PUBLIC ADMINISTRATION IN THE DIGITAL ERA

TREND REPORT 2020

CDTM

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CDTM CENTER FOR
DIGITAL TECHNOLOGY
AND MANAGEMENT

**Kindly supported by
Tech4Germany & Work4Germany**

With more than 80 Million "users", a well-functioning German public administration is essential for democracy, the economy, and social cohesion. At Tech4Germany and Work4Germany, we believe that interaction between administration and citizen – both digitally and personally – needs to be evaluated and designed in a citizen-centric way to increase both efficiency, security, and trust in public services and governmental authorities.

With our fellowship programs, we aim at creating a more digital public administration with citizen-centric services.

We firmly believe that citizen-involvement is a crucial part of that journey. The collaboration with the CDTM was just that: a collaborative rethinking of "the future of public administration".

Visit tech.4germany.org and work.4germany.org for more information.

**A project of the Center for
Digital Technology and Management (CDTM)**

The Center for Digital Technology and Management (CDTM) is a joint, interdisciplinary institution for education, research, and entrepreneurship of the Ludwig-Maximilians-Universität (LMU) and the Technische Universität München (TUM).

It offers the add-on study program „Technology Management" for students from various backgrounds, which provides students with tools and knowledge at the intersection of business and digital technologies.

The entire trend report was written by CDTM students under the close guidance of research assistants.

Visit cdtm.de for more information.

PREFACE OF THE EDITORS

As Herman Kahn, one of the founding fathers of modern scenario planning, nicely states, it is tremendously important for strategy and policy makers to get a deep understanding of possible future developments in order to be prepared for them.

The Center for Digital Technology and Management (CDTM) aims at empowering the innovators of tomorrow. It is our mission to equip our students with the tools and knowledge they will need to become responsible leaders, who actively shape their future environment, rather than only react to changes.

This trend report is the result of the first core course Trend Seminar, which is part of the interdisciplinary add-on study program "Technology Management" at CDTM. About 25 selected students of various disciplines, such as Business Administration, Economics, Psychology, Computer Science, Electrical Engineering, and others, worked together on the relevant topic of eGovernment and digital Public Administration. Over the course of seven intense weeks of fulltime work in their

> **" Clearly, the first task is to gain acceptance of a more reasonable view of the future, one that opens possibilities rather than forecloses them. "**
>
> Herman Kahn

semester break, the participating students dove deeply into the topic of the Trend Seminar. Working in several interdisciplinary sub-teams, students applied the knowledge of their main studies and learned new perspectives from their team members. They conducted trend research, developed scenarios of the future, generated ideas for innovative products or services, and detailed them out into concrete business concepts.

We would like to take the chance to thank everyone who contributed and made this CDTM Trend Report possible:

We want to thank tech4Germany and work4Germany for supporting this Trend Seminar. Particularly, we want to thank

Anna Hupperth and Florian Zechmeister for their great interest in the topic, the valuable insights and feedback throughout the whole project, and the collaborative organization and topic definition of this Trend Seminar.

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Last but not least, we would like to thank the CDTM students of the Class of Spring 2020. They put great energy and enthusiasm into this project, which made it a pleasure for us to supervise the course and coach the individual teams. We wish them all the best!

Philipp Hofsommer and Philipp Hulm
Center for Digital Technology and Management

PREFACE OF THE PROJECT PARTNER

Digital technologies are constantly pushing us towards an ever more connected world and have a significant impact on our daily private and business life. Our interaction with public and governmental institutions and processes, however, have largely remained unaffected by these new digital possibilities. At the same time, new technologies provide an ideal starting point to enable – and even demand – a shift towards a more digital public administration. At Tech4Germany and Work4Germany, we believe that interaction between administration and citizen – both digitally and personally – needs to be evaluated and designed in a way to increase both efficiency, security, and trust in public services and governmental authorities.

Tech4Germany's and Work4Germany's vision is an empowered government that shapes digital transformation, develops its policies and services in a citizen-centric way, and enables it`s employees as well as citizens to be part of and drivers of change. In our fellowships, we witness annually that there is a desire for co-creation and ownership in society and that citizen-involvement is crucial for developing and designing better government services.

The collaboration with the Center of Digital Technology and Management (CDTM) and its students has further proven this assumption to be true: There is a desire among citizens to participate in creating our state's digital future. We are delighted that the CDTM has created yet another opportunity for young talents to engage through a flexible format, which is, in our opinion, crucial in attracting some of the best students for this purpose.

The excitement upon revealing the topic, the enthusiasm and passion the students developed for their ideas and the excellence of this report as a whole will provide a long-lasting boost of confidence and source of inspiration for our organisation.

How can national government as well as municipal administrations make use of completely new and unused modes of service accessibility across authorities? How can processes and decisions by public administration be made more transparent? How can big data help administration on all levels to make smarter decisions and prioritise budget spendings better? How can digital technologies simplify administrative processes at various stages in life, making it easier to access and benefit from public services? What may be emerging business models in that regard?

The interested reader of this report will witness the variety, depth, and complexity that characterizes the digital transformation of the public sector. GovTech will play an ever increasing role in the next 20 years. This report is a testament that technology can in fact play an integral role in how we as a society interact with the state, but also how we as citizens can contribute to bringing this new digital future forward.

We would like to thank everyone at the CDTM for bringing such a positive attitude to your work, for being open-minded, and for creating a welcoming atmosphere for ideas and students alike. Tech4Germany, Work4Germany and the CDTM share a strong common believe in the value of interdisciplinarity. The exchange among students from different academic and cultural backgrounds as well as among lecturers from politics, academia, and entrepreneurs has proven to be a fruitful starting point for visionary ideas to emerge once again.

The digital nature of this year's trend seminar due to Covid-19 is one of many examples that has vividly shown that digital options covering our daily interactions are necessary - and possible. We are delighted that the CDTM as a key enabler for creativity in Bavaria and beyond has chosen such a relevant topic for their students of spring 2020.

We hope to have been able to spark an lasting interest in technology for the public good. Our thanks goes to all students whose complementary skills, energy, and drive fueled an adventurous learning journey and whose relentless interest led to such a comprehensive report.

Our heartfelt thanks go to Philipp Hulm and Philipp Hofsommer for their incisive vision of bringing this topic to the CDTM. Thanks for your unwavering interest in this area and for bringing together such a fantastic group of students and experts.

Anna Hupperth
on behalf of Tech4Germany and Work4Germany, Berlin

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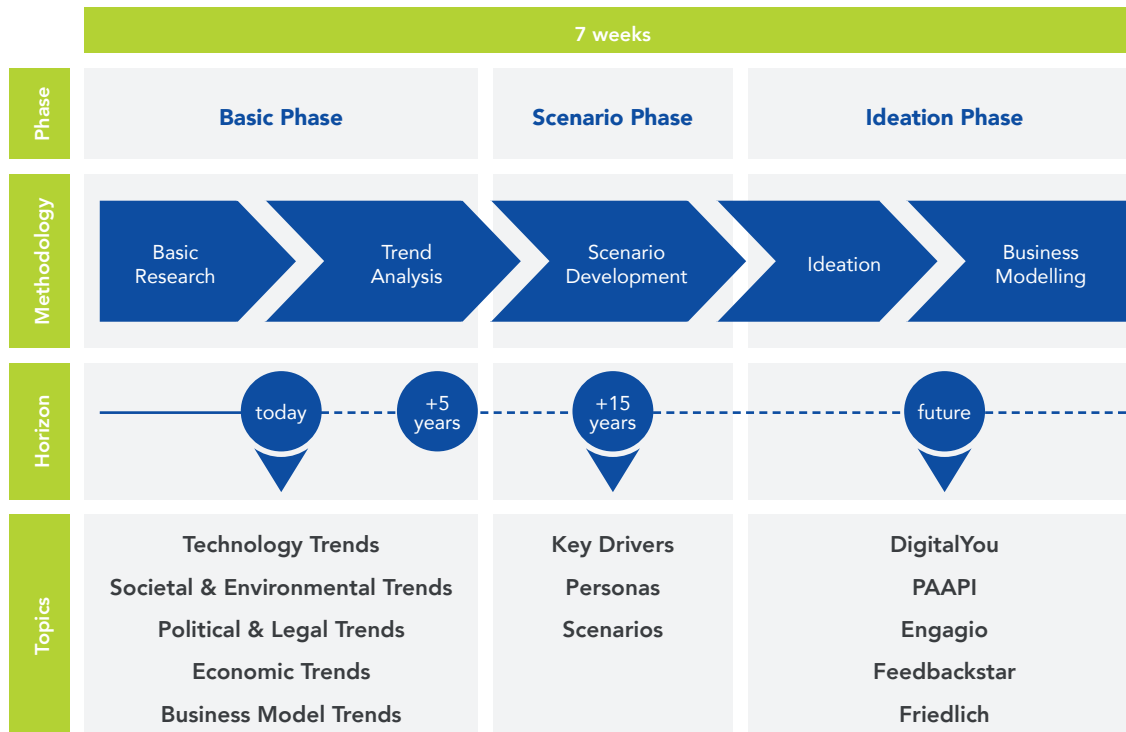
TRENDS

SCENARIOS

IDEATION

METHODOLOGY

For a given topic that is highly impacted by digital technologies, the Trend Seminar pursues three main goals:

- To analyze the status quo and recent developments in order to identify important trends
- To develop extreme scenarios of the future in order to be prepared for upcoming challenges
- To develop future-proof product and service ideas and to detail them out into business concepts.

These goals are represented by the three phases of the trend seminar: the Basic Phase, the Scenario Phase, and the Ideation Phase.

Twenty-six students, supervised by two doctoral candidates, pursue the Trend Seminar in seven weeks of intensive full-time work alongside with their project partner. In each phase, interdisciplinary subteams are formed including students from technology, business, and various other backgrounds to combine versatile ways of thinking.

The **Basic Phase** yields a holistic overview on recent developments and trends in the environment of the overall topic. Based on the commonly used STEEP approach (Social-Technological-Economic-Ecological-Political), the status quo and trends in the fields society & environment, technology, economics, politics & legal, as well as emerging business models are analyzed. Knowledge is gathered by literature research, preceded by a series of input presentations by experts on the topic. The class is split into five teams, each working on one of the thematic scopes. At the end of the Basic Phase, the teams present their key findings to each other in order for everyone to get a holistic view on the topic to build upon in the following phases.

The **Scenario Phase** builds upon the analyzed trends in order to create four scenarios of different futures in twenty years ahead. Driving forces behind developments are identified and specified as drivers with bipolar outcomes. Once specified, all drivers are ranked according to their respective impact on the overall topic and the perceived degree of uncertainty regarding their outcome. Two key drivers that are independent from one another and have both a high impact and a high degree of uncertainty are chosen and, with their bipolar outcomes, used to create a scenario matrix of four scenarios. A timeline for each of the scenarios is created and the scenarios are sketched out using persona descriptions and visualizations. The Scenario Phase starts with a two-day workshop followed by group work in four teams. Teams are newly formed in order to include experts from each subtopic of the Basic Phase in each new Scenario Team.

In the third phase, the **Ideation Phase**, the goal is to develop innovative business concepts, which are then tested against the previously developed scenarios. Within a two-day workshop on structured ideation following the SIT approach (systematic inventive thinking), a large number of business ideas are developed. Out of these, the most promising five ideas are selected and further developed into detailed business concepts. The business model canvas by Alexander Osterwalder and Yves Pigneur serves as the base structure. At the end of the seminar, the business model concepts are presented to the project partner and guests.

	7 weeks		
Phase	**Basic Phase**	**Scenario Phase**	**Ideation Phase**
Methodology	Basic Research → Trend Analysis	Scenario Development	Ideation → Business Modelling
Horizon	today — +5 years	+15 years	future
Topics	Technology Trends Societal & Environmental Trends Political & Legal Trends Economic Trends Business Model Trends	Key Drivers Personas Scenarios	DigitalYou PAAPI Engagio Feedbackstar Friedlich

LIST OF ABBREVIATIONS

AI
Artificial Intelligence

API
Application Programming Interface

B2C
Business to Consumer

B2G
Business to Government

BAföG
Bundesausbildungsförderungsgesetz

BBK
Bundesamt für Bevölkerungsschutz & Katastrophenhilfe

BMAS
Federal Ministry of Labour & Social Affairs
(Bundesministerium für Arbeit & Soziales)

BMFSJF
Federal Ministry for Family Affairs, Senior Citizens, Women & Youth
(Bundesministerium für Familie, Senioren, Frauen & Jugend)

BMG
Federal Ministry of Health
(Bundesministerium für Gesundheit)

BMI
Federal Ministry of the Interior
(Bundesministerium für Inneres)

BMVg
Federal Ministry of Defence
(Bundesministerium der Verteidigung)

BMVI
Federal Ministry of Transport and Digital Infrastructure

BMWi
Federal Ministry for Economic Affairs & Energy
(Bundesministeriums für Wirtschaft & Energie)

bn
Billion

CAN
Canada

CEF
Connecting Europe Facility

COVID-19
Coronavirus Disease 2019

CPP
Citizen Participation Portal

DEP
Digital Europe Program

DST
Digital Service Team

E-ID
Electronic Identity Card

ENISA
European Union Agency for Cybersecurity

EU
European Union

EUR
Euro

FIM
Federal Information Management System

FITKO
Föderale IT-Kooperation, Federal IT Cooperation

GBP
Great Britain Pound

GDP
Gross Domestic Product

GDPR
General Data Protection Regulation

Gestapo
Geheime Staatspolizei

GovTech
Government Technology

HR
Human Resources

ICT
Information and Communication Technologies

IGO
Intergovernmental Organization

IoT
Internet of Things

IP
Intellectual Property

IT
Information Technology

KPI
Key Performance Indicator

m
Million

Mbps
Megabit per second

MINDEF
Singapore Ministry of Defence

NGO
Non-Governmental Organization

NL
Netherlands

NSA
National Security Agency

OZG
Online Access Act
(Onlinezugangsgesetz)

PA
Public Administration

Q&A
Questions & Answers

RPA
Robotic Process Automation

SaaS
Software as a Service

SEA
Search Engine Advertising

SEO
Search Engine Optimization

SME
Small and Medium-Sized Enterprise

Stasi
Staatssicherheitsdienst

STEM
Science, Technology, Engineering, Mathematics

STIR
Startup in Residence

THW
Technisches Hilfswerk

UK
United Kingdom

US
United States

USA
United States of America

USD
United States Dollar

UX
User Experience

VC
Venture Capital

VR
Virtual Reality

TRENDS

The following chapter lists current trends that have a strong impact on the future of public administration in Germany in the digital age. In accordance with the Basic Phase methodology, trends and related driving forces are structured into five areas: technological trends, societal and environmental trends, legal and political trends, economic trends, and business model trends.

TECHNOLOGY TRENDS

INFLUENCING PUBLIC ADMINISTRATION IN THE DIGITAL ERA

Gigabit Network for Germany
Towards a Digital Administration
Administrative Process Automation
Cloud-Based Data Storage
Open-Source Software
Demand for Cybersecurity

TECHNOLOGY TRENDS

Influencing Public Administration in the Digital Era

The core of Germany as a constitutional state is its public administration. If the citizens want to participate in votes, register their car, or order their ID, they have to get in contact with the executive authority of the state. The sector of public administration is highly connected to every single citizen. This fact means every citizen is affected by the changes which are happening. Even small changes can have significant influences on how we interact with the government. Looking at the current Digital Era, public administration is also influenced by digitization. First movements towards an eGovernment can be detected even if public administration is far behind other industries. For the transition to eGovernment, putting the right technologies in the right places is crucial. To achieve smooth workflows for public servants and convenient government-citizen interactions, the following trends need to be considered.

Most of those technological trends are based on a proper working technical infrastructure. It is necessary to expand the current bandwidth for an adequate internet use regarding the upcoming higher data rates. The entire effort of the government goes now into supporting the expansion of high bandwidth called 5G.

The Online Access Act makes it necessary to digitize a total of 575 administrative processes until 2023 [1]. Germany already provides some of them, like the application tool BAföG-online for student loan and the tax declaration tool ELSTER [2], [3]. Further projects on cooperation between the German states were started to digitize and simplify the remaining processes [4].

Over the years, Robotic Process Automation (RPA) and Artificial Intelligence (AI) replaced jobs and made handling big datasets possible, which have already revolutionized parts of the private sector [5]. Public administrative processes can significantly benefit from the best practices and know-how of the industry. Countries like the United Kingdom and Estonia already make use of these technologies to improve their processes to rise effectiveness and quality.

Due to digitization, vast amounts of administrative data will be generated and stored on clouds in the future. The European project Gaia-X is a promising example of such a cloud-based infrastructure [6]. Furthermore, this infrastructure forms the base for further Artificial Intelligence or Data Analysis applications in the public sector.

Switching from proprietary to open-source software will help accelerate the development of eGovernance solutions. Administrative processes that are already implemented using open-source tools can be even shared with other states. Furthermore, it provides transparency because every citizen can technically look into the implementation and verify its legitimacy.

As we digitize governmental processes and transform into an eGovernment, one of the major upcoming challenges is data privacy and security. In this aspect, cybersecurity will play a crucial role, not only to protect sensitive information but also to help change the mindset of the citizens and PA workforce to gain trust in new technological processes.

GIGABIT NETWORK FOR GERMANY

Laying the foundation for digitalization at scale by enabling high-speed data connections

To facilitate a comprehensive digitalization of Germany's everyday life, its industry, and its government, reliable high-speed networks are required. Here, one has to differentiate between fixed broadbands and mobile networks: Generally speaking, the term broadband refers to cables with a big diameter capable of conveying large amounts of data. Today, this definition is outdated. When we now speak of broadband, this typically relates to glass fiber networks, since no other medium offers comparable reserves of bandwidths for the increasing data volumes of the future [7]. Mobile internet, on the other hand, relates to the interconnection of mobile devices such as smartphones, tablets, and stationary consoles. Together, they form the basis for a competitive digital infrastructure for both the private and professional life, facilitating the internet of things (IoT), industry 4.0, and smart cities [8]. The lack of investments into Germany's digital infrastructure increases the urgency for severe improvements to prevent the country from falling behind. Whereas even in developing countries broadband is the norm, Germany's internet infrastructure still primarily relies on copper-cored cables, a conduction technology that is more than 125 years old [9].

Facts:

- German PA aims at implementing a widespread broadband network until 2025, including rural areas in which a private implementation cannot be expected. By 2021, approximately 99% of all German households are to be supplied with 4G [7].
- The establishment of 5G networks starts in 2020; the auctions of 5G frequencies ended in 2019 [10].
- According to the Speedtest Global Index, Germany currently ranks 39th place in wired connection speed with an average download rate of 79 Mbps. In comparison, some Asian countries provide the double average connection speed [11].

Key Drivers:

- The coalition agreement of 2018 promises to subsidize country-wide network improvements with an estimated 12bn EUR [12], one of the most significant financial efforts of the BMVI [13].
- In the auction on internet frequencies of 2019, new frequencies were sold against the promise of a blanket internet coverage [12].
- The number of smartphone users has been on a constant rise and reached 57m users in Germany in 2018 [14], giving rise to the demand for reliable connectivity.
- The German federal government set up several innovation programs to test 5G applications and initiated a funding program for 5G on a communal level [7].

Challenges:

- Incentivizing private internet providers to implement a widespread deployment of high-speed internet and securing a fair investment and infrastructure competition [15].
- Internet requirements of Germany's industry differ from those of its citizens: the former demand a symmetrical distribution, meaning equally fast upload and download rates in gigabit ranges. This makes them highly reliable and disturbed by little jitter and latency [15].
- To implement such a high-speed infrastructure, the glass fiber cables must be laid into the houses and apartments. With a coverage of 99%, this requires the consent of nearly all German citizens [15].

Impact on Public Administration:

While yielding demanding challenges, the implementation of a comprehensive broadband internet connection and 5G networks offer enormous potential for Germany's future. It is crucial to enable technological progress, such as autonomous vehicles and the industry 4.0. But this progress and its emerging technologies come along with an urgency for the administration to adjust to it. With a better-connected national infrastructure, as well as a unified world in general, Germany's, as well as any other public administration, will have to keep up with social, technological, and political developments at a much-advanced pace.

TOWARDS A DIGITAL AD-MINISTRATION

Providing administrative services online for easy access and information exchange

To-date, most projects regarding digitalization in public administration in Germany focus on the online accessibility of existing processes e.g. the tax declaration tool ELSTER [3]. German citizens can make their tax declaration entirely online and send it to the tax office without having to print anything. This change happens under the pressure of the OZG, which forces the online availability of several administrative processes until 2022 [1]. As a further step, a simplification of the administrative procedures is planned and already started with the FIM [4]. The administrative institutions of the states, the municipalities, and the federal level share their processes as modules with this tool. Others can use the modules to simplify their processes and implement them easier. Given the lack of educated employees in the field of IT, these digitalization efforts present a difficult task for the German public administration [16].

Facts:

- BAföG-online and the tax declaration tool ELSTER are application processes in Germany which are working utterly online during the application process [2], [3].
- The state of Bavaria operates a digital company project since 2020, which aims at implementing the most used processes by companies online [17].
- FIM is a Germany-wide platform to share information about administrative procedures online. The aim is to optimize and digitalize administrative processes [4].
- Furthermore, there are specific rule-based processes e.g. applying for a resident parking permit in Frankfurt or payment of family allowance in Austria, which are entirely automated and digitalized [18], [19], [20].

Key Drivers:

- The OZG is a legal driver of the digitalization in public administration. It forces that almost 600 administrative processes have to be accessible online for all citizens by the end of 2022 [1], [21].
- Economic reasons in the public administration and private industry push the digitalization in administrative tasks, which comes with higher efficiency regarding time and costs [17], [22].
- With more online administration processes, less printed paper is necessary. This saves resources like ink, wood, and energy and makes the governments more sustainable [23].
- 91% of German citizens want online access to public services [24].

Challenges:

- The European countries have to adapt around 575 highly complex processes to a digital version [25]. Only a few of them are digitalized yet.
- A lack of highly-educated employees in the IT sector of public administration causes problems with the implementation of digital processes. [16]
- 86% of the German population use the internet [26]. The creation of access to the internet for every citizen is mandatory for a digitalization of the administration processes that will become accessible online.
- Most citizens want a secure and safe data storage for online services [24].

Impact on Public Administration:

In a digital government approach, the digitalization of all administrative processes is mandatory [22]. Online accessible application, approval, or ordering processes ensure that the administration can become more efficient in the future. With digitalized services, it will become easier to provide barrier-free services for citizens with restricted mobility because they can use the services from home. Individual solutions for color-blind or blind people are also possible as well as for non-German speaking citizens. Digitalization, through the implementation of online services, is an opportunity to compensate for the reduced amount of employees in public administration in the future [27].

ADMINISTRA- TIVE PROCESS AUTOMATION

Emerging technologies enable more transparency and higher efficiency in the public sector

The private sector makes use of two types of process automation technologies: RPA and AI. The former is the usage of software to automate rule-based activities, whereas the latter is the ability of a machine to "think". AI is globally on the rise. Nowadays, AI algorithms can be run on every smartphone. MIT technology review describes AI as one of the ten most crucial breakthrough technology trends of 2020 [28]. A great benefit of AI is that decisions are based on big datasets without human interaction. These are used in traffic control, criminal recording, and security issues like border control. Countries like Estonia and the UK are more digitalized than Germany. They are currently implementing applications like AI guided text analysis tools that increase the effectiveness of work processes in the public administration and enable the automation of repeating activities [29]. Additionally, Estonia creates environments to test new public sector AI to improve its software solutions before opening it up to all customers [30]. RPA technologies can automate tasks that are repeating, rules-driven, electronically triggered, and require no human judgment. Existing solutions for the public sector are document handling and validation, human resource tasks, and form processing [31].

Facts:

- Germany will spend 3.5% of its GDP on research and innovation with a focus on digitalization and AI until 2025 [33].
- According to McKinsey Global Institute, the estimated increase of the global cumulative GDP of 2030 due to AI is 16% in comparison to 2018 [33].
- Between 2020 and 2025, global turnovers in the field of AI are estimated to increase nearly [34].

Key Drivers:

- From 2017 to 2020, the revenue due to RPA amongst global enterprises in the software market increased by 63.1% [35]. This development enables the public sector to adopt the technology and profit from existing know-how [36].
- Due to demographic change, 1.3m public servants will leave the public sector by 2026. The use of AI and RPA will compensate for this decrease [37], [38].
- The costs of computing and storage is reducing [39]. The VC investment in AI start-ups increases which can drive new automation innovations for both private and public sector at scale [34].

Challenges:

- For implementing AI successfully, the prerequisite is Cloud-Technology and complexity-reduced operating processes [40].
- Security and data privacy issues due to hacker attacks are legally unsettled and can't be ruled out technologically. Additionally, hacker attacks can be very effective and remain unrecognized [40].
- If the dataset isn't representative or hasn't a certain quality, applying AI systems to social or demographic data can lead to discrimination of ethnicities and cultural backgrounds [41].
- Interoperability occurs due to the federal system of Germany that causes problems in information and process exchange between governmental institutions [42].

Impact on Public Administration:

The use of technologies to automate processes increases the transparency, efficiency, and quality of public services for public servants and citizens alike [43]. More accurate and on-demand information improves forecasts and predictions, for example traffic prognoses. The time exposure of public servants for repeating work reduces dramatically, allowing for reallocation to strategic problem-solving tasks. Smooth operations between Government and citizen are achievable by using AI-based programs to simulate complex systems that enable the Government to experiment with different policy options and spot unintended consequences [41], [44], [45].

CLOUD-BASED DATA STORAGE

European citizens' data and documents accessible on the cloud

New data infrastructure and cloud technologies are currently discussed in Germany. Examples are the "Gaia X" project or an administrative platform called "Bürgerkonto," where personal information or documents relevant to PA are stored and made accessible to citizens [46], [47]. In other European countries like the UK and Estonia, cloud systems for the PA are already widely implemented and form an essential pillar of their eGovernment services. In Estonia, personal information is stored in databases (registries) that are connected through the X-Roads technology [48]. This system allows agencies to access personal data of each citizen. Therefore, it eliminates the need to give personal information to various governmental agencies repeatedly ("once-only principle"), which can mean an increased convenience and simplicity for citizens. However, especially in Germany, citizens tend to be very protective of their data. There are several examples of governments collecting data which are perceived critically, like China's Social Credit System or the NSA gathering data on citizens [49], [50]. Securely storing data and, at the same time, making data easily accessible to the administration and citizens when necessary, seem like the two crucial goals to pursue.

Facts:

- In Germany, data can be stored by governmental agencies on the "Bundescloud" since 2017. However, so far, access is only possible within the government network and not through the internet [50].
- The Gaia X project started in 2019 and aims at building a connected, open data infrastructure based on European values [51].
- Within the Gaia X infrastructure, each cloud-service provider can become a node to which information like data storage location, calculation, and storage performance and data sovereignty is linked [46].

Key Drivers:

- It requires 6.7bn EUR in public and private investments over a period of 5 years to implement the European Cloud Initiative, e.g., for establishing high-speed connectivity and powerful high-performance computers [52].
- Cloud infrastructure is necessary for implementing innovative technologies like AI and big data analysis [53], which are increasingly funded by the government and potentially used in the PA [54].
- Other countries like Estonia and the UK set an excellent example for cloud-based administrative systems and serve as role models for other countries [55].

Challenges:

- A secure storage and transit of data, e.g., through secure data encryption, have to be guaranteed to implement cloud-based solutions, especially for handling sensitive personal data like the PA does [56].
- For the processing and storage of data, regulations like GDPR have to be strictly adhered to by cloud providers by law [57].
- Providing the necessary infrastructure like reliable and fast broadband internet access for the whole population is key to making sure cloud-based services are available for every citizen in Germany [55].

Impact on Public Administration:

Storing data in a cloud-based system allows the administration to improve scalability, sustainable use of resources, collaboration, and efficiency for its digital services [53], [55], [57]. However, the data stored could potentially be a target for people unlawfully gaining access or misusing the data. Providing a high degree of data sovereignty through local European cloud solutions like Gaia X, as well as implementing secure encryption and transparent access logs are critical factors for a legally compliant and safe cloud environment [46].

OPEN-SOURCE SOFTWARE

Adopting open-source software provides transparency and fosters public-private collaboration

Open-source software refers to software whose source code can be inspected, modified, and enhanced by anyone. It is accessible via a license so that the copyright holder provides the rights to study, change and distribute the software to anyone for any purpose. Open-source software is becoming increasingly popular due to the significant investments and adoption from the big tech companies. Proprietary software, on the other hand, is owned by an individual or a company, and its source code is mostly kept secret, preventing modifications and inspection of the software. The development teams of open-source software usually consist of volunteers working not for monetary return, but for the pleasure and pride of being part of a large virtual development project. Developers are mostly spread across the world, working remotely for the entire project. Overall, open-source software projects encourage rapid code evolution, employ a massive peer code review process and send out quick releases of the prototype code [58]. In France, the UK, and the US, governments have recommended using open-source software in their administrations. On closer examination, the benefits of open-source software are particularly well aligned with the objectives pursued by governments [59].

Facts:

- The open-source services industry is set to exceed 17bn USD in 2019 and expected to reach nearly 33bn USD by 2022 [60].
- The eGovernment powerhouse Estonia has used open-source software since 1995 to save costs on licensing fees [61]. It has now opened up public code repositories for eGovernance solutions [62].
- The open-source market is estimated to be worth hundreds of billions based on recent big-ticket acquisitions like Red Hat (acquired by IBM for 34bn USD) and GitHub (acquired by Microsoft for 7.5bn USD) as well as high public market valuations like those of MongoDB (7.9bn USD) and Elastic (7.3bn USD) [60].

Key Drivers:

- Open-source software costs much less compared to proprietary software [63].
- Even though proprietary software hides the source code, it is immune to attacks. On the other hand, open-source software allows for complete audits to check for backdoors or other vulnerabilities within the software [63].
- Proprietary software vendors get incentives to release improved versions only from time to time. Thus, users, in a way, are obliged to regularly buy newer versions, which can cost high licensing fees [64].
- The performance of proprietary technologies declines as they turn into a monopoly [64].

Challenges:

- Open-source software relies on its online community to deliver technical support employing forums and blogs. Getting the right feedback for an issue may not always be quick and straightforward [63].
- Implementing custom open-source software often takes more time and money compared to purchasing proprietary software [58].
- The longevity of open-source software is questionable. If a particular open-source software product is adopted and the community supporting the product disappears, this would result in additional maintenance efforts to take over the product.
- Despite having the source code freely available, some high-profile bugs were not detected and fixed for years [65].

Impact on Public Administration:

Open-source software can help accelerate the development of an eGovernment as it provides useful components necessary to build custom eGovernment software applications. Open-source developed solutions can also be shared across different areas of eGovernment. An example would be the data exchange layer that needs to be implemented across different states to communicate with the national database. The exchange of code helps avoid reinventing the wheel and save on development costs [62]. Adopting open-source software can bring the public and private sector closer together, allowing for more collaboration and transparency, thus ensuring a sustainable long-term eGovernment [62].

