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Digitally-induced change in the public sector: a systematic review and research agenda

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ABSTRACT

Digital transformation has become a buzzword that is permeating multiple fields, including public administration and management. However, it is unclear what is transformational and how incremental and transformational change processes are linked. Using the PRISMA method, we conduct a systematic literature review to structure this growing body of evidence. We identified 164 studies on digitally-induced change and provide evidence for their drivers, implementation processes, and outcomes. We derive a theoretical framework that shows which incremental changes happen in public administrations that are implementing digital technologies and what their cumulative, transformative effects are on society as a whole.

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KEYWORDS Digital transformation; digital government; public sector change; systematic literature review; PRISMA

Introduction

Digital transformation is a concept that has gained wide attention from different disciplines given its multi-faceted and appealing nature. At its core, digital transformation implies change on two levels: first, at the core of the organization, its processes and routines; and second, in its environment, business models, products, and services, and in the interaction between users and the organization itself (Hanelt et al. 2021; Mergel, Edelmann, and Haug 2019). The main trigger of these changes is the introduction of digital technologies, which change the expectations that citizens and users have for the delivery of public services (e.g. seamless service delivery, increased usability) and introduce new modes of service delivery. Here, recent theoretical frameworks argue that digital transformation can be interpreted as a continuous change due to its wide scope and complexity (Hanelt et al. 2021).

Whereas in the private sector digital transformation mainly focuses on the creation of new business models or the transformation of production modes from analogue to digital,

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the public administration and management literature has examined how digital technologies change and subsequently improve how governments are organized and how they deliver public services (Fischer, Heuberger, and Heine 2021). While many governments have not reached their goal to digitize all public services and administrative processes, there has been an increased use of new digital technologies which led to considerable change in public sector organizations (Enang, Asenova, and Bailey 2020; Gil-Garcia, Dawes, and Pardo 2018; Hinings, Gegenhuber, and Greenwood 2018). A primary expectation of these efforts is that digitalization does not only incrementally change, but transforms governmental organizations and their interactions with citizens, businesses, and external stakeholders (Bannister and Connolly 2014; Mergel, Edelmann, and Haug 2019).

An underlying debate in the existing research is whether the technology itself or managerial activities, influenced by the organizational context, are the driving factors for digitalization (Fountain 2001). To reflect this debate, we have decided to use the term digitally-induced change instead of digital transformation to emphasize that the role of technology is more nuanced. The central argument is that technology sets the stage for transformative efforts, but the main work and transformative potential lie within the organization that acts within and is influenced by its environment. Digitally-induced change serves as an umbrella term that consists of the incremental and transformative elements described above.

Considering this discourse on digital transformation, there is a need to systematically describe and summarize the empirical evidence on factors, mechanisms, and outcomes of the changes introduced by technology by synthesizing what is already known and identifying gaps for future research. To this end, we review the literature on digitally-induced change in the public sector by addressing three initial review questions that guide this systematic review:

(1) *What are the external drivers that push for incremental and transformative digitally-induced public sector change?*
(2) *What organizational factors explain the implementation of incremental and transformative digitally-induced public sector change within public administrations?*
(3) *What are the outcomes of incremental and transformative digitally-induced public sector change?*

To achieve this goal, we used the concepts of incremental and transformative change to determine the level of change that is expected in digitally-induced change efforts. For the definition of incremental change, we refer to Kuipers et al. (2014) who describe it as an adaptation of systems or structures that occurs within an organization and its administrative processes. These incremental adaptations of change can also lead to a transformation that affects the organization as a whole and its interactions with its environment (Mintzberg and Westley 1992). In addition, digital transformation can be a goal and strategic intent of larger policy programs that are implemented top-down. It targets deep cultural change in organizational arrangements, public service delivery, and relationship with stakeholders, and results in short-term measurable outputs, such as an increase in the availability of digital public services and long-term outcomes in terms of improvements in organizational effectiveness and citizen satisfaction (Bannister and Connolly 2014).

To answer our review questions, a systematic review is well suited as a comprehensive, transparent, and replicable way of identifying, selecting, and analysing the literature (Page et al. 2021). We adopted the established Preferred Reporting

Items for Systematic Reviews and Meta-Analysis (PRISMA) guidelines (Page et al. 2021) and the selection process of the literature led to a final list of 164 references that were eligible for coding and further analysis.

The main contribution is a theoretical framework that shows the link between incremental and transformative change. It consists of three parts: the external and internal drivers for digitally-induced change, the implementation processes, and the outcomes driven by technological change. The external drivers of incremental change efforts include the political system surrounding the administration, technological developments, the IT infrastructure, the economy as well as demands by citizens. Additionally, transformative change is driven by globalization dynamics, democratization, external shocks, and legal adjustments. The implementation of digitally-induced change within public administrations, whether incremental or transformative, is dependent on the quality of the collaboration with internal and external stakeholders, the formal characteristics of the organization (e.g. the size of the local government organization), or the IT infrastructure within the organization. Lastly, the outcomes of incremental and transformative change differ. Both types of change result in improved service delivery and processes within the organization. In addition, incremental change tends to result in an improved relationship between the individual citizen and the organization whereas transformative change leads to outcomes that benefit the whole society (e.g. in the form of reduced corruption). From these findings, we conclude that most of the digital transformation of government happens through incremental change processes cumulating to larger societal effects.

Based on the findings, we propose a future research agenda that includes the following three areas of research. First, research on digital transformation in government should move from technology-focused to actor-centric approaches. Second, most of the research focused on beneficial outcomes; therefore, negative outcomes, such as increased surveillance or misuse of automated decision-making tools should be analysed and evaluated in future research. Third, the long-term effects of digital technologies and digital public service delivery should be assessed using longitudinal methods.

The study is structured as follows: after the introduction, we outline the research strategy that led to the identification and analysis of the selected literature. Afterward, we present the findings of each review question. In the discussion, we propose a conceptual framework of digitally-induced public sector change and derive a future research agenda.

