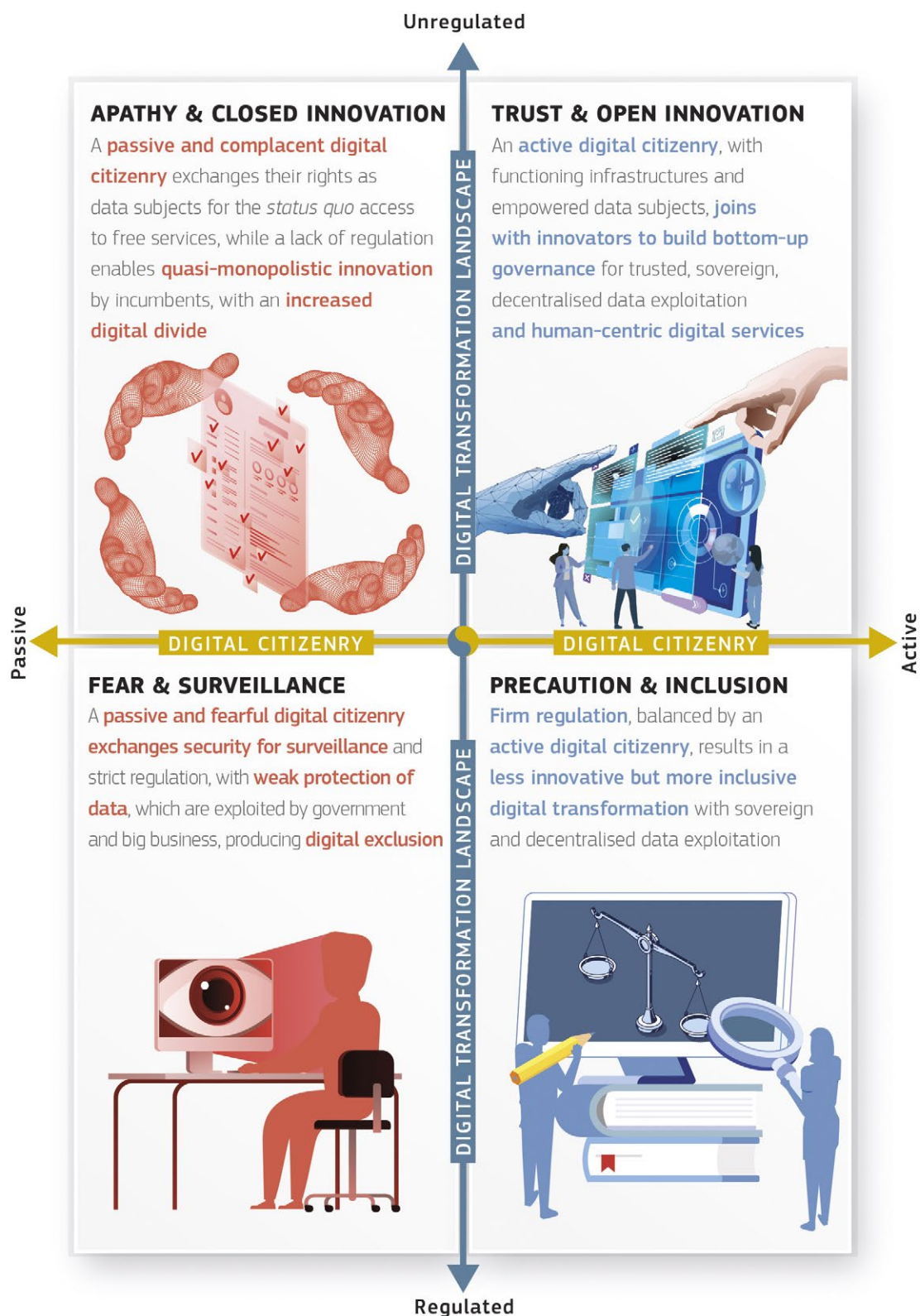
DIGITAL GOVERNMENT TRANSFORMATION IN 2040 WILL DEPEND ON THE WAY THE DIGITAL TRANSFORMATION LANDSCAPE AND DIGITAL CITIZENRY EVOLVE