DEMAND FOR CYBERSECURITY

Growing emphasis on data privacy and security calls for high security standards

As we increasingly experience massive data breaches, there is a growing emphasis on data privacy and data security. The German public administration stores far more data than its private sector, and often keeps this data on older, more vulnerable systems. Tools developed by governments to provide security are seized, weaponized, and proliferated by criminals as soon as they are released [66]. In terms of government preparations, Germany has started expanding its existing bodies and reinforcing its capabilities. An example would be the expansion of the National Center for Cyber Defence. It acts as the link between government ministries that are legally responsible for the cyber activity, and also the granting of independent capabilities to this unit to analyze, assess, and define the situation as well as to add a platform for practicing and simulating emergencies [67]. As we slowly move towards a digital era with an ever-increasing dependency on the internet and connected devices, the government's role in cybersecurity will grow further. With increasing threats and fewer opportunities to fail, governments must rise to the challenge of protecting both national security and economic prosperity [68].

Facts:

- In 2016, Cambridge Analytica gained access to private information of more than 50m Facebook users to influence the election [69].
- Google+ social platform shuts down after disclosing a major security bug that exposed private information of half a million users to apps that used the Google+ API [70].
- Data breaches exposed 4.1bn personal records in the first half of 2019 [68].
- Cybersecurity related spending is on track to surpass 133bn USD in 2022 worldwide, and the market has grown more than 30x in 13 years [71].

Key Drivers:

- Blockchain offers new algorithm-based mechanisms to establish and manage trust across entities, which can have a significant impact on eliminating single point of failure and protecting sensitive data [72].
- Government agencies like the Singapore Ministry of Defence (MINDEF), US Department of Defence, and European Commission leverage the global hacker community in the form of cybersecurity competitions like bug bounty programs to surface vulnerabilities before criminals exploit them [73].
- Federal Ministry for Economic Affairs and Energy (BMWi) launches GAIA-X to provide high-performance, competitive, secure, and trustworthy data infrastructure for Europe to become independent from commercial cloud providers [6].

Challenges:

- Incompatibility between blockchain-based solutions and existing legal and organizational frameworks in the public administration is a major barrier to unlocking the transformative potential of blockchain [72].
- Personal information has to be de-anonymized to comply with data privacy regulations. However, it is challenging to retain the usefulness of the data during this process [74].
- Outsourcing cybersecurity for the public administration due to the shortage of cybersecurity specialists, poses significant security threats due to multiple layers of contractor involvement, differences in international laws, and the inability to control quality [75].

Impact on Public Administration:

Government leaders are increasingly aware that promoting prosperity and protecting national security includes providing cybersecurity. That means demonstrating that a nation, state, region, or city is a safe place to live and do business online. And it includes deterring cyberattacks, preventing cyber-related crime, and protecting critical national infrastructure while also maintaining an environment that makes techno-logical progress easy [66]. Data security and data privacy are fundamental to the technological infrastructure of an eGovernment. Changing the mindset of the citizens about how the government protects its user information is crucial to gaining trust in new technological processes and applications.

SOCIETAL & ENVIRONMENTAL TRENDS

INFLUENCING PUBLIC ADMINISTRATION IN THE DIGITAL ERA

Rising Data Consciousness

High Demand for Convenience

Global Competitiveness

Changing Demographics

Increase in Extreme Events

SOCIETAL & ENVIRONMENTAL TRENDS

Influencing Public Administration in the Digital Era

Society represents the highly dynamic landscape in which humans interact and where they are bound together by a shared culture, religion, nationality, or other factors. There is a constant influence from individuals on society in the form of law, politics, or technology, while society shapes individuals at the same time. Thus, to understand what trends will affect the PA of the future, it is necessary to take a look at an individual's perspective as well as a global view on society and its environment.

The way each citizen perceives PA is driven by their own mindset. Currently, the rising importance of personalized information contrasted with recent data scandals lead to a shift in the mentality of the population. Society is becoming more data conscious and demands that the government imposes stricter regulations to ensure privacy. Therefore, the PA has to find a trade-off between security and usability in its digital offerings and drive engagement in a way that secures people's trust in it.

When it comes to the interaction of individuals with public services, the demands are shifting. Society's need for convenience has shaped the current baseline for digital services. Personalization, seamless access across devices, and easy authentication are now expected from any modern application, but currently only found in the private sector. The PA has to meet the users' expectations towards their services and incentivize the transition from analog processes in favor of the new digital ones.

Nevertheless, not only individual demands and opinions change, but there is also a transition in the very characteristics of society as a whole. Immigration, a rapidly aging population, and urbanization cause widespread demographic changes. Consequently, the needs and demands of the increasingly diverse groups in society are evolving as well. PA has to ensure the accessibility of their services for citizens, be it online or in person, and do so for every single member of society.

Besides an internally changing society, new dynamics on a global scale can be observed. Competition rises on an international level and members of society look more to other countries and their advances. Citizens demand that the PA in Germany shows innovative power by taking a leadership role in digitalization as well. At the same time, there is increased scrutiny on the efficiency of the public services themselves, which puts further pressure on the administration to implement structural reforms.

These structural reforms may also be needed to deal with environmental influences on society. Climate change drives an increasing number of extreme weather events, while globalization facilitates the spread of pandemics at an ever-increasing rate. PA is seen as responsible for minimizing the effects of such extreme events to ensure the safety of its citizens. In order to do so, it must develop into a well-structured, dynamic, and informative organization.

RISING DATA CONSCIOUS-NESS

Public administration must provide secure services to remain trustworthy

Many Germans are cautious to whom they hand over their data as there have been examples of severe misuse by government agencies in the past [76]. Nevertheless, a majority of people are willing to share their personal information when they are offered significant value in return, for example, on social networking sites [77]. In recent times, data has increasingly become more valuable and has, on many occasions, been leaked or sold without users' knowledge or consent. This has resulted in people demanding appropriate regulation and the assurance of secure offerings from the government [78]. As the German authorities prepare to digitalize 575 public services based on the Online Access Act [79], the PA will face a substantial challenge in the years to come.. It will have to find a way to implement these services in a way that ensures usability while not compromising on security. Additionally, the administration will need to communicate the offerings in a manner that proves its trustworthiness and drives engagement in society.

Facts:

- European data protection laws are among the strictest worldwide and were directly driven by the German society's demand for more regulation [80].
- Despite data privacy concerns a large share of the German population uses services they mistrust [81], for example, there were 37m registered Facebook users in Germany in 2019 [77].
- According to a recent survey by the European Commission, 62% of respondents who feel they have partial or no control over the information they provide online say they are concerned about this [82].

Key Drivers:

- For historic reasons, Germans are very cautious about their private data. The Gestapo and Stasi used personal information to control dissidents [76].
- Several large data scandals took place recently where personal information was leaked or sold without the users' knowledge, further decreasing the willingness to share personal data [78].
- Due to the increasing importance of personalized information in the digital era, users are becoming aware of the amount of data that is being stored and fear the risk of its misuse [83].

Challenges:

- For the success of digital offerings, a satisfactory tradeoff between security and convenience needs to be achieved. However, secure solutions offered currently are often highly complex and neglect the user experience [84], [46].
- To convince the population to share their data with digital services, clear principles concerning self-determination, ownership of data, and the "right to be forgotten" need to be implemented globally [85].
- At the moment, a majority of non-governmental data is stored in the US and China – to remain independent and unaffected by geopolitics Germany has to build up its own data infrastructure [46].

Impact on Public Administration:

The success of the implementation of the OZG largely depends on the question of whether the PA will manage to get a majority of the German population to engage with these digital services on regularly. To achieve this goal, it will be crucial to communicate the service's advantages transparently and ensure upmost privacy compliance. The German PA is therefore confronted with the challenge to provide easy-to-use services, similar to those of private technology companies, while at the same time maintaining its standing as a trustworthy institution.

HIGH DEMAND FOR CONVENIENCE

Public services have to meet society's expectation of user-centricity

The increase of SaaS offerings [86] and their enhancements over traditional service offerings raise customers' expectations of digital and analog services in terms of quality and convenience [87]. The PA, in contrast to private enterprises, does not have to compete for a market share, which leads to different priorities regarding user-experience requirements. Private companies not only digitalize their services, but continuously improve them to meet their customers' high demands with features such as personalized content and user-friendly design. Secure authentication, seamless transition between devices, fast response times, and homogeneity across services are part of the elements to be considered in the design of digital services by the PA. The transition to digital solutions provides the opportunity to develop services with user-centric design in mind and meet the citizens' high demand for convenience. Delivering a satisfactory user experience will be a deciding factor in the adoption and success of digital offerings by the PA.

Facts:

- More than 70% of European citizens think that the development of digital public services is a priority [88].
- For over 80% of users, convenience is an essential part of a positive customer experience and, therefore, a critical success factor towards customer satisfaction [87].
- Nearly one-third of customers abandon services after just one bad experience, emphasizing the importance of a service not only to be functional but also to offer an overall good user experience [87].
- In Europe, around 50% of citizens are not satisfied with public services and its processes, e.g., services around unemployment benefits, traffic police, and public education [88].

Key Drivers:

- Digital natives are becoming more significant, and they demand services to be personalized, fast, and convenient before adopting them [87].
- High competition in digitalized services in the private industry pushes innovation and convenience of their offerings, raising the public's expectations of how services, both public and private, should be delivered [89].
- Citizens want public services to become more flexible and more straightforward through digitalization [90], following the trends established by the private sector.

Challenges:

- Developing and supporting high-quality software solutions requires scarce and expensive resources that the public sector might not be able to match. Especially regarding human resources, a lack of qualified IT personnel could hinder the development of such services [38].
- The translation of legacy analog processes into digital solutions does not always result in a more user-friendly experience and might even increase the procedure's complexity [88].
- High heterogeneity of currently offered public services makes a unified user experience difficult [91].

Impact on Public Administration:

If digital services developed by the German PA are inconvenient, they will struggle to succeed. Digital services implemented by the PA will not only be compared to their analog counterpart, but also to offerings from the more dynamic and resourceful private sector. For the foreseeable future, services will have to be offered in both digital and analog variants, and citizens should be incentivized to embrace the change from long-standing legacy processes to new digital ones. If citizens find these new offerings convenient and adopt them, they will become more satisfied with PA services and more trustful of their capability.
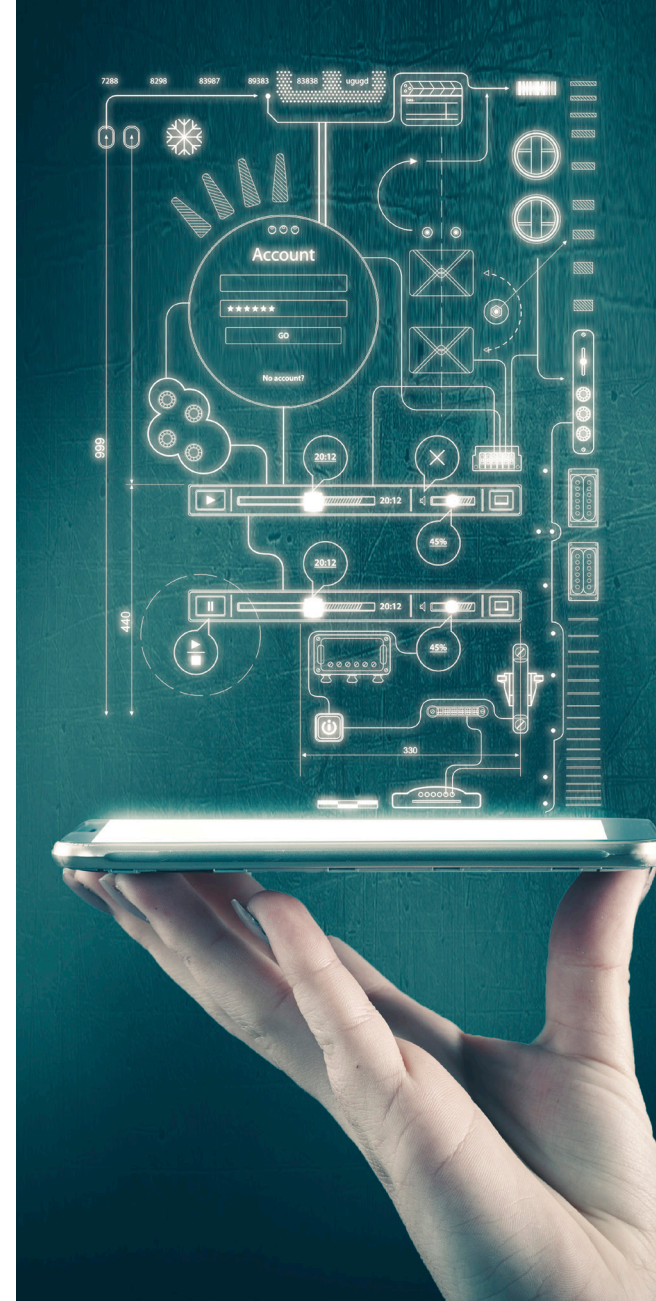
GLOBAL COMPETITIVE-NESS

Increasing international competition demands a more efficient public administration

Germany is known as one of the major economic powers globally. However, there is a growing sentiment in the German population that Germany is losing its advantageous position. The reason is not adapting quickly enough to the technological changes in a global market, most notably the rising importance of digital technologies. In recent years, countries have successfully renovated their economies to take advantage of new technologies and business models. The German society now increasingly demands decisive steps from the PA to modernize and remain competitive, with the requirement that the administration itself becomes more efficient and digital. Exposed to prominent examples such as e-Estonia, German citizens feel that their country has begun the digitalization too late. But even though it started delayed, digitalization might also provide chances for PA to improve its services and shake off its image of clinging to antiquated and inefficient processes. This change becomes increasingly essential as citizens now demand a leaner administration that can show Germany's technological prowess and provide more efficient services for its users.

Facts:

- In the Digital Economy and Society Index 2019, which ranks the economic and digital performance of countries in the EU, Germany ranks below average with marginal improvements from the previous year when it comes to PA [92].
- Each German citizen spends an estimated 130 minutes per year on applying for the top 35 administrative services, which could be reduced by nearly 50% if entirely digitalized services were in place [93].
- 89% of senior executives and 75% of German politicians state that the German government does not sufficiently support the process of digitalization in Germany [94].

Key Drivers:

- Digitalization is a crucial component and topic of major focus in global competitiveness [95].
- The general population, as well as business executives, feel that Germany lags in terms of digitalization and needs to be at the forefront to succeed [94].
- Historically, Germany has been perceived as a leader in technological innovation. The population feels the urge to live up to this standard in the age of software, as can be seen in the current revolution of the car industry [96].

Challenges:

- The transformation towards a more efficient and competitive PA is complicated given the unique federal structure in Germany. It necessitates new laws and a shift of competencies compared to the status quo [97].
- The digitalization and the optimization of administrative services requires a significant investment of time and effort in the years to come. This is due to the complexity of German law and administrative procedures.
- The fact that Germany started the process of digitalization in PA relatively late translates into additional time pressure for the modernization of PA service offerings following the OZG [98], [5].

Impact on Public Administration:

There is an increased drive for efficiency in today's competitive landscape. Due to the demands of the population on Germany maintaining its leadership role, PA will have to catch up and assume a forerunner position in digital services to remain competitive on a global level. Especially given the time pressure added with the introduction of the OZG [1], public services will not only have to become digital in the frontend but also in the backend in terms of underlying internal workflows. It will, therefore, become increasingly hard to justify spending tax money on outdated processes.

CHANGING DEMOGRAPHICS

The diversifying and aging population demands easily accessible and inclusive services

German society is currently undergoing a development process that will fundamentally change its demographic structure. On the one hand, the baby boomers represent the largest age group, which will soon retire, while birth rates are lower than they should be to ensure a stable demographic structure. On the other hand, net migration is still positive, which could party alleviate the problem of a shrinking population. The continuous influx of immigrants contributes to Germany's diverse society with its different cultural backgrounds and languages. Asylum seekers and immigrants, some without German language skills, must be successfully integrated into society. Another challenge for the community is urbanization. As more and more people move from the countryside to cities and urban areas, infrastructure for health care, mobility, and general services is slowly declining in rural areas. In these developments, PA plays a critical role by facilitating necessary services at the interface between the state and its citizens. Future digital and analog public administrative services have to be inclusive, ensuring access for all groups of society in both urban and rural environments.

Facts:

- In 2018, 21.5% of the German population was 65 years and older [99] With this figure rising to about 29% until 2030, the development of an aging population intensifies in Germany [100].
- About every fourth citizen in Germany has a migratory background, which indicates that Germany already has a multicultural society [101].
- 77% of Germany's population lived in urban areas and cities in 2018 [102]. Since more people are attracted by jobs and better infrastructure in cities, this rate is expected to rise by 5% until 2040, with 83% of the total population living in urban environments [103].

Key Drivers:

- Low birth rates and the unequal distribution of generations result in an aging, and in the long term, a shrinking population in Germany. The current number of immigrants cannot entirely compensate for this [81], [104].
- There is a steady inflow of immigrants into Germany, of whom 44% take a language course upon arrival, because they have no, little, or unsatisfactory German skills [105].
- The leading causes for leaving the countryside are the improved infrastructure, job and educational opportunities, higher salaries, and a more extensive choice of consumer goods in cities and urban areas [106].

Challenges:

- The high rate of older people not using the internet on a regularly and their lack of digital skills has to be accounted for when designing services for citizens [107].
- Immigrants face problems due to the opacity and complexity of German laws and bureaucratic processes, as well as due to language barriers [108], [109].
- Administrative services have to meet the needs of all members of society, including disabled people and the declining rural population [110].
- User groups show strongly differing preferences regarding their expectations of the design of analog and digital administrative services [111].

Impact on Public Administration:

The PA needs to address digitalization to facilitate access to administrative services, e.g., to avoid longer trips for people in rural areas. However, the current situation of many older adults who lack digital skills or internet access has to be considered. Thus, public authorities need to split up their resources to create both analog and digital services efficiently. For immigrants and digitally illiterate elderly, educational offerings such as online tutorials can help ensure access to online services. In general, services should be offered in different languages and simplified to be comprehensible for an increasingly diverse population.

INCREASE IN EXTREME EVENTS

Extreme events call for a well-structured, dynamic, and informative administrative body

The global phenomenon of climate change causes more extreme weather events than ever before. Moreover, globalization allows diseases to spread at an increasing rate and across borders. The PA is responsible for minimizing the effects of such extreme events to ensure the safety of its citizens. The difficulty and scope of this task will increase in the future. It is further complicated by several challenges, for instance, the spread of false information over the internet. Also, additional event-related workload might have to be handled under disrupted working conditions. To deal with the increasing amount and intensity of extreme events, competencies and responsibilities within the PA will have to be centralized, allowing an effective response and risk management. Dynamic and digitally enhanced working arrangements would facilitate the PA to stay functional in a crisis. Furthermore, new means of state-citizen interaction have to be developed to meet society's demand for trustworthy information about the development of the respective situation.

Facts:

- In the Global Climate Risk Index of 2018, Germany was ranked the 3rd most-affected country suffering from extreme weather events [112].
- According to the Intergovernmental Panel on Climate Change, a flexible and adaptive national system structure can manage the risk of climate extremes more effectively than a static and rigid one [113].
- A debate about future catastrophe response measurements is taking place in the Bundestag. In a parliamentary motion, it was decided to strengthen the THW. A motion demanding to expand the competencies of the BBK is being discussed further [114].

Key Drivers:

- Due to a changing climate, the frequency and impact of extreme weather events such as droughts or floods are expected to increase even further [113], [115].
- "The likelihood of pandemics has increased over the past century because of increased global travel and integration, urbanization, changes in land use, and greater exploitation of the natural environment" [117, p.315]. The impact of these pandemics will intensify further [117].

Challenges:

- The spread of false information about an extreme event through public media might cause misconceptions and panic in society, making it increasingly difficult to deal with the situation [118].
- The impact of extreme events results in an increase in administrative work. For example, in 2018 approximately 8,000 farmers applied for state emergency aid in order to compensate harvest losses up to 70% caused by severe droughts in that year. In response, 340m EUR of relief funds were provided [112].
- Extreme events can disrupt the working conditions of the administrative body, requiring a flexible work environment to maintain effective [119].

Impact on Public Administration:

The increase in extreme events requires the different levels of nation, state, and commune to collaborate very actively together. By centralizing competencies, catastrophe responses could become more uniform and coordinated. Moreover, flexible and effective working arrangements are needed to keep critical public services available even under disrupted conditions. Digitalizing the user-state interaction and expanding the facilities for administrative employees to work remotely could be one approach. Additionally, services to inform citizens during these events have to be expanded or implemented.

LEGAL & POLITICAL TRENDS

INFLUENCING PUBLIC ADMINISTRATION IN THE DIGITAL ERA

Top-Down Commitment to Digitalization

Legal Enabler for Local Innovation

Reducing Bureaucracy for Better Administration

Achieving Digital Sovereignty and Innovation

Protection of Citizens' Digital Rights

LEGAL & POLITICAL TRENDS

Influencing Public Administration in the Digital Era

In Germany, 89.7% of the population regularly uses the internet [120]. Although digital technologies have been profoundly impacting our daily lives, interaction with the public administration (PA) has remained mostly unchanged. Due to the increasing possibilities of digitalization and the rising demand for modern and personalized services by digital natives, a shift towards a digital public administration is taking place. Countries in Europe, as well as others around the world, are investing in eGovernment services. The aim is to not only cope with citizens' demands of convenient, reliable, and user-friendly services but also to potentially save money by replacing slow bureaucratic processes [121]. Introduced in 2017 in Germany, the Online Access to Administration Services Act (OZG), legally requires all government levels to provide all administrative services online through a central portal by 2022 [122]. The unique federal structure of Germany's government, divided into the federal, state, and local levels, complicates the restructuring and digitalization of administrative services.

Of the 575 services referred to in the OZG, 84% are regulated at the federal level, and 80% are executed at the local level [122]. This requires a coherent top-down strategy across all levels through laws that commit non-federal players to achieve a common digitalization strategy (Top-down Commitment to Digitalization).

In Germany, the local government is the lowest out of three constitutionally independent levels of administration, and the complexities of the federal system make it challenging for municipalities to keep up with technological advancements. In the last years, 'experimental clauses' have been introduced, which give municipalities legal flexibility to a certain extent, enabling them to be at the forefront of innovation (Legal Enabler for Local Innovation) [123].

Regarding effective administration and modern regulations, Germany ranks considerably low in an international bureaucracy comparison [124]. Additionally, there is significant dissatisfaction among citizens in their interactions with the public sector [125]. The German government aims to reduce bureaucracy for a more efficient administration by adopting initiatives that cut costs and save time, benefiting both citizens and enterprises (Reducing Bureaucracy for Efficient Administration).

Although Germany has a highly developed economy, many public administration processes continue to depend on the software or infrastructure of large foreign companies [126]. European policies are promoting digital sovereignty and connectivity through the Digital Single Market strategy for online goods and services to avoid undesirable lock-in effects (Achieving Digital Sovereignty through Innovation).

Emerging technologies and the increasing availability of open data can enable efficient and personalized digital public administration services. However, since there is the potential of the citizens' data being misused, regulations protecting citizen's rights in the digital age are imperative (Protection of Citizens' Digital Rights) [127].

TOP-DOWN COMMITMENT TO DIGITALIZATION

The federal government passes laws committing states to implement digital PA services

The German public administration is responsible for over five hundred different types of services [122]. From registering a newborn child to starting a company, public administration processes their citizens' requests at federal, state, and municipal levels. With the Online Access Act, Germany wants to move these services online by 2022 [122]. However, the question of the efficient design of these services, processes, and their IT architecture across all government levels remains to be answered. Therefore, inherent to the federalist German government structure, a coherent strategy and approach across federal, state, and municipal levels is necessary. This is achieved through laws that enable the federal level to commit non-federal players to accept additional digitalization targets without having official authority [128]. The result of this top-down approach, materialized in the form of the Online Access Act, is a commitment of states and municipalities to implement a commonly defined IT strategy and a commitment of the federal government to provide additional funds for its implementation [129].

Facts:

- The Online Access Act declares that all 575 PA services in Germany must be available online by 2022 [128].
- While 84% of these services are regulated at the federal level, 80% are executed at the local level [122].
- The Federal Ministry of the Interior (BMI) is responsible for driving the standardization of PA processes at the federal level and defines the National eGovernment Strategy, together with the IT Planning Council [129].

- The Federal IT Cooperation (FITKO) conceptualizes and manages the federal IT architecture and works with municipalities to drive implementation with usability and cost-effectiveness as the primary goals [130].

Key Drivers:

- Failed attempts of the states at implementing individual IT strategies, driven by their sovereign nature, have created a demand for standardization and consolidation of the German IT strategy [130].
- The decision to implement a central government portal ("Portalverbund") drives the need for standardized data transfer between federal, state, and local portals and a complex IT architecture [122].
- The biggest issues citizens have been facing with current online solutions of the PA are process complexities (41%) and difficulties in finding the right website to interact with the government (39%) [131].

Challenges:

- IT architecture, data formats, and standardized processes defined by the IT Planning Council might not be flexible enough to fit the needs of every municipality [130].
- Lack of legal and financial repercussions for not implementing the requirements stated in the Online Access Act might negatively affect compliance with the law at the local level [128].
- The sovereignty of states in the German federal structure is discrepant with a purely top-down approach and requires the incorporation of local innovation approaches.

Impact on Public Administration:

By committing the non-federal levels to an aligned IT strategy in exchange for extended funds, the federal level can define a well-structured IT strategy. This includes standardized processes and data formats and respects the sovereignty of each state and municipality. This top-down approach makes a quicker digitalization process possible, as it gives guidance on essential topics. However, committing local municipalities to a predefined IT strategy could hinder innovation at the local level, and hence, again slow down the digitalization process. Therefore, a combination of a top-down commitment and a bottom-up approach for implementation might solve this problem.

LEGAL ENABLER FOR LOCAL INNOVATION

Municipalities stand at the forefront of innovation, testing new government concepts

In Germany, municipalities host 33% of total public employment and provide 80% of public services [122]. The digitalization laws, enforced by the OZG, have set nationwide goals, and municipalities have started implementing numerous digital PA services. Local authorities autonomously initiate and pursue their individual administrative reform strategies and projects, giving their implementation a distinctly bottom-up profile [132]. The complex German federal system, combined with this local self-government, makes it difficult for different municipalities to cooperate. In the last years, pioneering legislation by individual states, in the form of experimental clauses, have been introduced to conduct small-scale explorative pilot projects to implement eGovernment solutions [123]. The heterogeneity of the German administrative regulations and requirements stand in the way of the digital transformation. In contrast, these experimental clauses give municipalities a certain legal flexibility, enabling them to be at the forefront of innovation.

Facts:

- States such as Bavaria (2015), Saxony (2014), Schleswig-Holstein (2009) have passed experimental clauses allowing municipalities to deviate from the formal requirements of administrative documents such as written (physical) forms [123].
- Municipalities widely recognize the added value of digitalization as 87% rated the added value as "high" or "very high" [133].
- From 2017 to 2019, nine municipalities across Germany conducted 24 pilot projects to demonstrate practicability and benefits of Open Government, a collaborative approach between PA and citizens to drive innovation [134].
- In the municipalities of Baden-Württemberg, concrete applications of AI in PA were assessed in 2019 [135].

Key Drivers:

- The Online Access Act (OZG) marked the beginning of a nationwide race towards the digitalization of public services. The local level is mainly responsible for the implementation of the act [129].
- Legislators are increasingly being required to regulate new technologies. This process can be long and tedious for companies wanting to bring out new products to the market. Digital companies especially profit from regulatory clauses to test their initial prototypes [135].
- Citizens have an increased demand for participation leading to new laws like the Freedom of Information Act promoting innovative initiatives such as Open Government [136].

Challenges:

- The OZG does not offer a clear guideline regarding the digitalization of services and technical implementation, leaving many municipalities disoriented and overwhelmed [137].
- Digital literacy and technical expertise required for the implementation of digital services are still scarce among public servants [16].
- The decentralized federal system makes the standardization and unitarization of information technology more difficult [138]. The poor IT coordination between the three administration levels can cause further delays in the development process.
- Pilot municipalities must be representative to provide generalizable insights from experimental clauses.

Impact on Public Administration:

The OZG is Germany's first big step towards a more digitalized PA. Municipalities are being pushed by the federal level to develop PA services online. Cities need to adapt to the new legal framework and make use of the flexibility of experimental clauses to learn about the opportunities and risks of future technologies. Municipalities are starting to develop the right regulatory environment to accommodate innovation in the private and public sectors. This approach can lead to a more direct citizen-state relationship, an increase in technical expertise within civil servants, and public modernization starting at the local level.

REDUCING BUREAUCRACY

Moving towards more efficient internal processes that benefit citizens and enterprises

Concerning effective administration and modern regulations, Germany ranks low in an international bureaucracy comparison [124]. Compliance costs, i.e., total costs incurred to comply with legal regulations, are distributed unequally in Germany and affect businesses the most. Totaling 7.9bn EUR in 2018, almost 90% of the costs were borne by businesses alone, while the PA incurred 8% and citizens accounted for the rest [125]. There is also significant dissatisfaction among citizens with PA services, particularly regarding the accessibility to procedural information, comprehensibility of forms, and applications in addition to long waiting times for responses to citizens' queries [91]. Since regulations are a key tool for the government to accomplish social, economic, and environmental goals, Germany is pushing initiatives to reduce bureaucracy and improve regulatory processes, thereby strengthening the competitiveness of the economy and increasing growth and employment [139].

Facts:

- Bureaucracy relief laws are in place since 2014 when the government started passing laws to cut administrative costs. Consequently, the Bureaucracy Cost Index consistently reports lower costs since 2015 [125], [139].
- Three initiatives - "Award of Public Supply and Service Contracts below EU thresholds" (2017), "Upstream Emission Reduction Regulation" (2018), and "E-Invoicing Regulation" (2017) – decrease compliance costs significantly [125].
- Through the "one-in, one-out" rule, passed in 2015, it is ensured that regulatory proposals, which lead to new burdens for businesses and service providers, should also provide for corresponding relief [139].
- The "Life Situation Survey", initiated in 2015, evaluates the satisfaction of citizens and businesses with public-sector services [125].

Key Drivers:

- In an international bureaucracy comparison of 51 countries, Germany ranked 25th in 2017 and 22nd in 2019 [124], [140].
- There is clear dissatisfaction among citizens and enterprises with the services of public authorities and the comprehensibility of the law [125].
- Administrative processes are attributed as one of the reasons why Germany has relatively 3.5 times fewer founders than Canada and Estonia. Founding a company requires 15 days and nine official notifications in Germany compared to only two days in Australia. [141].
- The rise in public-private partnerships and investments in new technologies require internal efficiency [142].

Challenges:

- New laws that are introduced due to emerging technologies lead to an increase in bureaucracy and compliance costs [143]. Therefore, merely reducing the number of laws will not limit bureaucracy.
- Adopting the "one-in, one-out rule" may restrict legislation of social innovations, such as reforms in unemployment, health, and pension insurance, as they may not be cost-effective [143].
- Reducing bureaucratic processes may lead to arbitrary decision-making and threaten the fairness of processes [144].
- Enterprises could suddenly be faced with a host of unregulated issues. These would then have to be resolved in courts, which would increase the time, cost, and administrative effort for all the parties involved.