Methodology

This article uses the established PRISMA guidelines for conducting systematic reviews that support a thorough, transparent, and rigorous identification and selection process of the literature (Page et al. 2021). We use the PRISMA checklist for systematic reviews to document the review process and report information on criteria used and decisions made to increase transparency and replicability (see Table A1). In this section, we describe how we screened and identified the relevant literature.

Identification

To identify the relevant literature on digitally-induced public sector change, we employed a search string consisting of two elements. First, we used keywords that cover different phrasings and concepts of government digitalization used in the literature. Second, we used keywords related to government and governance to limit

the results to literature that specifically focuses on public sector organizations. Combining these two elements, we used the following query to identify the literature:

> ('e-government' OR 'e-governance' OR 'digital government' OR 'digital governance' OR 'transformational government' OR digitisation OR digitalisation OR 'digital transformation') AND (government OR 'public administration' OR 'public sector' OR 'public service')

We used this broad selection strategy to reach a comprehensive overview of the literature on digital government. Thus, we did not limit the search to specific technologies (such as AI or blockchain), rather we used terms such as e-government because these terms encompass the different applications of different technologies in government which is the main focus of our research.

We applied this query to two different databases: the Web of Science Social Science Citation Index (SSCI) and the EBSCO Business Source Premier databases. We selected these databases because taken together they cover a large body of potentially relevant published research that meets quality criteria in terms of peer review and publication outlet. We excluded the Google Scholar database due to its low usability in systematically extracting and storing the literature. The search covered the literature published until May 2022. At the end of the identification stage, we identified 8,764 records. To store and organize the references, we used the reference manager Endnote. In the second stage, we excluded 467 duplicates. We then screened the remaining 8,297 records using a fixed set of eligibility criteria that were determined before conducting the study.

Screening

During the screening phase, we adopted the following set of eligibility criteria. A study was included if it met all the following eligibility criteria:

- *Research design – empirical studies*: We included all articles that present results of empirical studies, covering both quantitative and qualitative evidence. Consistent with the PRISMA guidelines for systematic reviews which focus on reviewing empirical evidence (Page et al. 2021), conceptual studies that do not present new empirical evidence as well as literature reviews were excluded. For quality purposes, we excluded studies that claimed to report empirical evidence but lacked a section that outlines the research design/methodology.
- *Field of study – digitally-induced public sector change*: We included all articles that focus on the digitization of internal processes and service delivery of public sector organizations or public sector digitalization reforms/change efforts. We excluded all articles focusing on private or third-sector organizations only. Therefore, studies on the collaboration of public sector organizations with private or third-sector organizations when implementing digital technologies were included.
- *Type of article*: We included only peer-reviewed journal articles and excluded books, conference proceedings, and book reviews.
- *Timeframe*: To increase coverage, no starting date was used, and research published up to May 2022 was included.
- *Language*: We only selected studies written in English for practical reasons.
- *Relevance*: We included the articles that featured one or more of the keywords used in the query to identify the literature in either the title or the abstract.

Through this process, we excluded 7,337 records that were not meeting one or more of the pre-determined eligibility criteria. The PRISMA method (Page et al. 2021) suggests full-text analysis after the application of the eligibility criteria, due to the large body of literature that resulted from this initial search, we proceeded by further narrowing the focus of the search to better capture the existing research on *digitally-induced public sector change*. To do so, we screened the titles and abstracts of the remaining 960 articles by performing an additional search in the abstract and title using the following keywords to reduce the amount of the selected literature: 'change', 'reform', 'transform*', 'shift', 'amend*', 'adjust*' and 'design'. We used this selection of additional keywords because studies may use the terms interchangeably to denote change, thus ensuring that we identify most of the studies within the sample that deal specifically with digital change. This additional step led to the exclusion of 795 records resulting in 164 studies that were outside the scope of this review. We decided not to use these additional keywords in the original search string to identify a larger amount of literature to reduce the risk of omitting relevant literature, thus sacrificing a more precise initial sample of the literature (Boell and Cecez-Kecmanovic 2015). To facilitate the selection process, we used the search function of EndNote, however, the content evaluation of the literature was then done manually. The PRISMA flow diagram (Figure 1) summarizes this process:

Data analysis and coding framework

We treat the studies forming the body of evidence as textual data (Bowen 2009), which enables us to use qualitative data analysis methods. In the next step, we used the qualitative data analysis software QSR NVivo (2020) to structure and implement the coding procedure. This textual data differs from other qualitative data, such as interviews or field notes in that the included published articles underwent a rigorous peer review, which enhances the overall validity of the sources. We derived the preliminary codes from the existing theoretical literature on e-government and organizational change. It consists of four elements and is summarized in Table 1:

(1) The general characteristics of the study such as the country, government level, and methodology used in the research;
(2) The types of digitally-induced public sector change (incremental or transformative). To assess the type of change, we coded the research questions of each article to identify whether the study aims to explain small, incremental, or large-scale transformative changes.
(3) The external drivers that push for digitally-induced change. To derive these factors, we used existing theoretical frameworks on digital transformation, which propose that economic and political factors, legal and regulatory changes, external crises, and pressure from citizens and stakeholders push towards digital transformation and motivate public organizations to initiate and develop digital transformation projects (Mergel, Edelmann, and Haug 2019);