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from ‘active’ to ‘passive’. With respect to the first dimension, the role of digital government is considered in the description of the storyboard of each scenario. However, the regulatory dimension of the digital transformation landscape we refer to should not be intended only related to legal norms. Rather it should be seen from the perspective of ‘steering’ the digital transformation, exploiting the potential

of genuine multi-sectoral partnerships to unleash innovation and govern effectively the future data-driven digital society. Following the established foresight practice, the opposite axis to the one pertaining to the government framework scenarios relates to society. We have thus used as horizontal axis ‘Digital citizenry’. This is intended to measure the extent to which individuals are actively in charge of their digital lives especially in relation to their rights as data subjects or whether they passively use free services and/or new Covid-19 related applications and others that will follow after them, without giving any deep consideration to the issues of privacy and undesirable surveillance. In the same tradition of prospective study, it is recognised convention to make scenarios extreme in order to capture collectively most of the possible features that will characterise the actual future, including those aspects that policy makers may wish to avoid. Thus, the scenarios are a means to the end of identifying the implications of particular policies. Decisions taken today will have an effect on the way society will look in the years to come, impacting the daily lives of future generations.





**FIGURE 11.** Scenarios for Digital Government Transformation 2040

Source: Own elaboration

***Fear & Surveillance.*** While this scenario may bring to mind the Chinese governance model, it cannot be ruled out for our democratic societies. The imposition and acceptance of very severe restrictions on freedom and rights (including free movement within Europe) during the Covid-19 pandemic casts doubts as to the strength of our democratic ‘anti-bodies’ against the virus of fear and surveillance. The precautionary approach to the Covid-19 emergency crisis and the associated fear and desire for security have made some democracies drift towards a control regime in which citizens exchange their rights in return for security and health and may accept widespread surveillance, with exploitation of their data by governments and big businesses. This means full government intervention and control over digital transformation, but without regulation or laws protecting personal data. European values with respect to AI and privacy are overlooked, while digital inequalities are sharpened by a lack of attention to specific groups of citizens, particularly the most disadvantaged and digitally excluded.

***Precaution & Inclusion.*** This scenario resembles the traditional European social model with a more precautionary bent, where managing risks and ensuring inclusion may however limit the potential for innovation. It also puts Europe’s digital sovereignty at the forefront. The interventionist approach to regulating digital transformation imposes a ‘public utility regime’ on key infrastructures and dominant online platforms. For online platforms, the approach includes new rules and decisions on digital competition policy (e. g. monitoring of anti-competitive mergers, taking into account price and data assets; a new definition of market power; the auditing of collusive algorithms, etc.). In addition to direct regulatory action, the transformed digital government, as both a user and provider of digital services and infrastructure, sets an example and establishes good practices in the exploitation of data. The GDPR is implemented in full, and new measures and policy actions actually carry Europe beyond it, establishing a fully decentralised data governance model with full sovereignty entrusted to individual data subjects. Individuals, first as a result of GDPR and subsequently as a reaction to excessive government control during the Covid-19 pandemic, have become fully active digital citizens, aware of their rights as data subjects and fully empowered to act in their own interest but also conscious of the need to create public value for the common good, and to avoid social fragmentation and discrimination.

***Apathy & Closed Innovation.*** An ‘unregulated’ digital transformation means that online platforms and tech giants remain untouched and can increase their advantages in terms of access to data and the continuous learning and improvements of their algorithms. Without direct intervention in support of 5G networks, the deployment of such mobile infrastructure may be delayed due to a lack of financial resources and/or may be made available only in densely populated urban areas, generating a polarisation of access (thus widening the digital divide). In relation to data protection, the implementation of the GDPR is patchy and differs between countries, with data therefore remaining to a large extent uncontrolled by individual subjects, and large players continuing to extract behavioural surplus without effective oversight or sanctions. During the Covid-19 pandemic, because of the short-term urgency, several exceptions of the GDPR were tolerated and became entrenched. The digital citizenry, thus, are passive and little concerned with their rights as data subjects. Imbalances in the European data economy (exporting raw data, importing refined results) are unlikely to be addressed. Prescriptions about the ownership of data and the purposes for which it is used remain only on

paper, with no tangible implementation or results. This commercial model might be attractive in the US culture and context, following arguments that it is the best possible way to sustain innovation and avoid protectionism. But the European value system will not ‘buy into’ such a model and it is indeed expected that citizens and interest groups will mobilise to regain their digital freedom and data ownership.

