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Defining digital transformation: Results from expert interviews☆

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ABSTRACT

Digital transformation approaches outside the public sector are changing citizens' expectations of governments' ability to deliver high-value, real-time digital services. In response to the changing expectations and triggered by supranational agreements, governments are changing their mode of operation to improve public service delivery, be more efficient and effective in their designs, and achieve objectives such as increased transparency, interoperability, or citizen satisfaction. However, beyond the availability of consultancy reports, there is little systematic insight into the way that public administrators themselves are currently defining digital transformation in their own day-to-day practices, how they are approaching digital transformation projects, and what their expected outcomes are. We provide an empirically-based definition of digital transformation derived from expert interviews and develop a conceptual framework with reasons for, processes to, and expected outcomes of digital transformation in the public sector.

1. Introduction

Digital transformation approaches outside the public sector are changing citizens' expectations of public administrations' need to deliver high-value, real-time digital services. Triggered by supranational agreements, such as the "Tallinn Declaration on eGovernment" (European Commission, 2017), governments are changing their mode of operation in order to improve service delivery, be more efficient and effective in their designs, and achieve objectives such as increased transparency, interoperability, and citizen satisfaction.

Digital transformation in the public sector means new ways of working with stakeholders, building new frameworks of service delivery and creating new forms of relationships (European Commission, 2013). However, beyond the availability of consultancy reports (see, for example, Deloitte's report by Eggers & Bellman, 2015), there is little systematic empirical evidence about the way that public administrations are currently defining digital transformation in their day-to-day practices, how they are approaching digital transformation projects, and what the expected outcomes are. As a matter of fact, terms like digitization, digitalization, or digital transformation are used interchangeably in the literature.

The goal of this article is therefore to extract the meaning that public administrators attribute to the term digital transformation and provide insights into their real-life experiences. Our initial assumption is that we would find a differentiation between the traditional transition from analog to digital processes toward a more holistic transformative approach of digital government. On the basis of the existing digital government literature, we derived a semi-structured interview guide for the expert interviews. Forty interviews were conducted with experts knowledgeable about digital transformation projects between January and May 2018. The experts included public managers on the national, regional, and municipal government levels, IT service providers and enterprises working only for government clients, quasi-government employees from consultancies and, in addition, a representative from the European Commission. The interview guideline addressed topics such as prerequisites, internal changes, and expected outcomes.

In order to investigate digital transformation an interpretative approach rather than a prescriptive approach was used (Miles, Huberman, & Saldana, 2013; Ospina, Esteve, & Lee, 2018). The interpretive (naturalistic) approach to the issue under investigation focuses on the qualities of the entities under investigation, the processes, and the meanings that occur naturally in the environments. This allows us to provide a rich narrative of the participants' view of reality, to explain the research observations and provide conceptual insights rather than a depiction of "realities (….) reduced to a few variables "(Rynes &

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Gephart Jr., 2004, p. 455). To frame our initial exploratory conceptual framework (Schwartz-Shea & Yanow, 2013), the experts' definitions were analyzed following four general questions derived from Glaser and Strauss (1967):

- What are the reasons of public administrations to digitally transformation public service delivery?
- What are public administrations digitally transforming?
- How are public administrations digitally transforming their public service delivery?
- To what end are administrations transforming?

Several rounds of coding and the deep analysis of the expert interviews show that at all levels of government, the demands for digital transformation in public administration are mostly driven by external rather than internal demands, in particular through changes observed in the organizations' environment, technology, and requests made by stakeholders. While experts from national and regional levels of government see the greatest external pressure as coming from the change in technology in the environment and demands made by private sector organizations on public administration to change, public administrators also highlight the changes in technology, but see citizens' demands playing a much more important role. Citizens, businesses, and politicians experience the technological change in their environment, life and work, expect public administrations to adapt accordingly and to provide similar technology in their public service delivery. The majority of experts interviewed stated that public administrations will be digitally transformed by using new technologies, focusing in particular on achieving an improvement of processes, relationships, and services. They also see a change in the relationship between public administrations and citizens as users of digital public services, as well as the relationships within the organizations themselves.

In the following, we first provide the theoretical background of digital transformation. We then describe the data collection and analysis steps. Finally, in an inductive process we derive the findings and discuss them in the context of the existing literature. The paper concludes with a synthesis of the findings and a set of propositions that can be tested in future quantitative analyses.

2. Background

Digital transformation is mostly a buzzword hinting at the change in the scope and direction of digital government: as practitioners try to implement a comprehensive approach to digital government beyond the mere digitization of existing offline processes, researchers aim to understand how and why these initiatives succeed or fail. Digitization efforts represent important improvements for public sector organizations to become more effective and efficient in their processes and outputs (see, for example, Alford & O'Flynn, 2009), but it is increasingly necessary not to simply focus on the advances of available technology.

A recent analysis of the existing e-government literature by Meijer and Bekkers (2015) shows that the focus on the use of technology in public administration and e-government helps to explain what e-government is, analyzing entire systems and on incremental change in terms of "objective knowledge" or "indicators" (p. 241). However, what is missing according to the authors is an understanding the social constructions, the behavior, attitudes and cognitions of individual actors or transformational change. They clearly state that research should consider "explaining how individuals transform government." (p. 243) or "how (…) new technologies transform our social construction of government?" (p. 243) so as to better understand how individual behaviors impact the system they are part of, how they impact change, and how individual interests, values, positions, local and institutional contexts are linked to developments and changes in public administration. We therefore need to set out to understand digital transformation from a whole organization perspective. This includes the notion that IT is not the means to support change, rather, processes, people, policies, and especially leadership need to be fundamentally changed to accomplish digital transformation in the public sector.

2.1. Theoretical frameworks on digital transformation

The literature on the fundamental change processes that can be a result of digital transformation approaches is relatively: mostly related terms such as e-government, digital government or transformational government are used and thereby conflating the meaning of these different approaches. The concepts themselves are interrelated and share a common ground: the examination on how the public sector uses ICTs to enhance service delivery, change organizational processes and culture, as well as its impact on value creation.

Two of the most foundational theoretical works framing the research are Fountain's technology enactment framework and Dunleavy et al.'s Digital Era Governance approach. Fountain's (2004) approach, in short, discusses the impact of technologies on organizations through an institutional perspective. She differentiates between objective and enacted technologies. Objective technology incorporates innovations such as the Internet, whereas enacted technology entails the use, design and perception of those technologies by individuals within the organization. The perception and usage of technology is constrained by institutional arrangements, but enacted technology also influences the organization. The role of technology therefore differs and is dependent on the organization and what individuals within the organization make out of it.

Another framework which evaluates organizational change enabled by technologies is the "Digital Era Governance" approach by Dunleavy, Margetts, Bastow, and Tinkler (2006) and Dunleavy, Margetts, Tinkler, and Bastow (2006). The authors argue that under the influence of the new public management paradigm, technological change enables change in public sector organizations in several ways. Dunleavy, Margetts, Bastow, and Tinkler (2006) and Dunleavy, Margetts, Tinkler, and Bastow (2006) core argument is that technology per se does not change organizations, rather the way organizations work and their use of technologies changes work practices. In addition, Dunleavy, Margetts, Bastow, and Tinkler (2006) and Dunleavy, Margetts, Tinkler, and Bastow (2006) consider the effects of change in technologies in a broader way. They focus on organizational change, organizational culture, and the new ways society handles information and new demands for government services. Both frameworks help us to derive the following elements of digital transformation.

2.2. Elements of digital transformation

Digital transformation, a term adopted from the private sector, is mostly associated with the need to use new technologies to stay competitive in the Internet age, where services and products are delivered both online and offline. Online service transformation is seen as a way to improve the customizability and automation through standardization (see, for example, Andal-Ancion, Cartwright, & Yip, 2003). Others define digital transformation as a way to rebuild business models following the needs of customers by using new technologies (Berman, 2012).

2.2.1. Using technology to transform service delivery

The results of digital transformation efforts are changes in the delivery mode of services, but also new forms of direct interactions with customers, for example, through social media to adapt products and services according to changing customers' needs. This can be seen in the emergence of platform economies where the core business model is to create space for interactions between external producers and consumers, i.e., the value is produced by connecting people. Digital transformation is also made visible through the proliferation of smart products that enable real-time monitoring and updating, and services that transform production processes and customer relations (see, for

example, Tesla updating its cars' software similarly to a phone, Porter & Heppelmann, 2015). In the private sector, digital transformation in its fullest form results in the creation of entirely new business models that undermine existing ways of delivering services, for example, taxi services now delivered by non-professional drivers using Uber as a service that connects to clients via a mobile phone app. It shows that existing channels for delivering services and the actors who are delivering the service are being replaced. Digital transformation is therefore seen as an opportunity for gaining new market shares, entering new markets, but also gaining new customers, and dropping those who are not contributing to the financial bottom-line.