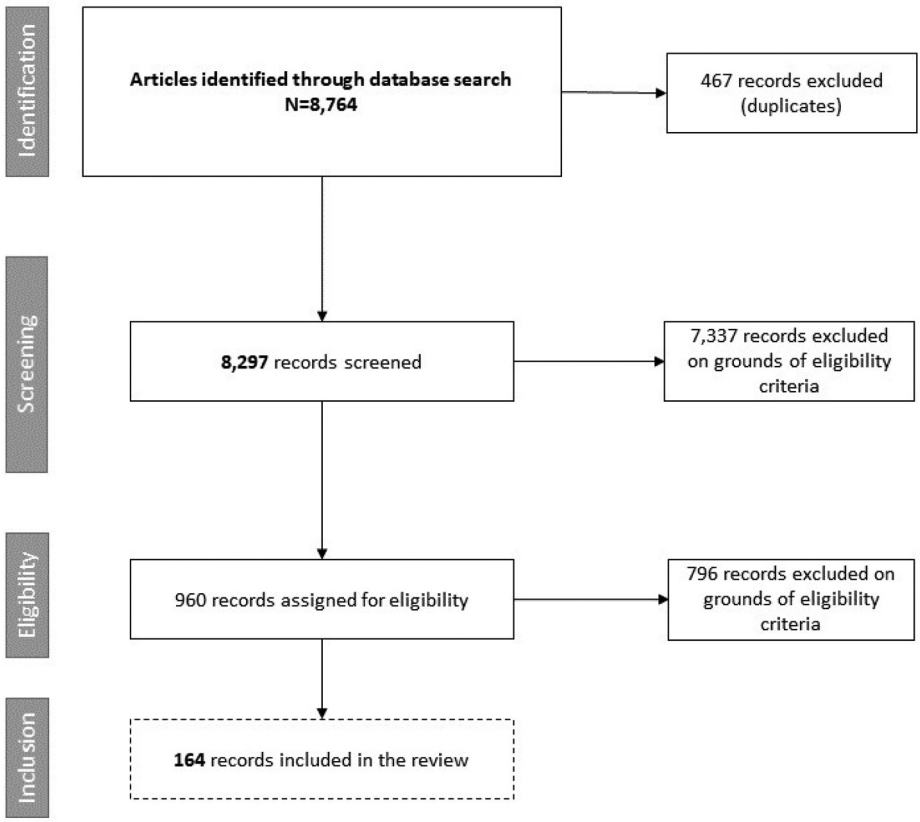

Figure 1. The PRISMA flow diagram.

(4) The implementation factors that show how government organizations implement digital technologies. These factors were derived from the literature on change management in public sector organizations. For implementing digitally-induced change, the quality of ICT and data infrastructure within the organization as well as the organizational readiness for digital implementation matter. In addition, those change processes are dependent on organizational capacity, which includes the effectiveness of inter-organizational and external collaboration, resource availability, leadership quality and decision-making, organizational pressure, and requirements for service delivery (Borins 2000). Unlike the external drivers, implementation factors are internal to the organization: public managers are required to manage the implementation factors to develop digital transformation projects and carry them out to completion within the organizational boundaries and administrative constraints in which they operate (Enang, Asenova, and Bailey 2020);
(5) The different areas inside and outside public organizations that are influenced by the ongoing digitalization processes. To capture the beneficial effects of digitally-induced change, we use the concept of public value

Table 1. Coding framework.

Code Empirical information	Sub-code Methods used Country	Literature reference	RQ
Type of change	Incremental	Kuipers et al. (2014) differentiates between 1st, 2nd and 3rd order change. Sub-system/part of the organization (1st order change)	RQ1
	Transformative	Change in organizational paradigms, at the core of the organization, targeted at the whole organization (2nd order). Sector-wide that changes the identity, between different organizations and the outside environment (3rd order change), see also Bannister and Connolly (2014); Norris and Reddick (2013)	
Drivers	Technological development Economic dynamics Political factors Legal and regulatory factors External events and crises	Borins (2000); Moore (1995); Mergel, Edelmann, and Haug (2019)	
Implementation factors	Quality of IT and data infrastructure Organizational readiness for digital implementation Effectiveness of inter-organizational collaboration Effectiveness of external collaboration Resource availability Quality of leadership Organizational pressure Requirements for service delivery	Enang, Asenova, and Bailey (2020); Pollitt and Dan (2013); Weerakkody et al. (2016)	RQ2
Outcomes	Information and service delivery Administrative processes Relationship with stakeholders Impact on society	Cordella and Bonina (2012); Mergel, Edelmann, and Haug (2019); Faulkner and Kaufman (2017); Twizeyimana and Andersson (2019); MacLean and Titah (2021)	RQ3

(Faulkner and Kaufman 2017; Moore 1995), which is a fitting concept as it allows us to account for both incremental and transformative change. According to Moore (1995), public value can be created through the strategic action of public managers. Twizeyimana and Andersson (2019) identify six public value dimensions of e-government: improved administration and public services, ethical behaviour and professionalism, open government, and administrative efficiency. To conceptualize the effects on society, they identify two additional public value dimensions: improved social value and trust in government. Digital government might affect these four areas: the information and service delivery of government, internal administrative processes, and relationship with stakeholders and society as a whole. Twizeyimana and Andersson (2019) assume that the introduction of digital technologies can lead to positive outcomes, so we

chose these four broad categories to be able to critically evaluate the outcomes and to summarize the existing evidence on how the outcomes are created.

Findings

To answer our review questions, we use a comparative approach focusing on the literature that explicitly investigates digitally-induced change to understand what drives change, how it is carried out, and which outcomes are observed. Table 2 provides a general summary of the findings, regarding the country and methodology used. The eligibility criteria did not restrict studies to a specific region so that the search results cover different countries and administrative arrangements. Most of the research originates in Western Europe (particularly the UK: 12 articles, Italy 11: articles, and Spain: 7 articles), Asia (China: 8 articles and South Korea: 9 articles), and North America (particularly the U.S.: 22 articles).

More than two-thirds of the empirical studies (112 studies) focus on incremental change, including the introduction of digital systems (Seepma, de Blok, and Pieter Van Donk 2021) or social media tools (Feeney and Welch 2016). About one-third (52) of the studies discuss transformational change such as the transformation of the public sector as a whole or the large-scale effects of technologies (Norris and Reddick 2013; Pittaway and Montazemi 2020).

Next, we report and discuss the findings regarding the drivers, mechanisms, and outcomes of transformative and incremental change. The literature cited in the following section highlights some examples of the analysed articles. The full dataset with the literature used in the literature review can be seen in the online appendix.

Table 2. General overview of the studies included in the review.

