The View from the Inside: A Case Study on the Perceptions of Digital Transformation Phases in Public Administrations

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The digital transformation of public administrations contributes to the re-design and re-structuring of the organizational processes and practices. Research on the digital transformation of public administrations often focuses on responding to the needs and providing benefits to external stakeholders and users, such as citizens and businesses. The study presented here focuses on one specific stakeholder, the employees of a department within the Federal Government of Lower Austria. Using a multi-method and granular qualitative research approach, the results are interpreted in the context of Perez's (2009) four phases of the digital transformation paradigm. The results show how the department is implementing the recommendations made in the literature and digital strategies: an extensive use of ICTs, the development of information-based services, and an acceleration of transactions and interactions with external stakeholders. At the same time, their perspectives point out some barriers regarding the implementation and use of new digital tools such as digital signatures, the legal frameworks at the national and regional level, and the need for an organizational culture that supports innovation. This study empirically contributes to the literature by providing an analysis of the digital transformation of a public administration as perceived by the employees.

CCS Concepts: • **General and reference** → **Computing standards, RFCs and guidelines** • **Information systems** → *Data management systems* • **Human-centered computing** → *Collaborative and social computing*; *Empirical studies in collaborative and social computing*;

Additional Key Words and Phrases: Digital transformation phases, public administrations, organisational processes, internal stakeholders

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1 INTRODUCTION

Digital technologies are used to design and restructure functional bureaucratic organizations, organizational processes and practices in order to achieve greater transparency, improve performance, reduce costs, or increase efficiency and effectiveness [Cordella and Paletti 2018; Lember et al. 2019]. The integration of digital technologies and applications in public administrations is to enhance the quality of organizational management and institutional capacities but requires *"the need to consider both tangible changes in procedures, functions and institutions, as well as a 'cognitive restructuring' that concerns values, culture and shared understandings to articulate a reinforced set of values for the public sector ethos"* [Misuraca et al. 2020, p. 111]. The digital transformation of public administrations often focuses on the needs and benefits for several stakeholders particularly those outside the organization, such as citizens and businesses [Jaeger and Bertot 2010], but the public sector employees need to be considered too [De Vries et al. 2018], particularly when organizational processes are being re-designed [Edelmann and Mergel 2021; Nabatchi et al. 2017]. Accessing public administration employees' knowledge is known to improve administrative processes and innovative management [De Vries et al. 2018; Schuster et al. 2020], so the research aim of this paper is to identify the internal stakeholders' perspectives on digital transformation in public administrations and barriers in order to re-design administrative processes that are effective and beneficial for internal and external stakeholders.

To identify the internal stakeholders' perspectives, a qualitative approach was chosen as it *"promote[s] a deep understanding of a social setting from the perspective of the research participants"* [Bloomberg and Volpe 2009, p. 38]. The case selected for investigation is the **Department of Economy, Tourism and Technology (WST3)** within the Federal Government of Lower Austria, that is currently digitalizing its administrative processes. All the employees from this department, including the head of the department, the legal employees, the IT employees, the team leaders, and the administrative employees were involved in contributing their experiences and perspectives on the benefits and barriers in the digital transformation of public administrations and digitalizing their internal processes. Several research methods were used to collect the data, and the qualitative analysis draws on Perez's [2009] paradigm that describes the four phases of digital transformation. The empirical results gained here show the advantage of collecting perspectives on the benefits and barriers of digital transformation, that there is no "single" perspective held by all internal stakeholders, that some public administrations already fulfil a range of external stakeholders' demands for efficiency and effectiveness and are in the process of implementing further changes and innovations to address the barriers identified.

This paper is structured as follows: In Section 2 we explain the study's theoretical background. In Section 3 we describe the research design, the case selection, and the data collection. In Section 4 we describe the data analysis, and in Section 5 we discuss the case study's results. Section 6 presents a discussion of the results in the context of the literature, whilst the final section contains the conclusion, the study's limitations, and some suggestions for future research.

2 BACKGROUND

The transformative impact of digital technologies can be seen on almost all aspects of an organization's internal and external environment [Chanias 2017; Chanias and Hess 2016; Vial 2019] such as improving IT infrastructure, core products and processes, but also new ways of working [Edelmann and Millard 2021; Hinterhuber and Stroh 2021]. The technological advances offer not only new opportunities to develop products and services, but also to innovate and create an organizational culture that is open and supports sharing and collaboration [Hanna 2016]. Thus, organizations across all sectors have developed strategies [Matt et al. 2015; Pedersen 2018] to help harness and exploit the benefits that digitalization brings to service delivery, customer and user relations, and human resource development. In the business context, Isaksen et al. [2020] suggest that digital technologies are interlinked by three *categories "[the] generation of scientific knowledge that forms the basis for developing specific technologies; [the] production of particular digital products and services; and [the] use of digital products and services in*

production and service activities" (p. 132). Berman [2012] contends that digital transformation strategies in the private sector can be summarized as a reshaping of the business and operating model, and a redefinition of the customer value proposition that involves enhancing, extending, or redefining the value of the customer experience. Whilst strategies will typically involve the explicit transformation of key business processes to include changes in product development, they can also represent a change in the internal workflows, organizational structures, and values. Matt et al. [2015] suggest that digital transformation strategies need to address the use of technologies, the ability of the organization to exploit the characteristics of the chosen technology, and consider the financial aspects associated with the transformation. However, the strategies must also consider the employees' attitude towards the technology and the changes in organizational structure that stem from the incorporation of new technologies.