In the public sector literature, changes in service delivery have been mostly analyzed under the term of "e-government". Generally speaking, the focus is not on the creation of new business models but rather on efforts to make service delivery more efficient and accessible to citizens (Meijer & Bekkers, 2015). The concept of e-government has been extensively studied in the last two decades and has many definitions. Rooks, Matzat, and Sadowski (2017) distinguish broad and narrow definitions on e-government. A broad definition focuses on the use of the Internet and ICTs to provide government information to citizens, whereas narrower definitions of e-government highlight the use of ICTs to deliver services to citizens. Other definitions highlight the engagement with citizens through ICTs (Ma & Zheng, 2017; Reddick, 2011).

The transformative effect of e-government on organizations and their environment is still a contested issue. The benefits of e-government focus mainly on the improvement of services and service delivery which leads to increases in government efficiency (see, for example, Cordella & Tempini, 2015; Linders, Liao, & Wang, 2018; Siddiquee, 2016). Stage models that theorize and analyze the development of e-government within public organizations argue that in the latter stages of e-government implementation, administrations shift their focus outside government and take the benefit to their stakeholders into account (see, for example, Bretschneider & Mergel, 2011).

The literature outlined here shows that e-government research focuses mainly on change within government, and that change is mostly directed at changing service delivery from offline to online but is still not concerned with re-designing or re-evaluating the purpose and style of service delivery itself. Moreover, e-government analyses often focus on how innovations in technology are used, most prominently the use of the Internet to deliver services. Those issues raised are not new: Janowski (2015) concludes that e-government only causes changes within an organization, whereas e-governance and policy-enabled electronic governance also transform external relationships. Meijer and Bekkers (2015) criticize that e-government research focuses on explaining incremental change initiated through technology and Tassabehji, Hackney, and Popovic (2016) even argue, that e-government is a relic of New Public Management because of its sole goal to increase efficiency in service delivery. More radical change, in Tassabehji et al. (2016) view, is caused by a change in institutions enabled by technology.

2.2.2. Using technology to transform organizational culture and relationships with citizens

Digital transformation is seen as a change of paradigm and sometimes labelled as a technological revolution (Perez, 2010). These innovative technological developments outside the public sector are changing citizens' expectations of governments' ability to deliver high-value digital services. However, even if expectations are high, digital transformation is seen mostly as a cultural change that has to happen inside the organization and the literature so far has not provided many details on how to orchestrate this transformational change.

At the same time, public administrations are aware of the need to improve service delivery, to be more efficient in order to achieve objectives such as increased transparency, integrity, and citizen engagement (Luna-Reyes & Gil-Garcia, 2014; Nograsek & Vintar, 2014). The use of digital tools allows for changes in the way public administrations deliver their work, communicate, and provide services, but can also have much more extensive impact such as changing the structure and culture of an organization, or engaging and integrating citizens and other partners into the co-design and co-delivery of public services (Bretschneider & Mergel, 2011; Mergel, Schweik, & Fountain, 2009; Sivarajah, Irani, & Weerakkody, 2015).

The change in relationships with citizens and other stakeholders is subject to the literature on e-governance. Meijer (2015) argues that by adopting e-governance, the role of the citizen is more active: citizens and other external stakeholders are seen as co-producers and not consumers of services. Luna-Reyes (2017) analyses how technologies enable extensive citizen participation through the creation of platforms for e-petitioning or use of social media. Other types of research focus on the impact e-governance can have on democracy and democratic representation (see, for example, D'agostino, Schwester, Carrizales, & Melitski, 2011; Dawes, 2008; Lee, Chang, & Berry, 2011).

2.2.3. Value creation as transformation outcome

Berman (2012:6) points out that digital transformation will result in a paradigm shift "characterized by hyper-connectedness and collaboration of consumers and organizations across the gamut of value chain activities: co-design, co-creation, co-production, co-marketing, co-distribution and co-funding." Related to administrative processes, ICTs have the potential to support administrative processes, for example, the coordination between departments, as a study by Cordella and Tempini (2015) finds. Nograsek and Vintar (2014) support this view, and they also find that ICTs can cause changes on a various dimensions such as the organizational culture or structures, at both the organizational and intra-organizational level. Bannister and Connolly (2014) note, that by adopting ICTs in a government organization, the values that underlie the public sector are changed as well. Cordella and Paletti (2018) argue that ICTs have the potential to enable co-production and produces new ways for citizens and stakeholders to engage in value creation.

In the public sector, this type of radical transformation of services toward platforms, smart products, and customer needs can be observed in early glimpses: the transition from paper-based to digital government has already gone through several phases initiated by policy changes, often tied to waves of ideological trends in public policy and public management (Bretschneider & Mergel, 2011). Most efforts, however, need to be labelled transitory – transitioning offline administrative acts 1:1 into online digital services without rethinking the service or the underlying processes itself. Not surprisingly, terms like digitization (downloading forms online), digitalization (filling out forms online), and digital transformation (full service delivery online) are used interchangeably in the literature and usually focus on the first two functions only.

It becomes clear from the literature referenced here that digital transformation (as a term) is not extensively used or elaborated on. The existing research focuses on e-government, e-governance, digital government and transformational government. By defining the concepts, researchers rely on either older definitions of e-government such as, for example, the definition by the UN (United Nations Division for Public Economic and Public Administration, 2001). For example, in a recent study by Gil-Garcia, Dawes, and Pardo (2018), the authors introduce the concept of digital government and define it by using a common definition of e-governance, provided by the UNESCO (2011). Several authors have (re-)conceptualized the terms, for example Janowski (2015) categorizes different concepts by using a 4-stage model. Bannister and Connolly (2011) in their study on transformational government incorporate the concept of e-government in the definition of transformational government but acknowledges that transformational government incorporates a broader change.

Given that digital transformation is not clearly defined in the literature, we have decided to empirically investigate new and upcoming understandings of digital transformation first, instead of deriving a new

definition from the literature. This is in line with a lot of criticism, as for example Coursey and Norris (2008) state that the predictions of the various models on e-government hardly correspond with empirical findings because the concepts' definitions itself lack an empirical grounding. We aim to understand what the current expectations of public servants are when they are in the process of implementing digital transformation projects and what their expected outcomes are.

Our guiding set of research questions is: How are public administrators interpreting the term digital transformation? How are their digital transformation efforts initiated and processed? And, what is their perception of the anticipated results of digital transformation processes?

In the following, we elaborate our methodological choices, our casing strategy, as well as the chosen instruments for data collection and analysis purposes.

2.3. Methodology and methods

The research questions were designed to investigate the research phenomenon in an open-minded way and to understand how public administrators in the context of their work environment describe their approaches to digital transformation, understand the term and its implementation as part of their real-life experiences (Saldaña, 2014). Therefore, we adopt an interpretative stance and aim to understand their perceptions, approaches, and activities in the area of digital transformation (Miles et al., 2013).

Gephert (in: Rynes & Gephart Jr., 2004) emphasizes that the aim of an interpretative approach should not be to "discover truth" (p. 456) but to understand the meanings and concepts used by social actors in their real-life settings, to see how different meanings are held by different persons or groups. Interpretive research is to find, describe, and interpret the meanings that people produce and use in real settings rather than producing quantitative facts to evaluate hypotheses. There are several interpretivist approaches, three frequently-used are phenomenology, discourse analysis and grounded theory (Starks & Brown Trinidad, 2007). Discourse Analysis is often used to study social interaction and the social context in which it occurs, and is used in social sciences, organization science, political science (Alvesson & Karreman, 2000) as well as public administration (McSwite, 1997). It is used to describe, interpret and explain relationships and social practices (human relationships but also large scale relationships in the economy and in organizations) by analyzing language and natural talk (Potter, 1998). Phenomenology involves the use of thick descriptions and close analysis of lived experience to understand how meaning is created through embodied perception and contributes to deeper under-standing of lived experiences (Starks & Brown Trinidad, 2007). Grounded theory aims to develop an explanatory theory of basic social processes studied in the environments in which they take place (Glaser & Strauss, 1967). Grounded theory examines social processes (causes, contexts, contingencies, consequences, covariances, and conditions) to understand the patterns and relationships among these elements Glaser & Strauss, 1967). As the aim of our research is to examine concepts (social processes) on the basis („ground") of data provided by experts (those who experience the phenomenon under different conditions), we used a grounded theory approach to study the dimensions in digital transformation.