	Total	%
Country ($N = 179$)		
Europe	83	50,6%
Asia	43	25,6%
North-America	30	18,3%
Global	11	6,7%
Africa	7	4,3%
Australia & Oceania	3	1,8%
South America	2	1,2%
Methodology ($N = 164$)		
Qualitative	85	51,8%
Quantitative	70	42,7%
Mixed-methods	6	3,7%
Experiments	2	1,2%
Software development	1	0,6%
Type of change ($N = 164$)		
Incremental	112	68,3%
Transformative	52	31,7%

Table 3. Overview of drivers of incremental and transformative change.

	Incremental	Transformative
Technology	15,2% (17)	13,5% (7)
Demands by citizens	13,4% (15)	11,5% (6)
Political system	10,7% (12)	25% (13)
Legal requirements	6,3% (7)	15,4% (8)
Economic dynamics	4,5% (5)	13,5% (7)
External shocks	0,0%	1,9% (1)
Sum of Drivers	31,3% (35)	36,5 (19)

External drivers of digitally-induced public sector change

In this section, we discuss how the drivers affect both transformative and incremental change – a summary of the findings can be found in Table 3.

On the citizen side, both types of digitally-induced change are driven by the availability of the technological infrastructure and the digital literacy of citizens (Young 2020). In addition, the high quality of digitized public services increases the demand for digital services (Jiang and Ji 2014).

Updates to the technological infrastructure drive both incremental change and transformational change. Here, the emergence of new technologies, for example, digital platforms or other software innovations motivate decision-makers in public administrations to experiment with and adopt new technologies (Cordella and Paletti 2019). To analyse the effects of technology on incremental and transformative change we coded the different types of technologies that are analysed in the literature. We found that most studies do not specify which technologies they studied – instead, they used general terms, such as e-government, ICT, or software, instead digitized services are the main vehicle of change (Kumar, Sachan, and Mukherjee 2017). The studies focused on different applications of digital technologies, for example, websites, portals for public participation, platforms to deliver services, or specific social media platforms, such as Twitter (Feeney et al. 2020). Lastly, some studies analysed organizational infrastructure technology including information systems, content management systems, or complex IT infrastructure (Andrade and Joia 2012). Only a fraction of the sample aimed to understand emerging technologies such as AI, cloud computing, or the Internet of Things that are assumed to have a high potential for transformation (Vogl et al. 2020).

The third external driver for digitally-induced change is the political system in which public sector organizations operate. In the incremental change literature, bureaucratic traditions, cultures, and norms influence the adoption and implementation of digital services (Hellberg and Gronlund 2013). The increasing complexity of the service delivery system influences the uptake of digital services (Lember, Kattel, and Tonurist 2018). Besides the political system itself, the empirical findings reveal that the pressure and support of political and senior administrative leaders can accelerate digitalization (Zherebtsov 2019). However, digital change can be hindered if it lacks adequate buy-in and does not constitute a political priority (Liste and Sorensen 2015).

Closely linked to the political system are the legal requirements: oftentimes, laws need to be adapted to successfully adopt e-government services (Kuhlmann and Heuberger 2021). Although legal requirements cut across both types of change, several studies highlight that a large-scale legal reform is required to drive and enact

transformative change (de-Miguel-Molina 2010). Differences in the legal framework partly explain cross-country differences in e-government adoption (Nguyen 2016).

Lastly, the economic situation of a country drives government digitalization. For an incremental change, economic wealth influences the citizens directly through enhanced internet access, a higher degree of digital literacy, and a higher standard of living (Tolbert, Mossberger, and McNeal 2008). Transformative change studies focus on macro-level factors: Astrom et al. (2012, 142) find that: 'economic globalization [is] the strongest predictor of e-participation initiatives in non-democratic countries'.. The last driver identified external shocks and crises as less significant for digital change compared to the other drivers. For example, one study analysed the effects of the COVID-19 pandemic on the digitalization of government. Agostino, Arnaboldi, and Diaz Lema (2021) show how libraries quickly digitized their services to be available during the lockdown.

Intra-organizational factors for change

Intra-organizational factors influence the implementation of public sector digital change at the organizational, procedural, inter-relational, and individual levels. Overall, the mechanisms of how incremental and transformative change are created are largely similar, shown in Table 4. In the following, we discuss examples for each mechanism in depth.

Organizational factors

The organizational characteristics driving digitally-induced change include size, financial resources, or the degree of centralization. They impact, for example, the diversity of an e-government website's features (Feeney and Brown 2017). The existing organizational ICT infrastructure matters to facilitate the seamless and effective implementation of digital processes and services (Seo, Kim, and Choi 2018). Especially for transformative change, the standardization of organizational ICT drives these processes by enabling information sharing (de-Miguel-Molina 2010) or automation (Kassen 2019).

For both types of change, the extent to which an innovative and open culture is identifiable within the organization matters (Schulz and Newig 2015). One driver that is especially salient in the incremental change literature is the presence of an

Table 4. Mechanisms of digitally-induced change in public sector organizations.

	Incremental	Transformative
Organizational	28,6% (32)	32,7% (17)
• Characteristics of the implementing organization	16,1% (18)	15,4% (8)
• Organizational culture	9,8% (11)	7,7% (4)
• IT infrastructure	8,0% (9)	17,3% (9)
• Digital strategy	6,3% (7)	1,9% (1)
Implementation process	14,3% (16)	11,5% (6)
Inter-relational level	19,6% (22)	21,2% (11)
• Inter-organizational collaboration	12,5% (14)	15,4% (8)
• Collaboration with partners outside the government	11,6% (13)	7,7% (4)
Individual	17,9% (20)	25% (13)
• Employees	10,7% (12)	9,6% (5)
• Leadership	8,9% (10)	19,2% (10)
Sum of Mechanisms	53,6% (60)	50% (26)

organizational digital strategy (Chen and Komlan Aklikokou 2019) that enables decision-makers to define measurable and realistic goals (El-Haddadeh, Weerakkody, and Al-Shafi 2013). However, there is a limited critical analysis of the impact of organizational arrangements on the implementation of transformative change over time. Most articles emphasize rather factors related to organizational structure and characteristics, instead of the dynamics and processes of transformative change.