Impact on Public Administration:

To differentiate between unnecessary bureaucracy and reasonable regulation, public administration may shift its processes to a user-centered rather than a law-centered approach. There may be a rise in the number of social innovation labs to analyze and improve processes collaboratively between citizens, enterprises, and the government. The implementation of the "one-stop-shop" principle will be able to reduce the number of touchpoints companies are required to undergo for administrative processes. By cutting down bureaucracy and improving regulations of administrative services, Germany could become the future hub of innovation, thereby gaining a higher ranking in ease of doing business in comparison to other developed countries.

ACHIEVING DIGITAL SOVEREIGNTY & INNOVATION

European policies are encouraging Europe's digital sovereignty through the Digital Single Market

Despite Germany's highly developed economy, many PA processes still rely on the software or infrastructure of large foreign companies [126]. In light of the fast-changing political and environmental circumstances, such as international conflicts or data security scandals, it is in Europe's interest to gain more digital sovereignty. Thus, the EU is working on solutions to avoid unwanted lock-in effects and to ensure the security of its digital assets. The European Commission's Digital Single Market strategy aims at creating the playing field for digital networks to flourish and data to flow freely across countries and sectors [127]. Due to the increasing amount of open data projects, new businesses can build digital services that complement and support public administration services. The CEF in the telecom sector and projects like GAIA-X, led by the BMWi, are building the necessary infrastructure for these new digital services [145], [46]. Besides, the increase in services using AI has made European policy-makers realize its enormous potential and strategic importance, leading to policies that incentivize developments in this field and address its associated risks [146]. Gaining citizens' trust and ensuring their rights is a continuous challenge [146], [139].

Facts:

- With the European Commission's data strategy and the OZG, Germany commits to making data available to empower a more data-driven public and private sector [127].
- To improve growth and competitiveness, the EU has set up the CEF fund, which invests in infrastructure projects in transport, energy, and digital projects [145].
- GAIA-X is an initiative to build up a data infrastructure and ecosystem for digital sovereignty [147].

- Germany's AI strategy aims at fostering the safe use of AI by looking into standardization methods to provide regulations for the applications in public services, e.g., anomaly detection in cybersecurity [139].

Key Drivers:

- Technological advances, such as AI, Cloud, and Edge Computing, enable the digitalization of PA [146].
- A unified approach to innovation will make the EU more competitive in the global market [148].
- Recent international conflicts and unexpected events demonstrate the need for more sovereignty [149].
- PA makes efforts to avoid lock-in effects with big tech companies [126].

Challenges:

- Finding the right balance between regulating the Digital Single Market to ensure trust and staying competitive on a global scale.
- Building up a scalable data infrastructure within Europe that can compete with existing providers in terms of pricing and customization [46], [150].
- Regulating algorithms whose parameters have not been defined by a person but by a machine remains a legal challenge that is yet to be solved [146].
- The current approach in setting standards lacks agility and focus, making the seamless collaboration between public administrations in the EU difficult [151].

Impact on Public Administration:

EU-wide projects like GAIA-X will provide the infrastructure to facilitate digital sovereignty in PA, as they will be less reliant on large tech companies. It aims at creating a shared ecosystem of users and providers from PA, enterprises, and scientific institutions across the EU [46]. The open data strategy will improve the exchange of information between public entities and allow SMEs to build services based on public data. These services can supplement existing PA services and open new doors for citizen-state interaction. Furthermore, the use of new technologies like AI in PA can increase efficiency in administrative tasks. Public organizations will be able to automate some tasks, freeing up time for civil servants, and will lead to more data-driven approaches [152].

PROTECTION OF CITIZENS' DIGITAL RIGHTS

Putting individuals' data protection at the center of EU regulations

In an increasingly connected society, data is generated at every corner. While related technologies can have an enormous positive impact on areas like healthcare or public services, the misuse can cause significant consequences. That is why Europe does not only want to become an economic leader by creating a Digital Single Market but also wants to act as a role model regarding data protection, cybersecurity, and market competition laws in the context of emerging technologies [153]. Recent regulations aim at protecting citizens' interests in data, infrastructure, and market-level, respectively. Citizen-centered regulations at all these levels provide the necessary trust for a PA in the digital era. Regarding data, the GDPR ensures citizen's privacy rights [154]. At the infrastructural level, cybersecurity certification schemes can help with building trust in data infrastructure [155]. Finally, at the market level, revised competition laws deal with the rise of oligopoly in the economic landscape [156]. All these recent regulations aim at reaching the goal of a digital economy that improves every individual's life and re-establishes trust in government.

Facts:

- The GDPR fundamentally changes how businesses handle personal data, shifting power back to citizens [154].
- The Federal Government's Data Ethics Commission is investigating potential risks of new data-driven techno-logies that could undermine human rights with non-transparent algorithms [157].
- Under the EU Cybersecurity Act, the ENISA is drafting an EU-wide cybersecurity certification scheme [155], [158].
- The commission "Competition Law 4.0" revisited the framework of competition law to make recommendations on changes that ensure a fair distribution of power in a digital economy [156].
- The BMI wants to increase oversight on digital companies with large market shares [159].

Key Drivers:

- Citizens are becoming more data conscious and demand data privacy [80].
- Regulations are needed to avoid aggregation and the continuous reinforcement of positions of power in the current landscape of the digital economy [46].
- European policy-makers realize the potential risks of new technologies and want to pursue a value-based, human-centric path to becoming more competitive in the digital economy [160].

Challenges:

- Smaller companies struggle with fully implementing GDPR compliance, and surveys show that a majority of companies within Germany, as well as Europe, are not fully GDPR compliant [161], [162], [163].
- High efforts in meeting requirements of GDPR hinder innovation in smaller companies [161].
- Aggressive lobbying efforts hinder regulations that return more power to consumers [164].
- Measuring the effectiveness of cybersecurity regulations is challenging in light of the scarcity of reliable data [165].

Impact on Public Administration:

The high focus on citizen interests in regulations regarding digitalization leads to more trust in the government and also in PA. Additionally, these regulations also have a direct impact on public servants. At the data level, a successful adoption of GDPR compliance could lead to more businesses entering the GovTech market, resulting in more service providers for PA. At the infrastructural level, trustworthy certifications regarding cybersecurity simplify the process of finding suitable service providers. Lastly, a stronger oversight on large market-share companies will give smaller European companies a better chance to enter the market, thus diversifying potential service partners of PA.

ECONOMIC TRENDS

INFLUENCING PUBLIC ADMINISTRATION IN THE DIGITAL ERA

Towards a Digital Single Market

Shortage of Skilled Workforce

Higher Investments in GovTech Market

Increasing Economic Cooperation Across Countries

The Emerging Data Economy

Leadership Through Digital Transformation

ECONOMIC TRENDS
Influencing Public Administration in the Digital Era

Today, the economy could be described as increasingly uncertain, agitated by trade conflicts and global issues such as the pandemic of COVID-19. However, six trends can be derived from the current economic situation that point towards a future of various opportunities and challenges. Looking at the economy on a global, European, and national level, these trends support an understanding of changes the PA will face in the coming years.

First, the European economy shifts towards a Digital Single Market with a free flow of data. This is driven by the Digital Single Market Strategy, one of the current top five priorities of the European Commission. As new legislation changes how businesses are interacting across Europe, a strong need for national adoption arises (e.g., the OZG). Challenges such as an unharmonized legislative landscape and fragmented data infrastructures need to be solved to unlock the full economic potential of the Digital Single Market.

Second, the shortage of skilled labor is increasing in severity. It is manifesting itself in the labor market and is likely to impact the public sector as well. IT-related skills are under high demand causing high wages for such labor and services. Consequently, the public sector will face severe challenges in competing with the high salaries in the private sector. The root causes of those developments can be found in the demographic change affecting the PA workforce and a shift in the labor market due to automation.

Third, an increase in investments in the GovTech market can be observed. The German federal budget for the digital transformation in the PA increased dramatically in recent years. Even though the digital transformation has been a focus topic before, concrete actions were lacking. With issuing the OZG, which commits to providing 575 public services online by 2022, concrete measures in performing the digital transformation can be expected.

Fourth, the global economy is driving cross-border cooperation across PAs. This is caused by an increased number of international treaties and a shift in economic activity towards new markets. Improved telecommunications infrastructure, global conglomerates, and SaaS companies enable such cooperation. Geographical requirements, as well as rising global tension, challenge the permeability of cross-border cooperation. However, cooperation between countries remains an important factor in any stable economy.

Fifth, the EU will not only undergo a shift towards a more integrated Digital Single Market but also a shift in industries itself towards a "data economy". Expected to multiply in value, data as a resource will play an increasingly important role in PA. Larger volumes of data are created, gathered, and used to improve products and services. Thanks to the cheap availability of computing power and recent advances in AI, this is easier than ever. Conversely, new challenges arise for the PA.

Finally, the race of economies to stay competitive could be fundamentally shaped by PA. As technological progress becomes a competitive advantage, the pressure on PA to facilitate and provide infrastructure increases. This particularly refers to the need for frictionless bureaucracy with PA serving as enabler.

TOWARDS A DIGITAL SINGLE MARKET

Europe strives to create a Digital Single Market fostering innovation and trade

As part of the top priorities of the European Commission, the Digital Single Market follows the strategy to achieve pan-European innovation and economic growth. It further aims at creating jobs throughout Europe, strengthening the European market, and retaining and building up knowledge. Establishing modernized consumer rules for online purchases will also take friction out of payment processes on the demand side. When tackling the issues in a Digital Single Market, different measures are employed, such as new legislation, investments in shared technological infrastructure, and institutions serving companies or citizens. Early success in legislative changes (e.g., adapted roaming legislation) creates a promising outlook on what a Digital Single Market can hold for the future. A reliable, efficient data and computing infrastructure serves as the backbone, but faces challenges like fragmentation of data infrastructure across countries. Additionally, PA varies widely across countries and therefore makes it harder for companies to create and sell products. However, shifting from national silos to open sources of knowledge will require PA to adapt their processes.

Facts:

- Already in-place measures of the European Union that strengthen the Digital Single Market provide annual economic benefits of over 176bn EUR [166].
- The digitalization of public products and services will add more than 110bn EUR of revenue to the European private sector in the next five years [167].
- The single digital gateway strategy acts as a driving force behind the digitalization of the public administration. It is expected to save companies more than 11bn EUR annually [168].

Key Drivers:

- To catch up with nations' lead in digital products and services such as Korea, Japan, or the USA, the European Commission has made the Digital Single Market one of its top 5 priorities [169].
- The EU heavily invests in digital innovation (38bn EUR - 3.9% of the multiannual financial framework funds from 2014 to 2020), and additionally finances digital innovation hubs (5.5bn EUR) to increase digitalization of the economy [167].
- Legislation such as the Digital Services Act and the GDPR support a developing European Digital Single Market aiming for common European standards in data privacy, intellectual property right, and competition law [170], [171].

Challenges:

- Value must be provided to all European countries to maximize the economic potential of the Digital Single Market.
- Due to fragmented data and computing infrastructures, talent and resources are spread around Europe, hindering the efficient exchange of knowledge [172].
- The lack of cross-border political coordination slows down developments towards a data-driven economy as part of the Digital Single Market strategy.
- Complex legal environments that differ internationally as well as within Germany itself create bureaucracy and hinder fast harmonization of legislation [173].

Impact on Public Administration:

A direct impact of the European Commission's push towards a Digital Single Market is the OZG, which follows the single digital gateway strategy imposed to lower administrative burden and attract innovators. Digital is becoming the new standard for government-company interaction in public services. Furthermore, the public administration has to become more transparent, making their decision-making processes open to companies which will benefit SMEs with low dedicated budgets for government interaction. Apart from greater transparency, harmonization across Europe in procurement processes can lower entry barriers for companies. This will lead to more pan-European awards, which ultimately improves the efficiency of state spending.

SHORTAGE OF SKILLED WORKFORCE

Digitalization and automation shift the labor demand in the public sector

Skilled professionals are crucial to innovation, competitiveness, economic growth, and prosperity. Securing the supply of skilled labor will challenge the PA in the coming decades, due to the retirement of many public servants. STEM- and healthcare related vacancies are already challenging to fill, especially in the southern and eastern parts of Germany. This labor shortage not only hampers economic growth already today but also [174] cannot be sufficiently filled by the national labor force and raises the dependence on skilled immigrants. 40% of German employees working in public service and 64% working in PA are expected to be replaced by automation in the coming years [38]. This change will shift public labor demand towards STEM, and personal-care workers. As a result, a war for talent between the public and private sectors will emerge, as the particularly underserved PA does not provide competitive working conditions.

Facts:

- The shortage of 816,000 professionals in the public sector will be more severe than in any other industry in 2030. This relative bottleneck will amount to 70% in comparison to 45% in all other sectors combined [38].
- In the next years, retirement due to demographic change will lead to a decrease of 1.3 million employees in the public sector, representing about one-third of the current public workforce [175].
- In 2019, the public service already suffered a shortage of 185,000 vacant positions [176].
- The highest shortage of personnel will be in the field of education, administration, health- and personal care, and STEM [38].

Key Drivers:

- The demographic change increases the average age of the public workforce: Currently, 20% of the working population is aged between 60 and 66 years [177].
- Digitalization and automation will fundamentally change the job profile of about 35% of jobs [174].
- Public occupations are not competitive due to their perception as being inflexible, organized in multiple strict hierarchical levels, and entailing poor career opportunities [178].
- Vocational training and or higher education positions in the public sector related fields lack young talents [179].

Challenges:

- The war for talents between the public and the private sector will rise due to the shift in labor demand [178].
- The public sector as an employer needs to improve in attractiveness and competitiveness [38].
- The labor force participation needs to be increased by involving more women, the elderly, immigrants, and the disabled.
- Education and acquisition of highly skilled IT personnel are required through vocational education and training, training on the job, and digital learning [174].
- It will be essential to attract highly skilled workers from non-EU countries and integrate asylum seekers into the education system and the labor market [180], [177].

Impact on Public Administration:

To prevent the threat of a collapse of the system, weakened social cohesion, and not fully exploiting the innovation potential, the state must quickly adapt to the changes in the German labor market [179]. Costs due to management responses to the labor scarcity can be prevented by adopting a long-term strategy [38]. Part of this strategy is to transition to flexible work arrangements and increase the international attractiveness of the PA as an employer through targeted investments in opportunities for development and the work environment [181]. Another strategic pillar is to integrate the growing number of qualified immigrants [174].

HIGHER INVESTMENTS IN GOVTECH MARKET

Global GovTech ecosystem is growing, Germany behind that growth for now

Within the last years, growth in the global GovTech market was observable. Taking the UK market as an example, the GovTech sector experienced remarkable expansion. Venture capital deals rose within the years of 2011 until 2015 from approximately 4 deals (accumulated deals value of approximately 81,000 GBP) to 31 deals (accumulated deals value of approximately 90m GBP) The current market size yields to 6bn GBP, which is expected to increase to 20bn GBP by 2025 [182], [183]. However, Germany is still behind this development and thus, market growth is perceptible. With the implementation of the OZG, the pressure of performing the digital transformation in the PA has increased. Hence, the government has issued higher investments and provides more financial resources than ever before. As a result of the higher availability of funds, the GovTech ecosystem is growing, attracting more companies to enter the market. In Germany, the first GovTech start-up accelerator was launched in Berlin in January 2020 [182].

Facts:

- The German federal budget for the digital transformation of the PA increased from 3m EUR in 2015 to 123m EUR in 2020 [182].
- Within the next four years, the state budget for the digital transformation of PA yields 500m EUR. An additional 1.5bn EUR funding on a federal level is available [182].
- In 2018, 3m EUR of the total of 47m EUR of the German federal budget for the digital transformation was spent [8]. According to the "eGovernment Report 2015", Germany lacks companies to support the eGovernment transformation process [184].

Key Drivers:

- The OZG puts pressure on governmental institutions to speed up digital transformation [125].
- Citizens are used to user-centric services. Therefore, their expectations for public services have risen [182].
- An eGovernment offers higher efficiency and lower costs in the long-term [182]. This becomes more important as one-third of the civil servants will retire within the next 10-15 years [38].
- The government has increased engagement with SMEs, and start-ups are additionally driving the awareness of the demand for digitalization and automation within the GovTech market, leading to higher investments [182].

Challenges:

- Besides investments, retained knowledge within the organization as well as flexible structures and processes are required to successfully perform the digital transformation [185].
- Although the financial resources are available, companies are required to overcome difficulties in supplying their services to the government due to long sale cycles and diffuse processes, for example. This especially is a challenge with regards to federalism and its complexity of responsibilities in Germany [184].
- When performing the digital transformation in the PA, servants, as well as citizens with various backgrounds, must be taken into account [186].

Impact on Public Administration:

The available funding in the GovTech market as well as additional drivers, such as the OZG, incentivize companies and start-ups to enter the GovTech market. With a higher availability of experts in the market, the PA will be able to perform the digital transformation effectively. In the case of a successful transformation, the PA will benefit from reduced operational costs and deliver digital services to citizens. This might lead to a positive reputation, which will help the PA to increase their attractiveness as an employer and therefore, recruit new IT-skilled people among other skilled labor.

INCREASING ECONOMIC COOPERATION ACROSS COUNTRIES

Cross-border cooperation of PA is not only beneficial, but key

While the need for international collaboration of PA is not new, it is extending beyond intelligence or merely filling in paperwork across different geographies. The G20, for instance, is establishing a standard for international data streams [187] and smart city infrastructure [188]. Similarly, the EU is coordinating efforts for the deployment of technologies such as AI and 5G [189]. The first main driver to this trend comes in the form of reactionary measures to mitigate the effects of unprecedented global challenges, such as climate change, massive migration, or the recent COVID-19 crisis. Governments have an interest to cooperate with PA from other countries, not out of kindness, but out of self-interest. The second main driver is the ever more global economic machine, which is extending its internationality to PA. However, efforts by PA do not remain unchallenged. Different legislations, languages, and interests complicate negotiations and put the possibilities to reach compromises at risk. Additionally, rising nationalism and global tensions between economic powers challenge intergovernmental cooperation.

Facts:

- The share of globally exported goods in global GDP has increased from less than 10% in 1970 to 24% in 2014 [190].
- The German export dependence rate of GDP has grown by an average of 0.4% per year since 2010, resulting in 28% of GDP in 2016 [191].
- Germany's foreign aid has risen from 0.38% of GPD in 2013 to 0.66% in 2017 [192].

- There are 40,300 active IGOs and international NGOs, and approximately 1,200 new organizations added each year [193].
- The number of regional trade agreements has increased from 1 in 1958 to 285 in 2018 [194].

Key Drivers:

- The center of economic activity is shifting towards Asia, and new markets are emerging, rearranging cooperation strategies worldwide, for instance, Europe's position towards 5G, despite US American warnings.
- Global conglomerates (e.g., Walmart, Shell) and technology giants (e.g., Facebook, Apple, Alphabet) globalize the economic landscape, affecting related PA operations.
- Global challenges such as cybersecurity, climate change, or the recent COVID-19 crisis are blind to borders, forcing PA to adapt, leading to intergovernmental cooperation.
- Global telecommunications infrastructure is improving, enabling PA across different geographies to communicate better and exchange data.

Challenges:

- Different legislations, languages, currencies, and interests make cross-border PA collaboration more difficult.
- Rising global tensions between economic powers, such as the USA and China, South Korea, and Japan [195] may impair the willingness to cooperate across borders.
- In Europe, immigration, slow growth, and unemployment, coupled with doubt about the future of the EU, fuel nationalism [195].
- Privacy and national security concerns, as well as protectionism, impose more restrictions on the sharing of data across borders [196].

Impact on Public Administration:

As the global economic interdependence spills over to PA, they realize that international collaboration is not only beneficial but also crucial. While the initial efforts are reactionary to global challenges, PA is taking the initiative to create frameworks for data sharing and smart cities to ensure interoperability. These developments can foster transparency and public trust in PA. Additionally, a tighter coordination and collaboration of EU members can shape the deployment of new technologies, such as Artificial Intelligence [153].

THE EMERGING DATA ECONOMY

Data as a good to public administration in governing the economy

The volume of data generated has been increasing year after year, and advancements in transistor technology and machine learning expanded the computational possibilities to extract insights from it. Technological progress significantly increases the value of data and creates business opportunities, shaping the "data economy." Today, its total value in the EU nears 301bn EUR (2018) and will have undergone a threefold growth by 2025 [197]. However, many challenges surround the field: data misuse, privacy, data breaches, and the general trust of the population towards the institutions that store and gather the data. Governments must work out the right approach about what citizen data to collect and use. A recent example highlighting the complexity of this issue is the approach regarding a publicly-funded mobile application to track the spread of the coronavirus. In the coming years, the main questions for PA will revolve around how to use big data to the best of the citizens by providing better public services while ensuring privacy.

Facts:

- The European Commission projects the value of data at 829bn EUR by 2025, an increase of over 275% compared to 2018 (301bn EUR) [197].
- The volume of data within the next five years will enlarge by 530%, to 175 zettabytes from 33 zettabytes in 2018 [197].
- The number of data professionals will almost double to 10.9m in the EU by 2025 [198].
- Initiatives and regulations of the European Commission, such as the "Free Flow of non-personal data" [199], the "Open Data Directive" [200], and the white-paper on artificial intelligence [153] strengthen the uprising data economy.

Key Drivers:

- The European Commission drives the data economy by providing a legislative framework and investing 4-6bn EUR in the underlying infrastructure in the coming years [127], more than the total EU expenditures of Denmark, Estonia, and Ireland of 2018 combined [201].
- Cross-border data exchange is increasing in size and volume at an average annual growth of 40% [202].
- Companies produce more data than ever [203], creating an economy with various opportunities for value creation and cost reduction [204].
- AI enables companies and administrations to gain valuable insights from data, adding an expected sum of more than 15bn USD to global economies [203].
- The increasing processing power of machines to analyze data and run algorithms contributes to the value of the data economy [205].

Challenges:

- Europe must find a balance between enabling innovation and ensuring data privacy through tight regulations [206].
- Countries must come up with a solution to govern the handling of citizen data in a trustworthy and efficacious manner [206].
- The question of data ownership must be solved on a pan-European scale.
- As the value of data increases, so does the number of attacks to steal it. Therefore, data protection has to be taken more seriously yet managed cost-efficiently [206].
- Institutions across the world have to find solutions to prevent the misuse and abuse of data like in the Cambridge Analytica scandal.

Impact on Public Administration:

Governments are one of the largest data producers [207]. As digital information is progressively regarded as an economic good, the importance of PA as manager of this resource grows more and more vital. While physical assets in possession of PA decrease in significance, the administration develops into a vault-keeper of strategically essential goods and should show demonstrate aptitude. In an information economy, data-driven decision making on all levels of government becomes possible. Economically, this can enable efficient and effective resource allocation. International data sharing poses a chance to broaden the scope even further. Ultimately, PA could evolve into a better service provider to its citizens.

LEADERSHIP THROUGH DIGITAL TRANS-FORMATION

The race of economies to stay competitive could be decided by PA

Government digitalization strategies shape how economies compete to achieve leadership status. On a national level, Germany needs to recover its previously held leadership status while setting frameworks to stay competitive in the near future. On a broader scale, the EU recognizes that large economic players such as China and the US pursue digital economic governance and aims to react accordingly. In the global view, it can be seen how different values and priorities shape economic decision making in digitalization. For instance, the Open Governance Initiative in the USA increases transparency by providing citizens with a dashboard on the government's spending data [208]. Meanwhile, the Chinese economy is on track to become the biggest datasphere in the world within the next six years [189], [209]. To keep up with these digitalization efforts, the EU carefully selected frameworks to set the ground rules for dealing with digital transformation. Various initiatives hope to provide pieces to a puzzle that collectively forms a position of international leadership. "The race for global economic leadership is ongoing" [153], and digital PA is shaping up to be an important battleground.

Facts:

- Germany performs below average in the digitalization of public services [210].
- Generally, venture capital investments are still significantly lower in the EU (6.5bn EUR) compared to the US (39.4bn EUR) [210]. Relative to the total GDP in 2018 of the two economies, the US numbers are five times higher than those of the EU [211], [212]. However, the EU is improving its position by investing 9.2bn EUR into the "Digital Europe Program" between 2021 and 2027 [213].

- Another 3bn EUR were committed for the same period as part of the "Connecting Europe Facility Digital" program, improving connectivity "to facilitate the delivery of digital public services across borders and sectors" [214].

Key Drivers:

- As technological progress spreads through the European economy, investment decisions by the EU, such as the "Connecting Europe Program" or the "Horizon Europe Program" specifically target economic competitiveness through digital technologies [145].
- The EU strives to establish a European single market for data to stay competitive digitally [215].
- The EU actively aims to emerge as a forerunner in the new data economy by becoming "the most attractive, secure, and dynamic data-agile economy in the world" [127].
- Frictionless bureaucracy in the PA could pose a locational advantage for an economy, helping to attract investments and strengthen its competitive position [216].

Challenges:

- Administrations need to prepare for interference of hostile entities on the domestic economy, e.g. election tampering, public record manipulation, or procurement manipulation.
- The EU needs to maintain its values and legislative standards as frameworks for the PA while preventing over-regulation.
- In Germany, the system of federalism causes slow decision-making on the digitalization of public services.
- The German economy needs combined efforts of politics, law-making, society, industry, and science to keep up with PA innovations of other nations.
- Acquiring skilled talent for the PA will be challenging amid competition by highly-paying private companies.

Impact on Public Administration:

Digital transformation fundamentally disrupts the PA. As data becomes more accessible, more stakeholders can benefit and PAs can provide frictionless bureaucratic services [167]. PAs could become a key factor ensuring future economic prosperity. In their new role as enablers of data-based economic action, this puts them in a position to facilitate the competitive race with other large global economic players. As stated in the European Strategy Data Paper, "(…) the sources of competitiveness for the next decades in the data economy are determined now" [189].
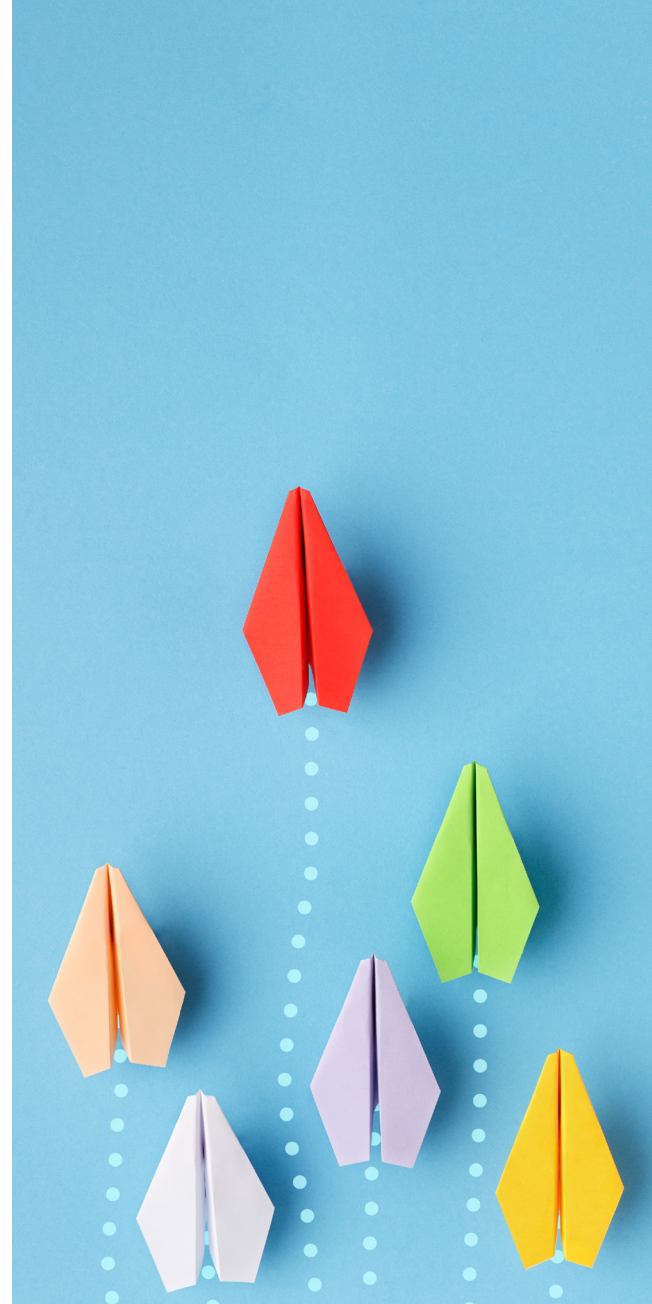
BUSINESS MODEL TRENDS

INFLUENCING PUBLIC ADMINISTRATION IN THE DIGITAL ERA

Pay-As-You-Go Cloud Providers

Open Data Marketplaces

From Pipeline to Platform

Co-Creation of Public Services

Adoption of a Liquid Workforce

Creating Space for Innovation Capabilities

Consent-Based End-to-End Transactions

BUSINESS MODEL TRENDS

Influencing Public Administration in the Digital Era

The separation of the public and private sectors is due to their difference in operations and goals. The private sector's ambitions are rooted in profit-maximization, while that of the public sector is vested in achieving communal value to its citizens. Big providers have established themselves in the PA, as only they successfully manage the complex procurement processes, thereby creating a barrier to entry for SMEs. However, a shift to a mutually-beneficial-relation is observable, with digitalization and unexplored business opportunities at its core.

In this context, PA is opening up to entrepreneurs and new forms of collaboration with companies of all sizes to bring services forward. In recent years, the public sector has adapted management models and benefited from the support and provision of public services by private companies. As a result, public organizations are reshaping in response to the changing environment. It includes an increasingly flexible and cost-effective approach to human resources [217], as well as the structural division of units for the strategic exploration of innovation potential (Trend "Creating Labs for Innovation Capabilities"). This rethinking has also led to the co-creation of services between administrations and companies.

The opportunities for the private sector are manifold. Emerging business models leverage the underused data of the government (Trend "Open Data Marketplaces") and facilitate citizen interaction with the PA by providing responsive and demand-driven services [218], [219]. Both private and public organizations increasingly adopt a platform design for their business. In its core, this approach allows for interaction between distinct parties with or within the PA. Use cases range from simplifying data exchange to increasing citizen engagement and crowdsourcing. A shift to a "cloud-first" strategy also entails a change in the conditions for selecting external providers. Several vital factors drive these trends. The introduction of new legislations [1], [135] stands out, as it boosts digitalization and innovation in response to the societal demand for greater participation and transparency [221], [222].

Besides, citizens expect user-friendliness and convenience in public services, as private companies focus on these two factors. The scarcity of digital talent within the PA reinforces these developments [223] and provides opportunities for businesses and technology companies to grow. Start-ups will take advantage of the beforementioned opportunities and

the PA, to adapt accordingly in the long-term. However, all stakeholders face challenges, such as the complex procurement process [224], political polarizations, ministry silos, and ongoing competition with big market players [225]. Current business models have only started to scratch the surface of the impact they can have on both German and European administrations. Two fundamental prerequisites for success are the collaboration and synergies between the stakeholders involved. By leveraging the requirements, both the public and private sectors can cooperate effectively and adapt their business models to create societal and economic value and impact the future of PA.