2.4. Data collection instrument

As the method of inquiry, we chose expert interviews to collect data directly from those subjects involved in digital transformation processes with a broad overview of governments' decisions and in-depth insights about implementation actions. Bogner, Littig, and Menz (2009) define an expert as a person with technical, process and interpretative knowledge in relation to their areas of expertise. Experts have more than just systematic organized knowledge, they also have deep knowledge in specific experiences which result from their actions, responsibilities, obligations of the specific functional status within an organization. Similarly, Meuser and Nagel (1991) see an expert as a person responsible for a concept, an implementation or ability to solve a problem, as someone who has relevant factual knowledge, aggregated or specific knowledge about processes, group behaviors, strategic decisions but also has knowledge, (general) information or privileged access to information. This type of knowledge is often implicit or difficult to articulate, and therefore we need a specific approach to interviewing in order to access the experts' knowledge. With the use of expert interviews, we are not interested in their individual biographies, but in their viewpoints, and, as representatives of a larger domain, such as the organization, to their privileged access to decision-making processes and people.

2.5. Casing

Probability sampling is inappropriate for qualitative research as the aim in not to estimate the incidence of phenomena in the wider population (i.e., be statistically significant) rather the actors selected have to reflect particular features of groups within the sampled population, specific criteria or purposes (Ritchie, Lewis, Nicholls, & Ormston, 2013). The selection enables the detailed exploration and understanding of the issue being investigated, and the criteria may be sociodemographic characteristics, or may relate to specific experiences, behaviors, roles, etc. This is known as purposive sampling, that is, members of a sample are chosen to represent a location or type in relation to a key criterion. With purposive sampling, decisions about which criteria are used for selection are made in the early design stages of the research and informed by a range of factors including the principal aims of the study, existing knowledge or theories about the field of study, hypotheses that the research may want to explore gaps in knowledge about the study population. As Ritchie et al. (2013) point out, the „purposive "selection involves quite deliberate choices, but should not suggest any bias in the nature of the choices made.

To ensure precision and rigour, the sample selected is defined by its ability to represent salient characteristics and features of relevance to the investigation. Thus, the first step is to decide about the sample by virtue of their proximity to the research question, those who are able to provide the richest and most relevant information. The researchers investigated a small group of actors from public sector organizations that are most relevant to the topic under investigation. Therefore, we selected experts that allowed access to in-depth insights from subjects who are involved directly in digital transformation projects and presumably exposed in their real-life settings to the core phenomenon we are investigating. This casing method allows us to generate the data necessary to determine the different categories or dimensions of the main concept from the experts' perspective and to delineate any differences (Ragin, 2009).

Specifically, the selection of the experts was based on their known national status in the area of digital transformation in public administration. The experts selected are publicly known to have a high-level overview of the topic, are known to have made statements about the general direction of digital transformation in their country, and have special knowledge and experiences based on their functions or responsibilities, for example as the Chief Information Officer of their country, as an expert for a set of countries, or based on their involvement in designing digital agendas and strategies. The research team agreed that experts could come from different levels of government (national, regional, municipal) or other organizations involved in public sector digital transformation projects (e.g. government-owned enterprises, IT service providers, consultancies).

The success of any research project based on expert interviews depends on the number of interviews conducted and the quality of the experts interviewed: Glaser and Strauss (1967) suggest to conduct a minimum of least ten interviews in order to adequately analyze the

Table 1
Expert interviews by type of organization and country.

Type of organization	Country												
	DK	ES	IT	AT	DE	EE	BE	FR	US	EC	IS	GR	Σ
Government													
Supranational										1			1
National	3	2	1	3	4	1		2				1	17
Regional		2	1	1				2					6
Municipal		1	2	1							1		5
Related sectors													
NGO/NPO			1					1					2
Consultancy		1	1		1				1				4
Government-owned enterprise			1										1
Private sector	2		1				1						4
# of interviews by country	5	6	8	5	5	1	1	5	1	1	1	1	
# of interviews													Σ40

patterns and differences across subjects. In addition, Saldaña (2013) argues for conducting 20–30 interviews to gain a deep understanding of the phenomenon. As the sample originally selected and agreed on was quite small, snowball or chain-sampling methods were used to extend the size of the sample. These are approaches which involve asking people who have already been interviewed to identify other people they know who fit the selection criteria. It is a particularly useful approach for dispersed and small populations, and where the key selection criteria are characteristics which might not be widely available. Thus all the researchers relied first on the known experts in their countries and then used chain referral approach to further relevant experts from the same area (Biernacki & Waldorf, 1981).

In total, 40 experts from 12 countries were interviewed. The majority of the experts came from Denmark (5), Spain (6), Italy (8), Austria (5), Germany (5) and France (5) although single experts from Estonia, Belgium, US, Israel and Greece as well as from the European Commission were also included because they were recommended by interviewees (Table 1).

Of the 40 experts, 29 came from government (ranging from national level to municipal level), including one from a supranational government level (European Commission), six experts came from related sectors, this includes consultancies (4) that specifically advise governments and non-profit-organizations (2). Five experts from private organizations were also interviewed, one of these is a government-led enterprise, these are organizations specialized in supporting or providing services in the public sector (e.g.in Italy) or were previously public but then privatized (e.g. in Denmark). These private sector respondents are main IT service providers or government-owned enterprises who can be classified as quasi-government actors because they advise public administrations on policy and its implementation. Even these organizations are from the private sector, they play central roles in the digital transformation of the public sector, so the experts were seen as being able to provide interesting and relevant perspectives on the topic under investigation. As can be seen from the distribution of the experts' roles in their respective organizations (see Table 2), the majority (37) of the experts were from higher or senior levels including commissioners, directors (this category also includes CEOs and CIOs), head of departments, government advisors, mayors and managers.

When describing their role and expertise, 24 experts mentioned their involvement in specific digital transformation projects. These included implementation, strategy or policy development related to digital transformation. Experts were, for example, involved in projects that focused on the strategic coordination and development of national projects and experiments in Italy, Austria or Estonia, or at the municipal level, such as the digital agenda of the City of Milan or Vienna. Other experts described their involvement in the development of policies for example at national level in Spain or supranational level (European Commission). Consultants and experts from NPO/NGOS indicated that in their role, they would, for example, assist in the development of policies or the implementation of public sector projects. Table 3 provides an overview of the involvement in digital transformation projects:

2.6. Data collection procedures

The expert interviews were conducted face-to-face, using online video tools (e.g. Skype), or by telephone. Each of these different ways of conducting interviews, although always characterized by synchronous communication and representing established and accepted methods in most research disciplines, has advantages and disadvantages (Hanna, 2012; Rowley, 2012). Face-to-face interviews have the advantage that the interviewer and interviewee are able to gage social cues, which may be partially lost in a synchronous online-video interview, and to an even greater extent when conducting the interview by telephone. In addition, we need to point out that only some of the interviews were conducted in English, others in local languages that were then translated into English. Some of the interviews were conducted in English even though this was neither the interviewer's nor interviewee's first language. Thus, some of the nuances of the language may have been lost during the interview or the translation of the transcripts.

The research team conducted the interviews between March and May 2018. For this research project, contacting the interview partners depended on several factors, such as the interviewees' relationship and connection to the interview partners, level of formality and the interview partners' hierarchical position. The research team used a shared email template and interview protocol to contact and invite the experts, these were translated into local languages if deemed necessary by the research team. The template included information about the research project, the interviewer, as well as the date, place, duration of the interview. The authors decided whether to contact the expert by email or telephone first, and ways to follow-up. Prior to the interviews, the experts were asked for permission to record the interview for accuracy purposes. Interviewees were ensured anonymity by declaring that their personal data will not be made available to any third parties or made public. At the end of the interview, experts were also asked if they would like to add any comments and insights they thought appropriate to the interview and topic, as well as suggest further experts and potential interviewees.

The interviews were recorded and transcribed verbatim without additional clues and the sole focus on the spoken word (McLellan, MacQueen, & Neidig, 2003). The text transcripts of the interviews are stored on a secure university file server of the first author. Identifying labels were removed from the file names.

2.7. Instrument: interview guideline

The questions in the interview guideline were derived from the existing literature and additional questions were added if they helped answer the overall research question. The questions in the guideline were framed in an open-ended nature and no “right” or “wrong” answers were expected. The guideline consisted of a total of 14 questions and included the four following themes:

- *Part 1:* General questions about the interviewees' background in order to understand his or her expert status.
- *Part 2*: Questions about digital transformation strategy. Additional questions focused on the extent of digital readiness, public administrations' general mindset toward digital transformation and what types of skills are necessary for leaders, civil servants, service providers, and public sector consultants in order to move toward digital transformation.
- *Part 3:* The role of citizens in digital transformation, as well as the necessary skills and competences.