Public administrations also aim to adapt to the changing environment and societal challenges [Dunleavy et al. 2006]. Digital transformation projects in public administration are to achieve benefits such as the transformation of back-office business processes, to introduce new and attractive customer-oriented practices, use digital channels, provide online transaction and service delivery, share information, infrastructure, processes, and standards across government departments and with other external stakeholders such as citizens, businesses, and partners. In this context, digital transformation is an ICT-enabled and ICT-led transformation of internal and external processes in order to respond to changes in the environment and to find innovative new ways to deliver public value and meet public sector objectives such as efficiency, transparency, accountability, and responsiveness to citizens [Linders 2012; Matheus et al. 2021]. The availability of digital tools and the digital transformation of organizations are changing citizen's expectations of governments' ability to deliver high-value and real-time digital services [Bertot et al. 2016], but also support organizational change, the systematic back-office transformation, and the reorganization of organizational processes and business practices [Lindgren and van Veenstra 2018]. Digital technologies, such as, the big data, and blockchain are increasingly used in the public sector in order to access data and resources digitally in order to enhance public service, linking, but also blurring, the distinction between back- and front-offices [Edelmann and Millard 2021]. The implementation and use of such technologies in the public sector is often supported by high-level policy documents, for example, in Europe, the Tallinn Declaration [Council of the European Union 2017] and the Berlin Declaration [European Commission 2020]. Digital policies and strategies may also be developed for other governance levels depending on the political structure of a country, and address the explicit transformation of key operations, organizational values, organizational structures, and internal workflow processes [Misuraca et al. 2021]. This is important so that the digital transformation of the public sector goes beyond just the digitalization of analogue processes into digital processes [Mergel et al. 2019].

Perez [2009] argues that digital strategies need to focus on the *"convergence of technology, the economy and the socio-institutional context"* (p. 4), a space that she argues is dynamic and represents the direction of change. She points out that new technology systems modify the organizational space, the institutional context, and the culture in which they occur, requiring new rules and regulations, specialized training, norms, and other institutional facilitators. The term "*techno-economic paradigm*" is a *"best practice model for the most effective use of the new technologies"* [Perez 2009, p. 9], one that opens a vast innovation opportunity space and provides a new set of associated generic technologies, infrastructures, and organizational principles that can significantly increase the efficiency and effectiveness of all industries and activities. New technologies transform work and organizational structures, and the ensuing new conditions contribute to the establishment of new principles of organization and new common sense for efficiency and effectiveness but should also prove to be superior to the previous ones [Edelmann and Millard 2021]. Perez [2009] argues that digital transformation leads to deep structural changes in organizations in terms of four dimensions: (1) increased use of information and communication technologies, (2) changes in cost structures such as cost reductions, acceleration of transactions and interactions, reducing cost of capital and labor, (3) full or partial digitalization of information, products, services, and processes; and (4) the

development of information-based knowledge services. Digital transformation can lead public administrations from being a closed, hierarchical, and inward-looking organization to an open, decentralized, service-oriented, and networked organization based on digital leadership, changes in attitudes, and new skills in the organization [Edelmann and Mergel 2022]. Achieving these changes requires significant investment in transforming routines, organizations, and structures [Hanna 2016], but are often approached in a positivistic manner, that is, assuming that the outcomes of innovation and change can only be beneficial [Fagerberg et al. 2013]. However, there may also be challenges and barriers that need to be addressed. Whilst technical and economic barriers may prevent organizations from implementing digital transformation projects, emotional barriers too may hinder transformation processes [Disselkamp and Heinemann 2018]. Understanding the potential barriers is essential to reforming and transforming organization, culture, and work practices [Hanna 2016], but the implementation of solutions must not only be beneficial to specific groups of stakeholders [Martin 2016]. The literature on the digital transformation of public administrations often focuses on the needs and benefits for the stakeholders outside the organization, such as citizens and businesses [Nabatchi et al. 2017] whilst ignoring other, salient stakeholders [Scholl 2004], such as the employees within the organization. Thus, barriers can be addressed and reduced by involving those who are the targets of change processes.

In this paper we aim to address the public administrations' employees' perspectives on digital transformation and the barriers they identify when they are involved in the digital redesign of administrative processes. Whilst there is previous research on how the digital transformation of public administrations leads to innovative and valuable results [Archmann and Iglesias 2010; Arendsen et al. 2014; Clarke 2020], it often focuses on the benefits for external stakeholders [Åkesson and Edvardsson 2008]. Although authors have already previously highlighted the need for including all stakeholders in the digital governance context [Gonzalez-Zapata and Heeks 2015; Rowley 2011; Scholl 2004], the literature often labels all members of each stakeholder group with one, undifferentiated perspective only; this represents both a theoretical and an empirical shortcoming in understanding digital transformation in public administrations as a holistic organizational change. To address this gap, this article presents a multi-method and granular qualitative analysis of internal employees' perspectives on digital transformation in public administrations and the barriers they identify. Therefore, in this paper, we ask: What are the internal stakeholders' perspectives on the benefits of the digital transformation of public administrations? Secondly, what barriers do internal stakeholders identify in the digital transformation of public administrations?

3 RESEARCH DESIGN

Research should be able to "*conceptualise, define, and come up with improved methods for measuring, analyzing and understanding"* [Martin 2016, p. 343]. This paper aims to answer the research questions by analyzing the Department of Economy, Tourism and Technology (WST3) in the Federal Government of Lower Austria that is currently digitalizing its administrative processes. The case study design allows a choice of evaluation methods and tools that are open and participative to collect data that *"foster[s] a deep understanding of a social setting from the perspective of the research participants*" [Bloomberg and Volpe 2009, p. 38]. In addition, the case study method helps deal with a large range of evidence such as documents, artefacts, interviews, and observations to derive a holistic picture of how organizations function [Yin 2017], in particular where the experiences of individuals and the contexts of actions are critical or the phenomenon under investigation is dynamic and not yet mature [Darke and Shanks 2002]. Several methods were chosen to ensure that all employees in different work-related roles could be addressed: semi-structured interviews, participation in a workshop, and a team task.