**Trust & Open Innovation.** Although there is no strong regulation and the market is left unchained, in this scenario we imagine a bottom-up process emerging from the digital ecosystem of innovators and empowered users. Full individual sovereignty over data is achieved from the bottom up as a result of soft regulatory support to the ongoing mobilisation for digital independence - resting, for instance, on blockchain-based systems and solutions, which are widely accepted and deployed by all market players. Civil Society, digital activists and visionaries manage to mobilise society and contribute to the emergence of an active digital citizenry. This scenario is the quintessential innovator’s dream, a sort of ‘back to the future’ return to the utopian ‘Silicon Valley’ origins of the Internet. Although it may seem unrealistic that such bottom-up data decentralisation could emerge from a situation in which digital infrastructures are not regulated, we envision a digitally transformed government acting as the player having the steering role in enabling a new and authentic, distributed and networked digital governance. Promoting a functioning open innovation, as access to data is no longer monopolised by incumbent platforms and few oligopolistic market players, this scenario may in turn contribute to the policy efforts of the EU to establish an International Alliance for a Human-Centric Artificial Intelligence, and to promote worldwide the European approach for building an open, democratic and sustainable digital society.

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REGULATORY INNOVATION  
REQUIRES THE DEFINITION  
OF A MIX OF NEW  
MECHANISMS AND CAPACITIES,  
BUT ALSO THE MAKING  
OF POLITICAL CHOICES

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As it is well known to futurists, ‘A Scenario is a possible world... a world that does not have to be, but may yet come to pass...’. This means that, as anticipated, none of the scenarios outlined above can be expected to occur exactly as described; rather, a mixture of elements from each scenario will shape the future society in which we will live. But these will depend on the policy decisions taken today, and will reflect the current cultural and governance value systems.

Therefore, neither ‘leave it to the market’ nor ‘make it a public utility’ can adequately represent the full gamut of values, economic interests and state priorities of the EU and its Member States. Digital infrastructures, if totally unregulated, will not automatically ensure distributed innovation and equitable economic opportunity and growth. In the same way, interventionist regulation would not necessarily produce the desired outcomes and might also delay innovation if not well calibrated and implemented in a specific way to promote investments and social impact.

In view of the fact that both interventionism and *laissez-faire* approaches may appear inadequate which to some extent mirrors the juxtaposition between the precautionary view and a cost-benefit approach – it is more realistic to expect that government players acting at the same time as users as well as infrastructure and service providers and regulatory innovators, can solve the dilemma between innovation and regulation, in collaboration with the makers (innovators) themselves. This would allow the building of the governance framework needed to spur innovation and build trust in Digital Europe in 2040.

Through firm, coordinated action between the EU and the Member States, Europe can virtuously connect *makers* (innovators) and *shapers* (regulators) to create an innovation-enhancing governance and regulatory framework that respects European values and rights while creating economic opportunities for all users (individuals, companies or civil administrations). Regulatory innovation requires not only the definition of a mix of new mechanisms and capacities, but also the making of political choices. This may, for instance, mean taking a precautionary approach when uncertainties concerning crucial and value-relevant issues require it, by adopting a more stringent approach to regulation. Alternatively, it may mean managing risks by assessing the costs and benefits of regulation and, when the costs outweigh the benefits, employing a softer approach or substituting it with co-regulation, steering self-regulation, and collaborating with innovators in the process of standardisation. Especially with respect to AI, a ‘sandbox’ regulation approach is advisable. As a metaphor we could refer to the different phases (1, 2 and 3) of trials for medical drugs: potential issues are identified, analysed through research and consultation to build consensus and trust and, only if needed and adequate, turn into regulation or other policy interventions.

## 06.4 POLICY AND RESEARCH RECOMMENDATIONS

In view of the results of the empirical and conceptual components of the research, but bearing in mind the lessons learned from the excursion into the future of Digital Government Transformation at the horizon 2040, and the current high-level policy debate on the implications of the digital transformation in the current pandemic society, we have identified a concrete set of actionable policy and research recommendations.