Table 2
Experts' roles across the sectors and levels of government.

	Government				Related sectors		Private		Σ
	EC (n = 1)	Nat. Gov. (n = 17)	Reg. Gov. (n = 6)	Mun. Gov. (n = 5)	NGO NPO (n = 2)	Consultancy (n = 4)	Gov.-owned enterprise (n = 1)	Private orgs (n = 4)	
Roles									
Commissioner councilor	1	1							2
Director/CEO/CIO		7	1	2	2	3		1	16
Mayor or deputy mayor				2					2
Advisor		4	1			1			6
Head of department/IT department		3	1					2	6
Manager		1	2				1	1	5
Officer		1	1	1					3
									Σ40

Table 3
Experts' involvement in projects, implementation, strategy and policy development.

	Government					Related sectors		Private sector	Σ
	EC	Nat. Gov.	Reg. Gov.	Mun. Gov.	Gov.-owned enterprise	NGO NPO	Consultancy	Private Orgs	
Strategy development		3	2	2	1				8
Policy development	1	1	1				1		4
Implementation		2	1	1			1	3	8
Project involvement		3				1			4
									Σ24

- *Part 4:* The final section included statements about the future of digitally transformed public administrations.

For the purpose of this paper, we analyzed one question of part 2 of the interview outline. The experts were asked for their definition and understanding of digital transformation in public administration.

2.8. Data analysis

For the data analysis procedure, the research team used a grounded theory-like approach. Grounded theory is a systematic approach of inquiry that is inductive, comparative, iterative and interactive (Glaser & Strauss, 1967). The analysis of the data gained from the interviews was based on Glaser and Strauss' constant comparative method that is to lead to "generating and plausibly suggesting (…) many categories, properties, and hypotheses about general problems." (Glaser & Strauss, 1967:104).

This data-driven procedure was chosen to look for general patterns in the data across levels of government and countries, and we aimed to remain open to all possibilities that emerged from the data without being influenced too much by pre-existing theory, previous empirical research, and our own expectations. We followed Miles et al. (2013) two-phased coding approach:

Phase 1: During the first cycle of the data analysis, a deductive or closed coding approach (Saldaña, 2013) was applied. This allowed us to break down the data into discrete parts. We assigned labels to extract the relevant paragraphs from the transcripts that included answers to the research questions.

Phase 2: Following extensive discussions among the researchers involved in the analysis of the data, we decided to expand the list so that the following subcodes emerged from the data; the subcodes can be characterized as process codes displaying the reasons and conditions under which what artifacts are how transformed and to what end:

- Conditions: Why are public administrations transforming?
- Dimensions/characteristics: What will be transformed?
- Processes: How are public administrations transforming?
- Output, outcome, and impact: To what end are public administrations transforming?

In order to operationalize the codes, we expanded our coding in phase two and applied an "in vivo" coding approach (Miles et al., 2013:74). This step included a round of coding in which we used words or phrases from the experts' own language to gain a broad overview of how the experts talk about each of the codes.

Particularly when coding for the last code, we placed emphasis on distinguishing between output, outcome and impact: Initially, the research team derived the meaning of the codes linguistically, compared our understanding with the dictionary terms, and then justified the coding approach with the existing literature. As a result, we define the code *output* as follows: Any quantitative results that can be counted (e.g., number of new services). Here we follow Boyne (2002:18) definition of output: "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)."

However, the literature is much less clear on how to distinguish outcomes and impacts. Oftentimes, these two terms are interchangeably used, e.g., Alford and O'Flynn (2009):175): *"Outcomes, that is, impacts upon those who enjoy the value/good in question or upon states of nature important to those people."* However, Bretschneider et al. (2004:310) define outcomes as "[…] *broader results from organizational activity that are typically called 'outcomes'.*", a definition we subsequently used for our own coding process. Our own code *outcome* is therefore defined as: the effect of an action, the consequences of an implementation or change (such as simplicity or accessibility). We distinguish *impact* (from outputs and outcomes) as has having a longer-term effect than measurable outputs or more immediately distinguishable outcomes. Terms such as value creation are contained within the subcode impact as well

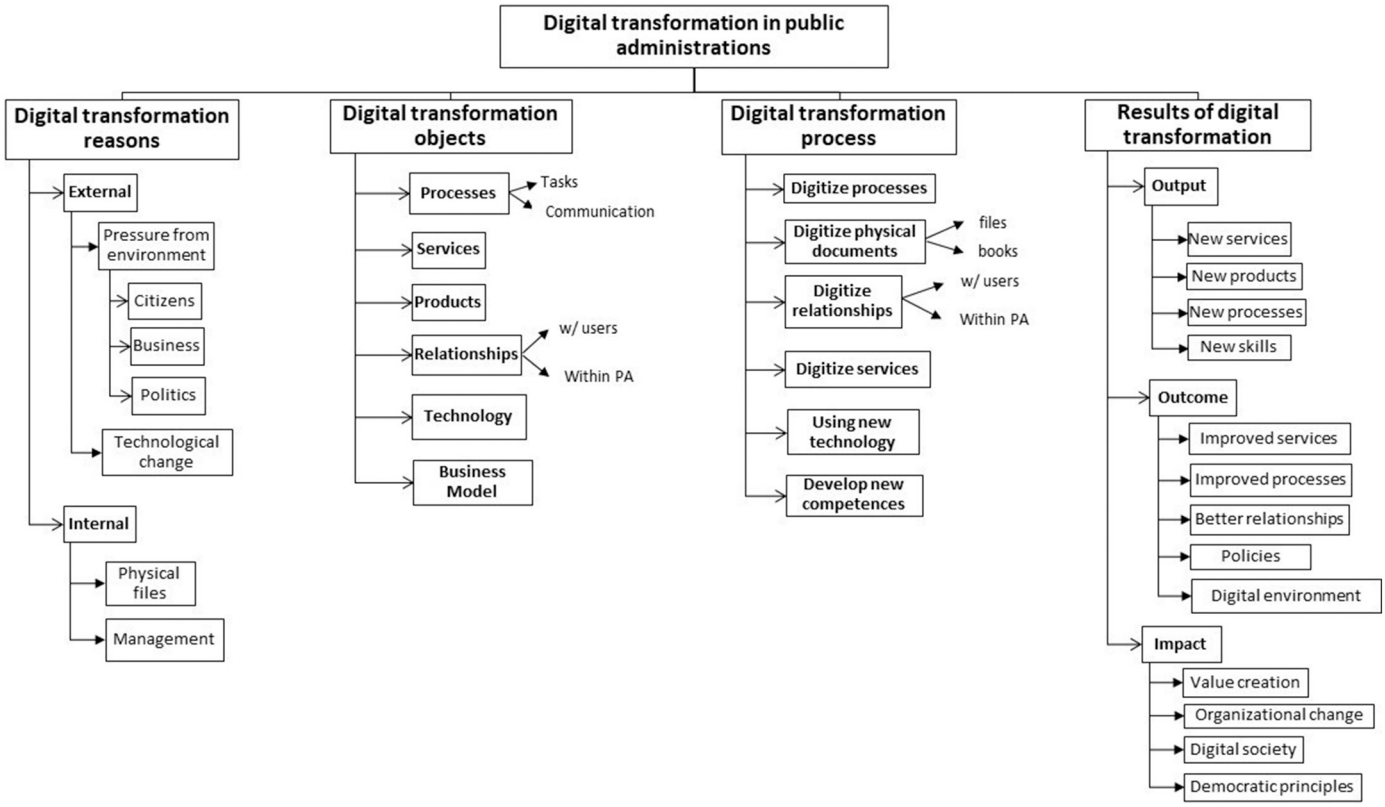

Fig. 1. Coding taxonomy for derived from digital transformation expert interviews.

as any long-term effects. The full codebook is available in the Appendix I.

In the following, we discuss the results of gained from each coding dimension, focusing on the contextual conditions, reasons for transformation, procedures of digital transformation, as well as expected outputs, outcomes, and impacts. In the next section we provide our coding taxonomy, the conceptual synthesis map is in the summary.

3. Results: defining digital transformation in the public sector

The results in this section are drawn from the coding and analysis of the transcripts of the 40 interviews conducted with experts on digital transformation in the public sector. We organize our findings along the four dimensions derived from the coding

1. What are the reasons of public administrations to digitally transformation public service delivery?
2. What are public administrations digitally transforming?
3. How are public administrations digitally transforming their public service delivery?
4. To what end are administrations transforming?