3.1 Case Selection

To make the Austrian public administrations less bureaucratic, they are rapidly being modernized and, at the same time, digitalized. Digital Austria (BMF, 2022) is the federal government's initiative for digitalization in

Austria. Focal points include supporting the economy with digital services, to create an environment to promote innovation, expand digital services for citizens and to coordinate digitalization measures across the government. The use of existing government data, streamlining processes, and promoting mobility are just a few of the principles that guide current administrative action (BMDW, 2020). The basis for this is, among other things, the implementation of the Austrian E-Government Act (E-GovG, 2004). These framework conditions determine the design and digitalization approach of all nine Federal Governments in Austria. The Federal Government of Lower Austria designs processes and services within the framework of the federal law and implements the three principles of Austrian e-government: (1) The free choice of the communication channel to contact the administration; (2) A secure and data protection compliant implementation of electronic traffic, and (3) Ensuring barrier-free access to public administration. At the same time, the Federal Government of Lower Austria has also published its own e-government strategy (2017) and digitalization strategy (2021), that focus on the expansion of infrastructure, safeguarding and expanding jobs, strengthening rural regions, and improving quality of life.

The case considered here is the Department of Economy, Tourism and Technology within the Federal Government of Lower Austria, responsible for training, science & research, administration, the labor market, higher education, tourism, culture, sport, agriculture, economy, health, infrastructure, energy, and sustainability. It is also involved in several aspects of the Lower Austrian digital strategy, including digital fitness, digital infrastructure, digital solutions, raising digital awareness, education and training, research & innovation, connectivity and innovative infrastructure, networking platforms, data, and digitalization in administration. Regarding the implementation of the digital strategy and the organization of administrative processes, the department is guided by both federal and national legal requirements.

3.2 Data Collection

This study aims to expand the empirical knowledge on the internal perspective on the digital transformation of public administrations. Data collected from all members of the internal stakeholders using several research methods helps capture their diverse perspectives and experiences. The data collection was based on several participative methods in order to consider the various interactive processes "*crucial to the success or failure of systems or organizations*" [Bell 2014, p. 10] and carried out sequentially [Ivankova et al. 2006] as results collected during each phase informed the next. To answer our research questions, we conducted semi-structured interviews with the heads of the department, ran a workshop with the heads of the department and, to include all employees in other, non-leadership roles, asked for all teams within the department to complete a task together. The semi-structured interviews enable us to compare the answers systematically while being able to adapt the questions to the individual circumstances of the interview [Barriball and While 1994; Longhurst 2003] and develop the research methods that followed. The data from both the interviews and the workshop were used for the development of the team task.

All data was collected just prior to the first COVID-19 lockdown in Austria in March 2019, then aggregated and analyzed anonymously by a team of four researchers from the University of Continuing Education.

3.2.1 Interviews. All interviews were conducted in January 2020, and each interview lasted between 1.5 and 2 hours. The interview guideline was developed using the literature on digital transformation in public administrations and the questions asked the interviewees about digital transformation and administrative processes in their department (the interview guideline can be found in Appendix 1). The participants were purposively sampled: The interviews were conducted with the all the heads in the department as they are known to have specific, deep knowledge and experiences which result from their organizational function, associated responsibilities, and obligations [Bogner et al. 2009]. The interviews were conducted in the participants' offices and recorded with the permission of the participants. The interviewees were ensured anonymity. Eight interviews were conducted:

Table 1. Heads of Department Interviewed

Department Roles
Head of Department
Head of IT
Head of Legal Matters
Head of Innovation and Technology Programmes
Deputy Head of Department / Head of Strategy, control, and planning
Head of Economy, tourism, investment programmes
Head of Large-scale projects and EU themes
Head of Finances and & investment management

The recorded interviews were transcribed verbatim, and the research team wrote memos to note important aspects that arose from each interview [Bloomberg and Volpe 2018].

A preliminary analysis of the interview transcripts revealed that the department has a high level of digital maturity. However, there is a need to understand in depth how administrative processes can be fully digitalized, and to consider issues such as data storage, information, and knowledge management. To collect data on these topics, a workshop for the heads of the departments was designed.

3.2.2 Workshops. Workshops foster engagement, collaborative discussions, and constructive feedback between the participants with the workshop facilitator [Lain 2017]. They are often used in professional development programs and can be used to achieve a particular goal, to draw a relationship between the workshop and its outcomes, and as a research methodology [Ørngreen and Levinsen 2017]. The engagement in workshops is often very intense and allows the researcher to gather data on collaboratively shared experiences as well as establishing credible results [Creswell and Poth 2016]. Seven of the interviewees who had been interviewed also participated in the half-day workshop on March 3, 2020, to provide a contextualized understanding of the initial results gained from a valuable compromise between the interviews. During the workshop, two internal departmental processes were analyzed to:

- Identify the insights, practical experience and knowledge on data, data flows, and knowledge management in digital processes.
- Identify and discuss the success factors, challenges, bottlenecks and barriers in digital processes, data flows, and knowledge management.