Collaboration between internal and external stakeholders

The process of implementing digital change involves inter-agency collaboration and collaboration with external stakeholders. In the incremental change literature, these collaborations tend to be described as partnerships, where synergies, the exchange of resources, and the distribution of authority and responsibilities can contribute to a more efficient and effective service delivery (Cordella and Paletti 2019). However, if collaboration is poorly planned, unclear responsibilities, and/or power differences persist, the implementation of digital change is inhibited (Zhang, Lu, and Shou 2017). Similar mechanisms are present in the literature on transformative change here, hierarchical power differences, lack of clear rules, and different cultural values inhibit collaboration (Jackson and Wong 2017).

Besides inter-agency collaboration, external collaboration with stakeholders influences the implementation of incremental change. Those external stakeholders can include private firms that provide software solutions, or internal and external users such as citizens who can act as strategic partners and influence service implementation (Klopp et al. 2013). Technical providers act as stakeholders who contribute to the development of the technical infrastructure by providing expertise that is required to implement the digitization of individual services or software products and oftentimes the expertise to make these decisions is not present in public sector organizations (Jones et al. 2019). Other studies document the importance of involving all relevant stakeholders early to benefit from external expertise and avoid conflict later due to inadequate stakeholder consultation (Toots 2019). For transformative change, stakeholder collaboration seems less relevant (only mentioned by four studies); however, the process of involving external stakeholders to integrate knowledge and resources is similar to the consultation process found in the incremental change literature (Kuk and Janssen 2011). This finding points to insufficient consideration of stakeholder engagement and user input in digitally-induced change. Given the scale envisaged in transformative change, it is especially relevant that user experience is carefully considered and tested.

Individual level: leadership and digital competences

At the individual level, employees and leaders influence the implementation of digital change – both transformative and incremental. They are vital for the initiation, support, promotion, and legitimization of digital change processes (Weerakkody et al. 2012). Leaders sustain the implementation of transformative change over time and in response to bureaucratic resistance (Tassabehji, Hackney, and Popovic 2016).

Lastly, the role of employees matters. In both types of change, they support the implementation of digitally-induced change through the use of their digital and cross-functional skills. If they have these skills they can understand and adopt new

technologies and tools into existing organizational routines (Arduini et al. 2013). It seems plausible that employee skills play a greater role in the implementation of single services or processes that matter for incremental change processes.

Outcomes of change

Empirical studies show that most of the change is incremental in nature – it targets individual services and organizational processes and alters the mode of service delivery and the relationship between the government and its stakeholders. In what follows, we review the outcomes of digitally-induced change on service delivery, organizational processes, relationships with stakeholders, and the impact on society. Table 5 provides a summary of the findings.

Changes in information provision and service delivery

Important outcomes of digitally induced change include access to online services and information in both types of change. In the incremental change literature, the introduction of government websites, platforms, and social media enables new forms of information provision (Krøtel 2021). Especially government websites' quality, such as their multiple and well-designed features, are important for improved information delivery and quality (Das, Singh, and Joseph 2017). Users are more satisfied with digital services due to the increased efficiency and accessibility of service (Bhatnagar and Singh 2010). One important outcome of digitally-induced change is the introduction of new services and products, including new digital platforms or portals (Kuk and Janssen 2011). These tools promote collaborative governance by facilitating the interaction between government bodies and their stakeholders (Epstein 2022).

Changes within the organization

Besides changes in service delivery, digitally-induced change also affects the organization's employees, processes, and structures. Similar to the first outcome, no difference between the incremental and transformational literature is identifiable.

Table 5. Outcomes of digitally-induced change.

	Incremental	Transformative
Information & service delivery	37,5% (42)	40,4% (21)
• Improved quality	24,1% (27)	21,2% (11)
• Access to information	16,1% (18)	13,5% (7)
• New services	9,8% (11)	11,5% (6)
Within the organization	29,5% (33)	38,5% (20)
• Process	25,0% (28)	34,6% (18)
• Personnel within the organization	7,1% (8)	9,6% (5)
• Structure within the organization	5,4% (6)	13,5% (7)
Relationship with stakeholders	34,8% (39)	25% (13)
• Communicate with citizens	20,5% (23)	15,4% (8)
• Participate in decision-making	12,5% (14)	5,8% (3)
• Government perception	8,0% (9)	7,7% (4)
Society	9,8% (11)	32,7% (17)
• Transparency	4,5% (5)	9,6% (5)
• Digital divide	2,7% (3)	1,9% (1)
• E-democracy	3,6% (4)	9,6% (5)
• Surveillance	0,9% (1)	1,9% (1)
• Economic growth	0,0%	3,8% (2)
• Reduced corruption	0,0%	9,6% (5)
Outcome	68,8% (77)	

Impact on employees. The first outcome at the employee level is an increase in individual and team productivity. Several studies report that employees spend less time working on a single case (Kim and Kim 2020) and travel is reduced (Im 2011), leading to an increase in productivity (Jones et al. 2019). Adjustment to a new digital environment has behavioural implications when, for example, new norms and values are introduced in the workplace and public sector employees are introduced to new tasks (El-Haddadeh, Weerakkody, and Al-Shafi 2013; Lember, Kattel, and Tonurist 2018). For transformative change, a negative consequence of the digitalization of work processes are workplace surveillance measures (Hayes, Introna, and Petrakaki 2014).

Impact on organizational processes. Most of the organizational changes include procedural change: where digitalized processes may improve intra- and inter-organizational collaboration, communication, and information sharing. These outcomes occur both in the case of incremental and transformative change. For example, the introduction of information management platforms or process standardization enables inter-departmental data sharing or leads to increased collaboration (Jones et al. 2019). As a result, new workflows are implemented (Andersson, Hallin, and Ivory 2022).