The following coding taxonomy (Fig. 1) emerges as a result of the in-depth coding process; each of the four dimensions are then subsequently discussed:

3.1. Reasons for digital transformation

The results here consider the reasons for transformation, and the reasons for having to change may either be understood as outside (external) factors, or stem from within the organization (internal).

Reasons for change:	%
I. External	
External pressure from the environment	12.7
Citizens	14.9
Businesses	17
Politics	4.3
Technological change	34
II. Internal	
Physical files	2.1
Management	14.9

Numbers in percent.

Most interviewees pointed out that the reason for change comes from the external environment (83%), rather than from internal pressure to digitally transform their own processes and the services they deliver (17%). One public administrator from Denmark stated that they feel the pressure to adjust their operations to outside pressures:

> *"That is the kind of digital transformation, in the outside world that we have to respond [to]."*
>
> Denmark, National Government

The technological change in the public administration's environment is seen as one of the main reasons (34%):

> *"If you look at the latest developments, the administration will of course have to make this change from fixed laptops and PCs to mobile devices."*
>
> Austria, National Government

Other experts state more specific external reasons such as pressure coming from citizens, businesses, or political actors, as the following expert states:

"and then there is the other kind of digital transformation, and, that is the kind that has come from the outside, and having consequences for us"
Denmark, National Government

Internal reasons are far less often mentioned by the experts interviewed for this study (17%). If they did mention them, they focus on a need recognized by the management itself or to improve the management of the organization:

"(Digital transformation) means modernization or the renewal of business processes and business models supported by IT, so business processes and business models are at the centre of attention and not IT"
Austria, Municipal Government

3.2. Digital transformation objects

Public administrators highlight different digital transformation objects, including the organization's use of technology, its business model, internal processes, workflows or procedures, public services offered to stakeholders or the products created, including the production and dissemination of content.

Digital transformation objects.

Processes	41.5%
Services	23.1%
Products	3.1%
Relationships	24.6%
Technology	3.1%
Business model	4.6%

The main areas to be transformed are processes (42%), as one exemplary statement shows: *"Digital transformation, (…) that means, we start doing something in a different way"* (Denmark, Private Enterprise). Most experts spoke about processes in general that need to be transformed, but in some cases the reasons given specifically focus on the tasks (3%) or on communication (3%). Experts from nearly all countries mentioned the need to address the processes in public administrations:

Well, as its name suggests, it is both transformation and digital; that is, it is the use of digital technologies to produce or to achieve great changes in the services provided to the citizens, and I stress "great changes" because it is not to make small improvements, but to change the way the administration works, the way it provides services and even the services provided.
Spain, National Government

Other areas that need to be considered are relationships (in general, with users and within the public administration, 25%) and services (23%). An immaterial and difficult to measure object to transform is the relationship between a public administration and users that could be outside or within the public administration:

"Efficiency, speed, responsiveness, availability 24/24, that's it. And a relationship to the administration more distant, or closer. Some say a more distant relationship because dematerialized. Others say, a stronger relationship since it is easier to access and you do not have to wait at counters."
France, Regional Government

To a lesser extent, the experts mentioned specific products (3%), business models of an organization (5%), or technology (3%) that will be transformed.

3.3. Digital transformation processes

Digital transformation processes.

Digitize processes	29.8%
Digitize physical documents	3.5%
Digitize Relationships	3.5%
Digitize services	5.2%
Using new technology	54.4%
Develop new competences	3.5%

The processes of digital transformation describe how public administrators are approaching the transformation of the objects mentioned above. These processes include, for example digitizing existing processes, forms/documents and services, but also the relationships with their stakeholders. This includes for example the use of big data, data-driven and user-centric approaches. When it comes to public services, public administration experts state that the digitization efforts offer the opportunity to rethink the existing processes, services, and products they have once created for the offline world:

"…is not only the digitalization of processes, which is of course necessary, but also reinventing the whole activity using the opportunities of technology."
Italy, Consultancy

When entering a digital transformation process, one third of the public administrators highlight that they are able to change the workflow of their existing procedures and are able to rethink them in the process:

"I see digital transformation for us, where we choose to digitize, our workflows, or procedures that used to be, on paper, or physical work flow."
Denmark, National Government

and

"Digitalization means modernization or the renewal of business processes and business models supported by IT, so business processes"
Austria, Municipal Government

In addition, for an organization or public administration to be digitally transformed, new competences or skills or educational measures may be necessary. However, only two experts mention that digital transformation occurs by developing new competences:

"But then you need people…, look I might be wrong, but my experience is that in many countries the people that are working in public administration, they have been working since more than 20 years. […] I'm not claiming that they are not good because of that, they are probably, oh, many of them are excellent professionals. But they are used to something which is not useful anymore. Or might become not useful anymore. So, some of them might have the necessary, necessary flexibility to take enthusiasm and learn, engage in him, or herself in this, in this new way to do things. But, but the new mindset especially, not eternal perfect processes with the standard like place, etcetera."
Italy, NPO

3.4. Results of digital transformation

Experts describe a series of results that can be achieved through digital transformation. In our analysis, we are dividing them into output, outcomes, and impacts, these are seen as the long-term effects of digital transformation on the organization or its ecosystem as a whole.

For the purpose of this paper, we define *output* as a quantitative result, that is, one where the results can be counted or described numerically,

following Boyne's (2002) definition: "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 result of digital transformation outputs therefore includes concrete and measurable services, products, processes or skills.

We define *outcome* (Bretschneider et al., 2004) as the effect that results from an action, or the implementation, of a new measure, thus describes the consequences an implementation may have on services offered, changes in processes as well as the quality of the organization's relationships with others. This includes achieving outcomes that relate to the improvement of services, processes, relationships (such as increased simplicity, accessibility, quality, advantages, efficiency, speed, inclusion, responsiveness, competitiveness, security, transparency) or contribute to the development of (better) policies and the digital environment (e.g. by being contributing to the digital infrastructure or being part of the digital environment).

Lastly, *impact* includes the change of the whole organization or public administration (public administrations achieve better internal/external communication, to provide better workplaces or have a better public image), how transformation leads to the creation of more or better (public) value, contributes to digital society (such as providing the conditions for a digital society, providing benefits for citizens, contributing to society, culture or the economy), or strengthens democratic principles (e.g. supports citizen inclusion, regulation, legal and political frameworks) (Alford & O'Flynn, 2009).

	Mentioned in percentage
Output	
New services	6.5%
New products	1.1%
New processes	2.2%
New skills	0%
Outcome	
Improved services	19.6%
Improved processes	8.7%
Better relationships	4.3%
Policies	1.1%
Digital environment	6,3%
Impact	
Value creation	9.8%
Organizational change	27.2%
Digital society	8.7%
Democratic principles	10.9%

In the perception of the experts included in our sample, the main result that digital transformation can achieve focus on measures that have a long-term impact (56%) or those that lead to a specific desired outcome (34%), rather than measurable, concrete output (10%).

The main aims of digital transformation are seen as broader *impacts* on public administrations as an organization, society and democracy. Of the three, organizational change as a result of the digital transformation process is seen the most important overall result as well as the impact to be achieved (27%):

> *"Digital transformation is something like about the opportunity to change by using also technologies. So, a change in the way you are doing your business, or the relations inside some organizations, and this change is possible by technology, but not only by technology."*
>
> Italy, Regional Government

In addition, digital transformation can contribute to the implementation of democratic principles (11%): Citizens might more willing to appreciate their citizenship if their satisfaction with government increases through the use of improved public services:

> *"Achieve more usable, more interesting services, to strengthen the democratic appreciation of citizenship."*
>
> Spain, Consultancy

In terms of the *outcomes* that can be achieved through digital transformation, experts focused mainly on the role of improved service provision (20%):

> *"Dramatically potentially improve services to citizens, improve speed, reduce… I mean increase productivity and efficiency, but reinvent all sorts of areas (…) from education to transportation."*
>
> US, Consultancy

Experts understand *output* mainly in terms the development of new products, new processes, but most of all, new services (7%). As one Italian consultant states: *"So a digital transformation occurs when there are especially new services, not only the same processes in a digital way."*

3.5. Summative synthesis

From the findings described in the previous section, we derive the following synthetic pattern map that summarizes our findings in Fig. 2 and serves as the basis for the following propositions. The map brings together the main themes derived from our analytical process and is based on Miles et al. (2013) suggestion to order the findings in a sequential approach:

Results from the expert interviews show that public administrations aim to show that they can respond and adapt to changes in the environment, such as citizens' increased expectations for efficient and effective online services by adopting new technology. Public administrations as organizations are fundamentally changing and aim to provide services online that are easy to use, secure and reliable. We therefore derive the following proposition:

Proposition 1. When external pressure pushes public sector organizations to engage in digital transformation projects, they focus on digitizing object, such as artifacts and processes (including public services, forms, books, or other artifacts).