3.2.3 Team Task. Work in organizations is often accomplished by teams, defined as "*work structures consisting of two or more individuals who interact and work interdependently to accomplish tasks related to common, organizationally relevant goals*" [Bush et al. 2018, p. 423]. Given the complexity of teams and their dynamics, a significant development in collecting data on teams includes synthetic task environments [Salas et al. 2008]. These are tasks developed for research purposes and incorporate features of a real task [Martin, Lyon, and Schreiber 1998]. They represent the complexity of the real world and experimental control and help to establish the validity of results [Salas et al. 2008].

The team task was designed to get a better understanding of the processes and data flows within the department, to identify existing potentials for the optimization of processes when they are digitalized. This allows all the department members to contribute their experiences and expertise to those collected previously from the heads of the departments. Each head of a team was asked to discuss digital processes and data flows together with their team members. All the teams discussed the processes relevant to their work and team to identify:

- Current processes:
  - Required data/data input;
  - Data generated/data output;

  - Data flows;
  - Tools used;
  - Data transfer;
- Future processes:
  - Who benefits from the data collected?
  - How can data be shared?
  - What do we need to do to ensure that the handover is done correctly?
  - What skills do we need to do this?
  - What tools do we need for this?

The researchers were not present during the completion of the team task. The teams had one week to provide written answers to the task set by the researchers, and data was collected from seven teams. As the head of the department's team consists of the other heads, data was not collected in this case.

Table 2. Department of Economy, Tourism and Technology: Teams

Roles within the Department of Economy, Tourism and Technology	Nr. of Team Members
Head of Department	n/a
Head of IT	1
Head of Legal Matters	2
Head of Innovation and Technology programs	9
Deputy Head of Department/Head of Strategy, control, and planning	8
Head of Economy, tourism, investment programs	10
Head of Large-scale projects and EU themes	6
Head of Finances and & investment management	4

The data analysis process is described in the next section.

4 DATA ANALYSIS

We used thematic analysis to analyze all the data gained from all internal member employees from the Department of Economy, Tourism and Technology. The data was analyzed to understand the internal employees' perspectives on the digitalization of administrative processes and to identify the benefits and the barriers in the digital transformation of public administrations.

4.1 First-level Analysis

Thematic analysis was used to analyze the data from the interview transcripts, process designs from the workshop, and the researchers' memos [Miles et al. 2014]. During the first level cycle of analysis, the themes that guided the initial classification of the content in the documents and the interview transcripts selected were guided by Perez's [2002] four dimensions: (1) increased use of information and communication technologies, (2) changes in cost structures such as cost reductions, acceleration of transactions and interactions, reducing the costs of capital and labor, (3) full or partial digitalization of information, products, services, and processes; and (4) the development of information-based knowledge services.

4.2 Second-level Analysis

A code assigns symbolic meaning to the collected data chunks extracted during the first cycle of analysis [Miles et al. 2014]. During the second level of analysis, the results were structured according to the internal stakeholders' perspectives and barriers regarding digital transformation. The second-level codes were also drawn from Perez's descriptions of the four dimensions, but any additional ones identified in the data were also included.

5 RESULTS

The following section contains the results from the data analysis. A central result of this analysis is that the paradigm shift initiated by the aims set out in the Austrian digital strategy (BMF, 2022) is reflected in structural changes and changed working methods. There is an increased implementation and use of ICTs, and their use has led to a notable increase and acceleration of digital transactions and interactions in comparison to just a few years ago. The results are structured below according to Perez's [2002] framework and include quotes to illustrate the employees' perspectives and to enhance the transparency of the research process [Ospina et al. 2018].

5.1 Increased use of Information and Communication Technologies

The department uses a variety of digital applications and tools for interaction and collaboration internally, with other departments within the Federal Government of Lower Austria, but also external users, such as businesses and service users. The most important digital tools identified are the Lower Austrian Information and Communication System **LAKIS ("Landeskommunikations- und Informationssystem")**[1], a comprehensive, digital management system for documentation, filing, initiating administrative processes and collaboration, and PROFIN,[2] an online portal for submitting and managing grant applications.

LAKIS represents the **Lower Austrian implementation of the Austrian electronic file (ELAK)**. As the central specialized application of the Lower Austrian public administration, it is used throughout the entire province and enables a comprehensive electronic file management. All employees of the Lower Austrian public administration have access to LAKIS. They must use the system, for example, for documentation or to initiate any processes. From the interviews with the team leaders, LAKIS represents a central function as a documentation and filing system in everyday work: Data, information, and documents are retrieved, used, and filed in a structured way. Each step of the standardized processes is documented in LAKIS in a comprehensible way and stored with the corresponding data, information, and documents. LAKIS also has a communicative function: it enables collaborative work, and, if necessary, telework or work from home.

The department's own application PROFIN represents on the one hand a project management system, and on the other hand, provides an interface to external service users and business partners. It enables external users to register online, use digital signatures, authenticate themselves, submit applications digitally, receive documents, and view the ongoing status of their application.

Employees also use an internal WIKI and the organization's Intranet. Further specific tools and databases are the Austrian Transparency Portal[3] and the Austrian business register (Unternehmerserviceportal, USP).[4] Further commonly used applications are mobile banking, BMD for accounting, YB & YK for payment and invoice management, as well as tools provided by the **European Union** such as ATMOS (for **EU** funding management), **SANI (State Aid Notification Instrument)** and **SARI (State Aid Reporting Instrument)**. Finally, additional tools used are Google for search requests, Doodle for scheduling with internal and external partners, and the Microsoft Portfolio (Office, Excel, Outlook, PowerPoint).