The recommendations indicate directions to be pursued today in order to accumulate evidence to support policy and regulatory approaches that can maximise the positive features of the scenarios outlined above, and minimise the negative ones. These can help in anticipating unexpected risks and managing challenges, trade-offs and emerging dilemmas linked to governance innovation in the digital age.

### Examining the dynamics of government platformisation versus distributed network effects

The literature in the field of Digital Government Transformation has not yet thoroughly examined the ‘platformisation’ of government services. Platforms tend to foster more efficient coordination, but as a result of network effects they are also bound to reduce pluralism *‘as more users beget more users, a dynamic which in turn triggers a self-reinforcing cycle of growth’* (Arditi and Miller, 2019). Platforms favour seamless integration, and at the same time may reduce the variety of streams of information and communication. The much-criticised silos into which governmental bureaucracies are segmented may also be considered part of a system of checks and balances. It is therefore important to better understand the dynamics of platformisation in government, in order to reap its benefits while also avoiding monopolistic or oligopolistic outcomes.

### **Embracing e-Government 4.0 and experimenting with new 'modes of regulation'**

Like Industry 4.0, Government 4.0 may transform both the way in which jobs are performed and how such activities are coordinated. In doing so, they may also alter the very social fabric of our societies. They may affect what the French School of Regulation calls the 'Mode of Regulation' (MR). This is a combination of institutional, normative, cultural and regulatory components that ensure the functioning of both the economy and society. Complex modern systems incorporate forces that keep these components together, despite the evolution of industrial structures, social relations, and techniques of production, as well as patterns of consumption. By its nature, any transformation will alter the equilibrium of these components, which may have profound implications on individual and collective rights, e.g. in relation to social relations, and in terms of income accumulation and distribution. Current research should give more attention to the implications of Digital Government Transformation on social structures and other components of the mode of regulation.

### **Developing ethical frameworks to minimise risks and negative implications of new technologies**

Over-reliance on new technologies – or combinations of digital technologies and applications, such as AI or the Internet of Things, among others, may adversely affect the fairness, neutrality and accountability of the public sector, and lead to a perceived or real loss of control (Tinholt, Carrara and van der Linden, 2017). Cases are known in which advanced algorithms used by police departments have accidentally reinforced racial discrimination and unfairness (Pencheva, 2018). The European Commission is taking action to address such risks and in 2019 established an High Level Expert Group on AI Ethics, which published the 'Guidelines for Trustworthy AI' and earlier this year the 'Policy and Investment Recommendations for Trustworthy AI'. Both documents aim to ensure a human-centric approach to this new set of technologies and big data analytics approaches, in order to minimise the potential risks, as well as respecting fundamental rights, democratic principles and values (European Commission, 2018b). Taking this into account, governments should ensure that every person has the right to choose human contact and decline to be looked after by a robot, for example. Policy makers should thus consider introducing regulations to ensure that AI systems are designed with an ethical framework in mind, as this is a main concern for the European Commission as set out in the new Digital Strategy and related AI White Paper.

### **Opening access to data through a legal framework that protects privacy and promotes interoperability and sharing**

Many scholars agree that the current legal framework should be developed to cover the ever-expanding variety of data sources and data services at governments' disposal. European policy makers have already inspired regulation across the world concerning the use of personal data, following the introduction of the GDPR. Nevertheless, a clear and consistent framework for the exchange, sharing and purchasing of data is yet to be

developed. A need exists for a regulatory framework that maximises data openness and accessibility. Various open data initiatives have responded to this imperative, but these should be extended to the private domain, with a view to creating public-private data sharing. In fact, while new data-driven technologies require access to enormous volumes of data, this has to be balanced with clear rules to prevent abuse and protect personal data. Conditions of access should be designed to ensure that the marginal costs of data sharing are covered, while preserving incentives to invest in data collection. This debate should be addressed at the European level, especially given the fact that public authorities often impose data localisation requirements on companies. To this end, it is required ensuring interoperability among various data sources, as well as data sharing and effective cooperation between public and private data providers.