In addition, when public administrations are acting on their own – due to internal pressure or public servants' dissatisfaction with the current way services are delivered - digital transformation does not only focus on citizen-oriented artifacts and processes. Instead, public administrations are entering into a change process that captures the bureaucratic and organizational culture. Leaders,' public servants' and citizens' competences and mindset toward a public service delivery need to be addressed and changed so that an approach that favors satisfaction with services can be achieved. Public administrations then focus not on the changing products of service delivery, but on changing the relationships with citizens.

Proposition 2. When internal pressure pushes public sector organizations to engage in digital transformation projects, they focus on change of the bureaucratic culture and organization to deliver public services.

Organizational change occurs through awareness of the users' demands and the new technology. Changes in the environment and the stakeholders' demands for change are seen as the main drivers for change in the public administration sector, and although the results reveal that public administrations are aware of the need to adapt to the new demands and technologies, as well as provide better services there still remains a conservative and cautionary approach that runs counter to innovative business approaches and stakeholders' expectations. We therefore suggest the following propositions that highlight that only internal changes in the bureaucratic culture and external relationships might lead to change:

Proposition 3a. A change in the bureaucratic culture will lead to a change in the awareness of citizen needs and subsequently to a change in the type of relationship public administrations maintain with their stakeholders.

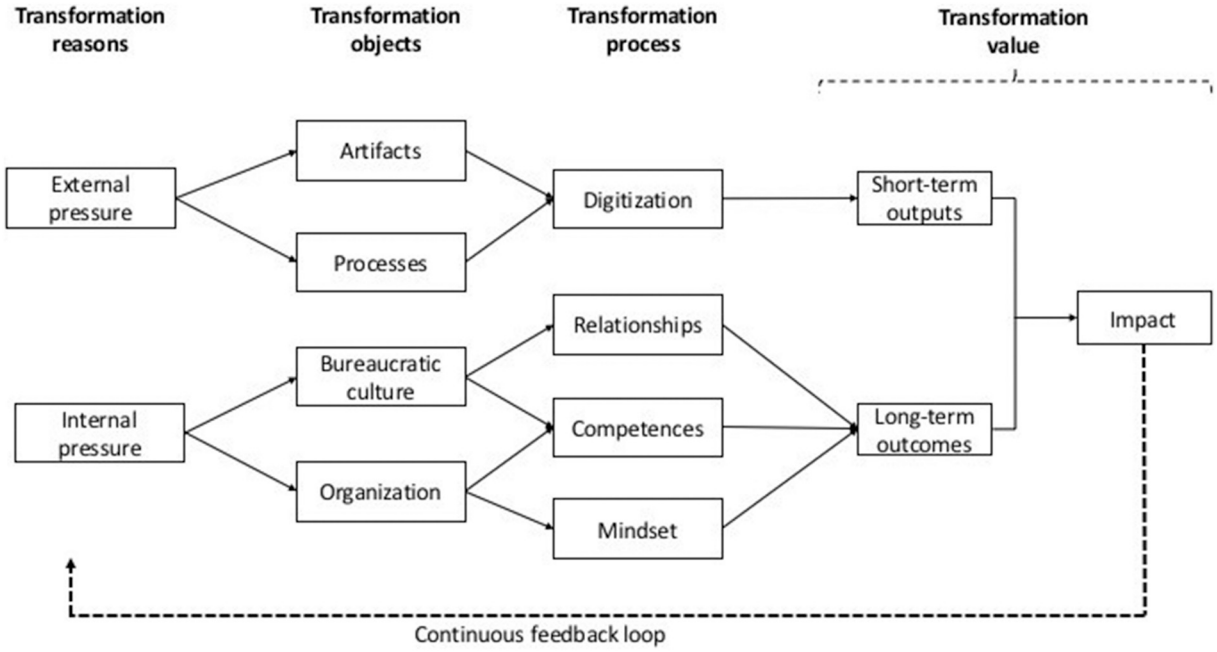

Fig. 2. Procedural pattern map of synthetic code.

Proposition 3b. In parallel, a necessary condition for a lasting change within the organization and bureaucracy is a change in the mindset and competences of the public servants.

One of the most difficult issues in digital transformation is the formulation of a goal, aim, or an end status that can be achieved. The analysis of the results shows the need to clearly differentiate between outputs, impact, and outcomes. The casual and interchangeable use of these terms used by experts and researchers makes it difficult to establish what digital transformation leads to in both the short-term and long-term. In addition, it makes it difficult to evaluate whether the changes have been implemented and what the consequences of change are. The results gained here show that digital transformation is mainly understood in terms of impact, which is often a long-term and addresses qualitative rather than quantitative dimensions that may be difficult to measure.

Proposition 4. When digital transformation leads to a short-term increase in output in terms of number of services changed, longer-term change does not automatically follow. Instead, public administrations have to invest in achieving permanent efficiency and transparency gains that enable the democratizing nature of digital public service delivery long-term.

The digital transformation of public administration is dominated by an approach based on technological determinism, that is, that the use of digital tools and digitization of processes leads to improved processes and services, the organization's ability to change, and has further positive benefits such as reducing costs, contributes to society and strengthens democratic principles. It is therefore necessary to consider and evaluate to what extent technology is able to fulfill such aims as well as to establish what the further effects and consequences that follow the implementation of tools and changes made.

In addition, while digital transformation of the public sector promises change, do these always lead to the desired improvements? Holistic change requires organizational change that is enabled by the emergence of new technologies. Our study shows that it is necessary to change services and organizational processes from analog to digital, but this transition leads to outputs as, for example, new services. In order to achieve long-term effects as an improvement in service delivery, or an increasing accountability or responsibility of public sector organizations, more in-depth organizational change is necessary. This organizational change incorporates a change in bureaucratic structures and cultures. To sum up, the role of technology is crucial to trigger the beginning of transformational processes but is not sufficient to establish long-term effects. Instead, it might trigger review and revisions of organizational change processes again:

Proposition 5. As technological development continuous, digital transformation needs continuous revisions and improvement. An end state is not achievable, instead, a continuous feedback loop will help public administrations revise their public service delivery.

4. Discussion and conclusion

This study set out to bring clarity to the existing digital transformation literature that so far has not produced a shared definition of the term digital transformation. As a matter of fact, terms like digitization, digitalization, and digital transformation are used synonymously with little attempt to distinguish meaning and use in practice. Here we contribute an empirically based definition of digital transformation that others can use to test at larger scale.

The results presented here from expert interviews reporting their work practices show that it is necessary to consider digital transformation as a comprehensive organizational approach rather than one that merely makes forms available online or the transition from analog to digital public service delivery. Digital transformation is a process that is heavily influenced by external drivers, such as the use of new technologies by stakeholders of public administrations. While experts have a sense of what the potential end result of digital transformation might be, they are rarely able to highlight how a digitally transformed public administration might look like. This reveals that digital transformation is considered a process without an end status, unlike previously designed e-government projects with a start and an end date, a measurable and defined end status, as well as a fixed budget. Instead, digital transformation is a continuous process that needs frequent adjustments of its processes, services, and products to external needs. It will likely result in improved relationships between public administrations and its stakeholders, increased citizen satisfaction, and, most importantly, a change in bureaucratic and organizational culture.

4.1. Contributions to the existing theoretical literature

The role of technology in transforming public sector organizations has been subject to many research streams in the past. Most of the empirical research is found in the e-government literature, that relies on theoretical stage models to explain e-government transformation processes (see Meijer & Bekkers, 2015 for a comprehensive overview of e-government studies). However, other types of theoretical models that assess a broader picture of the organization of public administration and its work practices provide a better fit to our findings as they address a broader set of aspects on the role of ICT than the research stream on e-government does (Dunleavy, Margetts, Bastow, & Tinkler, 2006; Fountain, 2004). In the following, we compare the propositions we derived from our findings with the two dominant theoretical frameworks that were introduced in the background section of the paper.