The data collected from the interviews show that the department has a high level of maturity in terms of both the availability and use of IT systems and digital applications, but also a human-centric approach to digitalization:

> *"That an IT project is really 20% technology issue and 80% a people and communication issue" (A3).*

The different digital tools support collaboration, teamwork, as well as the different working models, but there are many different tools and ways to use them. The analysis revealed significant differences in the digital skills

[1]LAKIS is compatible with the Austrian electronic file (ELAK) and is a central component of the IT architecture of the Federal Government of Lower Austria.
[2]The specialized application PROFIN is a funding project management system that is used internally in the department, but also provides an external interface to funding applicants and business partners via the funding portal.
[3]https://transparenzportal.gv.at/tdb/tp/situation/buerger/.
[4]Unternehmer Service Portal: https://www.usp.gv.at/.

as well as other necessary skills required for dealing with the (specialist) applications and tools used: "*[...] the same task can take 10 seconds or two hours"* (A3). In the future, it is necessary to carefully consider which digital tools, options, and possibilities should be used and not to introduce new tools indiscriminately:

> *"At the moment, I have the feeling that there is a bit of a fetish of digitalization, that everything new that comes from there has to be used [...]" (C1).*

5.2 Changes in Cost Structures Such as Cost Reductions, Acceleration of Transactions and Interactions, Reducing Cost of Capital and Labor

The internal employees often need to find answers to case-specific questions to complete their work; this often requires having and accessing the necessary data and content, especially at the beginning of the process. The use of LAKIS and PROFIN have led to several changes as they support digital processes, digital data management, internal collaboration, and transparency. Tasks are defined and carefully planned prior to searching for the data and selecting the digital tools, as they may involve several other additional tasks and require finding additional data and information. Thus, all projects, tasks, roles, and processes have been defined and standardized, speeding up the processes:

> *"And we have actually managed to become significantly faster within 5 years [in terms of time between application and approval of funding requests] and, most importantly, to become faster again with the portal" (A1).*

The LAKIS system is also seen as increasing the effectiveness of work processes. Access to data and information held in LAKIS, and the knowledge that can be generated from it enables work to be done effectively and efficiently.

The department's central service is available digitally through the PROFIN funding portal. The use of PROFIN has made the processes internally within the department faster and more efficient, but also external interaction and transactions with users, banks, tax advisors, auditors, lawyers, or subsidiaries have been simplified and streamlined. The introduction of the PROFIN platform has allowed us to digitalize processes and automate many routine tasks, significantly reducing the workload in the office. This means that when applications are submitted online, then fully digital processes without any media breaks can be achieved and thus processed significantly faster. For the internal employees, the standardization of external users' online applications means that they can be processed easily and quickly, and with fewer mistakes. When applicants do not use the PROFIN platform, do not have required digital signatures, or use digital applications and tools that record the data differently, then the data and information must be processed and entered manually by the employees.

When major changes to the existing IT systems are too labor-intensive and costly, then the employees will often work with improvised, but often effective solutions. For example, the exchange of data and information with external users or business partners who do not have a digital signature necessary for funding portal PROFIN can send email attachments instead.

The use of digital tools and digitalizing processes has speeded up transactions and interactions, led to better data and information management, but also reduced costs. The more services and processes are digitalized, the more efficient and effective they are. The number of employees in the department has decreased, yet at the same time the digital processes have helped the department be more efficient. In the future, the use of powerful databases would support further automation of standardized processes.

5.3 Full or Partial Digitalization of Information, Products, Services, and Processes

There is a clear need to be able to collect and evaluate data and information in a structured way. Sharing and forwarding data, information, and knowledge is a central part to the department's work; the internal employees

must search and collect the data and information relevant to complete their tasks. A recent experiment within the department has shown that most of the data and information the department needs is available *"somewhere"* (A5). It is therefore not surprising that researching the right data, information, and employees represents daily work, but also that storage of data in public administrations is central to public administrations:

> *"Everything that is not in the file is not in the world. Old civil servant saying" (A3).*

At the same time, the department must know which topics will be important in Lower Austria in the future, for example for developing future strategies. The department is a cross-sectional department and is thus in an excellent position to network, and to promote the use of data across the Federal Government of Lower Austria. The department can provide data and information (e.g., economic research reports, special evaluations, reports on business research, numerical and accounting information, data on the companies applying for funding as well as results from funded projects) that could be relevant and be made available to other departments, although the legal framework conditions must be taken into consideration.

The goal is therefore to avoid paper-based files and to be able to query data in a structured way. The steps of data management, collecting, using, preparing, creating, and sharing data and information are often mentioned as the central components of a digitalized process. Projects, information, services, and processes have largely been defined and standardized, an example of this can be seen in the everyday use of data and information contained in digital files:

> *"The file [means that] I can look at all the information [. . .] can look to see if all the process steps have been followed, I can spot check [. . .] I can basically look at all the file contents. I also do it on a random basis. So now, when a contract is awarded, I look to see if comparative offers have been complied with, is there a record of the reasons why those are involved, or in the case of subsidies or government decisions, are the necessary documents all there? Are the protocols there, are the recommendations there? I sign and then the [electronic] act continues . . . " (A8).*

The last phase of the digital process is the consolidation of data and information as documentation in LAKIS. Here decisions are made about which data, information, and knowledge have to be recorded.