PAY-AS-YOU-GO CLOUD PROVIDERS

Enhanced operational efficiency enabled by on-demand cloud resources

Technology pushes the modernization of the IT infrastructure in PA. Governments have been lagging regarding the adoption of digital technologies. The need for legal compliance and careful risk-benefit assessment led to this delay [158]. In recent years, public entities have begun to migrate their IT infrastructure to external cloud vendors. These providers offer a broad range of "as-a-service" products that match the requirements of most organizations. Under the promise of cost reduction, scalability, and flexibility, PA is prioritizing "cloud-first" strategies [226]. Nonetheless, important hurdles exist to facilitate the transition. Considerable effort must be invested to ensure a smooth migration in terms of organizational structures and processes. Moreover, a lack of IT skills exists raises concerns from PA concerning data privacy and security [158], [55]. If these hurdles are overcome, governments unlock on-demand access to higher computing power. This, in turn, avoids the need to plan intensive infrastructure upgrades or account for the distribution of processing units. Also, innovation possibilities arise from using the cloud as a development platform [227].

Facts:

- The government cloud market was valued at 20.8bn USD globally in 2017 and is expected to reach 49.2bn USD by 2023 [228].
- Worldwide, local governments spend 20.6% of their IT budget on cloud solutions, and national governments 22%. For instance, the UK government dedicates more than 1bn GBP annually on cloud transition [229], [57].
- In the Digital Single Market strategy, the European Commission pushes the establishment of a European Cloud Partnership with Member States to deliver better eGovernment [230], [231].
- Almost half of the governmental organizations are actively using cloud services [229].

Key Drivers:

- Cloud computing technology has expanded and diversified. Nowadays, "Anything-As-A-Service" business models allow relatively high product customization [226].
- Capital and operating costs of IT infrastructure are reduced without affecting performance [57], [232].
- Bringing cloud characteristics to modernize public institutions increases their attractiveness regarding accessibility, scalability, flexibility, easy deployment, and management [227], [57].
- PA will try avoid dependency on foreign providers. Local developments, like "Gaia-X" or "Bundes-Cloud", are being promoted to ensure data sovereignty [46], [233].

Challenges:

- The transition from legacy IT systems to the cloud requires skilled workers and careful planning of the organizational shift [55].
- Concerns exist regarding data security, sovereignty, privacy, availability, and law compliance. Many governments are reluctant to employ cloud centers located abroad [158].
- The lack of standardization hinders interoperability between providers. That means that institutions behave conservatively due to vendor lock-in risks [234].
- Migration has high initial investment, and budget planning must rely on cost predictions based on usage expectations [235], [236].

Impact on Public Administration:

The adoption of the cloud will open new possibilities for implementing digital solutions within PA and increase the operational efficiency of existing services. Some estimates calculate the savings from moving all governmental applications into the cloud to 50-67% of overall IT expenses [237]. Such cost savings could be used for other purposes. Additionally, a well laid-out cloud infrastructure could break current data silos and establish a baseline for future innovation by providing a platform for rapidly and affordably testing emergent technologies (e.g., IoT) and creating a data-driven culture [238].

OPEN DATA MARKETPLACES

Open data from public entities as revenue generator in the private sector

Governmental institutions manage vast amounts of data, which stay underused, when only in possession of the government. The open data movement within the public sector makes data freely available, which not only increases the transparency of institutions towards citizens but also has the potential to add huge value to the private sector by sparking innovation of new services. Most commonly used are geospatial, transport, and demographic data, applied in products ranging from route-planning apps to approaches to reduce pollution emission from buildings or optimize energy usage. Spanning across multiple industries, especially the ICT, education, and research sectors, open data is used, and new business models are created. These include facilitating open data for enhancing products and services, data analysis (collection, aggregation, evaluation, visualization), developing and operating open data platforms for the public sector [239]. Many public entities have already freed datasets for public use. However, these still represent a small percentage overall. Open data portals have started to appear in the last few years, but issues with respect to data quality and accessibility are still present for the users. Machine readability and licensing are the most influential aspects regarding the impact of open data [136].

Facts:

- The market size of open data in the EU grew by 37% to 75.7bn EUR from 2016 to 2020. In Germany, open data exploitation is estimated to create value of more than 12.1bn EUR annually, representing 0.4% of the nation's GDP [239], [240].
- Open data is provided on a municipal (City of Bonn: 259 datasets since 2014), federal (German GovData: 18,500 datasets across more than 40 open data portals since 2013) and European level (European Data Portal: more than 890,000 datasets since 2015) [239], [241].
- More than 1,600 organizations, mostly young SMEs, in 90 different countries are already using open government data [227].

Key Drivers:

- Both the commitment to improve the quality of public services as well as a political trend to increase transparency and accountability to citizens can be observed [221], [222], [242].
- Vast amounts of data are generated daily through government activity or acquired by the government [243].
- Private companies possess expertise in using big data and are capable of processing open data [239].
- "Datenlizenz Deutschland 2.0" defines usage criteria of German open data and thereby simplifies the understanding of the legal framework regarding licensing [244].

Challenges:

- Data sharing ethics, among them privacy concerns and regulatory issues, must be obeyed. This is especially true for particularly sensitive data, like health records [245].
- Open government data is still often incomplete and low quality. Currently, only 7% of governmental datasets are fully open, and only 50% are machine-readable [222], [55], [246].
- Most datasets are hard to access. Clearer guidelines to retrieve the datasets are needed, as well as standardized tools and APIs to facilitate the retrieval [246].
- Some PAs generate income from selling data and thus may be reluctant to release data without direct remuneration [247].

Impact on Public Administration:

By offering open data to the public, the administration fosters innovation and founding of new companies, indirectly creating new employment opportunities and wealth in the long run and fulfilling their primary purpose. Therefore, the PA is incentivized to provide large amounts of high-quality data in a conveniently accessible manner to the private sector. This will change the mindset within the PA to become more data-driven, enabling private companies and themselves to benefit from cost and process optimizations.

FROM PIPELINE TO PLATFORM

Facilitating interaction with and within Public Administration

Over the past decade, digital multi-sided platform environments have flourished in the private sector [246]. Such platforms facilitate the interaction between at least two distinct groups of participants [247]. Ad-hoc digital platforms enable the engagement of citizens or organizations in public service deliveries [248]. Their rise indicates that all data and knowledge-intensive industries, including governments and PAs, are expected to be greatly impacted by platform models in the upcoming decade. Primarily, the value creation and thereby, numerous business opportunities enable a direct interaction between a certain user group and the PA by focusing on either collaboration, orchestration, creation, or matchmaking processes [247]. Citizen relations management [249], [250], [251], [252], [253], the collaboration through crowdsourcing [253], [254] as well as process acceleration through streamlining [255] or by connecting supply and demand side [246] are common use cases. In Germany, states have started to provide basic digital interaction platforms for topics at the municipal level in which citizens can engage in. All of these business models, which are applied by both the PA or private organizations as third-party providers, leverage network effects and create multi-dimensional value for both, the PA itself and their respective partners [246], [256].

Facts:

- Moving procurement for German federal, state, and local governments from offline processes to online matchmaking platform "e-Vergabe" is expected to reduce procurement costs by 20% to 15bn EUR annually [257]. Currently, more than 600 authorities use this platform [258].
- The pilot project "Aufbruch Bayern" demonstrated the potential of collaboration platforms with 2,000 participants providing 740 ideas in 2010 [259].
- The municipality of Denver, a US-city of roughly 600,000 citizens, has over 10,000 employees. Applying a third-party platform solution to streamline processes and collaboration will annually save around 1.5m USD or 0.15% of the city's 1bn USD budget [255], [260].

Key Drivers:

- Citizens demand transparency of government and are motivated to give feedback on government decisions and actions [224], [246]. They also look for ways to more conveniently collaborate with and share ideas with their government [246], [28].
- Wide-spread access to the Internet enables new ways of direct communication and collaboration [246].
- The related economic advantages of platform models, namely network effects and reduction of transaction costs, motivate organizations to apply this business model design [246], [256].

Challenges:

- Government incentives are often linked to a legislation period, which slows down progress and impedes continuity [246].
- Funding initiatives by the government might cause that business models cannot be self-sustainable [246].
- Integrating platform solutions into existing services and infrastructures may lead to great reorganization efforts [246].
- Continuous competition between suppliers needs to be maintained as platforms tend to cause winner-takes-it-all markets [246], [256], [261].

Impact on Public Administration:

The emergence of platform models entails a greater involvement of citizens, new sourcing models for value creation, and the potential to facilitate operational processes between institutions. This brings transparency and economic advantages for the PA and its partners. Additionally, digital platforms enable the PA to reduce operational costs by focusing on resource orchestration rather than resource ownership. As an example, instead of owning a traffic management infrastructure to monitor traffic, governments could orchestrate data collected by car sensors [246]. In five years, platform models can become be an essential component of citizen-oriented and efficient administrations.

CO-CREATION OF PUBLIC SERVICES

Providing public value by co-creation of public services via intrapreneurship spin-ins

With companies increasingly leading technology advances, the government often has to look externally for solutions (government venturing model) [262]. There are multiple company models the PA can co-create with to enable services of public value: e.g., STIRs (US, NL, CAN) [263], DSTs, Venture Builders, Technology Taskforces and fellowship programs. Each of these models vary in definition, but follow similar steps when applied to the PA: (1) identifying service idea, (2) building co-creation teams, (3) securing a budget, (4) helping manage the co-creation, and (5) hand-over of the service [264]. The governments' or the PA's function shifts to one of a potential client/shareholder or value contributor. Depending on the model and legal nature of the company, profit and revenue are more or less critical. These forms of co-creation allow for the PAs to "spin-in" technology, which speeds up innovation and improves service delivery to citizens [262].

Facts:

- Since 2018, the German government initiates the co-creation of public services with non-profit organizations (fellowships), taking advantage of their flexibility, agility, and interdisciplinarity [265].
- The "STIR-program" selects and embeds small teams of tech entrepreneurs within the PA to help solve a specific challenge. In the Netherlands and the US, the program attracts over 100 start-ups and over 40 governmental institutions [263], [266].
- DSTs are in use in seven countries, often with their budgets and authority to spend outside of the existing centralized or decentralized budget decisions for legacy IT projects. The average budget in 2018 per DST in the UK amounts to 40m EUR annually [267].

Key Drivers:

- Worldwide, 134 VC funds are investing in GovTech start-ups with 1.95bn USD of funding since 2015 [268].
- New legislation, such as regulatory sandboxes test innovation [270]: 30 initiatives are active worldwide [270]. The German Federal Ministry for Economic Affairs and Energy has its own regulatory sandboxes [135].
- The OZG requires all administrative services to be available digitally in Germany by 2022. An intuitive and user-centric user interface is supposed to incentivize citizens to use online services instead of their still-available offline counterparts [271].
- GovTech-Accelerator-Programs offer customized support to "co-creators" for tapping into the public sector [272].

Challenges:

- Simplifying procurement processes is difficult but necessary to include SMEs. These processes slow down deployment, limit talent development, increase cost for government and industry [135] and limit SME engagements. SMEs represent 52% of the EU market. However, they only win 31-38% of public procurement contracts by value [1].
- An increase in entrepreneurial human capital and education is necessary to facilitate future PA developments [273].
- The attractiveness of working for the PA is lower than for the private sector [274], [275]. A report shows that 59% of administrations in Europe have trouble finding people with the right skills to support innovation [276].

Impact on Public Administration:

New forms of public-private partnerships (co-creations) emerge and create impact in PAs. They foster the creation of new high-quality jobs internally and to related sectors [135]. A win-win situation appears, in which the PA can enhance their capabilities further, while not carrying the full burden of developing the services themselves. Furthermore, efficiency in the decision-making process increases and gives civil servants a feeling of significance and the opportunity for personal impact. The attractiveness for co-creators to make an impact, secure clients, and increase profits is provided by the 400bn EUR global GovTech market [38].

ADOPTION OF A LIQUID WORKFORCE

Building agile public organizations by applying flexible human resources

To adapt their business model to any disruption, organizations are reshaping themselves by creating a "liquid workforce" [277], [182]. While the PA has long relied on "permanent employees", they are now accessing a broader spectrum of talent acquisition options [278] and face the challenge of building a flexible and cost-effective workforce [217]. For a "liquid workforce", two aspects are of significant importance: (1) Workers shall no longer be statically allocated to one department but rather to different areas and (2) internal resources can be supplemented flexibly by making use of external ones [279]. Therefore, this term strongly connects with the concepts of cloud-working, to allow collaboration independent from physical location and crowd-working, which refers to the outsourcing of different subtasks over the Internet [280]. Consequently, this new way of resource distribution offers the ability to apply resources when and where they are needed [45]. Besides these direct effects on any business model, a liquid workforce also contributes positively to richer career paths, higher employee engagement [281], and bridging the shortage of qualified employees in the area of data security and IT [282].

Facts:

- The US Environmental Protection Agency offers a skills marketplace program to shift the workforce towards critical projects while giving employees additional development opportunities [281], [283].
- Estonia opened a shared service center in which the workforce is not allocated to one specific ministry or agency but instead works for all 11 ministries [284]. A similar approach for sharng resources in Germany can be observed at the Institute for Municipal Data Processing in Bavaria [285].
- The number of self-employed people in liberal professions in Germany has increased by 75% over the last 15 years from 817,000 in 2004 to 1.43m in 2019 [286].

Key Drivers:

- Advances in technology and diffusion of cloud computing technology are creating an on-demand culture [287].
- Skilled labor scarcity in the public sector causes the need to approach external resources [223].
- The gig economy is changing its attitudes towards how to work, meaning more people are choosing a flexible alternative to the traditional "9-to-5" model [288], [286].
- The government program "Modern State - Modern Administration", which specifically induces structural changes, sets the increase in efficiency of the administration as a binding objective [289], [290].

Challenges:

- Complex award procedures in the complicate the integration of freelancers and self-employed professionals [288].
- Digitalized processes and digital access to all information are a fundamental prerequisite for the application of an efficient liquid workforce [279]. However, digitalization in public administration in Germany runs slowly [291].
- Strong hierarchies, the sovereignty of states, and fixed bureaucratic structures within German public administration hamper overarching cooperation [45].

Impact on Public Administration:

A liquid workforce helps the PA to achieve the agility needed for tomorrow's challenges [45]. With a shared talent pool that can be scaled dynamically, it is possible to shift resources from low-need to high-need programs to absorb peaks. Submitted requests can be processed by the first (internal or external) employee with available capacity, independent from department or location [292]. Furthermore, cost-effectiveness is leveraged, as the burden on each agency to maintain a large workforce is reduced. Even an overall decline of the classical civil servant contract with life-long employment is possible, to achieve a more efficient workforce.

CREATING SPACE FOR INNOVATION

Balancing exploitationand exploration within the public organizations through innovation labs

Within the private sector, the concept of exploiting existing business models and exploring new ones is well known. Organizational ambidexterity [293], the capability to perform not only incremental quality improvements to existing processes and products but also innovative or radical improvements that explore new opportunities, is growing in importance. For the PA to be effective in the long-run, all public services need to exhibit a certain amount of ambidexterity to respond to both stable and turbulent environments [16], [294]. Recently, there has been a rise in innovation labs in the public sector, including federal governments, that added extraordinary social and economic value to their host or parent organizations [295]. The most internationally renowned examples of innovation labs for PA are NESTA in the UK, Mindlab in Denmark and La 27e Région in France, Barcelona Urban Lab in Spain and GovLabAustria in Austria [296], [297], [16], [294]. In Germany, the trend is gaining traction. The innovation labs exist mostly on a municipal level, e.g., Munich and Dortmund [298]. Recently, individual ministries also opened respective innovation labs [299], [300], [301], [302].

Facts:

- More than 125 government innovation labs are spread across the globe; around 40 are located in the EU [303].
- Pioneers on a federal level in Germany are ministries with innovation labs, e.g., the BMFSFJ, BMAS, BMG and BMVg [299], [300], [301], [302].
- The innovation lab of the British Department for Work and Pensions (Intelligent Automation Garage) has built up a virtual workforce that saved 150,000 hours of work for their parent organization, which corresponds to the employment of 70 employees for one year [304].
- Globally, the average annual budget for Government innovation labs is 0.8m EUR, and the average number of

employees is six to seven [298], [305].

Key Drivers:

- Innovative working methods are gaining in popularity as the dynamics of the environment are increasing [298].
- Citizen and regulations like the Online Access Act demand a fast implementation of digitalized solutions [291], [304].
- Rigid structures and collective agreements of the parent organizations make separated units the only possibility to employ talent quickly and, if necessary, out of tariff [298].
- Regulatory pressure: The coalition agreement of the 19th legislative period specifies the eGovernment agency, which is responsible for setting up think tanks, incubators and innovation labs [306].

Challenges:

- Allocation of budget and resources is difficult, and the majority of the innovation labs are short-staffed and short-lived [298].
- It is challenging to develop a suitable level of autonomy and cooperation, which leaves room for innovation and facilitates the integration of results between the exploratory unit and the host organization [305], [307].
- Cultural challenges as well as silo thinking and inertia within established structures in PA can hamper the success of explorative units [293].

Impact on Public Administration:

Properly managed, innovation labs have the potential to generate solutions and to enhance the digitalization of services within the next years without restricting the resources of PA in their regular processes. However, PA has to actively face challenges to establish an alternative culture, that needs to be more agile and allows for open innovation. With that, public innovation labs are better able to exploit the ecosystem of users, citizens, start-ups, and experts, adding social and economic value to their parent organizations. Thus, the structural division may soon become a long-term solution to foster transformation within the public sector.

CONSENT-BASED END-TO-END TRANSACTIONS

Consolidation of Public Administration self-services into a single user-centric channel

A consent-based model informs citizens of tasks they need to fulfill while leaving it up to citizens to decide when to perform tasks [219]. Multiple tasks are seen as a transaction, while end-to-end transactions allow the PA to put together all tasks from various ministries or government departments (for example, apply for a driver's license, book theory test), to create one user-centric channel to complete the self-service (for example, learn to drive) [302]. Self-services allow citizens to solve a task by themselves via the internet, instead of calling or visiting the PA [303]. Such front-end solutions can be implemented quickly, thus enabling the PA to experiment on services and receive direct citizen feedback, thereby providing responsive and demand-driven services to the public [218]. The PA channels of the UK (730m annual visitors) and Denmark (37m annual visitors) are scaling their self-service channels for citizens, keeping the user-centricity in focus by employing user journey maps [304] as well as user-tested structure and design through eye-tracking and heat-mapping [305].

Facts:

- Since 2012, the UK has taken nearly 2,000 government websites and combined them into a single site (status 2019): GOV.UK. This trusted online communication and public service channel supports nearly 730m visitors annually [219].
- Denmark's Borger.dk refers to approximately 2,000 self-service solutions, developed by the country's authorities [305]. Borger.dk has 37m annual visitors [306].
- Switzerland has committed itself with the "eGovernment-Strategie Schweiz 2020–2023" to, among other things, offer public administration services to its citizens via one digital channel: EasyGov.swiss [307].

- The provision of digital public services for businesses in the EU has increased from 67 services in 2013 to 84 in 2018, an increase of 25% [308].

Key Drivers:

- Private companies have set the bar for what users expect: convenience, experience, and personalization [54]. The public sector is driven by these expectations and needs to adapt accordingly.
- Online public services require a form of digital identity [309], which is provided through eID and eIDAS in Germany [310].
- Regulations in Germany [271], [290], and the EU [311] require administrative services to be available digitally and should relieve the PA of bureaucracy: "Online Access Act", "Bürokratieentlastungsgesetz", "Single Digital Gateway".

Challenges:

- The content and the transactions are owned by different, siloed parts of government, making the consolidation of information and transactions more difficult [302].
- Lack of standards regarding data, technology, middleware, platforms must be overcome. If not, this can prevent the systems from being able to incorporate innovation in the long run [77].
- Currently, only 30% of German citizens own a functioning eID, a prerequisite to ensure data privacy and security on a single user-centric channel [312].
- The fragmentation of the ministries complicates the consolidation of transactions by task, which is needed for citizens to easily access public services. [313].

Impact on Public Administration:

By improving the user experience of the 35 most commonly used services in Germany, citizens would gain 84m hours of free time, and companies would save 1bn EUR of administrative cost [314]. A consolidated channel allows the government to understand its online performance from end-to-end. This helps to reduce redundancies and understand what offers are being used and also increases citizen satisfaction and feedback. German PA offices are overfilled daily. [315]. Introducing a channel for citizen information and basic transactions helps improve this situation, allowing regional offices to focus on tasks where human interaction is essential.

SCENARIOS

The following chapter describes four scenarios of different futures. The chosen scenarios are relevant, and of consequence for the user's decision, challenging, internally consistent, and recognizable from the signals of the present and near future. All four scenarios described below are equally plausible. They describe extreme visions of how the future of public administration in the digital age might shape our lives in the year 2040 with regards to two key drivers. Stories of personas experiencing a day in 2040 are used to envision the scenarios. Signposts (often described as signals) that indicate a development towards each scenario are identified in order to describe a possible path from the present to each of the four extreme futures.

DRIVER MATRIX

The scenario phase follows a structured approach. Current drivers and their resulting challenges for the future development of the public administration are identified based on the research from the basic phase of the Trend Seminar. Drivers are forces that shape the future of public administration and are usually exogenous.

All identified drivers model two bipolar outcomes. To create four equally plausible scenarios, two key drivers are combined in a scenario matrix. The key drivers are characterized by a high impact on the future of public administration and a high degree of uncertainty (i.e., it is impossible to assign a higher probability to one of the respective outcomes).

Further, the key drivers are independent of each other and do not overlap in their definition. To select the most suitable key drivers, all drivers are ranked in a matrix according to their impact and degree of uncertainty. Different combinations of potential key drivers are then compared, and the best combination of key drivers is chosen.
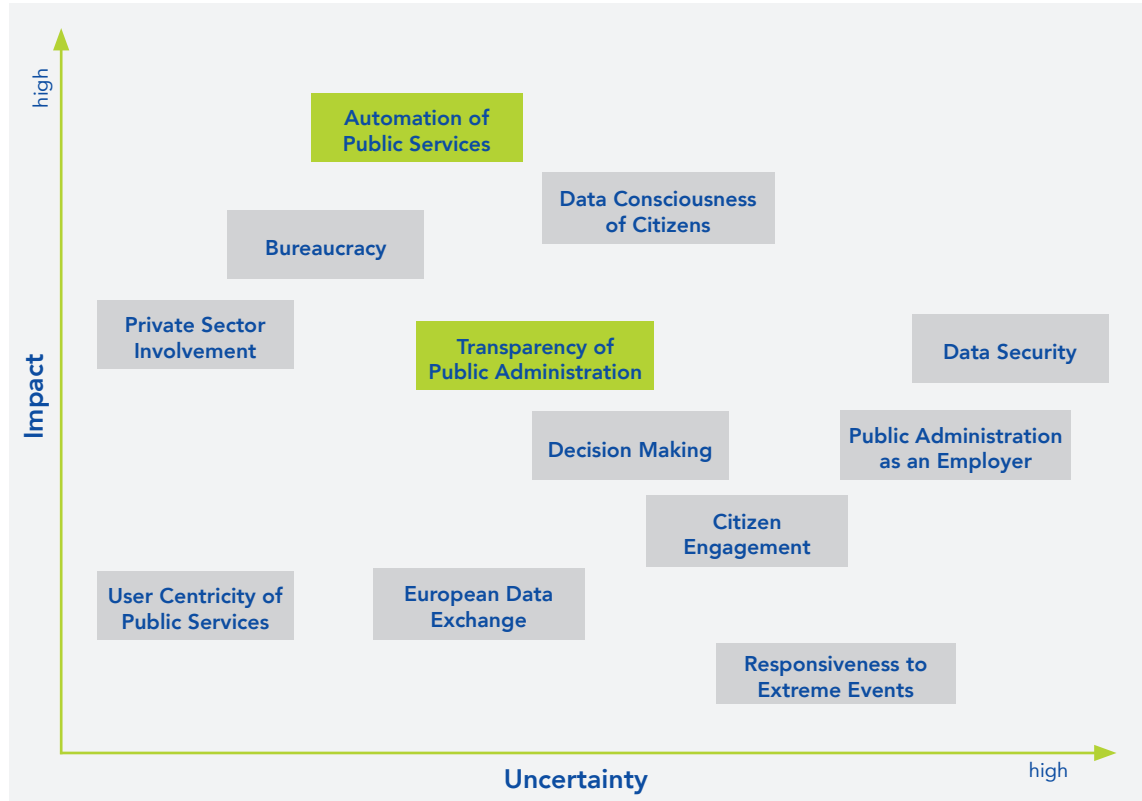
KEY DRIVERS

Low transparency

In this setting, PA has undergone a shift towards non-transparency. Operations and processes are unclear, and communication towards all stakeholders is scarce, due to highly complex process structures. Stakeholders are unaware of the underlying processes and could inform themselves about ongoing decisions upon request. Respective outcomes are shared once available. Hence, the federalist character of the state becomes more pronounced, with ministries working independently of one another. Across all levels - from state to municipality - there is a lack of communication and exchange. Further, collaborative efforts and potential synergies across countries are only partially realized, increasing uncertainty and costs for global coordination. Stakeholders fear possible non-transparent consequences, reducing overall trust, satisfaction, and citizen engagement.

⟵ Transparency of Public Administration ⟶

The concept of transparency of PA refers to being accountable and open in all operations in such a way that it is easy for stakeholders (citizens, politicians, businesses, civil servants) to see all performed actions. This traceability allows trust, fairness, and honesty to flourish within the system. The main aspects that determine transparency are: Traceability in data processing, storage, access, and ownership as well as clarity of public funds, investments, and budget allocation. The plausibility of current decision-making processes within the PA is crucial as well. Transparency not only relates to the administration's actions but should also enable open communication and the regular implementation of citizen feedback.

High transparency

In a highly transparent setting, all stakeholders have access to and are actively informed about the ongoing operations and decisions of the PA. On a horizontal level, ministries work flexibly and are collaborative in their efforts. Vertically, from federal down to municipal level, all actions and decisions are streamlined and openly communicated. Collaborative efforts and potential synergies on a global scale enable efficient coordination with the PA of other countries. This openness and understanding allow for citizens to pro-actively become involved and increasing satisfaction that goes in-hand with overall trust. Enhanced by the data security policy implemented by PA, this ensures privacy to all stakeholders while maintaining transparency.

Highly manual

The automation of public services is rudimentary, and activities are carried out manually. The high potential for automation in administrative tasks is not exploited, as insufficient political and financial support is provided. Consequently, most processes are initiated and executed manually, and workflows are time-consuming and repetitive. Likewise, the workload for data collection and processing is a burden on employees. Thus, the error rate and overhead costs are high, and the speed of services is poor. Even if the user interface of a service is digitalized as per the Online Access Act, manual intermediate steps are necessary. The tasks of public administration employees are characterized by monotonous activities and do not require a diversified skillset.

⟵ Automation of Public Services ⟶

The automation of public services describes the extent to which processes are performed by technologies, such as AI or physical robots, instead of humans. Thus, automation goes beyond digitalization, which only refers to the format in which services are available. The concept of automation includes citizen interaction, as well as the internal processes within a single or between many institutions. Clear data structure and the accessibility and exchange of data across systems, are prerequisites for a highly automated public administration. The consequences of automation concern the number of employees in public administration, their skillset as well as time and monetary resources.

Highly automated

Automation technologies reshape public services due to the increased maturity level of AI as well as statutory modernization strategies for the public sector. This development increases efficiency as processes are carried out immediately and at a lower cost. The high degree of automation goes beyond the mere digitalization of services; therefore, the number of public offices is reduced to a minimum. Using automation, public administration provides services proactively once citizens are eligible for them. Services are designed to automatically match the users' specific context and needs. However, human administrators are still responsible for high-level decision-making and edge cases, in which citizens explicitly demand human interaction. The employees' skillset shifts from repetitive tasks towards IT skills and critical problem-solving.

OTHER IMPORTANT DRIVERS

	Public Administration as an Employer	
Unattractive The PA struggles to acquire talent.	← →	**Attractive** The PA can attract the best talent.

	Decision-Making	
Anecdote-driven The PA bases organizational decisions on personal evidence.	← →	**Data-driven** The PA bases organizational decisions on the systematic use of all available data.

	Responsiveness to Extreme Events	
Reactive The PA misses opportunities to prepare for extreme events.	← →	**Proactive** The PA finds a way to prepare for extreme events.

	Data Consciousness of Citizens	
Careless Citizens are unconcerned about giving away their data.	← →	**Protective** Citizens are very cautious about giving away their data.

	Bureaucracy	
Inefficient Administrative processes are complicated.	← →	**Efficient** Administrative processes are frictionless.

	European Data Exchange	
Closed digital borders European PAs are isolated and do not exchange data.	← →	**Open digital borders** European PAs are tightly connected and can exchange data.

	Data Security	
Low-security There are no technical options to guarantee the required level of information security.	← →	**High-security** Available security standards ensure the protection of citizens' data.

	Private Sector Involvement	
Dependency The PA lacks capabilities to provide the most services and relies on the private sector.	← →	**Autonomy** The PA offers most services independently.

	Citizen Engagement	
Low engagement Citizens are not actively involved in governmental decision-making and idea creation.	← →	**High engagement** Citizens are actively involved in governmental decision-making and idea creation.

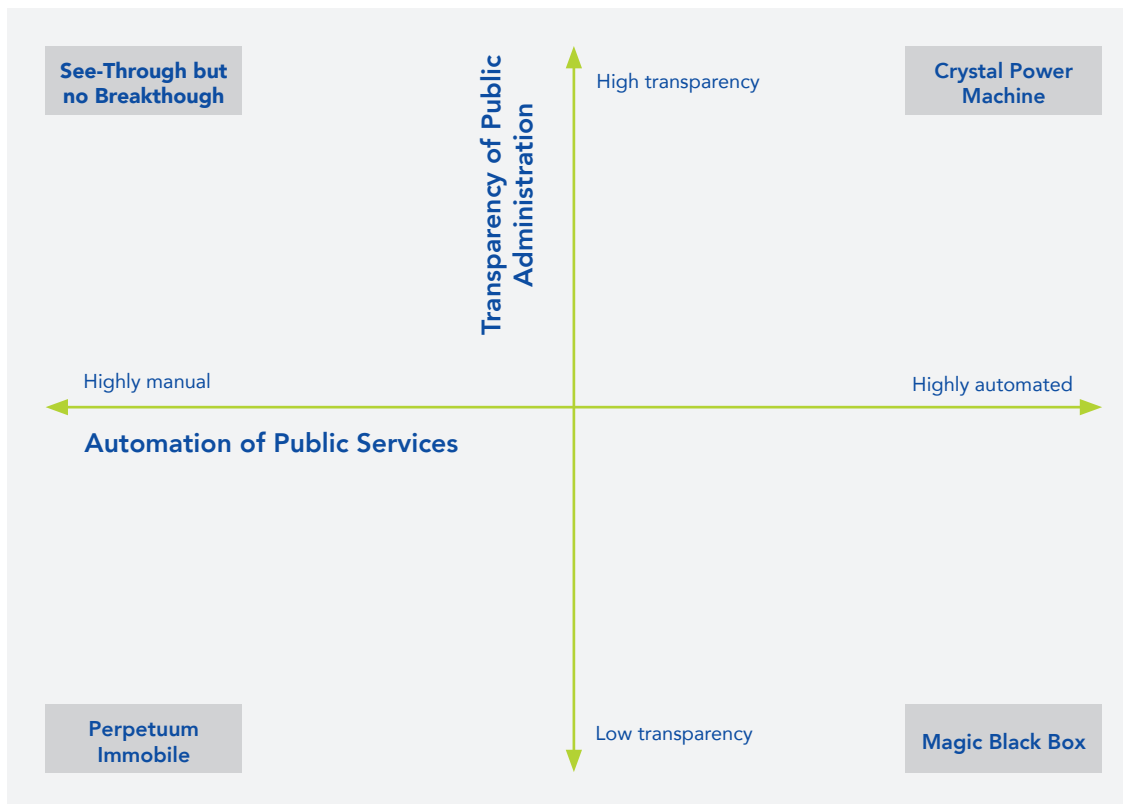|	User Centricity of Public Services	
Inconvenient The public services are not designed in a user-centric way.	← →	**Convenient** The public services are designed in a user-centric way.