Proposition 1 and 2 deal with how internal and external pressure leads to transformation. Dunleavy, Margetts, Tinkler, and Bastow (2006) rely on two sources of pressure that lead to change in the organization. On the one hand it is necessary to reverse and develop the changes in government that were produced by the reforms under the New Public Management paradigm, as for example the fragmentation of government agencies and outsourcing core government functions to the private sector. Secondly, business already adopted the new information technologies and therefore have different demands for government and administration. Fountain (2004) does not extensively address internal and external pressures that initiate organizational change but mentions that public organizations start to use the new information technologies in different ways, which can be interpreted as sort of an external pressure. In contrast to those ideas, we have identified that the type of pressure influences the way digital transformation is carried out, as external pressures cause the digitization of services and processes whereas internal pressures initiate a more holistic change of the organization, such as the change in organizational culture.

Proposition 3a, 3b is about the internal conditions of the organization that are crucial to implement change. We identified the organizational culture (Proposition 3a) and individual competencies and mindset (Proposition 3b) as important for digital transformation. Both, Dunleavy, Margetts, Tinkler, and Bastow (2006) and Fountain (2004) analyze cultural and individual factors. Dunleavy, Margetts, Tinkler, and Bastow (2006) stresses that in Digital Era Governance the interaction between government and external stakeholders changes. This happens through simplification and re-engineering of service delivery processes. Individual competences and mindsets are of minor importance in Dunleavy et al.'s framework: they rather focus on how the organization changes as a whole, however they reckon that cognitive abilities play a role in the change processes of Digital Era Governance. In Fountain's (2004) approach, the role of individuals is more important. She argues that only through the technological perceptions of individuals change can be introduced into the institutions. Organizational culture matters for Fountain as well. Nevertheless, she conceptualizes organizational culture as an external indicator of the organization's institutions and not, as we do, as a precondition for long-lasting transformative outcomes. Dunleavy, Margetts, Tinkler, and Bastow (2006) address a changed organizational culture as an outcome or by-product of Digital Era Governance. Our contribution to theory is, that a change in culture, skills and mindset have been identified as an important condition to make digital transformation last.

Proposition 4 is about the interaction of digital transformation outcomes. The argument is, that the mere digitization of services does not automatically lead to a broader change in administration, it is the active role of the organization that achieves this long-term change. In Dunleavy, Margetts, Tinkler, and Bastow (2006) view, the change that digital era governance brings, mostly affects society and not the individual organization. They state that change is not the incorporation of different technologies in government organization, instead it is reflected in the way information is dealt with. They propose three analytical themes that capture this broad change: reintegration, needs-based holism, and digitization. Fountain's (2004) view on the outcomes of change are that they are necessarily fuzzy and hard to determine, which is due to the high individuality of how organizations use different technologies. The main difference between Dunleavy and Fountain is, that Dunleavy, Margetts, Tinkler, and Bastow (2006) considers society as a whole as the target group of change, whereas Fountain (2004) remains within organizational boundaries. We connect these concepts by arguing that internal organizational change (change in processes and service delivery) is necessary to transform the society and, more importantly, citizens that are the main target of governmental services.

The final Proposition 5 argues that through constant revision of the transformation outcomes already achieved, the stability of the change increases. Dunleavy, Margetts, Tinkler, and Bastow (2006) propose a cyclical pattern of interaction between New Public Management and Digital Era Governance reform ideas, so that old government structures produced by New Public Management are gradually changed by Digital Era Governance reforms. Fountain (2004) introduces the feedback loop by stating that the outcomes produced by enacted technology itself influence the institutions internal and external to the organization. The changed institutions then also changes how technology is used by the organization. As a result, external relationships are less important than in Dunleavy, Margetts, Tinkler, and Bastow (2006) and our findings. Furthermore, we observe a cyclical interaction: the rise of new internal and external demands through the use of new technologies, lead to new public services and organizational processes that in turn lead to increases in internal and external pressures to innovate.

Compared to the two dominant perspectives of technology-enabled organizational transformation, it might seem that our findings only repeat what has already been said before. This is true to an extent, however, especially by explicating and supporting this with empirical evidence, we are providing an extension to the perspectives formulated by Dunleavy, Margetts, Bastow, and Tinkler (2006) and Dunleavy, Margetts, Tinkler, and Bastow (2006) and Fountain (2004). We confirm Fountain's framework by showing the change in relationships and organizational culture: in Fountain's view a manifestation of an institution that will result in long-term outcomes is crucial for a substantial transformation. Furthermore, we expand the organization's environment by considering citizens as important stakeholders for transformation and include reasons why organizations change. We assess the role of technology in a simpler and maybe more limiting way because we argue that technology is the trigger of change and influences organizational behaviour. The organization is not influenced by the enacted technology itself, instead it is changed through the integration of technology into the service delivery process. We define the results as output, outcomes and impacts. In our view, organizational transformation happens as the result of the process it entails: the creation of new services and processes as part of public administration's day-to-day work and through interactions with citizens that in turn changes the relationships within the organization and with its stakeholders.

Our empirical data contributes procedural insights into the process of digital transformation which can be tested in the future. In our view, technology enables change, but this change must be carried out by the organization itself if it wants to realize the long- term effects of transformation. We show the active role of the public administrators and their responsibility to sustain the long-term change.

Our research was carried out in a different organizational context than Fountain's and Dunleavy's works. Both scholars are influenced by organizations in an NPM context, whereas our research was conducted in organizational environments influenced by new public governance approaches that have been developed more recently (Osborne, 2006). We mostly talked to public administrators from European government organizations. This fact matters because the perceptions and meaning they derive from the term digital transformation are influenced by different bureaucratic traditions, as New Public Management has not

been implemented that rigorously in European public administrations as in the Anglo-Saxon context.

The new procedural insights gained from our expert interviews together with the theoretical frameworks previously developed, allow us to propose the following definition of digital transformation:

> Digital transformation is a holistic effort to revise core processes and services of government beyond the traditional digitization efforts. It evolves along a continuum of transition from analog to digital to a full stack review of policies, current processes, and user needs and results in a complete revision of the existing and the creation of new digital services. The outcome of digital transformation efforts focuses among others on the satisfaction of user needs, new forms of service delivery, and the expansion of the user base.

Going forward, we also suggest to use more differentiated language:

- *Digitization: to highlight the transition from analog to digital services with a 1:1 change in the delivery more and the addition of a technological channel of delivery;*
- *Digitalization: to focus on potential changes in the processes beyond mere digitizing of existing processes and forms; and*
- *Digital transformation: to emphasize the cultural, organizational, and relational changes that we highlight in the outcomes section in order to differentiate better between different forms of outcomes.*

Therefore, digital transformation is more comprehensive than the mere digitization of processes and services, and further research in this area needs to consider not only the process and impact of transformation, but the emphasizes the need for a holistic approach to (digital) transformation.

4.2. Limitations of approach and findings

We have chosen to generate new knowledge by using the real-life insights of public sector experts in their work environments describing their work practices. This epistemological viewpoint, supported by our interpretative research design, helped us to understand the phenomenon in its context-specific settings (Babbie, 2013; Golafshani, 2003).

Our methodology and methods are however not without limitations. For this study we draw on the procedures of engaging extensively with experts in the field and in reflexivity processes while conducting the interviews and collecting data, during the analysis and interpretation of the data and the results, as well as looking for disconfirming evidence in the data and the results. We focus on what Cresswell and Miller (2000) label as the socially constructed reality of our subjects or what Wilson described as government in action (Wilson, 1887). In order to ensure validity and reliability, we describe the logic of the inquiry, the purpose, and the reporting style of our approach in the methodology section (Lub, 2015). We show evidence by providing direct quotes from our subjects to increase transparency and trust in our findings, reporting and distinguishing between the participants' views and opinions in our study. At the same time, we encourage other researchers to test the transferability and generalizability of our findings given that we worked with a large – albeit limited – sample with a fair amount of heterogeneity in terms context, level of government, and geographic location.

This study provides a mostly European perspective and an understanding of digital transformation in public administrations: the data stems from nine European countries (out of 28 EU members) and two interviews with experts from non-European countries (Israel and USA). Some of the countries included, e.g. Estonia, Belgium and Greece, are underrepresented in our data, as we were only able to gain access to individual experts. This might lead to a potential bias in our findings. We sought to mitigate this bias by comparing data across the sample and found a surprising homogeneity among the statements of public administrators in their work environments.

Even though the composition of the dataset is heterogeneous, represents different countries, different organizations and levels of government and within these organizations, different official positions, we believe that the insights gained here represent current work practices across government levels and those who work closely with government to implement digital transformation projects. With this study, we provide insights into the importance of defining the core concepts of digital transformation and linguistic clarity, and use the empirical evidence to distinguish the concept from previous approaches as used in the e-government literature.