The basis for the digitalization of the public services offered by the department is the availability of digital data and information made available in specialized applications such as PROFIN. PROFIN represents an internal process but also the interface of the department to its external users. Funding calls for businesses are advertised online on the department website. Applicants can access the PROFIN portal funding portal by logging in with a digital signature ("Handysignatur"),[5] registering with user data (email address & password), or by proxy (a person authorized by the funding applicant) - functionalities that cannot be found in comparable funding portals, e.g., in Germany. The portal allows the external user to grant select others the authority to view all information on the application, to edit the application, to view uploaded documents related to the application (exception: documents uploaded as confidential can no longer be viewed after uploading), and to manage authorised persons (authorise persons or revoke rights for persons). The PROFIN provides a user-friendly overview of the portal's functionalities, current funding calls, areas of investment, business development, and innovation and technology. If the funding applicant is unsure about the appropriate funding, he/she can even request support for the selection of the appropriate funding from the internal employees. A FAQ page addresses common questions, further information on funding can be accessed via a link, but the department can be contacted too. Once an application has been submitted digitally, the ongoing status of the application can be tracked. Applicants for funding who receive a positive decision can also apply for payment of the funding online.

[5] https://www.handy-signatur.at/hs2/.

5.4 The Development of Information-based Knowledge Services

Data, information, and knowledge management are important elements for digital processing as well as for handling external data and sharing internal data. Large amounts of data and information are stored in PROFIN, LAKIS, and other systems, and all employees working in the department have the necessary permissions to access the data and information they need, but they must have the competences to be able to use this data to answer standardized enquiries and to speed up administrative processes. The data and information needed for the department's everyday work can be found by using digital (specialized) applications such as LAKIS, PROFIN, or other digital tools, by using guidelines, or by informally asking employees members inside and outside the department. The employees have good networks, and, depending on the issue or task, can use several channels that enable them to find the data and information they need. Within the department, cross-team projects support the exchange of data and information and generate new organizational knowledge. The data and information currently available, in combination with the existing digital competences and tools, means that currently, employees are unable to use the available data to answer complex or multi-dimensional questions. The future digitalization of the department's services is therefore based on the availability of digital data and information and linking this data within specialist applications such as PROFIN.

The number of employees in the department has decreased in recent years, so there is a need for digital tools that accelerate communication and interaction, but also to further develop digital information-based knowledge services and an organizational culture that supports the use of such tools and services:

> *"The [. . .] department has been working intensively on digitalization for a long time, not only in the operational sense, but also thematically, strategically, organizationally, and in terms of processes, and as a department it has a high level of digital maturity compared to other administrative units. Research, development, and innovation have a high priority in the department simply because of the area of responsibility of the department [. . .]" (A1).*

The employees noted that to develop such an organizational culture, all public administration employees, in particular those in leadership positions must support it, which is not always the case:

> *"The current administrative culture enables decision-makers to prevent the development of a digital organizational culture" (B2).*

6 DISCUSSION

Mergel [2015] suggests that public administrations are moving from a "need-to-know" to a "need-to-share" information system that encompasses dimensions such as openness, conversation, inclusion, co-creation, and real-time feedback cycles. These are dimensions found in Perez's digital transformation paradigm that foresees an increased use of ICT, changes in cost structures, an acceleration of transactions and interactions, digitalization of information and processes, and developing information-based knowledge services. Perez indicates that these elements open public sector organizations and make them more sustainable, effective, and efficient. Research on the digital transformation of public administrations often focuses on the benefits of the digital transformation of public administrations [Gonzalez-Zapata and Heeks 2015] identifying the stakeholders involved [Rowley 2011], how to involve them [Jaeger and Bertot 2010], and the danger of excluding or ignoring their needs. The literature on digital transformation in public administrations is characterized by considering the stakeholders involved, but there is a gap on a granular understanding of internal stakeholders' perspectives on the digital transformation of the organization they work in. This study therefore focuses specifically on them, their perspectives on the benefits of digitalizing administrative processes, and the barriers they identify. In this study we therefore aim to answer the following two questions: First, what are the internal stakeholders' perspectives on the benefits of the digital transformation of public administrations? Secondly, what barriers do internal stakeholders identify in the digital transformation of public administrations?

As noted in the literature review, digital transformation strategies often include three or four dimensions. Perez's framework with four phases was selected for this study as it focuses on achieving efficiency and effectiveness which are core values in public administrations. A first milestone for the entire Federal Government of Lower Austria government was the introduction of LAKIS (Lower Austrian Region Information and Communication System) in 2010; it represents the start of the digital transformation paradigm shift.[6] LAKIS is compatible with the Austrian electronic file (ELAK) and is a central component of the Lower Austrian public administration's IT architecture. It was implemented with the aim to digitally transform public administrations and the way the employees work, the structure of processes, and the services offered. It is associated with Perez 1st phase, the increased use of digital applications, that then leads to the next phases, the significant acceleration of transactions and interactions with external stakeholders, digital information and storage, automation, and organizational change. All employees have access to LAKIS, and it enables them to access all processes and documents, also when working remotely. LAKIS provides the basis for the further specialized digital tools and applications, such as the department's project management system PROFIN.

The digital transformation of public administrations leads to changes in cost structures, Perez's 2nd phase. The digital project management system PROFIN requires the digitalization of the department's processes, links internal digital data and information, and is also the department's external digital interface. The department's working environment is based on digital processes with only a few media breaks, so tasks can be completed efficiently and with high quality, even though the teams are becoming smaller. The department's digital working environment supports cooperation and data exchange within the department, with other departments of the Federal Government of Lower Austria, and with external organizations, e.g., banks, tax advisors, auditors, lawyers, or other public sector organizations. Automation leads to a smaller workforce and makes tasks, transactions, and interactions faster and easier, ensures efficient data and information management, and is thus another factor to help reduce costs. Currently, automation is available for some of the simpler processes, e.g., letter/message writing, data entry, and approval processes, and payment transactions for smaller financial amounts, which reduces the number of errors. The automation of even small processes steps is important and can have a large impact, although it requires careful attention to the details of the processes, and its impact on other processes. Digital signatures are important in this context too (these are available as a citizen card or on a mobile phone) as they allow full digital processes. More automated processes are expected to lead to further benefits for the future, but they require powerful databases and web crawlers to identify and react to important societal trends.