### **Building human capacity to ensure a successful Digital Government Transformation**

Civil servants play a key role in fostering the diffusion of new technologies within government. Digital Government Transformation requires new digital skills, which opens up new job opportunities. Many authors and observers have noted that one of the main challenges currently facing the adoption of AI, as well as exploiting the potential of big data, is the lack of workers within public administration with relevant skills. Governments should thus create new roles relating to the competences required by new technologies, and design career paths to attract highly skilled professionals. Technical knowledge and capacity should also be developed internally through training schemes. Significant advantages come with building talent from the inside, due to an in depth understanding of the public sector's mission as well as its mode of operation.

### **Taking advantage of predictive analytics to improve policy making and service delivery**

Predictive analytics offer a range of options for data-driven policy making. According to the literature reviewed, analytics has already been used by governments in areas as diverse as public safety, health, education, housing, transportation, defence and others. Predictive analytics may contribute to the more efficient usage of public resources, helping organisations to deliver services more quickly and to undertake a preventive approach. Nevertheless, various authors signal a variety of ethical and empirical issues, ranging from personal data protection to biases in historical data. Fundamentally, in many instances there is a lack of quality data to generate meaningful predictions. From the policy making perspective, in order to take advantage of predictive analytics, the public sector should invest in the internal capacity and skills necessary to work with data and use predictions in an informed way and ensure transparency as to the way in which predictive algorithms are created and used.



## Being selective about impacts and realistic about trajectories: moving from linearity to complexity

A significant share of the literature on e-Government comprises prescriptive analyses that are overly optimistic, normative and express high expectations with regard to the potential impacts of transformation. This trend has been apparent ever since the initial wave of literature on e-Government emerged. The impacts of digital transformation should therefore be identified realistically and in ways that favour empirical measurement. While we are aware that benchmarks and scorecards remain an essential part of policy monitoring and evaluation, such measures often assume a linear progress, which does not reflect the reality of digital transformation in government. In fact, the process of transformation unfolds in twists and turns, through changing hypes and discourses, via different projects and applications, and is subject to both incremental change and radical innovation. In many EU countries, new and innovative technological initiatives coexist with old ones. The vocabulary and methods of complexity theory and analysis should therefore be applied to Digital Government Transformation.

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EVIDENCE TO INFORM  
POLICY MAKING  
CONCERNING THE  
INNOVATIVE USE OF DIGITAL  
TECHNOLOGIES IN THE  
PUBLIC SECTOR IS VERY  
MUCH IN DEMAND

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## Creating a culture of digital transformation and innovation within the public sector

Organisational and bureaucratic obstacles hamper the use of new technologies in the public sector. Interdepartmental differences and inter-institutional competition create bureaucratic silos that slow down the pace of transformation. A successful digital transformation requires a conceptual and cultural change within the public administration concerned. Therefore, a culture of innovation should be encouraged within the public sector. Governments should set out a long-term vision for the advancement of data-driven governance and technological innovation. For example, many cities have introduced the role of Chief Data Officer (CDO), who is in charge of fostering technological innovation in various departments within government and improving IT capacity (Wiseman, 2018). Together with a long-term vision, governments should set concrete targets and communicate effectively the results obtained, as well as measuring progresses and assess socio-economic impacts.

In terms of recommendations for **future research**, a crucial aspect that emerged from the study is that evidence to inform policy making concerning the innovative use of digital technologies in the public sector is very much in demand. For example, the research team had to liaise with public sector institutions while designing and implementing the experimental approaches of the case studies. This process itself was very valuable for the public sector organisations involved, as it helped to expose (and, eventually, test) the assumptions under which an innovation is assumed to work. After concluding the case studies, the research team presented its findings with the practitioners from the team working to further develop the applications at the core of the case studies and provided some evidence-based advice.

More fundamentally, our empirical research has shown that AI-based innovation is currently a topic very pertinent to the public sector. Actual innovations based on AI are frequently still at the discussion or pilot stage, while raising funding and political support for further

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FUTURE RESEARCH SHOULD INCLUDE A SYSTEMATIC MAPPING OF INNOVATIVE PUBLIC SERVICES AND A THE FURTHER INVESTIGATION OF THE IMPACT OF ICT-ENABLED INNOVATION ON GOVERNANCE AND SOCIETY

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investment may be difficult due to scarce resources and, often, limited evidence that previous innovations have delivered the efficiency gains promised. On one level, such situations call for a careful and theory-informed analysis as to why the expected gains were not realised. For instance, were the expectations unrealistically inflated from the very beginning, or did something in the policy process prevent the original objectives from being achieved? On another level, this condition calls for broader, more systematic discussion, using, for example,

foresight and other participatory 'Policy Lab' techniques. Here, the key question is three-fold: (a) Maybe the expectations we entertain with regard to ICT-based innovations are wrong and we are missing some important objectives?; (b) What combination of technology, procedures and resources makes an innovation possible?; and (c) How do these new technologies change and challenge the power balance between the public authorities, private companies and citizens, and how should this balance be reimagined for the benefit of society?