A second outcome of both incremental and transformative change processes includes the change in routines that results from increased standardization, automation, and digitalization of files (Hayes, Introna, and Petrakaki 2014). This leads to more efficient decision-making processes as a form of incremental change (Lim and Tang 2008). In the case of transformative change new managerial work practices, such as agile management are introduced that require a re-organization of organizational planning and decision-making (AlNuaimi et al. 2022). Third, digitally-induced change might lead to cost-reduction of administrative processes. This was observed for both types of change and is a result of the replacement of cost- and time-intensive analogue processes by automated machine-supported decision-making processes (Jones et al. 2019). However, this relationship is contested: some studies find no significant effect between digitalization and cost reduction because duplicate and parallel systems of analogue and digital processes have to be maintained (Andersen, Medaglia, and Henriksen 2012).

Impact on organizational structure. Concerning the impact on the organizational structure, transformative change targets the organization as a whole. For example, El-Haddadeh, Weerakkody, and Al-Shafi (2013) show how organizations were restructured to implement online service delivery processes as a whole. In the case of incremental change, the changes in the organizational structure mostly refer to small structural changes within individual departments, for example, the reduction of red tape (Tolbert, Mossberger, and McNeal 2008). These differences can be explained by the fact that transformational change takes several organizational processes into account to improve the service delivery processes, whereas incremental change targets a single process to achieve a specific goal.

Change in the relationship with stakeholders

For the effects targeted to citizens, we identify differences between the literature on incremental and transformative change. Incremental change targets the relationship between individual citizens and their administration. The relationship with individual

citizens is changed by using government websites or platforms in general and social media in particular (Pors and Pallesen 2021). However, there is mixed evidence on other forms of interaction and participation. For example, social media can serve as a valuable communication channel for citizens to provide feedback about public services (Feeney and Welch 2016) and there are online platforms that enable citizens to provide feedback about public policies or programs (DePaula, Dincelli, and Harrison 2018). However, online participation has limits, for example, government responsiveness is necessary for e-participation success (Jun, Wang, and Wang 2014), Feeney and Welch (2016) report that public administrations have trouble responding to citizen input provided through these channels.

Besides the changes in direct interaction between government and citizens, the provision of e-participation has the potential to improve citizens' perception of government. The literature on incremental change finds that government accountability, trust in the government, and satisfaction with government can be strengthened (Kumar, Sachan, and Mukherjee 2017). For a transformative change, we found evidence that improved government-citizen interaction can lead to increased government legitimacy (Maeroe et al. 2020).

Changes in society

Digitally-induced change in government contributes to outcomes that occur in society. Both the incremental and transformative change literature provide evidence for increased government transparency. Liste and Sorensen (2015) find that the provision of government information on government websites enables citizens to educate themselves and improve their understanding of the actions of public administrations. An increase in government transparency may contribute to improved decision-making in both online and offline participation (Mahmood, Weerakkody, and Chen 2019). However, not all citizens have equal access to online services. The persistent inequality in access to online services and websites, caused by the digital divide is mostly identified in the existing research on incremental change (see Table 5).

In the literature, one of the main outcomes of transformative change is the reduction of corruption (Banerjee et al. 2020) and the improvement of democratic processes. However, most of the empirical studies find that progress in this area is slowed down due to a lack of unfavourable legal frameworks (de-Miguel-Molina 2010) and/or political will (Kardan and Sadeghian 2011). The transformative effect of digitally-induced change in government can lead to large-scale benefits, for example, economic growth (Astrom et al. 2012) – one reason for this might be the increased efficiency of public sector organizations. However, negative consequences may follow. These include enhanced government surveillance (Polat and Pratchett 2014), a larger digital divide and related inequality in Internet access, and a lack of digital literacy (Schou and Pors 2019).

To sum up, the findings have shown that in the case of drivers and mechanisms of change, the literature on incremental and transformative change identifies similar ways in which the change is achieved. Some nuanced differences can be identified. However, concerning the outcomes of digitally-induced change, we show that incremental change only affects individual citizens and their relationship with public administrations, whereas transformational change targets organizations and society as a whole. The beneficial effects of digitally-induced change on society include the reduction of corruption, economic growth, and strengthening of democratic processes; however,

there is also evidence that points to negative effects such as increased surveillance and unequal access to digital government services.

Discussion and conclusion

This article synthesized the growing literature on digital transformation by distinguishing between two types of digitally-induced change: incremental and transformative change. The goal was to assess how these changes are discussed in the literature, implemented in practice, and what the factors are that lead to the different types of change. Transformational change in public administrations targets organizational structures as a whole, but there is a lack of studies that analyse how sustainable these change efforts are (Mergel, Edelmann, and Haug 2019). This result runs contrary to a widespread assumption that digital transformation is already a reality across the public sector, rather than a process that is to a large extent 'in the making' (Armbrust, Bertmann, Levo, and Hassan 2021). It also points to a poor conceptualization of the term digital transformation, which is frequently used in the academic literature to signal elements of government digitization and digitalization rather than true digital transformation. Although this is not a novel finding (Mergel, Edelmann, and Haug 2019; Weerakkody et al. 2016), we base this statement now on this extensive analysis of published public administration research that we coded, examined, and reported systematically. The findings of our review, therefore, reflect the nature of the examined literature. In this way, this article serves the purpose of reinforcing the existing evidence to probe, structure, and further theorize and empirical research. The discussion that follows aims to serve this purpose.

Based on the synthesis of the literature, we derive the following theoretical framework of digitally-induced change in the public sector (Figure 2).