Digital transformation impacts back-office business processes too, for example, by introducing new user-oriented practices that deliver public value or help share information and standards across government [Linders 2012; Matheus et al. 2021]. The results from the study show that the department has already achieved Perez's 3rd phase, the digitalization of data and information that helps answer questions, examine cases, and supports decision-making procedures. Collaboration in the department is based on sharing and forwarding data, information and knowledge, and the value of the data increases when it is available in networks and shared with others. The steps of (1) collecting, (2) using, (3) preparing, (4) creating, and (5) sharing data and information are the components of knowledge workflow [Chourabi et al. 2009] and represent the pre-conditions necessary for Perez's 4th phase, the development of fully digital processes and services. Perez's 4th phase requires the consolidation of data and information, that is, services and processes based on information and data gained or stored, but also holistic organizational change [Lindgren and van Veenstra 2018].

The internal perspective on the department shows that three of the four dimensions from Perez's framework can be clearly identified, probably because it has been very intensively involved with digitalization for a long time, not only in the operational sense, but also thematically, strategically, organizationally, and process-wise. The employees generally see the department as having a high level of digital maturity, especially in comparison

[6]In 2020 the Federal Government of Lower Austria decided that software offered by the Austrian software company Fabasoft will replace LAKIS: https://www.noe.gv.at/noe/Zahlen-Fakten/Bericht_13102020.pdf (p.1).

to other administrative units. The largely digital working environment of the department supports cooperation and data exchange within the department, with other departments of the Federal Government of Lower Austria, and external organizations. A decisive factor for the high level of digital work culture compared to other administrative units is the long-standing use of digital (specialized) applications and tools to perform the department's central tasks. The department continues its digital transformation efforts, including the further digitalization of processes and services, implementing specialized applications, and investing in relevant projects. Research, development, and innovation are important values that are also reflected internally: The interviewed employees talked about the tools they use, the implementation of their ideas and suggestions, collaboratively solving everyday problems and finding unconventional digital solutions in a very reflective way and with a high degree of abstraction. There seems to be consensus that digitalization is a people and communication issue - not an IT project. This approach to digitalization and a focus on the interfaces between technology and people is seen as strengthening everybody's digital and social skills.

The second research question considers the internal stakeholders' perspectives on the barriers in digital transformation. Answering this question helps explain why the 4th phase of Perez's paradigm has not been achieved yet. Several barriers slow down or prevent digital transformation in organizations. The internal stakeholders point to barriers that relate to the first three dimensions of Perez's paradigm, but which have an impact on achieving the 4th phase: problems with the use of LAKIS, the voluntary use of digital signatures by employees, the partial automation of processes, and a lack of uniform data management. A further, but major barrier identified is the existing legal framework that is seen as preventing holistic organizational change and the development of an organizational culture that supports the digital transformation.

LAKIS is a central and very powerful component of the IT architecture of the Federal Government of Lower Austria. The main advantages are that all employees have access to LAKIS and that it enables them to access all work processes and documents, also if they are not in their office. One disadvantage though is the lack of user-friendliness as well as a poor search function. Another disadvantage mentioned is that once documents have been saved and stored in LAKIS, they cannot be completely deleted: Changes and deletions are possible on the interface, but erroneous data, information, or documents remains stored in the background. Whilst this storage corresponds to the principles of good record keeping and the principle of traceability of administrative procedures, it is a reason why, in everyday practice, data, information and documents are often only created in LAKIS when the contents are watertight. Another central digital tool, the digital signature, also poses problems. It can be set up for natural persons in a few minutes at citizen service centers, administrative offices, however, legal entities cannot apply for one. This makes it complicated for businesses, who must register as a natural person, but whose representatives must be registered in a supplementary register in the **Austrian business service portal (USP)**. Such complex issues prevent the extensive use of digital signatures and fully digital processes, as businesses elect to send their applications by post, and internal employees must transfer the data into the system manually. Disruptions also occur internally, as the use of digital signatures is voluntary, so that documents are printed out, signed, then scanned for further use within the digital working environment.

According to the team leaders, the sharing of data within the department already works very well, especially on a bilateral level. However, there are deficits about uniform data and information management, among other things because there are no clear guidelines for the preparation, use, and creation of new data and information. In most cases, existing data and information are used to clarify an issue, to conduct an audit or to prepare and, if necessary, to take a decision. In this context, a barrier is that data often must be entered, then re-entered. Automation (e.g., in payment transactions or the processing of funds) would reduce the number of errors, and the use of algorithms and **TOOP (the-once-only-principle)** could replace standard requests. Implementing TOOP in Lower Austria would mean that data and information from the application can also be reused in other contexts by authorized bodies in the administration. End-to-end digital authentication and the digital signature could be used throughout the processes, which would reduce the number of process steps, would save time, and

the data could be reused or made available in other departments or registers. At the same time, it is important to keep in mind that automation may lead to errors that are then particularly cost intensive to resolve.

The legal framework is often a barrier, even for daily work. Not only the regulations themselves, such as data protection laws represent a barrier, but even the fear of misunderstanding or breaking the law can act as a barrier to work digitally or new digital activities. This is further exacerbated by the Austrian e-Government law that provides service users the right to demand paper-based services.