These and many other research questions materialised during the study and should be addressed in future applied research. In this regard, however, an important methodological issue must be addressed. The case studies conducted as part of this research drew on a variety of methods, including experimental and quasi-experimental research. They clearly demonstrate that in order to implement a well-designed experiment, two key elements are required: first, collaboration with the public sector (ideally this should be formalised, at least to a certain extent); second, such experiments should have a longer timespan (of between 1.5 and 3 years). The design stage may take a few months, while time is also needed for the effects of an innovation to manifest themselves so that they can be measured in a technically robust way, and scientifically validated.

Thematically, our research points towards the need to undertake further in depth sectoral or organisational level studies. These should be carried out in the fields of, for example, transport, smart city and living environments, health and education, among others, as well as on more traditional public administration operations and e-Government services. While our literature review revealed that a variety of previous research endeavours have been undertaken in these fields, the emergence of AI-based or platform-based solutions is now fundamentally altering the context, including the respective roles of the public and private sectors.

Following up on these changes and supporting the public sector with pertinent evidence is therefore of the utmost importance and urgency. Specific research could involve systematic mapping of innovative public services in a variety of fields and contexts. Two distinct research directions are possible here. First, research could provide pragmatic actionable, evidence-based advice on what works and what does not, including the questions of the functioning of data ecosystems, and effective interoperability across domains and countries.

Second, such research could analyse in a more fundamental way the implications of ICT/AI-based innovation on governance and society.

In this regard, the revision of the European Interoperability Framework (EIF) envisaged in the Digital Europe Programme, should take into account the findings of this study and support the digital transformation of government by giving a more prominent role to all forms of public sector innovation. As demonstrated by this research, the public value orientation should also be an essential part of the next EU Governments Interoperability Strategy, addressing both organisational and governance innovation and related challenges.

From a more cross-cutting perspective, the evidence gathered from the case studies points in fact towards the importance of reframing and public sector ethics. With regard to reframing, we argue that it involves tangible changes in procedures, functions and institutions as well as a cognitive restructuring, which concerns values, culture and shared understandings. This, in turn, points towards the need both to research and to articulate a reinforced set of values for the public sector. In other words, ICT/AI-based technologies provide the public sector with powerful tools that include data, behavioural insights and capacity for ‘nudging’ citizens to behave in one way or another.

During earlier waves of e-Government research, the academic consensus was that ICT-based innovation will, by and large, benefit the citizen. The current scientific discussion is much more equivocal. From a research perspective, this suggests the need to explore how, for example, data is used and governed in the public sector, how it is shared, what checks and balances are in place. In practice, the unresolved and ever-crucial issue of governance ‘with and of’ ICTs, is now further amplified, as in the era of Artificial Intelligence we have a third aspect to reflect upon: governance by algorithms (Kuziemski and Misuraca, 2020).