SCENARIO MATRIX

The scenario matrix consists of the two key drivers and their corresponding bipolar outcomes. Each key driver represents one of the axes of the matrix. Each one of the four built scenarios results from the intersection of two of the drivers' extreme outcomes (one per matrix quadrant). All scenarios are plausible and internally consistent.

"See-Through but no Breakthrough": Citizens completely understand the functioning of all aspects of administration. Nevertheless, internally, the public sector suffers from inefficiencies due to stagnant regulations concerning emerging technologies and fragmented efforts to integrate different administrative systems.

"Crystal Power Machine": Public administration adopts the newest automation technologies to streamline public services and to ensure the transparency of their internal mechanisms. Political commitment to technological progress and citizen-centric strategies lead the way.

"Magic Black Box": Public services run very smoothly but entail high back-end complexity. Due to interpretability issues and sensitivity of some state-owned data, the administration decides to keep most data internal and citizens do not really understand the decision-making scheme, leading to mistrust. They just know everything seems to be working very nicely.

"Perpetuum Immobile": As a result of high bureaucracy and federalism, there has been no adaptation of newer technologies to improve internal efficiency. Furthermore, data security concerns lead to no advances in opening their inner workings to the citizens to make them more understandable and actionable.

	Transparency of Public Administration	
See-Through but no Breakthrough	High transparency	**Crystal Power Machine**
Highly manual		Highly automated
Automation of Public Services		
Perpetuum Immobile	Low transparency	**Magic Black Box**

SEE-THROUGH BUT NO BREAK-THROUGH

A Day in 2040

Good morning everyone, I'm excited to have you all here! Let us kick off your two-week internship with a quick introductory question. Who of you has worked with Windows 13 before?" Polina Yilmaz, a 16-year-old student from Munich, hesitantly raises her arm. "Windows 13...," she asks, "Isn't that a little outdated for 2040?!" The supervisor ignores her remark and energetically continues: "Here in Public Administration, we work in a fully digital manner and with a modern approach to serve all citizens best. Responding to the increasing demand of our citizens, we aim to provide maximum transparency in our highly specialized software solutions that tackle different issues on various bureaucracy levels." Polina gets excited: "Maybe this isn't too bad after all," she thinks, although she is biased because, to her, the public administration has a bad image and is known to take a long time to respond.

After the session, the students are assigned to respective departments where they will work for the next weeks to come. Polina is allocated to the data migration office as it is among the most understaffed departments. "Well, this doesn't sound too appealing," she mumbles, "but let's see how it goes." Polina walks through the administration campus that spans multiple buildings to accommodate thousands of employees that are barely able to keep up with the amount of work to be done. After what feels like an endless walk, she finally arrives at her designated department. It consists of vast, open space with hundreds of people sitting in front of computer screens.

Just as she enters the room, she is greeted by an old lady who looks exhausted. "Hello, my dear, you must be the new intern. Welcome to the data migration department. I'm Mrs. Mensah-Bonsu and will be your supervisor for the next two weeks. I'm so happy that you're here! We can really use your help." Polina looks around and notices that there are still several vacant desks. "As you can see, we are all working

very hard, and our team is still growing," Mrs. Mensah-Bonsu continues. "You know, I am very proud of our team, we have come a long way since I started working here in 2015. Back then, it was one big mess. We had to do all this work on paper, can you imagine that? Now we have digitalized these processes completely. I mean, they are still not automated, but we don't have to stamp anymore." Polina ponders what she just heard, "Stamping. That sounds ridiculous."

Mrs. Mensah-Bonsu shows Polina to her desk, where they turn on her computer. "In the data migration department, we handle internal and external requests to our citizen

database," she starts explaining. "If, for example, an employer wants to get confirmation that an employee has subscribed to a certain health insurance plan, they can send out an access request for that information. This triggers a notification in the citizen's e-GER.de account where all our services are located and can then either grant or deny the requested access. You can see here that the citizen with the ID G2304982 has granted the Austrian police access to his DNA profile for a mass DNA screening concerning an open murder investigation in Salzburg. Now you can copy the requested data from the digital citizen registry into our data exchange form and send it back to the Austrian police via the

quantum security transfer protocol. All clear?" Polina looks at the long list of information requests and asks: "Can't this be automated?" "I know, my dear, but unfortunately, it can't," Mrs. Mensah-Bonsu responds. "The Government tried to standardize all processes to enable automation. However, having different legislations in every federal state, one solution could just not fit them all." With a deep sigh, Polina gets to work and opens another information request.

Finally, after a long and tedious morning, Polina is off for her lunch break. She orders a personalized FlyingEats lunchbox that addresses her indigestion as well as her taste buds. "I know your task this morning wasn't overly exciting," Mrs. Mensah-Bonsu admits. "But after lunch, I have another more compelling assignment for you." Polina becomes slightly more hopeful again. Maybe work-life is not too bad after all? Unfortunately, Mrs. Mensah-Bonsu and the team only have time for a quick bite before rushing back to work again. There is just too much work to do and too few personnel to do it. Polina thinks back to the morning she had and goes to get the first coffee of her life. "It tastes too bitter," she thinks while she rates the coffee blend on her watch. "But after I have rated a couple of these blends, the algorithm can recommend me a coffee that I truly like," she assures herself. With her coffee in hand, she goes and sits back at her desk.

"Alright, Polina, good that you're back!" Mrs. Mensah-Bonsu rushes to Polina's desk. "I have a crucial task for you. Ever since we introduced the CPP back in 2035, we have been bombarded with inquiries. For us to process them, I need you to enter those inquiries into our internal system according to their classification on this list. After you have added them to our platform, you need to tick the box "received" in the CPP and type in the department responsible for further processing in this box. When you click the "save" button, the citizen will be notified of the current status, so please recheck everything before saving. Can you do that?" Polina nods. "Great, thank you. If you have any questions, you know where to find me." Mrs. Mensah-Bonsu disappears as quickly as she came.

"I wonder what people write in that portal. It might be interesting," Polina says to herself as she opens the first citizen's request. Citizen G2307724 is complaining about autonomous cars driving 50km/h in her street, which is a 30km/h zone. The citizen noticed that a neighbor's hedge is covering up the street sign, so the cars cannot detect it. "Who complains to the city about a hedge?", Polina wonders

and looks at the date of birth of citizen G2307724: Born in 1994. Polina shakes her head. "These millennials. Don't they have anything better to do?". Nonetheless, she diligently copies the information from the CPP into the internal complaint longlist, ticks the "received" box, and enters the street maintenance division as the responsible department.

"I don't know if I can stand this for the next two weeks," Polina wonders while the robotic cleaning aid swivels out with her empty coffee cup. "Two weeks. How can Mrs. Mensah-Bonsu endure this for years?" With a quick glimpse of the message popping up at her watch, Polina realizes that she has to rush down to the nearby junction: Her mother is about to pick her up in just a couple of minutes. Throwing a quick goodbye to Mrs. Mensah-Bonsu and despite taking a few misleading

turnoffs in the endless corridors of the department building, Polina hastens out of the entrance hall. "Damn it," she rails, "mum's already been waiting for me." As she comes closer to the driverless hydrogen car, the face ID recognizes Polina and unlocks the door for her. Polina jumps into the car, and the virtual vehicle assistant, Tom, carefully wakes up her mother Anna from her espresso nap.

"How was your first day, honey?" Anna welcomes her warmly. "It was... well... to be honest; it was exhausting," Polina replies. "That's work, hon," her mum says while scrolling through her contacts on the touch table in the center of the car. After a moment, Tom pipes up again: "Madam, it seems like you are searching for Mr. Jansons. Would you like me to call him?" "Yes, please," Anna calmly replies. After a short ring, Mr.

Jansons picks up the phone, but Polina is hardly listening anymore. Instead, she stares out of the window, and as she sees all the people passing by, she starts thinking about her future ahead. What should she do? Where should she work? Many of the big companies dissolve their business presence in Germany and public administration seems to be the only remaining large employer. The car stops at a red traffic light and the digital road sign starts playing the typical traffic light advertisement. "WE ARE HIRING!" it says in red, capital letters. "SUPPORT YOUR LOCAL ADMINISTRATION!" She knows that they pay well, but she could not do today's tasks for the rest of her life. "Brilliant," Polina hears her mother rejoice, "then it's all set! I will contact the notary. We should be done with relocating our business to Latvia by the end of this week. Moving abroad is the only option, looking at the unresponsiveness of the German Public Administration and the economic slowdown that is caused by not embracing new technologies." "Moving abroad," Polina contemplates, "I think that's it. Chances seem to be better there."

Signposts:

- "All public services are finally accessible online in 2028 – 6 years behind the plan.
- Laws and technical feasibility strengthen citizens' data ownership, leading to higher transparency in data handling by PA.
- Public administration follows citizens' demands to make internal processes fully transparent.
- New regulations of technology applications fail to enable their deployment in public administration.
- Public servants complain about stressful workdays, low appreciation and monotonous tasks.
- In 2032 an attempt to harmonize backend systems failed – complex processes in federalism presented the highest burden.
- The Government desperately tries to improve its attractiveness as an employer to overcome deficits in workforce.
- By 2030, an increasing portion of fiscal budgets is spent on financing operational costs in PA.
- Companies move to other countries – "PA is too slow for us".

CRYSTAL POWER MACHINE

A Day in 2040

"Come on, Lea, please hurry!" Carlos shouts from the corridor through the apartment. "I really don't want to be late today." While waiting, he nervously stares at himself in the mirror. He wants to make a good impression on his first day and planned to get to work a few minutes earlier. For many years, he has been working in public administration and has recently accepted a position at the Federal Office for Civil Protection and Forecast of Extreme Events. "I'm already here, darling." His wife smiles at him reassuringly as she slips on her coat. "And besides, you have no reason to be nervous. The department hired you because you're the perfect match for the job." A grin appears on his face. Getting married to Lea and finally living together with her was a step he had long been waiting for. Ready to leave, the couple steps out of the door.

Carlos and Lea take a seat in the autonomous car that was already waiting outside. During the ride, he receives a notification from the residents' registration office on his phone: "Based on your newly-signed rental and employment contracts, we assume that you have moved to Mittelweg 31 in Munich. Would you like to update your permanent address?" He confirms by scanning his iris and smiles at the thought of finally ending the long-distance relationship with his newly-wedded wife. Another notification appears: "Would you like to update the following documents and related registers: ID card, Passport, Resident and Taxation Register?" He clicks on 'Select all' and confirms again. Looking at Lea, he sighs: "I'm quite relieved that the whole moving process went so smoothly, and that we could enjoy the weekend together." Lea gets a surprised look on her face and inquires: "Is everything already taken care of?" Carlos assures her: "Yeah, I just received an automatic request and approved the updates to my documents." Lea's eyes light up: "That's great! Now you can fully focus on your new job!"

Carlos looks thoughtfully out of the window. After a few moments of silence, Lea asks: "You really liked your job back in Berlin, didn't you?". Glancing at the landscape passing by, he responds: "Well, of course. I had great colleagues who were highly qualified, and I really appreciated the agility and direct communication that reminded me of the time I interned in a start-up back in the days." "That is true," Lea nods in confirmation, "The administration is really dynamic. The other day, I was astonished to read about how fast they implemented the new data security regulation; it didn't even take them an hour!" Carlos smirks: "You're right; I experience that every day. Overall, the established standards for data exchange are fantastic. They work perfectly for all German institutions and even across national borders within the EU. To comply with new legislation, all the data is automatically extracted, reviewed, and new programs are created within minutes by Ostara, one of the strongest AIs on the planet. And even before the new regulation, we had extremely high standards of data security already. That is why there hasn't been a cyber-attack for the past ten years." "You have a point there. So, what are your hopes for the new job?" Lea asks and takes Carlos' hand in hers. "Well, I hope it will be as exciting as my old one in the data science department. Working on projects in infrastructure for the public administration was a

very diverse job, but I expect the forecast of extreme events to be just as interesting."

"I'm sure it will be amazing! All the best for your first day," Lea says as she gives him a quick kiss. They arrive at Carlos' stop. He grabs his coat, gets out of the car, and stumbles onto the sidewalk. Startled, he comes to a halt. A gaping pothole next to the sidewalk made him almost sprain his ankle. "Wow, that was close. I better report it right away," he thinks to himself as he takes a photo of the road damage with his smart glasses. With a small gesture, he confirms that the image should be sent to the responsible construction office and directly receives a certification that the damage and its location have been recorded. He is satisfied with the notification. The overall quality of public services has tremendously improved since it became so easy for citizens to inform the administration. Keeping an eye on the time, Carlos continues towards his new workplace.

"Public Administration Campus Munich," reads the sign next to the entrance. This campus, also known as PACM, is the current technology hotspot of the public administration in Germany. Highly educated IT and management employees develop the IT architecture and supervise the outcomes of the automated administration processes. Due to a data breaching incident during the collaboration with a large software provider, the authorities decided to develop all services in-house, yet open source. With this degree of innovation and superior working conditions, public administration ranks as the most attractive employer in Germany. Knowing this, Carlos feels proud of his new job because he has succeeded against other applicants from top consultancies and IT companies. A soft voice awakes him from his thoughts: "Welcome to PACM, Carlos!" A small robot is talking to him, "I am PARy, your public administration receptionist. I will guide you to your boss, Mrs. Obermaier. Please follow me." On the way, PARy explains the structure

of the campus to him. The buildings are arranged in a circle to enable proximity between different departments. The employees working there can choose between twelve different restaurants and make use of the kindergarten, gym, among other facilities. One building clearly sticks out due to its curved glass front with embedded wooden elements. Inside, Carlos spots a large table with four people passionately debating. Pointing towards the room, PARy explains: "Over there is the conference room for edge case decisions. When a citizen demands a request to be re-examined by a human instead of an AI, they come together to discuss here." Carlos is impressed by the scene. The two continue the tour and stop in front of an office building made of glass. His new boss, Anna Obermaier, is waiting at the entrance and greets him: "Good morning, Carlos! We're glad you're here."

Anna is head of the Federal Office for Civil Protection and Forecast of Extreme Events. They start walking towards Carlos' new office but come to a halt in front of a large screen in the entrance hall. It is filled with a plethora of graphs and has a massive '86%' displayed in the middle. "This is our agency's transparency index. We're struggling to get past the 90% mark and are falling behind the other federal institutions." Carlos nods, since he has already read about it in the news. As they continue their way through the halls, Anna further elaborates: "You probably already know that we use citizen data to precisely predict the impact of extreme events. You can imagine that these simulations are quite complex, especially since they are fully automated. Of course, we ask the citizens whether we can use their data. However, we're having a hard time communicating in simple terms how exactly we utilize it. This has lowered our transparency index and brought us into the media's spotlight." With his expertise in data science, it is Carlos' task to now overcome this problem as the project manager of the department. His role also includes communicating the progress of the projects to the public.

As they pass by a balcony across the hall, Carlos exclaims: "Wow, you can see the Alps from here!" "And not only that," Anna replies, "they serve great coffee here as well. Would you like to have one?" Carlos agrees with a smile. While they enjoy the view of the Alps, a robot barista prepares two cappuccinos for them. The informal atmosphere turns the conversation into pleasant small talk, prompting Carlos to open up towards Anna: "I really appreciate how transparent you are not only towards citizens, but also towards us employees regarding the challenges we work on. The child

in me is very excited by all this automation." After the last sip, the two continue their way to the office, where a group of people is waiting. "This is your new team," says Anna, "welcome to your new job!"

Signposts:

- In response to the Online Access Act, all public services are available digitally by 2025.
- With the introduction of the once-only principle, personal data is stored centrally and is accessible to all public authorities.
- Progress in automation technologies fosters the re-stabilization of the German economy, after its downturn in the early 2020s.
- The public administration is cutting over 60% of jobs. The majority of the remaining employees are retrained.
- The demonstration movement "Tuesdays for Transparency" drives the implementation of numerous transparency and communication measures in the public system.
- New paragraphs are added to the German constitution to promote collaboration between the German federal states. These include, for instance, a law requiring all public authorities to exchange internal data.
- Public service interactions, such as updating documents or applying for benefits, are carried out proactively and interaction-less by default.
- The increasing automation of work leads to the introduction of a universal basic income.
- The public administration's transparency index is introduced as a mandatory KPI for all public institutions.

PERPETUUM IMMOBILE

A Day in 2040

Martin Flieger wakes up as fresh as a daisy. Thanks to his smart bed, he is woken by massage-like movements coming from his mattress, right in between two sleep cycles. The lights in his room turn on slowly, and his favorite podcast starts playing. What a fantastic way to start the day! Sleeping well has not been easy for him and his wife, Jennifer, in the last weeks, as they are still getting used to taking care of their newborn daughter Marlene during the night. He will never forget the day Jennifer gave birth to her. He was so overwhelmed by this news that he practically froze in shock. Luckily, his family's virtual assistant Pepper had ordered an autonomous taxi to get him to the hospital. During the ride, Martin had logged in to the iHealth app to check Jennifer's room details and installed the baby-welcome module. With only one click on his glasses, Martin placed an order of all the necessary products, from custom-fit clothing to toys and diapers. Suddenly he realizes that most of the things he had ordered are still piled up next to their daughter's crib because they haven't gotten around to unpacking them yet. However, there is no time for that right now. Today is the dreaded day where he has to register Marlene, which requires Martin to take her to the public administration office. So far, he was lucky enough to avoid it and interact with all their services digitally. Nevertheless, when it comes to essential tasks such as registering your child, the state requires you to show up in person and provide fingerprints and an iris scan. Martin kisses his wife goodbye, picks up Marlene, and heads to the building of the public administration. During the ride, he checks the appointment in the transPArent app and quickly goes through all his digitally prepared documents. To help citizens navigate through the jungle of bureaucracy, many private companies have realized this business opportunity and provide automated and personal tools for specific interactions with the authorities.

Martin is grateful that a friend had recommended the app to him, since otherwise he would have needed hours to look up all the necessary information. The ride takes them through a district which he considers uninhabitable after a recent flooding. There are still many people living here while their requests to move to social housing are still pending. The scene exemplarily shows the public administration´s slow response to the severity of extreme weather events which they could have prevented. Finally, the two arrive at the public administration office. Heading to the entrance, Martin overhears the conversation of two civil servants getting a coffee: "I'm already tired! I've done nothing else than check forms all morning!" Hearing this puts a worrisome smile on his lips as he walks on.

Martin accepts that he might have to spend the whole morning here. The hall is full of interactive panels that indicate the location of the different offices. With a click, the screen shows the path to the office 16A. After walking past various corridors, they arrive at the waiting room with a long line of people waiting for appointments. Martin uses the transPArent app to pull a virtual waiting number. "Position 120. 20 to go, it could be worse," he whispers to Marlene. Martin sits down and waits while looking at the baby, wondering whose nose she will get. Finally, his phone notifies him: "120!" They walk inside the office where a middle-aged woman sits with her gaze focused on the screen. He sits down and clears his throat. She then turns, sees Marlene, and congratulates him: "Good thing that we have new generations coming in! Sadly, there are not many young people taking that step." He starts

transferring all the documents wirelessly to her computer while she checks them off on a list. Even his original birth certificate is required, which is still on paper since they didn't issue digital certificates when he was born.

Martin notices that the woman is taking a long time to review his documents. Jokingly, he says: "Actually, I have heard that they are still thinking about automating this, but I prefer having a human double-check my baby's name." He laughs. "Yes, that the state digitalized everything is nice, but that doesn't make it any faster. After the rushed implementation of the OZG, the focus of public investments shifted to economic recovery after the recession. We never got the automation they promised. So, same processes, same problems, just with a computer." She shrugs her shoulders. Finally, she confirms that everything is correct. "Thank you for bringing your wife's certificate from Sweden. We could not have accessed that from here, the countries within the EU do not share their data." Martin silently thanks the transPArent app for reminding him. "Now, the last step. Let's get the fingerprints and iris scan of this princess." The scanner seems very large compared to her tiny fingers. "Is the iris scan a new requirement? Do you know why they are asking for it? It would have been nice to involve citizens in the decision-making", Martin comments skeptically. After the big scandal a few years ago, people still have a hard time trusting the public administration with their data. In 2036, the Chaos Hacker Club found out that the PA´s IT infrastructure was not as secure as claimed. The authorities promised that no sensitive data was leaked, but citizens remain cautious when the PA asks for data. Back then, private companies used this leak to convince the citizen that they were more trustworthy regarding data than the PA.

Suddenly, with a soft noise, his virtual assistant reminds him that Jennifer's parents have confirmed the invitation for dinner. "Isn't it ironic how I trust my digital assistant more than my administration?", Martin thinks to himself. He gets pulled out of his thoughts by the servant's answer: "I have no idea why we take the iris scan now. We only got the protocol and the form to include it in the system; maybe someone higher up thought it would be good without looking at any data." Finally, after some more clicks and forms, the email with Marlene's birth certificate arrives in Martin's inbox.

With all the information on his phone, they both head to the office next door to request child support. "Hopefully, this process will be faster as the queue is shorter," Martin thinks

to himself. While waiting, he scrolls through the dozens of notifications popping up on his glasses: "Looking forward to seeing our kids playing together! Lots of love, Ben & Jerry!" He smiles and thinks about their dinner together two weeks ago. Then he remembers: Ben was also talking about child benefits as they were still waiting for a reply from the administration. After reading through several official websites that were contradictory, they didn't even understand which criteria the allowance is based on. Also, when they called to check on the application status, nobody could provide them with further details. With his smile wavering a bit, he wishes that their own child benefit decision will come sooner. Finally, it is his turn, and he approaches the counter to deposit the documents he needs to provide digitally. As before, the public servant on the other side of the counter manually checks all the forms. Eventually, Martin signs a multitude of administrative forms and gets a confirmation of the

application via email. Relieved that this long day of waiting is ending, he uses his glasses to call a taxi and heads outside, excited to meet Jennifer's parents, who are coming by for dinner to visit their newborn grand-daughter.

Back home, the family is already waiting in the kitchen. As usual, Jennifer´s parents brought self-made dessert, even though most people order all their meals online. Jennifer's father still prides himself on baking the best apple pie, so it has become a tradition to bring it to family dinners. During the meal, Martin recounts how he spent his day waiting in lines. Jennifer's father then proceeds to tell a very similar story of how he registered his daughter 30 years before: "Funny how the public administration is still as inefficient as it was back then. We hoped that by digitalizing their processes, we would never have to go there in person. But the law has not changed because political parties could not agree on

this. Look at private companies. Laws do not restrain them as strictly, and they have automated almost everything. No wonder that the public administration has enough people who want to work there after losing their job in the private sector." But in the end, the real star of the evening is Marlene with her radiating smile and tiny hands that grip your finger so tightly.

Later in the evening, Martin puts his daughter to bed and can't help thinking about her future: "What kind of wonders will you see? Maybe you will not have to register your child in person like me. Who knows?" The thought that it might very well be the same as today puts an ironic smile on his lips as he quietly leaves the room.

Signposts:

- The implementation of the OZG misses its mark, leading to fragmented digital services across municipalities and states.
- The Constitutional Court reaffirms the sovereignty of the federal states in implementing digital systems.
- Automation replaces 8.5m jobs in the private sector by 2035.
- The lack of political consensus stops the approval of the Public Administration Automation Act (PAAA).
- 80% of German households use digital home assistants.
- Germany is in place 25 in the EU ranking on the transparency of administrative services due to technical limitations and missing political will.
- Investors and companies increasingly choose other countries over Germany, with one of the top reasons being less bureaucracy.

MAGIC BLACK BOX

A Day in 2040

Thursday, February 23rd, 2040 - Zeynep just woke up. For weeks, she has been looking forward to the kickoff day. She got accepted to the Quantum AI Masters class of Spring 2040. Being born and raised in Turkey, she emigrated to Estonia to obtain her bachelor's degree in General Artificial Intelligence. While moving to Estonia, she encountered several obstacles as Turkey is not part of the European Data Exchange program. Last month, she moved to Munich to begin her master's degree. Zeynep was surprised by the high degree of automation and simplicity of the administrative process while moving to Germany. It required close to no input from her side since most information was already available for German authorities from her prior interaction with the Estonian administration. The transition processes, such as the visa application or accommodation registration, were initiated and approved automatically. Like most Germans, her impression of the system is generally favorable. However, there is a growing concern around data control and privacy due to little insight into how data is collected and processed.

On her way to the university campus, she smiles nervously at the cameras positioned at the entrance of her SpeedPod-Station. While waiting for the next SpeedPod to arrive, a giant ad-hologram appears: "GovNet – the on-demand, user-centric omnichannel platform for interacting with your public administration. Now more personal than ever with our updated virtual assistants, helping you in any situation." Imani, a young girl with a colorful shirt, appears next to Zeynep and notices her perplex expression as the ad is displayed. "What do you think about GovNet? I obviously like it", pointing to her t-shirt with the word-play "Gov-Net or Gov-Home" on it. Zeynep answers: "I'm impressed by the degree of automation, but administrative processes here are – well, mysterious. Just today, I got a notification telling me I came in contact with two people affected by the flu on my commute and that they will start monitoring my temperature". Imani seems baffled by Zeynep's comment and explains her view, while the two girls board the
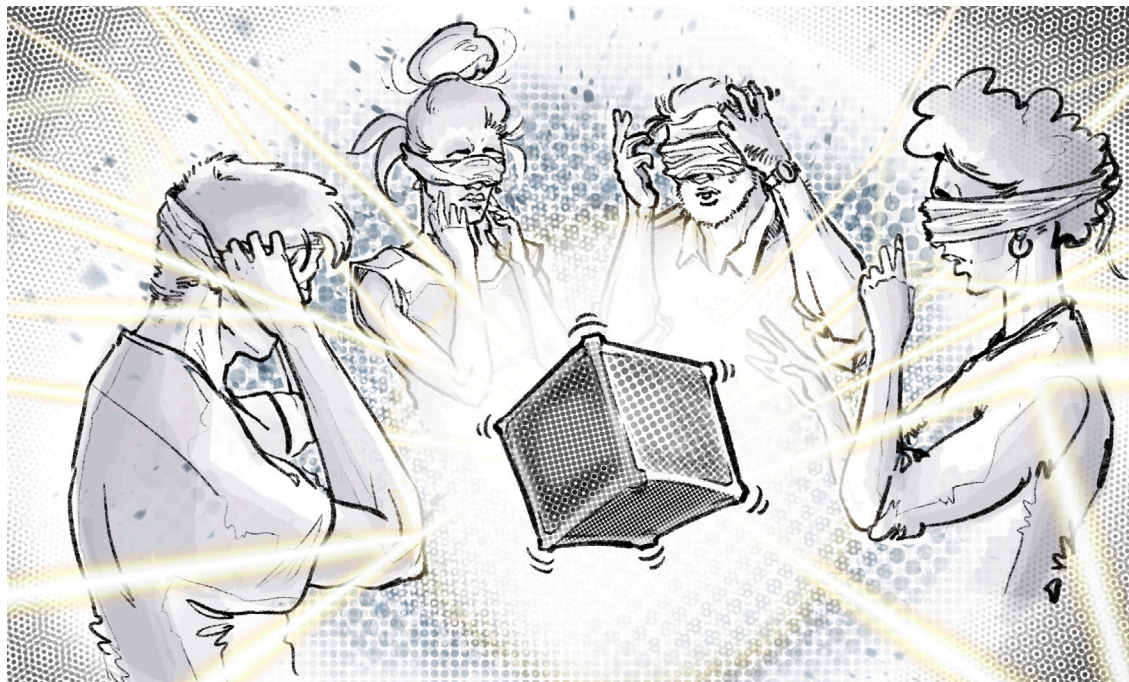
SpeedPod. Imani grew up in a highly automatized Germany, and its smooth processes never raised any suspicion to her. She cannot remember a time before GovNet and enjoys the comfort of having access to all PA services at her fingertips. The system can intercede in the citizen's name and notifies you about any required procedures and their results. Imani still remembers the excitement of receiving her E-ID on the day of her 18th birthday, an automated service provided by the PA. This day was the first time she was able to enjoy alcoholic beverages without worrying about her parents receiving a fine for neglecting parental duties. During the conversation, Zeynep discovers that Imani also attends the Quantum AI Masters class.

Mid conversation, the pod stops and opens its doors. As they walk out of the station, a self-driving bus with the university's initials comes to a halt across the street. After a

short ride, they arrive at the main entrance of the university. They cannot help but notice the colorful banners for the next PA "Mega-Hackathon" advertised in the entrance hall. Slowly the new class gathers under the high ceilings of the 20th-century building. A young man introduces himself to the students as Prof. Theowald, an expert in the field of Explainable AI, who teaches Transparency in Autonomous Decision Making at the university. He explains how to use the E-ID for the different services across the campus. Zeynep remarks on the professor's introduction: "Sounds like the German PA skipped your class." A couple laughs resonate among the students, while the professor nods amused. Zeynep is shocked by the professor's following anecdote, telling that GovNet notified him about a violation charge on his bank account. He was only able to assume that he got it for throwing an apple into the Garda Lake during his stay in Italy two days ago. He gets interrupted by Imani, who

elaborates on her experiences made during her government internship. She starts by stating the benefits of the disruptive change in PA. The increase in automation over the past two decades led to a transformation of the society's workforce – the need for operational activities decreased. The development of the PA into an attractive employer for young digital talent compensated for this transformation. Imani then continues going into detail about how a legal entity for a newly founded company can be established effortlessly and within just 10 minutes.