The use of these technologies and the ensuing new conditions contribute to the establishment of new principles of organization that become part of the new common sense for efficiency and effectiveness [Edelmann and Millard 2021]. Digitizing small steps can lead to big changes, which requires a careful consideration of all possible details and outcomes, slowing down speed of change and willingness to experiment. The department is characterized by a pronounced interest and great openness towards the opportunities and challenges of digital transformation, but the current overall organizational culture remains dominated by the fear of making errors from implementing innovations [Fagerberg et al. 2013] and prevents necessary conditions for Perez's 4th phase.

7 CONCLUSION

Achieving organizational change requires the transformation of organizational routines, processes, and structures, but also addressing challenges. Digital strategies provide the vision, direction, and pace, but they are often also hard to implement. A paradigm based on several phases, such as Perez's, can provide structure and milestones to guide the digital transformation of an organization, in particular those in the public sector that are bound to a legal framework and obligations to society.

The results from this study show the need for research on public sector digital transformation to go beyond the identification of stakeholders and characterizations of their needs and demands. This case study that draws on a qualitative, participative method to collect data from all the employees, provides granular results and deep insights on the impact of digital transformation of public administrations and barriers that may be easily overlooked. Whilst team leaders emphasize that benefits and advantages of digital transformation, they add that such efforts must be supported by organizational change. Core elements of organizational change include all employees taking an interest in digital transformation topics and being open to change, innovation, and experimentation. The benefits of digital transformation in public administrations need to be made clear to both internal stakeholders and external stakeholders too. Thus, an important principle that must guide digital transformation is not continuously developing or introducing new digital tools, but to be able to identify problems and find appropriate solutions. Successful digital transformation requires a cultural change that supports the development and provision of digital services, processes, and new ways of working. At the same time, an awareness of potential barriers and how to resolve them is essential to the digital transformation of an organization, its culture, and work practices. Based on the barriers identified by the employees, specific recommendations for next steps can be derived, such as the mandatory use of electronic communication and digital signatures, further automation of processes, prioritizing data and information management, as well as ensuring education and training of all employees.

Research should be able to explain how new technologies and individuals help digitally transform public sector organizations, and we believe that the results presented here are of significance for policy makers pushing for digital transformation and organizational change in public administrations. Studies often treat an organization as a uniform entity or assume that perceptions are identical across the organizations and employees. However, this study empirically shows that organizations are composed of distinct groups that may have different experiences and perceptions. It is therefore important to carefully analyze each organization and to address the different internal stakeholders and their needs. We therefore recommend this kind of in-depth research to investigate in what transformational phase an organization is in, planning to move onto, or to understand why it is unable to move forward. By using several different data collection methods and by addressing all employees, we were able

to highlight themes and issues from several different perspectives. We also particularly recommend the collection of data from employees in non-leadership roles as they not only represent most employees but also have a different perspective. This study could benefit from a comparison with other departments to see in which phase of Perez's paradigm they are in, and whether the "local" departmental cultures have an impact on employees' perceptions of digital transformation. This would lead to a cross-case study which would allow further insights into aspects such as knowledge sharing across departments and the identification of competences for digital transformation.

This study represents an analysis of a public administration just shortly before the first lock-down due to CoVID-19 in March 2020. Although the pandemic has increased the use and reliance on digital tools and remote work, this case should be followed-up by a second investigation to see to what extent the measures implemented during the pandemic have changed the perspectives, reduced barriers, and led to new ways of working that support the digital transformation of the Federal Government of Austria.

APPENDIX 1: INTERVIEW GUIDELINE

The interview guide consists of nine main questions with explanatory sub-questions that are asked as required.

(1) Please give me an overview of your area of responsibility.
   - What is your role?
   - How many employees do you have in the team? What are the employees responsible for? Who do the employees work with (from the Lower Austrian administration/external customers)?
   - What services do you offer? (to external parties/within the Lower Austrian administration/only the department). Who is requesting these services?

(2) What influence does digitalization have on your area/your team?
   - Which digital tools do you and your employees use?
   - How do you benefit from it?
   - Are there any obstacles?

(3) Process description: Please describe (sketch) the most important process in your area.
   - Why is it the most important?
   - How long does it last in total?
   - Which deadlines must be observed?
   - Where are digital tools used?
   - Which interfaces with other areas/departments in the Lower Austrian administration/external actors are necessary?
   - What information do the actors need (employees within/outside the area or external customers)?
   - What information do you pass on to which actors?

(4) Analysis.
   - Where do you see strengths and weaknesses?
   - What would you change in this process?
   - What could be improved? How could something be improved?
   - Has or how has digitalization changed this process?
   - Where can digital tools improve the process?
   - Which skills and digital tools do customers (citizens/companies/other employees of the Lower Austrian administration) have to have in order to apply for or receive this service?

(5) What data is generated in this process?
   - Can these be used by another area within the department or within the administration?
   - If not: Why can't the data be used by other areas within the department or within the public transport system?

- What data do you think could be made available outside the department and if so, how?
- Could you imagine that citizens/customers receive a transparent overview of the data they process?

(6) What else would you wish for in your day-to-day work? For example, other digital tools, information, skills, or training?
- For yourself
- For your team

(7) How could the department benefit more from digitalization in administration?
- What should you watch out for?

(8) Assuming resources as well as legal and technological restrictions play no role, how can the department take on the digital pioneering role in the Lower Austrian administration by 2030–2050?

(9) Would you like to make a final statement about digitalization in administration?

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