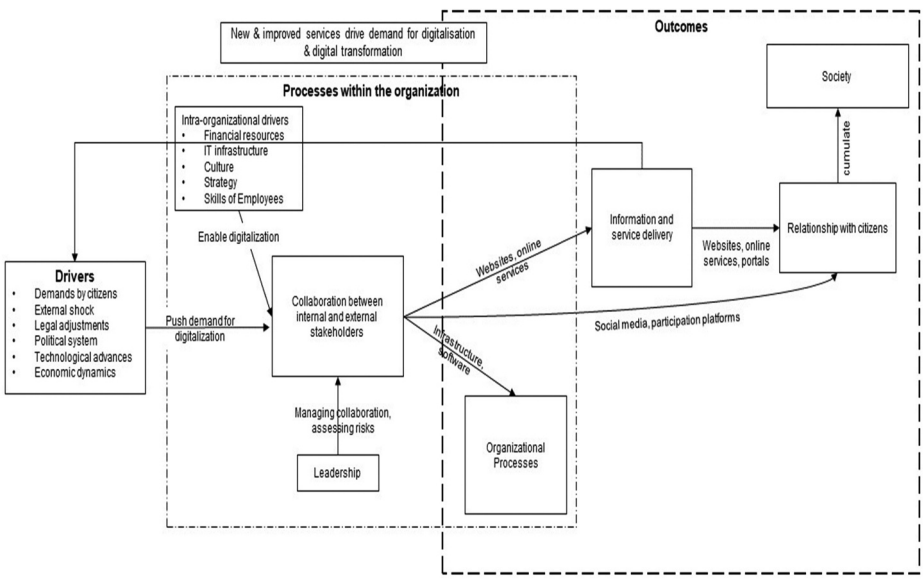

Figure 2. Digitally-induced change in the public sector: A theoretical framework.

The main argument is that incremental and transformative change are part of the same process – because the mechanisms that lead to digitally-induced change are similar for each type of change. For the same reason, the external drivers for incremental and transformational change influence the organizational processes as a whole. These consist of the legal regulations, economic situation, demands by citizens, and the technological maturity of the country itself. These factors are external to the organization because they limit the extent to which technologies are implemented within the organization and can hardly be influenced by actors operating within single organizational boundaries.

The second set of driving factors includes organizational characteristics, such as the size and capacity of the organization or technological infrastructure, which we labelled internal drivers. They influence collaboration processes between employees within the public administration as well as with external stakeholders who provide expert knowledge and resources. Leadership is a crucial factor for collaboration because leaders assess the risks and facilitate joint work by communicating common goals and a vision. In addition, the relevance of collaboration with external stakeholders in digitalization processes shows that implementing digitally-induced change, whether incremental or transformative in nature, is characterized by multi-actor constellations. Public managers, especially public leaders, must therefore be skilled in managing these transformation processes.

Incremental and transformative change lead to different types of outcomes, however, there are different pathways enabled by different digital technologies to reach these outcomes. Most of the literature focused on common technologies (social media, platforms, and websites) instead of novel technologies such as AI, thus the pathways depicted in Figure 2 reflect these technologies. As shown in the findings, both incremental and transformative change result in improved information provision and service delivery as well as the digitization of internal processes through automation software or the implementation of information systems. Especially the relationship with stakeholders is changed by multiple pathways: first, there is a direct path by the implementation of digital participation platforms, public service portals, or social media that facilitate two-way communication (Bertot, Estevez, and Janowski 2016). Second, there is an indirect path that highlights that an improved information provision influences the relationship between public administrations and their different stakeholders. However, transformational change is not a direct consequence of the implementation of technology, as suggested, for example, by MacLean and Titah (2022) or Twizeyimana and Andersson (2019). Instead, it can be derived from large-scale use of digital technologies by citizens, for example, social media, service platforms, and government websites, and increased accountability of government through the provision of online information. These cumulative effects of increased government transparency might reduce corruption, or citizens are empowered to make more informed decisions by being able to look up information on those websites and contribute to the digital transformation in the long run. Hence, transformation is a slow process that leads to outcomes that are built and reinforced over time (Mintzberg and Westley 1992). This has implications for future studies on digital transformation given that there is little experience on how to measure the effects of digital transformation and how to differentiate its specific effects from other dynamics that happen in the environment in which public administrations operate.

Future research

From the systematic analysis of the existing research, we derive three areas for future research. First, we showed here that existing research focuses predominantly on technology-driven change moving public services from analogue to digital delivery modes. Our theoretical framework highlights, that transformative change is the result of incremental steps that cumulate in broader effects on society as a whole and are generally not realized through a holistic strategy that tackles questions including how organizational and administrative processes as a whole have to be changed to lead to truly transformative change. They also leave open ways of rethinking whether services were previously delivered in ways that reduce administrative burdens on stakeholders or in ways that support ease of use and delivery by civil servants. A few studies are looking at the changes happening at the relational level, analysing how routines and processes are transformed actively by those implementing the change (Pors and Pallesen 2021; Seepma, de Blok, and Pieter Van Donk 2021). However, what we require are theoretical approaches that put the actors – rather than the technology or organizations – at the centre of change efforts.

Second, future research needs to systematically examine how the cumulative effects of digital transformation identified in our theoretical framework play out in the long run. The studies in the reviewed sample predominantly include individual case studies looking at changes in one specific political and societal context. It would be useful to conduct comparative research to understand similarities among the implementation challenges and how civil servants are navigating the resulting digital transformation challenges. This can be done by comparing technology cases across contexts and focusing on change leadership aspects across jurisdictions. In our sample, we were not able to identify longitudinal studies that observe these changes in public administrations among stakeholders and their perceptions of public service delivery over time. However, these insights could be especially important for examining how the cumulative effects of incremental change leads to digital transformation in the long run.

Third, there remains an inherent assumption in much of the literature that digitally-induced public sector change and digital transformation must necessarily be beneficial. This is, however, an assumption that future research needs to assess further. Appropriate methodologies need to be employed to this end. Longitudinal designs (both large-N panel data and thick, small-n analyses that use, for example, process studies) can provide useful evidence on the long-term implications of digitally-induced change. The use of theory-based process studies could provide a better understanding of how organizational factors influence the implementation and outcomes of digital transformation given that incremental change can cumulate over time and result in different degrees of transformative change. Process studies of change are particularly suitable because they examine temporality, activity, and flow (Langley et al. 2013).