Zeynep and her class continue on a tour of the campus. While passing the sports facilities, she considers the many steps of automation the German government has undergone. She reflects on her knowledge that the interaction with the German administration two decades ago had the reputation of being "a lot of pen and paperwork and hours of wasted time." The administration has turned into a highly automated institution that creates value for a large number of citizens. However, the increasing complexity of the decision-making process and use of AI fuels a lack of interpretability that has

turned the PA into a "Magic Black Box." As Zeynep's attention returns to the other's conversation, a fellow student shares his most recent experience with the PA: "I just got an ecological footprint warning on my GovNet dashboard regarding my heating usage. I don't know what they base their calculation on – maybe I'm using more than the tenant before me? If this continues, I might have to start using GovBlack instead. I think German citizens are entitled to more transparency and should be a part of shaping the PA. Currently, all we can do is like or dislike a process in GovNet, allowing for close to no citizen engagement!". Slightly confused about this new piece of information, she activates her retina contact lens and looks up GovBlack. It is an anti-system movement triggered by the opaqueness of the PA and the data consciousness of citizens. GovBlack allows to hide all personal data exchange between citizens and PA, thereby, sabotaging GovNet's algorithm.

After a long and intense kickoff day, the students are dismissed and head home. Imani and a couple of others continue the discussion of the current administration's benefits and shortcomings as the driverless bus pulls up in front of the SpeedPod-Station. While entering the building, Zeynep receives a notification from GovNet: "Hello Zeynep! We inform you that our automatic system has filed your tax information. Once ready, your bank account will automatically be charged, or your tax refund deposited." Arriving at Zeynep's home station, Zeynep says goodbye to her classmates and heads off to do some grocery shopping. When entering the supermarket, she scans her E-ID on the shopping cart. Immediately, the cart registers her profile and payment method. While waiting for the robot to pack her groceries, Zeynep's eye catches the news screen: "PA buys out private investors, taking over German Communication Systems." "Now, public administration has the capabilities to offer more communication services independently of the private sector. This development probably facilitates higher security standards to protect our data," Zeynep thinks out loud.

Entering Munich's most giant student tower, Zeynep finally arrives at home. Using her VR set, she scrolls through her social media feed. Imani has already created a university class group and just uploaded a new VR video. It shows her GovNet dashboard and her reaction when seeing a large support grant she received for her studies. Wondering how to apply for the scholarship, Zeynep accesses her GovNet account and starts researching. She does not find any application form; however, there is a short page about financial support for students. Nobody can apply as an algorithm based on your GovNet data

finds and selects students who are eligible to get the support grant. Zeynep hopes to be selected one day.

As usual, her HoloScreenTV turns on at eight o'clock with the climate update and evening news. Zeynep listens attentively as the news reporter elaborates on an urgent climate situation: "An extreme storm of the 10th magnitude is building up and will hit most of northern Germany by next month, according to the forecast of the PA's SmartClimateSystem. PA's security precautions include strengthening old building structures and providing shelter for the homeless. We advise all citizens to follow the behavior policies posted on GovNet's Extreme Weather channel." Zeynep is impressed – to reach such accurate predictions, the decisions and processes in PA must base on the systematic use of all available data. Without these capabilities, the German government would not be able to develop and implement interventions to prepare for the unpredictable challenges of extreme events.

Zeynep closes her eyes. She reflects on how the high degree of automation benefits the whole society and offers various opportunities for the future, despite the opaque nature of the governmental decision process. Before falling into dreamy clouds, Zeynep wonders: would a more transparent PA lead to an increase in trust and satisfaction? Is a high degree of automation not enough?

Signposts:

- The government offers 3-week student hackathons in PA as an employer-branding measure in 2022.
- The German government establishes a single portal for citizens to use all public services – known as GovNet.
- In 2028, German data infrastructure projects provide a single, centralized network of databases for the PA.
- Approaching 2034, an increase in the accuracy of automated back-end processes in PA makes algorithmic decisions legally binding.
- Elster 2.0, an AI-powered tool that only needs you to confirm the generated tax declaration, becomes mandatory for every citizen.
- Due to the increasing complexity of AI and automated processes, the lack of interpretability and transparency fuels citizens' mistrust in the PA.
- The PA implements face and image recognition technologies as authorization mechanisms in 2040.
- The public administration's last front-desk civil servant retires.Thus, virtual assistants run all self-service terminals entirely.

IDEATION

The following chapter describes five novel business models in the field. Each of the business models is described using the Osterwalder Business Model Canvas.

digitalYOU
simple . swift . secure

DIGITALYOU

A Smart Assistant Helping You With Public Administration

There is one thing that every citizen has in common: the need for interaction with the PA. No matter if you have to register your child or pay taxes, many of these processes require a significant amount of time and are not clear to most people. Also, throughout our lives, official documents start to pile up either in digital or physical form and, in many cases, are scattered through folders and binders. As the demand for convenience and the digitalization of services increase in the mass market [87], a market for smart assistants opens up the possibilities to amend the mentioned inconveniences.

DigitalYOU is a secure cloud storage solution where users can save their most important documents, without any of them getting lost or compromised. After uploading the documents, they get automatically filed in an organized folder structure. Additionally, an explanation of the document is displayed to understand its purpose. The most tailored

experience is ensured by providing a customized structure and personal recommendations of services for which the user might be eligible. In many cases, paper documents are still necessary. Hence, instructions and advice are provided on how to organize your binders, so everything is organized and easily accessible. Besides, users can use this platform to fill in their forms regarding Public Administration processes with just a few clicks. All the relevant information is getting prefilled with the priorly stored data, and the user only needs to follow the intuitive UI to fill in the remaining gaps. After this, the complete form is available in the DigitalYOU folder. No more mistakes, no more unclear questions, no more time-wasting.

DigitalYOU includes a community forum to become the central information hub regarding Public Administration procedures. This portal serves as a customer support portal

in which users have their questions answered and get the best quality of information. Thus, we do not only offer raw information to our users, but we also facilitate communication amongst them.

DigitalYOU is the platform regarding all your connections to Public Administration, which helps you in a simple, swift and secure way.

Trend   Scenario   **Ideation**   78

Business Model

🤝 Key Partners

- Cloud providers to host technical infrastructure
- Public Administration authorities
- Audit partner to certify secure handling of user data
- Institutional partners (e.g., educational institutions)

🧑‍🏭 Key Activities

- Product development and continuous improvement
- Gaining expertise in the field of PA
- Marketing the product and community building

🏭 Kev Resources

- Experts in PA & legal entities
- Technical infrastructure
- User data as the basis for the form filling service
- Qualified employees in web development and marketing
- Financial resources
- Attention-grabbing through PA related information
- Direct access to platform

🎁 Value Proposition

Simple

- Document storage in an easy and intuitive structure
- Understandable explanations of processes and documents

Swift

- Time savings by prefilling forms and once-only principle
- Proactive reminders for eligible PA services

Secure

- Safe storage of your most important documents
- Integrated version control system

❤️ Customer Relationships

- Provide a personalized customer experience
- Build trust through customer support and community platform

🚚 Channels

Age focused marketing

- Age group 16 - 35: Social networks
- Age group 26 - 55: Newspaper advertisement

Website as central access-point

- SEO strategies
- Attention-grabbing through PA related information
- Access to DigitalYOU platform

👥 Customer Segments

- Internal and external service developers as paying customers
- Citizens as non-paying customers

🧮 Cost Structure

Initial Investments

- Legal and administrative costs
- Server and domain setup
- Office furniture, hardware, and software

Fixed Costs

- Salaries
- Operational costs: Rent, loans, utilities, insurances, etc.

Variable Costs

- Cloud storage
- Cloud computing

💰 Revenue Streams

- Freemium model with personalized and smart storage
- Dynamic pricing of form filling based on time-savings
- Marketing the product and community building

Value Proposition

Simple: German Public Administration is currently transparent but highly complicated. Thus, DigitalYOU provides, a solution with easy and understandable explanations for public services. Additionally, it gives information about the purpose and value of the corresponding uploaded documents. As a result, public services become more understandable for all citizens. Secondly, DigitalYOU eases the organization of the documentation as another of its characteristics. A customizable folder structure adjusts to the user and its living situation so documents can easily be found, always in its newest version.

Swift: Users who seek a convenient way to deal with Public Administration forms can also find that in DigitalYOU.They receive personalized service to save time on filling out government forms. An intelligent algorithm automatically fills the form fields, drawing from the available information through the uploaded documents. This feature ensures high convenience in filling forms and easy applications for public services like Kindergeld or BAföG. By extracting information on citizen's papers as well as knowing their data, DigitalYOU can offer tailored services. Furthermore, the services can be provided proactively to the customer to support his current living situation. An example of that is the birth of a child. A prefilled application with all necessary data for Kindergeld is offered if the user uploads the birth certificate of his child. Then, the customer only has to sign, confirm and send the application, saving the user a significant amount of time.

Secure: The foundation of DigitalYOU is the online storage service. Users can store their relevant documents in a secure cloud on German servers, which works as a central and digital access point. The benefit of the cloud storage is that, DigitalYOU's customers never lose their documents if they move to another city or if the analog version gets destroyed in an accident.

Customer Segments

Same Product, Tailored Services: The total available market considered is the German population in the age of needing to interact with the PA. The demand for storing and organizing documents is exceptionally high when distinct life events such as marriage urge the citizen to high administrative

efforts. Hence, DigitalYOU targets mainly citizens in those circumstances to support them in their administrative processes.

The first segment (16 - 25 years old) consists of individuals entering the job market for the first time. This segment might require information on governmental benefits such as Kindergeld or Bafög. Thus, DigitalYOU helps those people to gather data about their job situation, their tax declaration, or their insurances. This group is defined by being digital natives but lacking the experience regarding PA procedures. Hence, an attractive UX and comprehensible information service is where they find the most value.

The second segment (25 - 35 years old) interacts more with the public administration. Distinct life events causing this higher interaction might be life-long binds or building a house. These new situations require a higher knowledge of procedures in which the features of DigitalYOU assists. Furthermore, the storage feature gains relevance, as the number of documents increases: not only individually but also dependent on the number of family members. This segment group is likely to be willing to pay for storage service.

The third segment (35 - 55 years old) has the highest purchasing power, as well as many procedures and documents that they must gather. This group values security and convenience above all, so the secure storage functionality is the key feature. Hence, the market of 55-year olds and beyond can be considered as a relevant market.

Customer Relationships

Provide a personalized customer experience: One of the key values that DigitalYOU offers is the customized experience. There are differences in the customers' life situations, and thus a different customer experience is delivered to each of them, starting from the very beginning by providing customizable folder structures. On top of that, the system communicates regularly with the customer by providing reminders of services that are of interest to the customer and when to apply. With regards to the form filling, the UI is as intuitive and personalized as possible, by adapting the language and messages to the customer. DigitalYOU incentivizes the use of the platform by offering specific statistics of time-saving and by facilitating payment methods to very few step processes.

Building Trust through Customer Support and Community Platform: The aim is to build a long-life relationship with the customer based on trust with its most precious documents. There is a 24h customer support to ensure that any problem receives an immediate answer. But the focus is not just on individuals' problems. DigitalYOU wants to build a community to help citizens in a broader sense. The goal is to become the one platform that gives you all the information that you need regarding Public Administration. A forum embedded in the online website lets users enter questions and answers within the Public Administration. With DigitalYOU's expertise, answers get verified, and content is created to respond to questions. By doing this, the forum helps current and potential customers, which can boost the word-of-mouth effect.

Channels

Age Focused Marketing: The marketing strategies are tailored to customer segmentation. Potential customers aged between 16 and 35 are targeted mainly through social media, as more than 60% of them use at least one social media platform regularly [316], [317]. The campaigns aim to highlight the features most relevant to the targeted group, for example, the safe storage or the easy access to information. Shortly before application deadlines for services like BAföG, additional marketing efforts are made. The age groups between 26 and 55 years are made aware of DigitalYOU through marketing in spaces such as known newspapers or specialized magazines. Especially tech-savvy and security-concerned adults with high purchasing power can be addressed adequately in such a manner. Video advertisements on well-known platforms are also part of that marketing plan.

Website as central access-point: The website is the heart of DigitalYOU. Through SEO, the DigitalYOU website appears on top in specific web searches (e.g., particular forms or administrative processes) and therefore gains traction. By providing PA related information in a Q&A section, potential customers are incentivized to remain on the website. The community forum serves as an additional touchpoint and allows the user to engage actively. The content of the forum is linked to the offered services to increase the conversion rate of readers to customers. The product can then further be marketed by explaining the different functionalities and prices according to the services.

🏗️ Key Activities

Product Development and Continuous Improvement: As DigitalYOU is a software-only company, there must be a dedicated team to code the product, continuously improve the user experience and keep the software up to date with changes in the PA system. The secure storage system, as the foundation of the product, is built first. It includes a cloud infrastructure hosted in Germany to adhere to privacy laws and expectations when handling confidential private documents. Furthermore, adopted encryption procedures ensure the highest security standards when transmitting data. In the second step, the machine learning algorithms are developed. These are capable of recognizing the Public Administration document to explain that document and fill out new forms using the user's information. For that, optical character recognition models need to be trained. The more sophisticated the algorithms and the training, the more the system can adapt quickly to various government forms. All of the technology, as mentioned above, is already available on the market. However, implementation success relies on acquiring enough resources and human talent.

Gaining expertise in the field of PA: As the product is strongly tailored towards administrative documents and forms, DigitalYOU must gain enough insights in that field. This can be achieved by building a strong relationship with the Public Administration and analyzing the user journey when filling out administrative forms.

Marketing the Product and Community Building: DigitalYOU needs to reach a large enough customer base to have the desired impact within the Public Administration landscape. Therefore, the marketing team is responsible for advertising the product through the main funnels of social media and the website. Additionally, to reach a larger audience, they position the product as a community-driven platform and actively build the community.

🏭 Key Resources

Domain Experts in the Area of Public Administration and Legal Entities: Legal expert knowledge ensures the correct handling of datasets provided by customers and other stakeholders. Additional information granted by Public Administration experts is one of the primary resources to explain the administrative services and to gain knowledge about the required forms and documents.

Technical Infrastructure: On a technical side, reliable, secure server storage is needed to implement a place for all user documents. This storage has to be extendable as more users require additional capacity. Additionally, a domain is necessary to host the DigitalYOU online platform.

User Data as the Basis for the Form Filling Service: The user data represents the basis of the automated form filling software, proactive service offering, and the document recognition function. These features rely on machine learning algorithms. Hence, DigitalYOU must ensure a high quality of the gathered data as a critical resource.

Qualified Employees in Web Development and Marketing: The online platform is the central part of DigitalYOU. It requires eligible employees to develop the web application, including services such as automated form filling, proper document organization, and form explanations. Furthermore, these developers also need to enable a further extension of the services provided by the platform. It is conceivable that Public Administration, as well as institutions such as universities, or schools, could be linked to the platform. UX Designers keep the customer in focus and guide the developments in the right direction. In addition to that, qualified employees in the area of marketing are crucial to market and position such a novel product.

Financial Resources: With its financial resources or external funding, DigitalYOU can start and run its services and take over the costs of employees and the technical infrastructure. It is estimated that DigitalYOU needs approximately 2m EUR in funding to launch the product and break even.

Key Partners

Cloud Providers to Host Technical Infrastructure: As DigitalYOU is an online platform, a web host is needed to make the services online accessible. This hosting company has to be reliable, as the stored data is susceptible. Therefore, one of the requirements is to have local servers in Germany. These servers ensure data security and service reliability for DigitalYOU and its customers. It is essential to work actively with the server host as data security is one of the key values. If a data leak occurs, DigitalYOU loses the entire trust of all customers.

Public Administration Authorities: DigitalYOU is dependent on Public Administration Authorities. Their forms are the foundation of the offered services, and with additional information from them, DigitalYOU can offer explanations on its online platform. Mainly information about local differences between municipal regulations is an essential resource this partner can provide. Further, the authorities have to accept the filled forms which are generated via DigitalYOU.

Audit Partner to Certify Secure Handling of User Data: DigitalYOU wants to ensure its processing of user data is in compliance with data protection regulations with an external audit partner. Such a third-party audit takes place regularly to check the data security at DigitalYOU to keep customer trust.

Institutional Partners (e.g., Educational Institutions): In the long term, it is planned to collaborate with institutional partners to provide additional features with DigitalYOU. Institutions like universities, schools, or the Public Administration itself (e.g., municipalities) can use an interface to upload certificates or facilitate direct communication exchange with a citizen on DigitalYOU's platform. It is necessary to cultivate a relationship with these partners, to incorporate their expertise and challenges in the development of new features.

Revenue Streams

Freemium Model with Personalized and Smart Storage: One of DigitalYOU's revenue streams are connected to the cloud storage feature. Here, a freemium model is offered. DigitalYOU allows the user to upload, store, and organize the essential documents as part of the basic package. The customer that chooses the basic package can access some of the features and gets a glimpse of the full product. To deliver the whole experience with DigitalYOU, the users can upgrade their status to "premium" by paying a monthly fee of 3 EUR or a yearly subscription of 30 EUR. In this case, the premium user benefits from a discount by making a one-time payment. The premium package includes multiple features. Among others are the unlimited storage of documents, tailored organization structure based on the user's life situation, and active recommendations and reminders of services the user can access. Additionally, a family package is available with which family members benefit by obtaining a common dashboard as well as having all mutual documents stored and organized.

Dynamic Pricing of Form Filling based on Time-savings: One of the main features of DigitalYOU is to ease the process of filling Public Administration forms. For this reason, the platform provides a broad portfolio of the most used forms. By assessing the complexity of each form and the time spent in the process, DigitalYOU determines the price for every different process. Therefore, the fees range between 1 EUR - 50 EUR depending on the form's complexity. This results in a weighted average of 15 EUR per form. Along with the price, the user gets notified of how much time they saved by using DigitalYOU.

Cost Structure

Initial Investments: Before the launch of DigitalYOU, it is necessary to incorporate the enterprise. Several expenses for legal and administrative purposes thus occur. In this initial investment, technical aspects such as the registration of DigitalYOU's domain and server storage setup need to be considered. With the development of a first version of the web platform, it is possible to start. Investments in the corporate identity and an early marketing campaign facilitates making DigitalYOU visible for the customer. Besides the platform and founding expenses, the office's initial set up, including technical and office equipment for employees and founders, provides a further source of costs.

Fixed Costs: The most significant part of the fixed costs of DigitalYOU is the salary of the employees. Having highly skilled employees, especially software developers, is the basis of DigitalYOU towards a simple, swift, and secure solution for its customers. Other relevant fixed costs are related to the operational costs of DigitalYOU. These include rent for the office, utilities, insurance fees, the hosting of the webpage as well as loans for the initial investments.

Variable Costs: With the number of users, the required cloud storage increases. As a consequence, DigitalYOU has to extend its capacities at the Web Host or build up its servers. Also, cloud computing costs rise due to the higher use of machine learning algorithms to provide the best user experience. Furthermore, DigitalYOU has to acquire users with individual campaigns regarding different customer segments. The goal of further marketing operations is to partner with the Public Administration to support DigitalYOU on its customer-centric service and storage platform Public Administration.

Scenario Fit

See-through but no breakthrough: In this scenario, explanations of PA documents don't provide much value to customers due to governmental transparency. Yet, the government body's low automation status has the consequence that filling out PA documents and forms is still a tedious process. Citizens are frustrated by the government's slow automation progress and look for third-party solutions like DigitalYOU to cover that need. Therefore, DigitalYOU has a high potential to deliver value with its form filling, automated, and personalized storage solution. Furthermore, the government's high transparency and low automation enable DigitalYOU to form partnerships with the government to allow the government to use DigitalYOU as a platform to provide the Once-Only Principle to its citizens. In the long term, the government could provide its citizens with additional value through a possible integration of DigitalYOU into the government infrastructure.
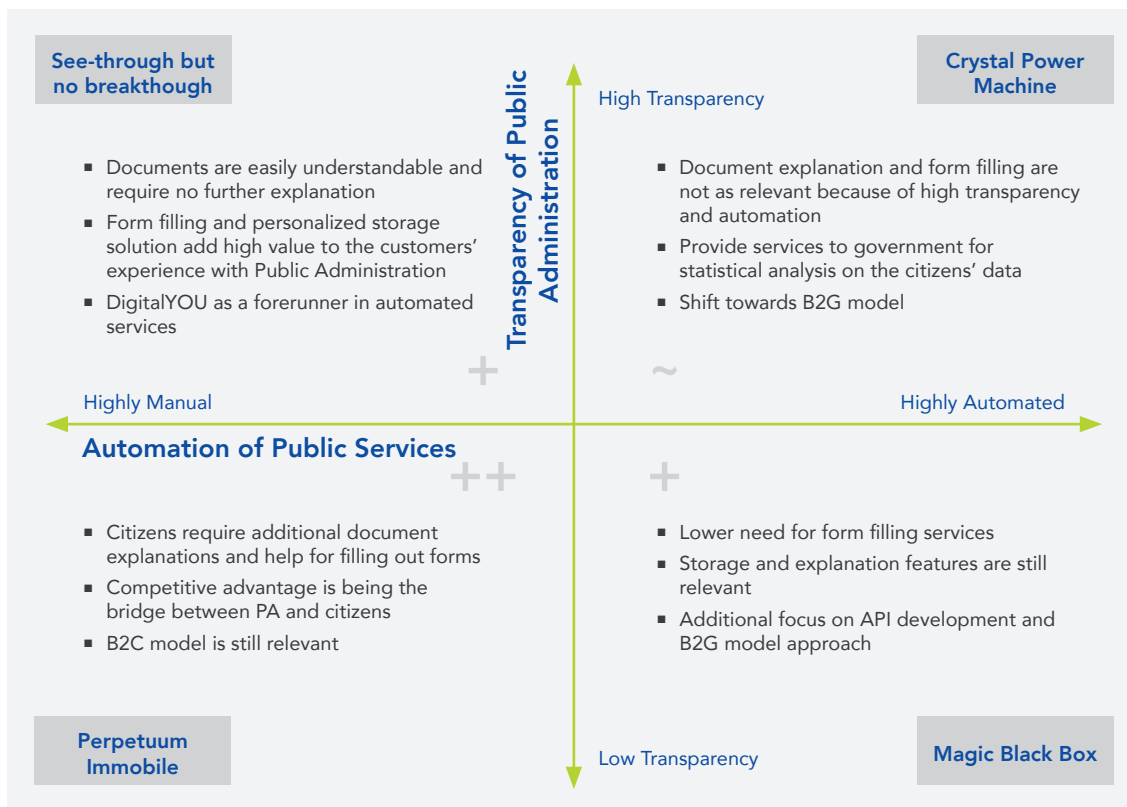
Crystal Power Machine: In this scenario, the German Government has improved its services to provide them in the most transparent, understandable, and usable manner. Therefore, explanations of Public Administration documents of DigitalYOU are not the primary value provided to customers. Furthermore, the German government is a pioneer showcase of the digitalization and automation of a Public Administration. Therefore, the form filling and storing services of DigitalYOU are not as relevant. DigitalYOU should be able to create a feasible business model by closing partnerships with institutions and the Public Administration itself. The option to use documents stored with DigitalYOU with the automated public services offered by the government could be one example of that. Additionally, the business model could transform into a B2G model: the government pays and provides the DigitalYOU service for the citizens in exchange for the option to get a statistical analysis done on the citizens.

Magic Black Box: In this scenario, the citizens' need for form filling services is rather low as Public Administration is highly automated. Yet, high automation and the government's low transparency in this scenario create a very high demand for explanations on government forms and a secure and trusted storage solution for private documents. Descriptions of forms are necessary for a wide range of citizens who do not understand the Public Administrations processes and want to get insight into the relevance and purpose of their documents. Additionally, individual privacy-focused citizens

use DigitalYOU as a secure storage platform for all their documents with the rights and power to choose what specific information to reveal to the government. This is possible because of the API integration with the government and provides an additional business model for DigitalYOU.

Perpetuum Immobile: In this scenario, the low transparency of the government creates a very high demand for, first, explanations on government forms and, second, a secure and trusted storage solution for private documents. In addition to that, the government's lack of automation progress frustrates citizens. It increases their demand for a convenient third-party solution to save time on filling out

Public Administration forms. DigitalYOU provides a solution to both of these problems and, therefore, the B2C business model with a basic freemium level and dynamic pricing on form filling services is still very viable and attracts various kinds of customers in this scenario. General support for all government forms enhances the service's value to customers. Furthermore, DigitalYOU's online community provides users with a platform to ask for help if they have questions regarding public services and forms.

See-through but no breakthough

High Transparency

- Documents are easily understandable and require no further explanation
- Form filling and personalized storage solution add high value to the customers' experience with Public Administration
- DigitalYOU as a forerunner in automated services

Crystal Power Machine

- Document explanation and form filling are not as relevant because of high transparency and automation
- Provide services to government for statistical analysis on the citizens' data
- Shift towards B2G model

Transparency of Public Administration

Highly Manual — Highly Automated

Automation of Public Services

- Citizens require additional document explanations and help for filling out forms
- Competitive advantage is being the bridge between PA and citizens
- B2C model is still relevant

- Lower need for form filling services
- Storage and explanation features are still relevant
- Additional focus on API development and B2G model approach

Perpetuum Immobile

Low Transparency

Magic Black Box

Challenges

The development of the recognition algorithm and training the model poses technical challenges. Although the current state of this technology is quite advanced, and the proposal is feasible, there are limitations on the scope of different forms that can be filled out automatically.

- Ensuring the highest level of security for the storage requires a trusted third-party cloud storage provider and marketing efforts to convey that security to the customers to build a reputation of trust.
- Legal issues might arise if the German government would not recognize prefilled forms as legally binding.
- Data consciousness of German society, as well as complying with GDPR, could be a barrier of entry in the market.
- If the German government makes enormous progress in its digitalization efforts, the form filling feature might become obsolete, and the business model relies solely on API services and the role of the central document platform.

Outlook

DigitalYOU intends to become the trusted personal assistant of its customers by growing the DigitalYOU ecosystem together with its partners. An API interface and a form creation tool are established to allow a more robust engagement of third parties. Via the API, institutions like universities and Public Administration itself connect to DigitalYOU. The data saved in DigitalYOU could then be used, e.g., for university applications or for directly filling out a government form online. Vice versa, these partners are also able to deliver documents to the users via the platform directly.

Additionally, DigitalYOU can provide insights generated from analyzing the platform's usage data to partners. Using its expertise in levering and analyzing data, DigitalYOU develops a versatile questionnaire builder to create customized forms intuitively and straightforward. Access to this tool is provided to third-party customers as licenses to directly allow them to build and offer their forms on the DigitalYOU platform. This tool, together with the API interface, leads DigitalYOU to become an intermediary allowing fluent data exchange between service providers and customers. The business model shift enables DigitalYOU to scale further and maintain its sustainability in the future.

PAAPI

The Next Step Towards Data Democratization

Public Administration in the digital era means not only providing more services digitally but also more transparent to foster better collaboration between the government and its citizens. One significant move towards a more open government is the Open Data Directive, a regulation that prompts administrations to make all collected raw data accessible to everyone for potential re-use. This data is referenced and indexed in Germany's GovData portal [318], so that anyone can find and download it in its raw form. However, just as a raw diamond needs refining, raw data needs to be cleaned and refined to gain in value. Therefore, to fully achieve transparency and data democratization, data needs to be accessible in a usable, structured way.

PAAPI is the next step that builds on raw open data. Its software extracts machine-readable datasets indexed in the GovData portal, refines, stores it in a central database, and

provides it through an API for further use. With the ultimate goal of achieving an open government, PAAPI's core is an open-source project that can be utilized and developed further by anyone. Using this free version of PAAPI, called Open PAAPI, any citizen can directly access the usable data they need – completely free of charge. PAAPI thereby contributes significantly to data democratization in Germany.

The benefits of open data also extend to the economy, where it is estimated to have a market value of 15.8bn EUR in Germany alone. Therefore, PAAPI is also offered as a service to meet the high volume data needs of larger organizations such as private companies and governments. PAAPI Business subscriptions take care of everything institutions need to leverage government data, enabling them to directly start creating value and extracting insights from government data on a large scale. By subscribing to PAAPI Business, clients

gain immediate access to the scalable, stable, and reliable PAAPI infrastructure, making time and effort spent searching through vast piles of datasets a thing of the past. For more individual needs, the PAAPI team also provides full support in setting up the PAAPI infrastructure in-house, guaranteeing full control and security.

Business Model

Key Partners

- Data providers and metadata platforms
- Open source and open data community
- Trusted relationships with municipalities

Key Activities

- Software development and maintenance of PAAPI open source project
- Setting up the infrastructure for a PAAPI live instance
- Building trust with partners
- Customer service for private companies

Key Resources

- Datasets provided by PA
- PAAPI and open-source developers
- Digital infrastructure

Value Proposition

Open PAAPI

- Transparency on open data management

PAAPI Business

- Standardize interface for consuming PA open data
- Ready to use platform for consuming PA open data
- Guaranteed quality of services through the API service
- Convenient visualization and reports for datasets of interest

Customer Relationships

Open PAAPI

- Collaboration with developers through Github
- PAAPI website
- Social Media Project updates

PAAPI Business

- 24/7 customer support
- Personal assistance
- In-house consulting

Channels

Open PAAPI

- Github repository
- PAAPI website
- Twitter

PAAPI Business

- SEO & Advertisement
- GovData website
- Data Science meetups & conferences

Customer Segments

Open PAAPI

- Public educational institutions such as universities
- Interested citizens such as hobby open-source developer
- GovTech founders that want to build software prototypes

PAAPI Business

- Private companies of all scale such as marketing agencies, financial and insurance service
- Public institutions such as research institutes and municipal governments

Cost Structure

Initial Investments

- Source code development
- Website development
- SEO and SEA

Fixed Costs

- Salaries for developers and data scientists
- Office rent
- Sustainability costs (i.e. system maintenance)

Variable Costs

- Cloud computing and storage
- Marketing
- Incentivizing open source developers

Revenue Streams

Consulting for in-house infrastructure

Subscription packages

- Independent developers: Start tier
- Start-ups and SMEs: Grow tier
- SMEs and Enterprises: Scale tier

Value Proposition

The German PA puts forth a major effort to provide the open data they collect through their broad plethora of services, ranging from city air quality to water consumption per household. Over 30,000 datasets are offered in various structures, sources, and formats, requiring the user to locate, download, and analyze the raw files. For each of these three steps, PAAPI offers a feasible, user-friendly solution.

Open PAAPI: Open PAAPI offers an open-source platform to extract, consolidate, and publish this data as an API. Open PAAPI follows open data structure standards and allows complex queries involving multiple datasets, which is not possible with current solutions. Anyone can see the source code of Open PAAPI, corroborating its transparency and enabling the community to collaborate with new features. Anyone can download and deploy Open PAAPI for private use and start unlocking the potential of PA open data.

PAAPI Business: Deploying and maintaining a big data platform such as Open PAAPI requires ample time and resources. This is why PAAPI is provided as a service through a hosted and configured instance by the PAAPI team. This live API is optimized to meet the highest performance and scalability requirements from customers. Any stakeholder interested in consuming PA open data can start the moment they sign up to PAAPI Business without worrying about maintenance or scalability issues. As an alternative offering, PAAPI also provides support for setting up on-premise PAAPI installations, if solicited.

PAAPI Business includes the dedicated data analysis tool PAAPI Insights. It helps the user unlock the potential of over 30,000 openly available datasets by offering data exploration, data visualization, and showcasing valuable insights.