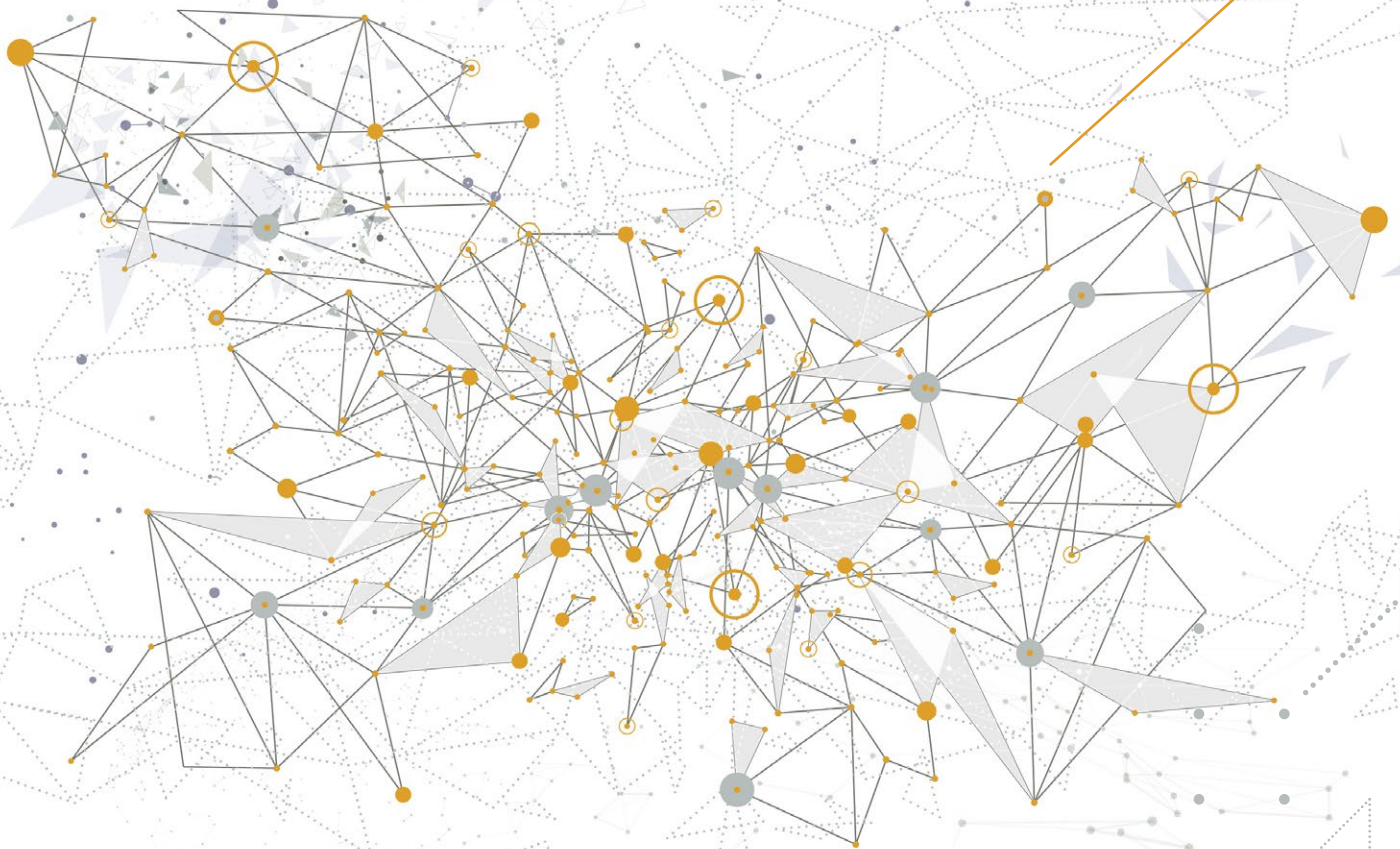
As indicated in a recent [JRC report on the use and impact of AI in public services \(Misuraca and van Noordt, 2020\)](#) published as part of the AI Watch<sup>6</sup>, the Commission knowledge services to monitor the development, uptake and impact of AI for Europe, ‘...*the use of AI-enabled innovation within governments to support redesigning governance processes and policy making mechanisms, as well as to improve public services delivery and engagement with citizens is growing. Indeed, when used in a responsible way, the combination of new, large data sources with advanced machine learning algorithms could radically improve the operating methods of the public sector, thus paving the way to pro-active public service delivery models and relieving resource constrained organisations from mundane and repetitive tasks*’. At the same time, and in line with the features that emerged in our foresight analysis, some of the more radical cases of AI-enabled innovation already raise concerns and fears from citizens and regulators, as they entail the potential to redefine power relations and generate unbalances within governance systems, bringing to the fore new risks and positing threats to the democratic settings of European societies.

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6 [https://ec.europa.eu/knowledge4policy/ai-watch\\_en](https://ec.europa.eu/knowledge4policy/ai-watch_en)



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