The first limitation of our systematic review concerns the selection of studies and subjectivity in data extraction, interpretation, and analysis. This limitation, however, is inherent to any qualitative systematic review (Page et al. 2021), including public management and digital government systematic reviews (Enang, Asenova, and Bailey 2020; MacLean and Titah 2021). We are aware of possible bias and therefore transparently described the search string, eligibility criteria, and databases used to identify the relevant studies. In doing so, we may have inevitably omitted relevant literature that falls outside of these parameters, such as relevant research published in books,

conference proceedings, or consulting reports that may document specific cases of digitally-induced change.

The second limitation concerns our theoretical framework. Due to the skewed representation of incremental and transformative change in the existing studies, the conclusions drawn for incremental change might be better grounded in the literature than the evidence on transformative change given that only a few studies assess larger societal impacts. In addition, most of the technologies featured in this review are established technologies like social media, government websites, or participation platforms. Evidence on the outcomes of emerging technologies, including AI or blockchain, is still scarce and might in the future show other pathways to transformation than those presented in this study. Our conclusions on transformative change and the role of technology need to be tested by additional empirical research.

Regarding subjectivity in data analysis, we used our own analytical categorization, coding, and interpretation, which inevitably influenced our analysis and findings. The specific framing and design of our review may also be incomplete, potentially leaving out important analytical constructs and categories. To address these limitations, we developed a research protocol that includes explicit review questions, search strings, eligibility criteria, and a coding framework, following the checklist required for PRISMA analyses (see Table A1) and justified the decisions made across the different stages of the systematic review process. To address these limitations regarding the omission of relevant studies, we included and reviewed a large number of references (164 records), a number that is significantly higher than the number in other existing reviews in the field. This article thus provides a comprehensive synthesis of the evidence on digitally-induced change in the public sector over the past twenty years focusing on the interaction between incremental and transformative changes in public administrations and society as a whole induced by digitalization.

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Appendices

Table A1. PRISMA checklist (following Page et al. (2021).

TITLE			page
Title	1	Identify the report as a systematic review, meta-analysis or both.	1
ABSTRACT			
Structured summary	2	Provide a structured summary including, as applicable: background; objectives; data sources; study eligibility criteria, participants, and interventions; study appraisal and synthesis methods; results; limitations; conclusions and implications of key findings; systematic review registration number.	1
INTRODUCTION			
Rationale	3	Describe the rationale for the review in the context of what is already known.	2–5
Objectives	4	Provide an explicit statement of questions being addressed with reference to participants, interventions, comparisons, outcomes and study design (PICOS).	3
METHODS			
Protocol and registration	5	Indicate if a review protocol exists, if and where it can be accessed (e.g. Web address) and, if available, provide registration information including registration number.	NA
Eligibility criteria	6	Specify study characteristics (e.g. PICOS, length of follow-up) and report characteristics (e.g. years considered, language, publication status) used as criteria for eligibility, giving rationale.	7
Information sources	7	Describe all information sources (e.g. databases with dates of coverage, contact with study authors to identify additional studies) in the search and date last searched.	6
Search	8	Present full electronic search strategy for at least one database, including any limits used, such that it could be repeated.	6
Study selection	9	State the process for selecting studies (i.e. screening, eligibility, included in systematic review, and, if applicable, included in the meta-analysis).	7–8
Data collection process	10	Describe method of data extraction from reports (e.g. piloted forms, independently, in duplicate) and any processes for obtaining and confirming data from investigators.	N/A
Data items	11	List and define all variables for which data were sought (e.g. PICOS, funding sources) and any assumptions and simplifications made.	N/A
Risk of bias in individual studies	12	Describe methods used for assessing risk of bias in individual studies (including specification of whether this was done at the study or outcome level), and how this information is to be used in any data synthesis.	NA
Summary measures	13	State the principal summary measures (e.g. risk ratio, difference in means).	NA
Synthesis of results	14	Describe the methods for handling data and combining results of studies, if done, including measures of consistency (e.g. I) for each meta-analysis.	NA
Risk of bias across studies	15	Specify any assessment of risk of bias that may affect the cumulative evidence (e.g. publication bias, selective reporting within studies).	24
Additional analyses	16	Describe methods of additional analyses (e.g. sensitivity or subgroup analyses, meta-regression), if done, indicating which were pre-specified.	NA
RESULTS			
Study selection	17	Give numbers of studies screened, assessed for eligibility and included in the review, with reasons for exclusions at each stage, ideally with a flow diagram.	8
Study characteristics	18	For each study, present characteristics for which data were extracted (e.g. study size, PICOS, follow-up period) and provide the citations.	NA
Risk of bias within studies	19	Present data on risk of bias for each study and, if available, any outcome level assessment (see item 12).	NA

(*Continued*)

Table A1. (Continued).

TITLE			page
Results of individual studies	20	For all outcomes considered (benefits or harms), present, for each study: (a) simple summary data for each intervention group (b) effect estimates and confidence intervals, ideally with a forest plot.	NA
Synthesis of results	21	Present the main results of the review. If meta-analyses are done, include for each, confidence intervals and measures of consistency	10–20
Risk of bias across studies	22	Present results of any assessment of risk of bias across studies (see Item 15).	NA
Additional analysis	23	Give results of additional analyses, if done (e.g. sensitivity or subgroup analyses, meta-regression [see Item 16]).	NA
DISCUSSION			
Summary of evidence	24	Summarize the main findings including the strength of evidence for each main outcome; consider their relevance to key groups (e.g. healthcare providers, users, and policy makers).	20
Limitations	25	Discuss limitations at study and outcome level (e.g. risk of bias), and at review-level (e.g. incomplete retrieval of identified research, reporting bias).	24–25
Conclusions	26	Provide a general interpretation of the results in the context of other evidence, and implications for future research.	21–24
FUNDING			
Funding	27	Describe sources of funding for the systematic review and other support (e.g. supply of data); role of funders for the systematic review.	See funding note

Note: Some checks are not applicable as they are designed for a meta-analysis, not a systematic review.