Customer Segments

PAAPI aims at two different customer segments; one through the open-source project Open PAAPI, and the other by providing PAAPI Business services.

Open PAAPI can be downloaded, modified, deployed, and consumed by individuals. From data-curious citizens to hobby app developers, PAAPI open source can satisfy any

individual's need for clean and accessible Public Sector data. Private users can also do fast prototyping with a free PAAPI instance offered for low throughput testing. Secondly, public educational institutions such as universities or vocational schools can utilize PAAPI's free service in their curriculum. Finally, for GovTech founders, Open PAAPI provides the perfect base for data-driven prototypes that could drive an even more digital development in PA.

PAAPI Business is designed for more demanding data requirements. In the private sector, market research agencies, finance, and insurance companies profit mainly from additional information and insights and therefore have a high demand for public data. PAAPI's subscription packages deliver a ready-to-use data infrastructure with a structured and accessible database of the available government data,

allowing easier integration with customers software solutions. Regular updates ensure that the company always stays up-to-date with recent data publications and allows smooth and frictionless value creation. PAAPI can also support the public sector in integrating their data into existing processes and ultimately assist in implementing data-driven solutions and offering insights from the plethora of GovData datasets. Therefore, PAAPI targets data-savvy citizens as well as the private and public sectors.

Customer Relationships

Open PAAPI: As with most open-source projects, the interaction with developers will run through a Github repository. Here, coders can download all the source code

and find instructions on how to use it. In case users find any bugs or encounter a problem they cannot fix, they can open an issue and collaboratively fix the bug with the PAAPI developer team. In addition, open-source developers can publish their data-driven projects, for example, an app to track your city's air quality, on the PAAPI website, and exchange ideas on the PAAPI platform. Instead of sending out the traditional newsletter, customers can stay connected with project updates on Twitter, where PAAPI also reaches new customers in the GovTech Twitter scene.

PAAPI Business: PAAPI Business subscribers enjoy extra customer service benefits. These include 24/7 online service and reachability of PAAPI's support team as well as personal assistance with bug fixes either through the PAAPI website or a hotline. In the particular case where a private or public client needs custom solutions such as an in-house infrastructure, PAAPI consultants will go on-site and offer guidance through the process until the instance is up and running. Once subscribed to PAAPI Business, customers can consult the forum on the PAAPI website to interact with other users and exchange advice on best practices.

🚚 Channels

Open PAAPI: Given that PAAPI mainly targets tech-savvy customers, the majority of channels to reach PAAPI customers are online-based. PAAPI's Github repository will be the main point of contact with individual open source developers. Here, users will find all the information and code needed to employ the PAAPI software by themselves. The PAAPI website offers all of this information with the additional benefit that open source app developers can share their projects with the community. To target customers in the open government and open data scene, PAAPI will be very engaged on social platforms such as Twitter, where this community is highly active.

PAAPI Business: To promote PAAPI Business, its team will make use of search engine optimization and advertising to target data scientists. Regular data science meetups and conferences will be another channel through which PAAPI's data enthusiasts can mingle with data scientists from potential customers. Additionally, through a collaboration

with the GovData portal, customers can be redirected to PAAPI's website directly when searching for datasets on GovData. When considering the public sector in Germany, it relies heavily on word of mouth recommendations between municipalities. Building relationships and trust is essential to gain more traction in the public sector, which is why the PAAPI marketing team will focus on direct contact through phone calls or in-person consultations.

🚧 Key Activities

Software development and maintenance of PAAPI open source project: The core of PAAPI consists of code that extracts data from govdata.de, cleans, and processes it to then be structured in a database. This task is already complex, given the highly diverse data formats provided by the variety of data sources ranging from water levels to meeting protocols. The development process will start with machine-readable datasets first. Once the core code is developed, it needs to be maintained and expanded in combined efforts with the open-source community.

Setting up the infrastructure for a PAAPI live instance: A scalable, robust infrastructure is essential for customer satisfaction of PAAPI subscribers. As one major expense will be cloud service providers, tuning the code for maximum efficiency will save a lot of resources in the long run.

Building trust with partners: Building trust is critical in collaborating with partners, especially in the public sector. Therefore, PAAPI will take the time to contact public servants, who are in charge of open data in different municipalities, to thoroughly understand their needs and address their pain points with the PAAPI service. Gaining public partners' trust is also beneficial when approaching the private sector, as they are aware of the high-security standards posed by the public sector.

Customer service for private companies: The PAAPI subscription packages promise seamless deployment of the API and easy integration into existing company frameworks. To ensure customer satisfaction, PAAPI's team provides 24/7 online support to keep all processes running effortlessly. Especially in the starting phase, PAAPI relies on customer feedback to improve the service, which is why customer service will be essential for further development.

Key Resources

Datasets provided by PA: The PAAPI service is built on top of public datasets published as a result of the eGovernment act that demands federal administrations to publish all their collected raw data. This raw data is categorized and indexed in the GovData portal through which the PAAPI software extracts the data.

PAAPI and open-source developers: PAAPI's key intellectual resource is the source code deployed to clean the data as well as the API used to access it. Both require human resources in the form of experienced software developers to guarantee the quality of PAAPI services. While PAAPI will employ many software developers itself, open-source developers can also contribute a portion of the needed work.

Digital infrastructure: Besides the intellectual resources, physical resources are required. To run the PAAPI service on a large scale, computing power and data storage are necessities that can be procured from cloud service providers. Nevertheless, the underlying digital infrastructure development requires fine-tuning from PAAPI's software development and operations team. This set of configuration and optimization then becomes one of PAAPI's vital resources. The service will run on two instances: a demo version with limited scalability and an enterprise instance for high-volume requests.

Key Partners

Data providers and metadata platforms: The GovData platform is currently overseen by the IT Planning Council which will hand over this responsibility to the within 2020. Since the metadata platform is the central starting point of PAAPI, close collaboration with these federal institutions throughout the development process will be a crucial success factor. By facilitating exchange on both sides, the data provision and data application process, all stakeholders can gain a better understanding of how to improve the complete value chain of open data.

Open source and open data community: Germany is in a unique position as it has a very active open source and open data community, as seen from their contributions on open projects as Open Street Map and Wikipedia. This community

consists of individuals from various backgrounds, from public servants to computer scientists, who engage in an eager exchange of ideas in this field. PAAPI wants to make use of the experiences gained in the community by actively including them in the development process.

Trusted relationships with municipalities: In terms of customers, PAAPI especially wants to strengthen partnerships with public institutions. In the pursuit to enter the public market, PAAPI first focuses on municipalities that have an open data or smart city initiative with more than 50,000 citizens. These municipalities will be key partners in gaining traction in the public sector due to entry barriers in the procurement process being lower on a local level. These strategic partnerships will facilitate a later approach at the state level.

Revenue Streams

Subscription packages: The critical revenue source from PAAPI comes from its Software-as-a-Service subscription packages. The main driver for the pricing of packages is the calls-per-month made to the API, which follows an overage model where calls to the API are limited and additional calls are charged 0.2 EUR per thousand requests. Since PAAPI offers services to three different customer groups, their respective revenue streams have to be assessed independently. Subscriptions can be paid on a monthly or annual basis.

Independent developers: Start tier (9.99 EUR/month): To incentivize solutions, all private developers are free to use PAAPI services with a limited quota of 10,000 calls per month. If a prototype is being tested and the quota is not enough, PAAPI offers a minimalist Start tier package, which raises the quota to 50,000 at 9.99 EUR per month and enables the possibility to pay per use after the threshold is exhausted.

Start-ups and SMEs: Grow tier (79.99 EUR/month): The Grow tier is aimed at small businesses with less than ten employees and costs 79.99 EUR per month, including 250,000 monthly calls. The package includes 24/7 support and access to PAAPI Insights, allowing customers to review visualizations based on PAAPI data.

SMEs and Enterprises: Scale tier (199.99 EUR/month): The Scale tier is offered to big companies for 199.99 EUR with a quota of 1 Million monthly calls. With access to 24/7 support and PAAPI Insights, Scale tier includes the same additional services as Grow tier.

Consulting for in-house infrastructure: If required, the PAAPI team assists on companies' own PAAPI deployments, allowing full control over their services and independence of secondary parties. This service is available to subscribers of Grow and Scale tier.

Cost Structure

Initial Investments: To start offering PAAPI, an initial investment is needed to clean and refine the first datasets from data source platforms. Additionally, web developers are needed to develop the PAAPI website, while PAAPI's fundamental code is written in-house by data scientists.

Substantial costs for covering these experts' salaries are created. During the first weeks of operation, SEO and online advertising will be required to gain solid brand awareness.

Fixed Costs: PAAPI requires a certain amount of in-house data scientists and developers to maintain and revise its infrastructure, as well as a small office to conduct business. Further, deploying a free-to-use basic API results in fixed charges for hosting our services at an external contractor. Nevertheless, together with Webhosting, those fees make only a small portion of the overall costs.

Variable Costs: The biggest variable cost factor is the API's cloud network storage for premium subscriptions. Depending on the traffic caused by the requests for the API service on an hourly basis, the costs can vary strongly. API calls, i.e., receiving and sending data through the API, can have strongly varying costs depending on how resource intense the average call is. Since most of the calls are read queries, the cost per thousand calls is estimated in the proximity of 0.016 EUR. Marketing campaigns can be considered to increase the usage of the API's services. The frequency of such campaigns mainly depends on two factors: First, the initial campaign when commencing business activity can be considered a dry run. Thus, the following campaigns partly depend on the first campaign's success. And secondly, the urgency of such a campaign can be traced back to PAAPI's success in gaining recognition on GitHub and further open-source platforms. To incentivize open source developers, a reward program for reporting bugs could be implemented in the long run.
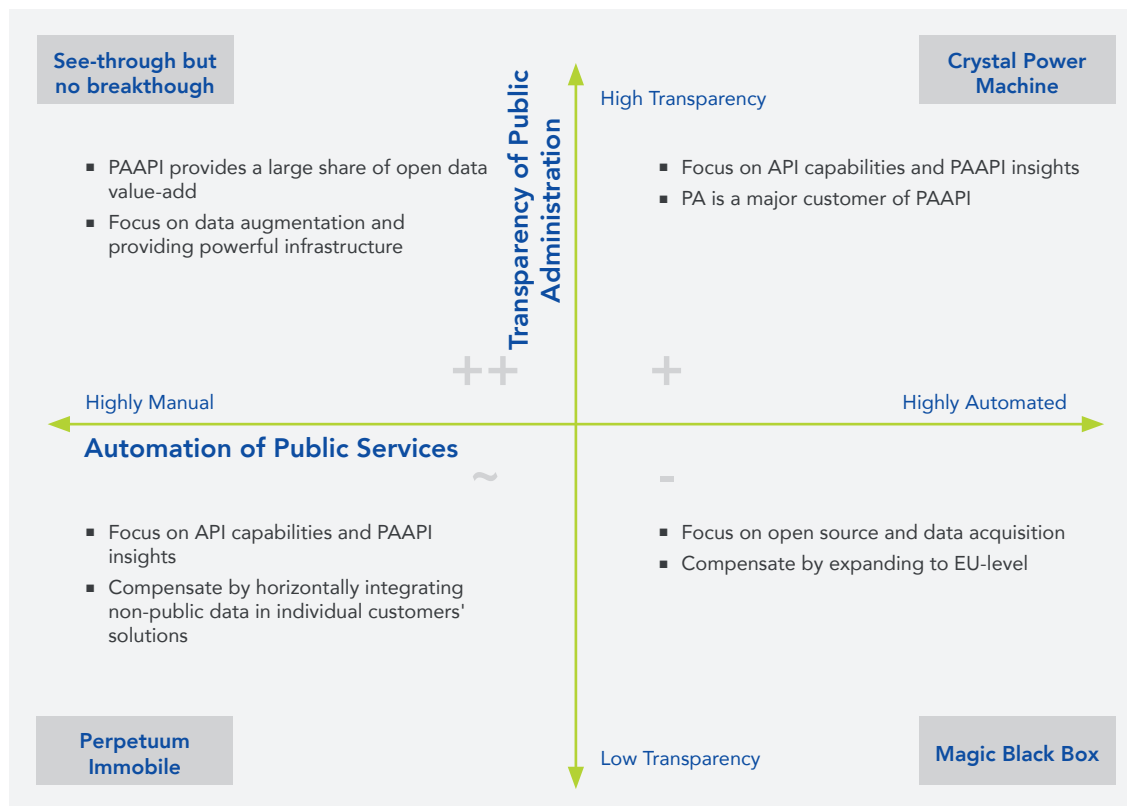
Scenario Fit

See-through but no breakthrough: The PA provides large amounts of data to the public in their quest to be as transparent as possible. However, they do not use common platforms or standards. PAAPI provides high-quality data and thereby generates the major share of open data's value-add. To cope with the high demand, PAAPI invests in a robust infrastructure. The high availability of open data motivates many open source developers to contribute to PAAPI, which has become a synonym for open data.

Crystal Power Machine: The PA generates large amounts of high-quality data to enable efficient automation and provides it to the citizen to ensure transparency and accountability. PAAPI focuses on providing open data through its state-of-the-art APIs. Enabled by their automated nature, the PA offers basic API services, but companies favor PAAPI for their flexible out-of-the-box solutions and 24/7 support. The PA is one of the biggest customers of PAAPI.

Magic Black Box: The PA has automated its services and possesses large amounts of high-quality data, yet only publishes the datasets they are legally obliged to. The amount of openly available data remains limited, yet the few published data is high-quality. These circumstances reduce the value PAAPI can generate. To compensate, PAAPI shifts its focus further to API-capabilities and PAAPI insights. By horizontally integrating non-public data, PAAPI increases the data foundation.

Perpetuum Immobile: Most processes of PA are still performed manually, and generate few datasets. The lack of shared open data platforms, strategies, and standards creates a vacuum which is filled by PAAPI in combination with open source developers. To compensate for the scarcity of data, PAAPI expands to EU-wide operations. While this increases the data foundation, challenges such as licensing and international data-compatibility arise.

See-through but no breakthough

High Transparency

- PAAPI provides a large share of open data value-add
- Focus on data augmentation and providing powerful infrastructure

Crystal Power Machine

- Focus on API capabilities and PAAPI insights
- PA is a major customer of PAAPI

Transparency of Public Administration

++   +

Highly Manual   Highly Automated

Automation of Public Services

~   −

- Focus on API capabilities and PAAPI insights
- Compensate by horizontally integrating non-public data in individual customers' solutions

- Focus on open source and data acquisition
- Compensate by expanding to EU-level

Perpetuum Immobile

Low Transparency

Magic Black Box

Challenges

- The high heterogeneity of the open datasets structures poses a technical challenge when trying to store all of them within a single database.
- The selection of technologies and frameworks to be implemented for the Open PAAPI need to remain dated and supported for the long term.
- Non-structured data, such as images or pdf files, requires complex non-deterministic solutions to become structured.
- Foment and grow an engaged community around an open-source requires a very positive perception of the company and a solid public relations strategy.
- It is a challenge to showcase the benefits and added value of open data to data providers from the PA.
- Storage and provision of PA datasets must comply with many tight data regulations.

Outlook

The German government has regulations and policies in place to warrant the growth of available open datasets. Unfortunately, the lack of a standardized interface to access and consume these datasets constitutes a high obstacle to their end-goal of data democratization. PAAPI solves this growing problem by gathering all usable datasets from PA and making them available through a comprehensible and more familiar web API. The PAAPI project assists the joint efforts for transparent use of open data and sets up a common ground for future software solutions, allowing them to start garnishing its potential without unnecessary overhead. Wide adoption of PAAPI would allow for a bigger feedback loop between businesses, citizens, and PA to grow and foster open data initiatives. Nevertheless, the lack of quality control and structure on the open data available limits PAAPI's ability to consolidate and harmonize the information collected. The high volume of the currently available data is offered as images or pdf files, which might be the biggest challenge for the PAAPI project. Still, most cases can be tackled with artificial intelligence, and future datasets are projected to follow a stricter standardization, ensuring the relevance and functionality of PAAPI in the years to come.

ENGAGIO

Bridging the Communication Gap Between Citizen and Public Administration

Citizens want to have their demands heard by the public administration. Currently, most municipalities do not have a standardized system to sort through all citizen requests, making it difficult to act upon the issues and concerns they receive. Additionally, the lack of user-friendly feedback forms, non-transparent engagement opportunities, and the absence of a centralized platform to gather feedback contributes to a negative relation between citizens and the PA. Engagio provides the solution to improve this relationship.

Engagio offers citizens a user-friendly mobile app. Citizens can give feedback about past PA visits, voice concerns, and upvote fellow citizens' requests. It also allows citizens to report damages by taking pictures. To ensure GDPR-compliance, Engagio's object recognition software processes all images and blurs out faces or number plates. By leaving comments underneath a request, Engagio enables citizens to connect and discuss municipal issues together in the mobile app. Additionally, Engagio offers gamification to incentivize citizens in helping the PA resolve small neighborhood issues by collecting "EngagioCoins". These can be redeemed in exchange for attractive offers, like free tickets to a public swimming pool. A core feature is the transparency provided by updating citizens on the progress and resolution of their reported requests.

Engagio also offers a holistic and smart solution for the public administration. The software uses machine learning to intelligently sort citizen input and forward the information to the responsible public servant. Engagio's backend automatically sorts citizen input for each PA office by "level of criticality". This feature allows the PA to provide higher overall value to citizens, e.g., repairing a pothole in the road before fixing a street sign. Engagio's dashboard function gives the PA an overview of the demands and needs in the municipality, enables easier task delegation, and contributes to a better relationship by improving services and ensuring transparency.

Engagio is a SaaS company that targets municipalities that want to improve their relationship with citizens and benefit from on-time maintenance. The platform offers a mobile app to citizens and a web app to the PA. Transparency, relationship improvement, and a citizen-engaged municipality are shared values at the core of Engagio's actions.

Business Model

Key Partners

- PA offices and IT department of the individual municipality
- Key users such as promoters, influencers, and politicians
- Active and highly-engaged citizen groups
- Resellers to leverage existing municipality access

Key Activities

- Product Management
- Software development
- UX/UI research
- Data analysis
- Customer Relationship Management
- Citizen engagement through marketing campaigns
- Formation of partnerships
- Consulting & support

Key Resources

- Technology and IP
- Mobile and web app
- Algorithm to sort requests and check GDPR compliance
- Data from requests
- HR and Partnerships
- AI & UX experts, developers
- B2G sales experts, personal network and private partners
- Citizens as users

Value Proposition

- Intelligent algorithms protect privacy and save time
- Increased responsiveness and transparency through a single channel
- Data-based decision making and resource management for PA
- Citizen engagement and empowerment
- Cleaner and safer cities

Customer Relationships

Municipalities

- Customer success agents & IT support
- Workshops & consultations
- Platform for PA & citizens

Citizens

- Transparent communication
- Co-creation & prioritization of requests by citizens
- Gamification & real-life rewards

Channels

Municipalities

- Networking with politicians
- Political conventions & communal associations
- Private partnerships & resellers
- Training and consultations

Citizens

- Mobile app
- Online & offline advertisements

Customer Segments

- Municipalities lacking a standardized feedback management solution
- Municipalities considering an alternative feedback management solution due to challenges with the current system
- Citizens of a municipality (end-users) using the Engagio Platform on a voluntary basis

Cost Structure

Initial Investments

- Product development
- Company setup costs

Fixed Costs

- Development, maintenance, and customer support
- Legal, accounting, administration, and rent

Variable Costs

- IT infrastructure
- Marketing, sales, and customer success and acquisition

Revenue Streams

- Monthly subscription fee for the web app (dependent on municipality size)
- One-time setup fee (dependent on municipality size)
- Workshops for public servants
- Support and consulting fees for public servants or municipalities

Value Proposition

Intelligent algorithms protect privacy and save time: Object recognition algorithms and automatic location tracking locates the relevant objects and blur out details such as faces and number plates to protect the privacy of citizens in compliance with the GDPR. Delegation algorithms analyze requests and automatically sort and forward them to the responsible department, thus saving citizens' time in searching for who is accountable. Over time, the gathered data serves to optimize the algorithms further.

Increased responsiveness and transparency through a single channel: With interfaces designed for citizens and tailored to the needs of the PA, citizens can easily report any feedback directly and frequently. The PA continuously informs citizens about the status of their requests, which enhances communication and transparency of internal processes.

Data-based decision making and resource management for PA: The dashboard gives the PA an overview of the activity in the community as well as statistics of the citizens' requests and their response rate, promoting data-based decision making. Citizens reporting issues also enable early maintenance, which saves the municipality maintenance costs in the long run. The PA also benefits from a better judgment of how critical requests are and can manage their resources more effectively.

Citizen engagement and empowerment: Citizens can see requests made by others and can upvote and comment on them, thereby having the power to highlight the most pressing issues in their municipality. The community network, gamification features in the mobile app, and incentives such as vouchers further motivate citizens to be more active.

Cleaner and safer cities: The efficient feedback reporting and management, enhanced collaboration, and transparency result in a better image of the PA. Consequently, the relationship between the PA and citizens strengthens, leading to a higher quality of life in the municipality.

Customer Segments

Municipalities lacking a standardized feedback management solution: For municipalities that do not have a feedback management solution, Engagio plans to establish itself as their first affordable and comprehensive tool. With digitalization, an effective tool for communication with citizens becomes increasingly important as it can relieve municipalities of information overload. Municipalities of all sizes can use and adapt the Engagio platform to match all needs and requirements of their community.

Municipalities considering an alternative feedback management solution: Some cities already have feedback management solutions in place, like the Melde Michel in Hamburg and the Ordnungsamt App in Berlin [321], [322]. However, they might experience challenges with current solutions, whereas Engagio can provide them with the comprehensive, comfortable, and automated tool they are looking for. Engagio's integration of existing requests makes switching from an old service a smooth process. By providing the added benefit of analyzing citizens' pictures on GDPR-conformity, municipalities can save time and are motivated to switch platforms.

Citizens of a municipality: Citizens represent end-users that use the mobile app of the Engagio Platform on a voluntary basis. They form the core user group, as Engagio depends on them for making requests. Engagio, in return, offers a direct line of communication to the PA and empowers citizens to contribute to a cleaner and safer environment. Citizens that make requests, however, should be intrinsically motivated to shape and help their community as engaged citizens.

Customer Relationships

Customer success agents and IT support: Customer success managers ensure that each municipality is supported extensively. Additionally, when customers encounter technical difficulties, Engagio's IT consultants resolve these issues immediately.

Workshops and consultations for public servants: Engagio supports public servants that use the platform by offering workshops and consultations. The focus of these workshops is to ensure that they understand how to maximize the scope of each feature.

Automated service platform connecting PA and citizens: Once the platform is running, Engagio's interaction with municipalities is reduced to a minimum apart from on-demand remote support and workshops. Citizens can communicate their appreciation to the public servant responsible, by sending a short message through the platform after a request has been resolved.

Trustful and transparent communications: Engagio provides citizens with a platform to transparently and publicly communicate with the PA. Citizens can view all requests made by other citizens and can upvote a request that they would like to see resolved. Requests made are visible and can be upvoted by fellow citizens to emphasize its criticality.

Co-creation and prioritization of requests by a community of citizens: By using the upvote function, citizens can influence what requests the PA prioritizes. Whenever a claim is being processed or resolved, citizens who created or upvoted the request are immediately notified.

Gamification system with real-life rewards provided by municipalities: Citizens collect EngagioCoins for every accepted request they upload. Municipalities can select focus areas where they need feedback and ask citizens to participate through the mobile app. EngagioCoins can be redeemed for vouchers, e.g., entry tickets to swimming pools, incentivizing a high quantity and quality of requests.

Channels

Municipalities: To gain municipalities as customers, sales activities primarily target the mayor and other politicians in the municipal council who are responsible for securing contracts for their city. Engagio reaches this target group through cold calling, face-to-face sales meetings, booths at political conventions, communal associations (e.g., Deutscher Städte- und Gemeindebund [319]), and private partnerships with other municipal software providers or with potential resellers. Online channels, including blogs such as 'Apolitical' [320], and targeted advertisements are also employed to make the first contact. Once a working relationship is established, a pilot phase begins, where the municipality is provided with the prototype to try out the services of Engagio. Upon starting the official contract, public administration offices receive access to the web app that integrates with their existing processes. To train

public servants for the seamless adoption of Engagio and increase user acquisition, additional support in the form of workshops, customer support, and consulting is provided throughout the subscription period at an extra fee.

Citizens: A mobile app available on iOS and Android is available for citizens through which they provide their input. They are made aware of Engagio through localized social media campaigns and promotions on mobile app stores. Municipalities also make efforts to acquire users. Offline advertisements are done through posters inside and around the stations of various public transport providers in the city. Local newspapers and radio stations are also employed for advertising to citizens. Engagio partners up with active citizen groups and specialized organizations (such as those for the physically disabled) to provide regular feedback to the public administration and accelerate the usage of Engagio. Around the city, information booths showcase the services of the app to citizens and facilitate word-of-mouth marketing.

Key Activities

Product management: The main activities are the implementation, development, and maintenance of the Engagio platform, including software development, research, and data analysis. The iOS and Android apps for the citizens, the web app for the public administration, and the Engagio platform's back-end have to be continuously maintained and improved. Another focus area to enhance the products further is UX/UI research, which allows to design all software products as user-friendly as possible and to keep up with current developments of the operating systems. Furthermore, the data collected across the Engagio platform is analyzed internally. The analysis results improve the classification and language processing algorithms that delegate requests and identify the content of the requests. Deploying the software with a municipality not only involves onboarding the users but also integrating it with their systems, which requires the modification and extension of the Engagio platform and its APIs.

Customer relationship management: Another critical area to acquire and retain customers is the combination of sales, marketing, and support of existing customers. The marketing channels are used to facilitate sales to municipalities, promote the platform to citizens, and form partnerships, for example, with municipal organizations or influential citizen groups.

Most of the marketing activities are enacted in cooperation with municipalities and have a local focus to attract citizens to the platform. To this end, Engagio also offers consulting services to support municipalities to engage citizens better and communicate more transparently. For new and existing customers, workshops are held to onboard and educate them about the platform and make the most out of it. Furthermore, there is a team specializing in remote customer support for any problems that might occur when municipalities are using Engagio.

Key Resources

Technology and IP: Engagio provides customers with a web app for public servants and a mobile app for citizens. The web app integrates into the PA's IT systems, and the mobile app can be downloaded for free on Android and iOS smartphones by all citizens. The user-centric design of the mobile app makes Engagio easy and engaging to use, and appeals to citizens both visually and through gamification incentives (EngagioCoins). The design of the web app aims to support PA employees in their tasks efficiently and effectively. The algorithm which assists the user in uploading a request and forwards it to the respective public servant is essential to the automation of the platform. It automatically filters or modifies pictures that violate the GDPR law, e.g. by blurring people's faces or license plates on cars. With the agreement of the public administration, the vast amount of data collected is also a resource that can be further analyzed to discover patterns and possibilities to improve public services as well as the responses of the PA to citizens' requests.

HR and partnerships: Engagio attracts its employees by offering an attractive and modern workplace and the chance to create a platform available to every citizen. Experts for AI, UX designers, and app and web developers are needed to develop the Engagio platform in the first place. Once a prototype is ready, sales representatives with expertise in B2G sales need to establish contacts and personal networks with municipalities within the customer segment. Private partnerships with other companies selling their products or services to the PA enable Engagio to be potentially resold by them as well. Citizens using the mobile app are critical to Engagio's success. They have to be actively motivated through various gamification incentives to ensure the long-term use and success of the platform.

Key Partners

PA offices and IT department of the individual municipality: Engagio offers its service to municipalities of all sizes in Germany. The target customers, however, are medium-sized municipalities. A close relationship with the PA offices of every municipality is necessary to obtain knowledge regarding the existing feedback sorting and allocation mechanisms to be able to construct accurate algorithms to automate the process. There is also close cooperation with the IT department of the municipality, especially in cases where greater integration with existing software systems of the PA is required. Public servants receive support through training workshops not only during the implementation of the platform, but also with on-demand consultations and customer assistance throughout the year.

Key users such as promoters, influencers, and politicians: As the users who are generating the requests, citizens are crucial for the success of Engagio as their input is required for the PA to take action and enhance their effectiveness. To initially reach a critical mass that generates the requests, the establishment of partnerships with key partners such as politicians, promoters, and influencers is needed to leverage their reach and engagement with citizens.

Active and highly-engaged citizen groups: These segments of the population are the core users of the platform. Engagio, therefore, aims to partner with them to sustain user base growth as effectively as possible.

Resellers to leverage existing municipality access: To increase the speed of customer acquisition, Engagio leverages resellers that already maintain relationships with the public administration. In the sales process, they will play a pivotal role in shortening the selling time by building upon existing contracts to prevent tedious tendering processes.

Revenue Streams

Monthly subscription fee for the web app (dependent on municipality size): Citizens can download Engagio's mobile app free of charge. The primary source of revenue is the monthly subscription price municipalities pay to use the web app. It is calculated by multiplying the number of citizens (in a given municipality) with a standardized cost-per-citizen

value of 0.03 EUR. For target customers (municipality size 5k - 200k), the monthly price ranges from 400 EUR to 4,000 EUR. Municipalities can renegotiate or cancel the contract annually.

One-time setup fee (dependent on municipality size): After subscribing to Engagio, municipalities must pay a one-time setup fee. This fee is calculated by multiplying the municipality's size with a standardized cost-per-citizen value of 0.10 EUR.

Workshops for public servants: Engagio offers workshops to municipalities that want to increase efficiency by training their public servants to use Engagio to its full potential. Engagio prices workshops at 800 EUR per day. They can be booked in advance and are billed at the end of each month.

Support and consulting fees for public servants or municipalities: Engagio offers municipalities support services remotely to resolve technical issues and address general questions. Additionally, Engagio provides consulting services to help increase citizen mobile app downloads and usage by running marketing campaigns for municipalities. Support and consulting fees cost 35 EUR per hour. Support is available on-demand, and the resulting payments are billed at the end of each month.

Cost Structure

Initial Investments: Product development costs have to be covered to start up, including designing, developing, and user-testing of the platform. Since Engagio is available as a mobile app for citizens and a web app for PA offices, development costs are threefold: Android, iOS, and web. Although cross-platform development increases code reusability, costs to natively adapt the software to the respective platform remain. Further setup costs involve initial marketing that is not directly related to customer acquisition but rather to raise overall awareness. Additionally, there are setup costs for accounting, legal and administrative tasks.