4.3. Future research questions

Additional research is needed to understand the specificities of each country's digital transformation approaches, how comparable public services are digitally transformed, how a specific digital transformation projects looks like inside public administrations in order to derive a theory of digital transformation in the public sector.

We believe that additional research is necessary to distinguish digital transformation approaches in practice as they relate to their digital agendas. This well help identify how digital transformation differs based on the size of the country, its history, and present context as well as how these dimensions might have an impact on their digital transformation efforts.

It might also be useful to break down the definitions by type of public sector services and its subsectors: We suggest that there are likely differences across sectors, such as health, traffic, safety, or social services. There might be sectors that are more prone to engage in the use of new technologies based on the types of public servants they hire. For example, national security might hire more engineers with a different type of education in technology than social services. We might see a more nuanced definition of digital transformation as a result of this distinction and the heterogeneous nature of the public sector itself.

Digital service delivery might also differ depending on the complexity of service delivery itself. Additional research is therefore necessary to understand the nature of the service on the process level. Further analysis needs to be conducted to dive deeper into individual services and user needs to understand how digital transformation leads to public value creation.

Finally, we believe that there is a need to align the myriad of definitions with the different types of indices that are used to measure digital transformation. We observe a wide variety of scales, measures, and reporting mechanisms that result in an even wider diversity of rankings of individual countries. Measures are currently not comparable and make it difficult to align them with the definitions of digital transformation and its work practices.

This research has highlighted that digital transformation within the public sector is not a task to be fulfilled by public administrations alone. The change in the relationship between public administration and citizens implies that citizens have a more active part: they are not just seen as a client of public administrations, but as a partner that helps to transform public sector organizations by actively participating in public service delivery enabled by new technologies. By securing greater participation of citizens it is easier for a public sector organization to achieve long term goals and have a substantial impact, for example value creation. Nevertheless, a change in relationships (and a focus on citizens) has only been mentioned by a few experts. This proposed link has little empirical grounding so far and therefore requires more investigation in future research.

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Appendix I. Codebook

Dimension: what dimensions or characteristics will be transformed?	
Codes	Description of codes
Processes	Any processes, workflows or procedures within an organization or public administration as the dimension that needs to be or will be changed. These were coded either as processes or more specifically as processes that focus on either tasks or communication if mentioned accordingly by the interviewee.
• Tasks	
• Communication	
Services	Services offered by the public administration to users as the dimension that will be changed in an organization or public administration.
Products	This focuses on the products created or provided by an organization or public administration, and could also include the production (and dissemination) of content.
Relationships	This code is used if the interviewee argued that relationships (between different entities) are a dimension that would be or needs to be changed or transformed.
• Between PA and users	This dimension is coded either as a relationships (in general) but, if mentioned by the interviewee, could also be more specifically coded as the relationships between a public administration and users outside the public administration (e.g. citizens, customers, businesses or other organizations) or as those
• Within PA	relationships within the public administration (between e.g. employees, departments or other units within a public administration or even between different public administrations).
Technology	This code was used if the interviewee argued that the technology used within an organization or public administration is the dimension that needs to be or will be changed.
Business model	This describes a change or transformation of the organization's aim or business model.
Dimension: how are they transforming?	
Codes	Description of codes
Digitize processes	Describes transformation or change that occurs by digitizing processes, workflows or procedures within an organization or public administration.
Digitize physical documents	Describes transformation by digitizing physical (analog, paper) documents. This digitization can either focus on the digitization of documents in general, or be more specific, where the physical documents to be mentioned are described as either files and/or books.
• Files	
• Books	
Digitize relationships	Transformation that occurs or will occur by digitizing relationships. This can either focus on the digitalization of relationships in general, but some interviewees focus specifically on relationships between public administrations and users outside the public administration (e.g. citizens, customer,
• Between PA and users	business or other organizations) or addressed the relationships within a single public administration or between different public administrations.
• Within PA	
Digitize services	Transformation by digitizing or automating services offered by public administration to its users.
Using new technology	The change or transformation occurs by implementing or using new technologies. This also includes the use of big data, data-driven approaches, innovative approaches and user-centered approaches that rely on the use of new technologies.
Develop new competences	In order for an organization or public administration to be transformed, new competences or skills or educational measures that people within the organization will need to have or gain in order to fulfill the changed or new tasks and responsibilities.
Dimension: why are they transforming? Antecedents and drivers	
Codes	Description of codes
External reasons	This code describes the reasons and drivers for changing and transforming an organization that are external to or are seen as coming from outside the organization or public administration. This could be described more specifically as coming from the organization's
• Pressure from the environment (citizens, businesses, politics)	external environment, and even focus on external reasons such as specific demands for change to be made by different stakeholders or user groups such as citizens/citizen groups, businesses/markets or political institutions/politicians.
• Technological change	A further external reason can be seen as the technological changes or advances that the organizations needs to consider, adapt to and implement.
Internal reasons	Internal reasons are those drivers for change and transformation that are seen as coming from within the organization. In some cases, the internal reason could be specifically described as the need to digitize physical files in order to improve processes or
• Physical files	services, or as coming from management in order to improve the management of the organization or to achieve (different or new)
• Management	organizational goals.
Dimension: To what end are they transforming?	
Codes	Description of codes
Output	Output is understood as a quantitative result, that is, one where the results can be counted or described numerically. This code was applied where the reason for transformation was seen as producing an output such as new services, new products, new processes or new skills that can then be counted.
• New services	
• New products	
• New processes	
• New skills	
Outcome	Outcome is seen as the effect of an action, or the implementation of a measure, thus describes the consequences an implementation may have on services offered, changes in processes well as the quality of the organization's relationships with others. This includes achieving outcomes that relate to services,
• Improved services	processes, relationships such as increased simplicity, accessibility, quality, advantages, efficiency, speed, inclusion, responsiveness, competitiveness,
• Improved processes	security, transparency.
• Better relationships	Outcomes considered are also the way the transformation of the organization contributes to the development of (better) policies and the digital environment (e.g. by being contributing to digital infrastructure or by being part of the digital environment).
• Policies	
• Digital environment	

Impact • Value creation • Organizational change • Digital society • Democratic principles	Impact is understood as the long-term effects that change and transformation may have and is not quantifiable. It includes the change of the whole organization or public administration (public administrations achieve better internal/external communication, are able to provide better workplaces or have a better public image), how transformation leads to the creation of more or better (public) value, contributes to digital society (such as providing the conditions for a digital society, providing benefits for citizens, contributing to society, culture or the economy) or strengthens democratic principles (e.g. supports citizen inclusion, regulation, legal and political frameworks).

Appendix II. Coding results – digital transformation in public administrations

Table II.1
Coding results.

	DK	ES	IT	AT	DE	EE	BE	FR	US	EC	IS	GR	Σ
Why are public administrations transforming?													
External													
External pressure from the environment	1		2	1	1			1					6
Citizens		1	1	1	1		1	2					7
Businesses		2		1	1			3		1			8
Politics			1		1								2
Technological change	1	2	1	4	2	1		2	1	1		1	16
Internal													
Physical files					1								1
Management		1	2	1	1			2					7
What will be transformed?													
Processes	5	2	5	2	3	1		3			1	1	23
Tasks					1				1				2
Communication					1			1					2
Services	2	4	4	0	1			3	1				15
Products	1	1		0									2
Relationships								1					1
PA with users		1	1	1	1		1	3		1	1		10
PA within			1	1	2			1					5
Technology			1	1									2
Business model		1		1	1								3

	DK	ES	IT	AT	DE	EE	BE	FR	US	EC	IS	GR	Σ
How are public administrations transforming?													
Digitize processes	5	2	4	1	2	1		1	1				17
Digitize physical documents	1				1								2
Files													0
Books													0
Digitize relationships								2					2
PA with users													0
PA within													0
Digitize services			2					1					3
Using new technology	4	5	5	5	3	1	1	5		1		1	31
Develop new competences			2										2
To what end are public administrations transforming?													
Output													
New services	1	1	2		1			1					6
New products			1										1
New processes			1						1				2
New skills													0
Outcome													
Improved services	1	6	2	1	1		1	4	1		1		18
Improved processes	1				3	1	1	1			1		8
Better relationships					1		1	2					4
Policies								1					1
Digital environment				2	1			1		1			
Impact													
Value creation	2	1	1	2	2						1		9
Organizational change	4	4	5	1	4	1		3	1	1	1		25
Digital society	2	1		2	2						1		8
Democratic principles		2	1		2		1	3		1			10

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