Fixed Costs: Major contributors to the fixed cost structure are ongoing software development, customer support, and administration. In software development, salaries for engineers, product managers, and designers represent the most significant positions. Since Engagio supports two user bases, citizens and public servants, high fixed costs
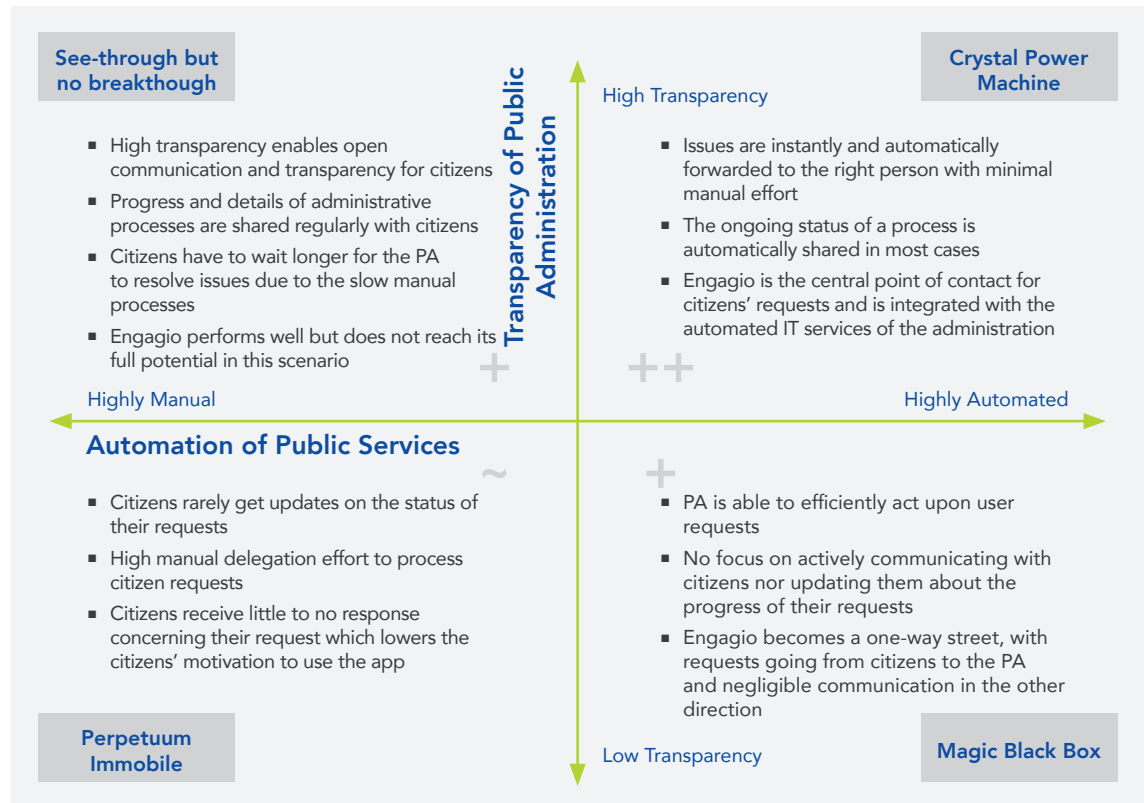
in customer support arise. To enable municipalities to get the most out of the Engagio platform, consultants help in adapting the software to the clients' needs and support them in making strategic decisions, e.g. for citizen engagement. Additional operating costs include rent, utilities, HR, management, legal, and accounting expenses.

Variable Costs: As Engagio heavily relies on demand-driven serverless infrastructure, an increasing number of customers cause higher expenses in digital infrastructure. Besides, acquiring, onboarding and retaining customers incur costs that are directly related to the number of active customers. In this area, Engagio employs salespeople specialized in

government sales and customer success managers. By investing in offline and online marketing to acquire citizens, the platform remains useful to the municipality as a customer.

Scenario Fit

See-Through but no Breakthrough Engagio's goal is to enable better interaction between the public administration and citizens, which requires efficient communication on both sides. Given the high transparency in this scenario, it is essential for the PA to openly communicate and share the progress and details of administrative processes with citizens. Due to low automation in the PA, manual work is necessary to

See-through but no breakthough

High Transparency

- High transparency enables open communication and transparency for citizens
- Progress and details of administrative processes are shared regularly with citizens
- Citizens have to wait longer for the PA to resolve issues due to the slow manual processes
- Engagio performs well but does not reach its full potential in this scenario

Transparency of Public Administration

Crystal Power Machine

- Issues are instantly and automatically forwarded to the right person with minimal manual effort
- The ongoing status of a process is automatically shared in most cases
- Engagio is the central point of contact for citizens' requests and is integrated with the automated IT services of the administration

Highly Manual   Highly Automated

Automation of Public Services

- Citizens rarely get updates on the status of their requests
- High manual delegation effort to process citizen requests
- Citizens receive little to no response concerning their request which lowers the citizens' motivation to use the app

- PA is able to efficiently act upon user requests
- No focus on actively communicating with citizens nor updating them about the progress of their requests
- Engagio becomes a one-way street, with requests going from citizens to the PA and negligible communication in the other direction

**Perpetuum Immobile**

Low Transparency

Magic Black Box

provide the required feedback transparently. As Engagio uses automation to deliver requests directly to the responsible public servant, it reduces the time spent on manual task delegation and does not need to interact with any existing PA systems. However, citizens have to wait longer for the PA to resolve issues due to the slow manual processes, which decreases their motivation to use the service. Therefore, Engagio performs well but does not reach its full potential in this scenario.

Crystal Power Machine: This scenario combines the best of both worlds for Engagio. A highly transparent public administration focuses on clearly communicating the progress and details of processes to its citizens, which is facilitated by the Engagio platform. Highly automated processes within the administration ensure instant and automatic forwarding of issues to the right person with minimal manual effort, and the current status of a process is automatically shared in most cases. In this scenario, Engagio uses its platform to provide the ideal means of communication by offering a central point of contact for citizens' requests and is directly integrated with automated IT services of the PA. The resulting efficient interaction between citizens and administration is a rewarding experience for both sides and promotes the adoption of the platform even further.

Magic Black Box: Here, the PA can efficiently act upon user requests due to the highly automated internal processes. Thus, Engagio forwards requests directly to an internal IT system rather than a public servant and integrates seamlessly with the PA's backend. Due to the very low transparency of the PA in this scenario, there is no focus on actively communicating with citizens nor updating them about the progress of their requests. Therefore, Engagio becomes a one-way street, with requests going from citizens to the PA and very little communication in the other direction. It will still create a community among citizens but will ultimately struggle to provide meaningful and transparent interactions between citizens and the PA.

Perpetuum Immobile: In this scenario, both sides of the interaction are impeded. Due to the low transparency of the PA, citizens rarely get updates on the status of their requests. Additionally, due to the low automation of public services, there is a lot of manual effort needed to delegate and process the requests. The latter is offset in part by the automation Engagio uses to deliver requests directly to the responsible public servant. This automation reduces the time
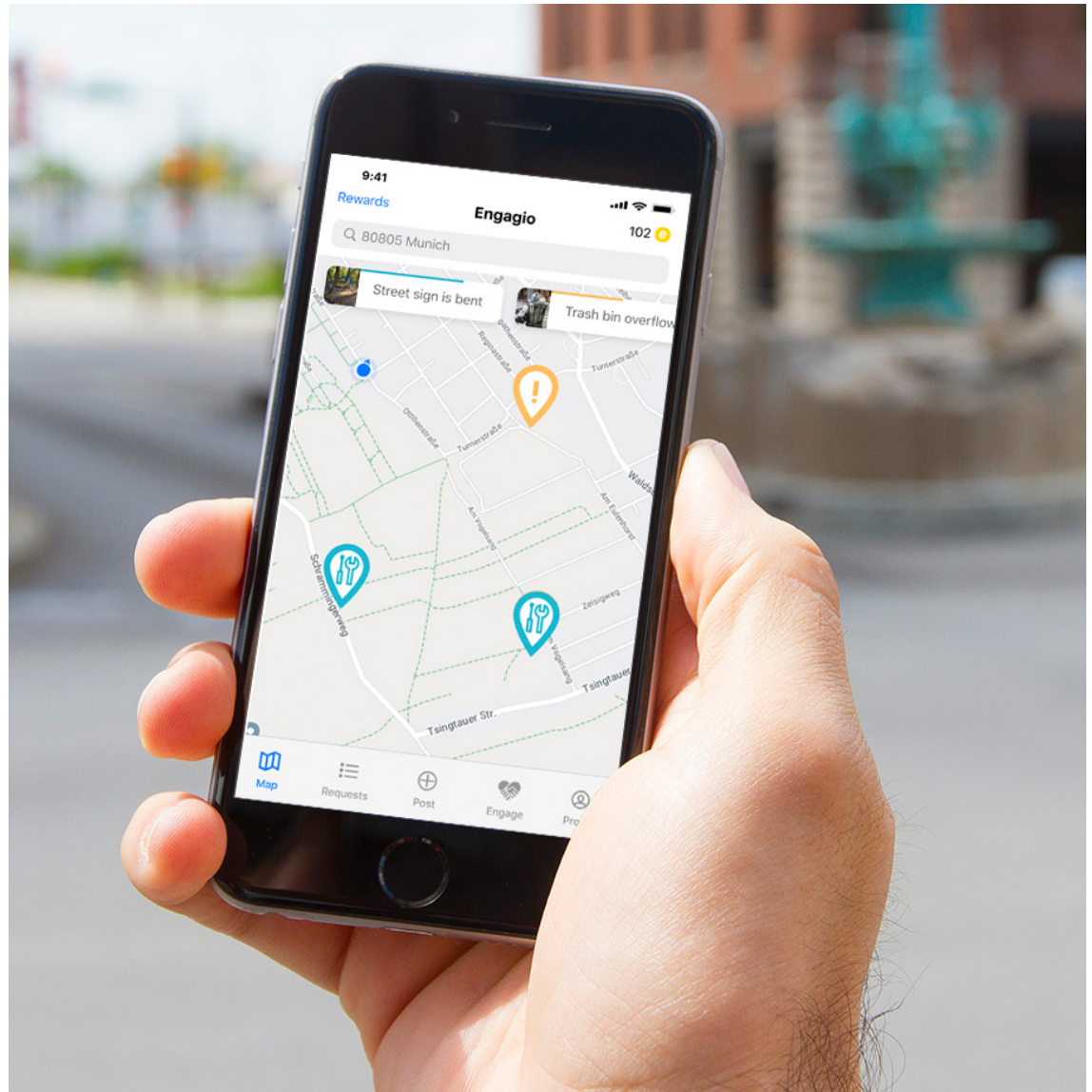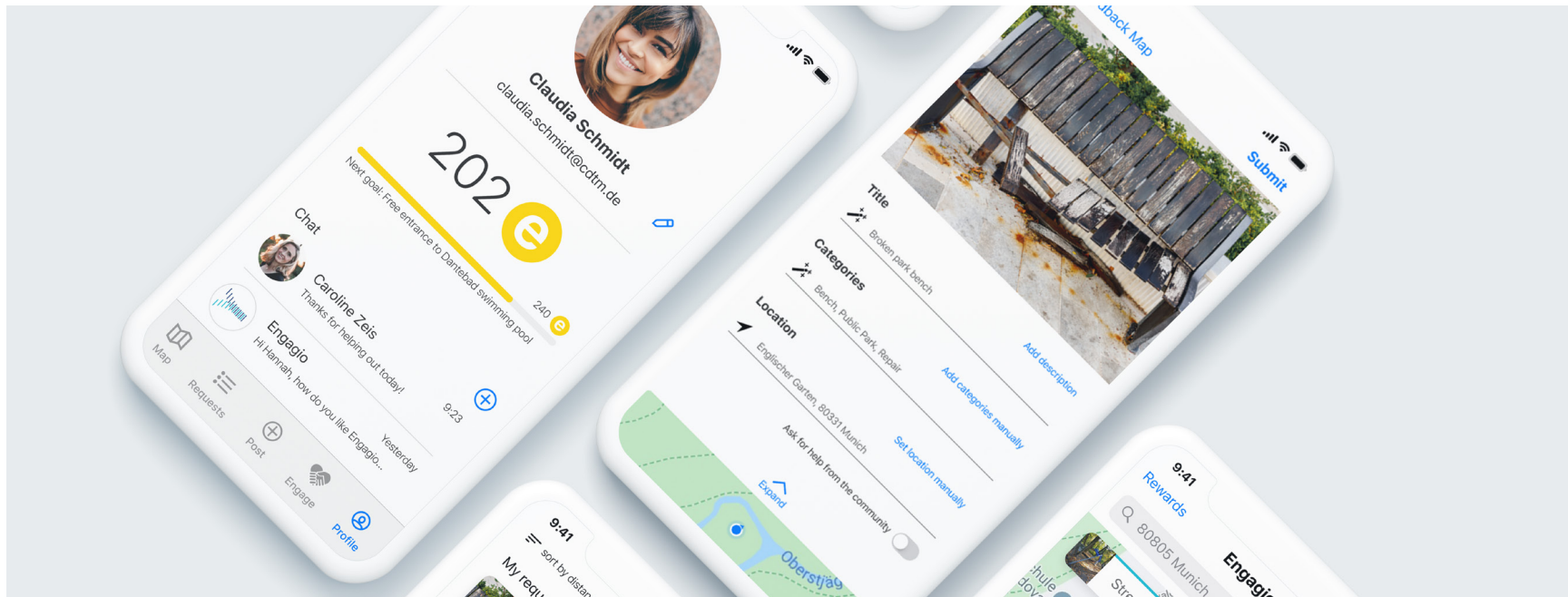
spent on manual delegation of tasks by the administration. Due to the lack of transparency, however, citizens receive little to no response concerning their request, which in turn lowers the citizens' motivation to use the app. This potential user loss can be mitigated by offering higher incentives, but that might decrease the profitability of the platform. Thus, this scenario is the least favorable.

Challenges

- Gaining acceptance from public servants is hard. Therefore, the advantages of using Engagio have to be experienced firsthand, which requires more frequent personal contact and incurs higher customer acquisition costs.
- The value of the platform increases with the number of requests citizens make. Convincing municipalities to commit to a subscription when usage is low complicates sales.
- Long sales cycles in the public administration makes customer acquisition tedious.

- Developing and maintaining three platforms, Android, iOS, and web, is complicated.
- Acquiring and engaging citizens plays an essential role in providing value to municipalities. An efficient incentive system for citizens must be in place to save company resources.
- Fostering citizen communities that regularly use Engagio must be done individually for every municipality.
- Keeping the platform free of hate speech and profanities while employing as few people as possible to filter out malicious requests.

Outlook

The gap between citizens and the public administration must be bridged. So far, attempts to do so have not reached the necessary impact nor the adoption of citizens that is required. Engagio aims to fill this gap and envisions itself as the leading platform that connects citizens and the PA in Germany. The user-friendly app allows citizens to have their voices heard,

step into contact with the PA, and engage in making their municipality a better and safer place. At the same time, Engagio provides structure and overview to the PA while enabling efficiency and transparency in operations.

As the leading platform in Germany, Engagio will be available in most municipalities, allowing users to benefit from the service independently of location. In the long-term, Engagio wants to be the platform for citizens to discover initiatives near them and engage with others in their community to create value. By establishing itself as the primary tool to collect citizen feedback, the potential for Engagio to be of value to the PA internally and allow public servants to give feedback to their superiors also exists. An essential part of Engagio's success story will be the adoption rate of citizens.

FEEDBACKSTAR

Enabling Software Developers to Create User-Centered Public Digital Services

Currently, Germany is pushing towards the digitalization of government services [1]. Nevertheless, the country is lagging behind internationally in terms of usage of such digital services, as well as overall citizen satisfaction with eGovernment services [323]. Finding a solution to this problem is a top priority among public decision-makers [324], but user-centered design methodologies are not easy to implement.

Feedbackstar offers a platform solution where citizens can try beta versions of digital public services. It consists of a web and a mobile version for testers where feedback and usability data from the users are collected; and a web version for developers where there are recommendations based on the feedback data in order to improve the usability of the service. On top of the platform, Feedbackstar's consultants are available to provide additional advice. At the end of

the development phase, Feedbackstar issues certificates of usability for the software developers to attest to the user-centric approach.

The crowdsourcing approach allows service developers to conveniently consider users in the development process, which makes the resulting product attractive for both public administration and the user itself. Additionally, bringing awareness of eGovernment to the citizens increases the usage of digital services. As for the citizens, Feedbackstar not only facilitates collaboration with the administration but also engages them in a community and provides monetary incentives through gamification features.

Feedbackstar has as customers both internal software departments within public administration and external software providers. Partners within public administration are

essential for establishing Feedbackstar's brand and foster growth. Other partners are private companies and social organizations, which contribute to the incentive system for citizens in the form of rewards that can be exchanged for virtual money earned while testing services.

Feedbackstar has three revenue streams. Firstly, a tier pricing model for service developers who want to run their software on Feedbackstar's platform. Secondly, consultancy services are offered with respect to user experience and service design, and lastly, Feedbackstar charges for issuing certificates of usability.

Business Model

Key Partners

- Decision-makers in public administration
- Private companies and social organizations
- Cloud providers

Key Activities

- Development and maintenance of Feedbackstar platform
- Establishing a network of partners
- Marketing to citizens and service developers
- Consulting services and certification of services

Key Resources

- User base
- Brand and image
- Skilled employees in the platform development and marketing team
- Feedback data

Value Proposition

Internal and external service developers

- Enable user-centric design of digital services
- Usability analytics
- Expert consultation
- Increase citizen satisfaction with digital public services
- Certification of product increases sales for external software providers

Citizens

- Possibility to co-create public services
- Entertaining user experience via social and gamification features
- Virtual coins can be exchanged for vouchers and donations

Customer Relationships

Service developers

- Website as core for all features
- Key account manager

Citizens

- Users acquisition via internet marketing and referral system
- Discussion & eGovernment community building via forum

Channels

Service developers

- Content marketing
- Cold outreach
- Personal contact at events

Citizens

- Social media
- Offline marketing
- Referrals from existing users

Customer Segments

- Internal and external service developers as paying customers
- Citizens as non-paying customers

Cost Structure

Initial Investments

- Costs of company setup
- Product development
- IT-infrastructure setup

Fixed Costs

- Wages for staff
- Office space
- IT hosting & maintenance

Variable Costs

- Marketing
- Costs for goods offered as rewards to citizens
- Data storage

Revenue Streams

- Tiered price subscription fee
- Consulting services
- One-time issuing fee for certificates

Value Proposition

Internal and External Service Developers: Feedbackstar's diverse user base enables the internal software departments within PA and external software providers to implement a user-centric development process. It offers valuable insights with concrete actions based on usability metrics from citizens. Moreover, Feedbackstar adds value by providing consultancy services in the fields of user experience and user interface design. Software providers see added value in the creation of services that increase the usage of digital public services and the overall satisfaction of the citizens. In addition to these benefits, Feedbackstar provides external software providers such as IT-vendors, or third party providers the opportunity to obtain a certificate. The certification increases the possibility of being successful in tendering processes as well as improving their image as a company, as the citizen-approved and -tested products are valuable for the public administration.

Citizens: By opening the prototypes for usability testing, citizens can, on the one hand, perceive the administration as more approachable, and on the other hand, can use the platform to engage in contributing to the public sector actively. In this regard, Feedbackstar becomes a convenient tool to co-create services for the citizens themselves. Individuals expect not only a fulfilling purpose in what they do but also an enjoyable journey while doing it. Feedbackstar delivers an entertaining user experience by embedding gamification and social features that bring together the community via rankings, challenges, and other engaging features. In relation to the gamification facet, Feedbackstar allows users to accumulate points that can be redeemed for vouchers, donations to NGOs, or material goods. This feature provides an incentive to keep using the platform and motivates potential users to join.

Customer Segments

Feedbackstar constitutes a platform that targets two customer segments. One customer group are the citizens that provide feedback on digital public administration services. The other customer segment is represented by software providers who can receive feedback on digital service prototypes.

Internal and External Service Developers As Paying Customers: Feedbackstar provides a platform to receive feedback on beta versions of digital public services before deployment. These beta versions can be developed by internal or external software providers. Internal software providers can potentially be represented by public entities from the municipal to the federal level. External software providers can be private companies that work independently of public administration, but develop software for them.

Citizens As Non-Paying Customers: Feedbackstar aims for citizens who are actively engaged and want to shape the future by interacting with public administration. Digital public services are directed towards all citizens ranging from teenagers to the elderly. It is crucial to acquire feedback giver from diverse age groups because some services target specific parts of society.

Customer Relationships

Service Developers: Feedbackstar provides through its website all the necessary features - like payment methods and package selection - for customers to acquire the service by themselves, meaning that no personal interaction is strictly necessary. Service developers can view and interact with the feedback data and see the recommendations on Feedbackstar's web app directly. When requested by a service developer, personal assistance can be offered for specific inquiries. They are provided with dedicated online personal assistance from the customer support team. As an add-on, software developers can purchase consultancy services to better leverage the benefits of Feedbackstar. Specifically, the consultant assists the software developers to better interpret the feedback data, come up with actionable recommendations and support the software developers during the implementation. Furthermore,

the client is assigned to a key account manager who clears any doubts before and after the purchase and ensure that the client is satisfied with the services. If necessary, the key account manager can offer special deals to clients, to persuade them to use – or keep using – Feedbackstar.

Citizens: The Feedbackstar community has an active discussion forum and organizes events regarding the digitalization of PA. New feedback givers are acquired via internet marketing, mainly social media and content marketing. Another source of new users is organic growth via a referral system, where existing users can gain virtual points by making their friends sign up to Feedbackstar. Citizens mainly interact with Feedbackstar and other users via the web and mobile applications. Social and gamification features such as comment sections, monthly rankings, friend lists, and achievements keep users engaged, enabling user retention. Users can buy virtual objects with in-game coins or exchange them for vouchers at partner stores or donations to charitable causes. Partner stores and NGOs benefit from this by using Feedbackstar as a marketing channel.

🚚 Channels

Software Developers: Internet marketing is used - content marketing in the form of webinars, videos, and blog posts would be generated. Emails to contact people of interest are another main channel. Additionally, cold-outreach and networking are used, specifically by attending conferences and events or directly approaching people. Free consulting sessions or free trials would be provided on request for customers to become confident using Feedbackstar. Additionally, customer testimonials and case studies provide validation through Feedbackstar's website and social media profiles. Internal software departments can purchase and access the platform services via the Feedbackstar website. For consulting services, Feedbackstar is communicating and negotiating with service developers in a direct and personal manner (via online or physical meetings). After the sale is completed, additional services would be offered, for instance, data analytics or consulting services. This is offered

to both PA and external software providers via reminders in the form of emails or as notifications in the application itself.

Citizens: To create awareness of citizens, targeted marketing is applied. On the one hand, online marketing, mainly in social media, raises awareness of younger to medium aged citizens. On the other hand, offline marketing is used in higher educational institutions to reach out to young adults and direct users in municipalities. Additionally, to ensure that a variety of user personas is reached, marketing efforts in city halls (engaged users), newspapers (older citizens), and community colleges (adult learners) are undertaken. By doing so elderly people who are willing to engage in social activities are reached as well. As the community grows, referrals from existing users become more and more important to grow. The service is delivered free of cost to citizens via a web and mobile app.

👷 Key Activities

Development and Maintenance of Feedbackstar's Platform: Feedbackstar is a platform that brings together citizens and the public administration. Therefore, developing and maintaining the platform is at the center of business activities. As the company depends on the provision of feedback by citizens, it is especially important that citizens feel comfortable and enjoy spending time on Feedbackstar's platform. Thus, specific attention needs to be given to the design and user experience of the platform. The integration of sophisticated gamification concepts, which includes a coin reward system for service feedback, supports the attraction and retention of feedback providers. To add value to the service developers, platform development includes the creation of features to integrate user research methods to process data on user behavior. This encloses the development of dashboards and recommender systems to support the targeted improvement of services. The developers can choose to collect the required data from users directly via questionnaires as well as indirectly through analyzing cursor heatmaps, the time spent on each page, dropout rates, and more. Feedbackstar continuously extends its service with new features through research and development.

Establishing a Network of Partners: Partnerships with private companies, social organizations, and the public administration all serve to raise awareness of Feedbackstar and incentivize citizens to contribute to public administration by providing feedback. To do so, Feedbackstar dedicates a team that

scouts and establishes suitable partnerships with companies. This includes careful identification and selection of companies that are willing to provide discounts for trending products. Furthermore, Feedbackstar also identifies local NGOs that are trustworthy to partner with and are perceived as attractive by feedback providers.

Marketing to Citizens and Service Developers: Citizens' awareness of Feedbackstar's offering is essential because their feedback is a central part of the value creation for service developers. Thus, to gain traction on the feedback giver`s side, marketing efforts are required.

Consulting Services and Certification of Services: If required by the client a team of consultants can offer assistance to software developers during the implementation. Additionally, software developers can request Feedbackstar to certify their digital public service.

Key Resources

User Base: The community is the most valuable asset for Feedbackstar. A strong community that is willing to participate and a belief in eGovernment can further promote user-centricity in digital public services. They guarantee the service developer a certain amount of feedback which will have direct results on the implementation of upcoming digital services.

Brand and Image: A respected and trusted brand is key to find customers both in public administration and the private sector. This strong presence adds recognition to Feedbackstar's certificates for the service developer. Branding is a key appeal to attract clients for consulting services as well.

Skilled Employees in the Platform Development and Marketing Team: Talented software engineers are important for the development of Feedbackstar's platform. A multidisciplinary team of psychologists and software engineers with a focus on user interface design and user experience is required to develop a platform that is attractive, intelligent, and convenient for users. Data scientists and artificial intelligence experts are required to extract the most valuable insights from surveys and process interaction data while providing a high level of automation. On top of this, an experienced sales and marketing team for reaching new customers and partners is needed. Finally, the consultancy offer provides clients with an interdisciplinary team developing tailored and actionable recommendations.

Feedback Data: With continuous operation of Feedbackstar, a significant amount of data on tester behavior as well as direct opinions are collected. As a result, the amount and the value of data becomes a key resource because it leads to proprietary knowledge about process performance, usage patterns, and preferences. This knowledge can be leveraged to improve the accuracy by which Feedbackstar can provide automated recommendations on service improvements to developers. Additionally, data represents an entry barrier for potential competitors since more users will allow faster and more representative data collection to customers.

Key Partners

Feedbackstar collaborates with different partners to acquire key resources. One of the main resources is the citizen and their feedback on the development of new digital services. To attract citizens to the platform, Feedbackstar is partnering with two main institutions: public administration and private companies.

Decision-Makers in Public Administration: By partnering with public decision-makers, decision-makers take on the role of contributors to Feedbackstar's marketing efforts and thus raise awareness of the importance of user-centricity and increase the transparency for the development of new digital services. The public administration benefits from more usable services provided by developers. In return, citizens are informed of existing digital public services on Feedbackstar's platform which would result in increased usage of these services.

Private Companies and Social Organizations: Besides only raising awareness for Feedbackstar, it is necessary to attract citizens to the platform. Feedbackstar is partnering with private companies to implement the feedback reward system for citizens. Giving feedback on a digital service during its development phase will allow feedback providers to earn coins that can be used in a variety of shops. For this, Feedbackstar collaborates with diverse shops that cover the interests of several age groups so that adequate incentives are provided. The partners benefit from positioning themselves on the Feedbackstar platform with increased visibility and reach which in turn supports their sales. Besides private companies, Feedbackstar is also partnering with local social organizations. These organizations allow citizens to use their earned coins to support local projects for social good such as planting trees in their municipality.

Cloud Providers: Feedbackstar builds a partnership with cloud providers, mainly for storage and to host the product. They are located in Germany and are compliant with all regulations set by the German government and European data protection laws.

💰 Revenue Streams

Tiered Price Subscription Fee: Every new usability study requires a subscription fee. The pricing for any given study depends on several factors: the number of potential end-users of the tested service, the time when the software provider wants to have the study insights ready, and the feature package that is chosen. The feature packages are offered on a tiered model with an increasing number of features available for the service providers in terms of the type of data collected. Data types are either subjective data such as feedback forms or objective data such as measured retention time or mouse-tracking. Feedbackstar offers automatized analytics of subjective feedback in the form of a browser dashboard. Subjective feedback data is provided by the feedback forms which the citizens fill out. The analyses include evaluation and visualization of feedback results. The client can adjust their ideal user profile for their specific needs. The advanced package, which includes the evaluation of objective usability metrics, including mouse tracking, measured time, and the number of clicks, can be purchased for an additional charge. Objective data contains measurements like mouse clicks or time taken to perform a task.
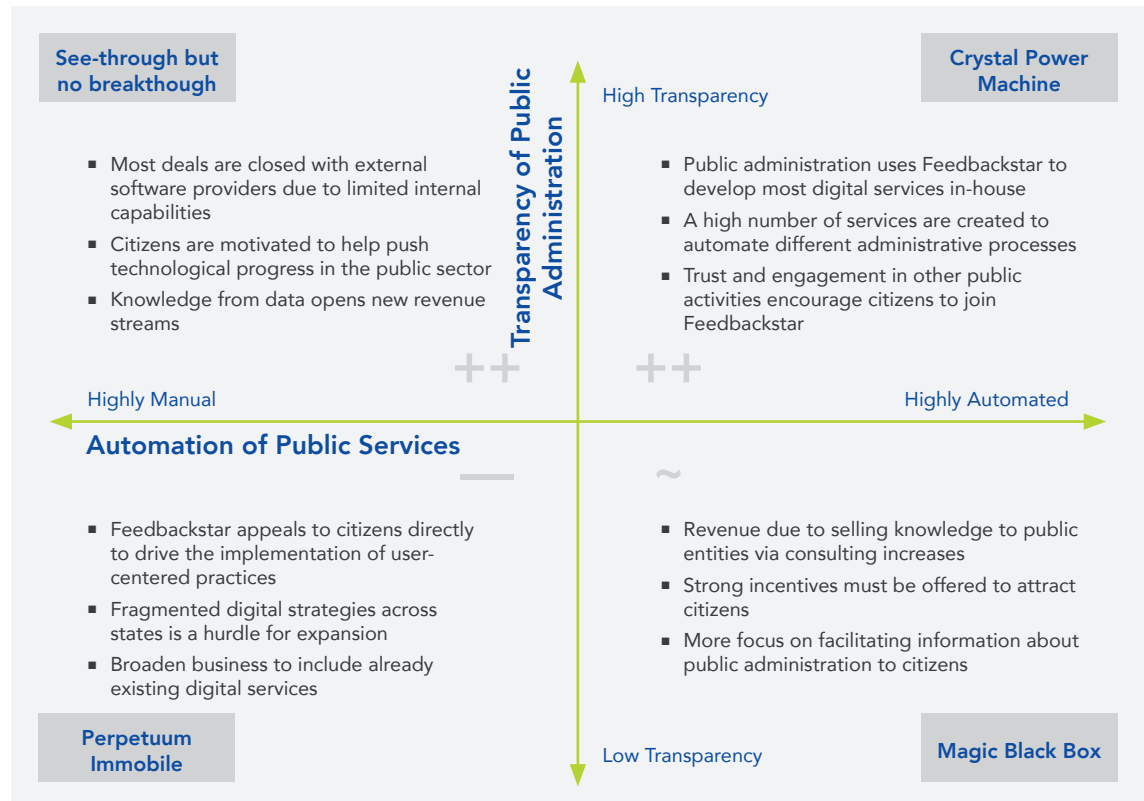
Consulting Services: Feedbackstar offers the option to be supported by a personal advisor who consults the service developers in creating the optimal feedback form or extracting the best result from given feedbacks. Consultants help to extract the highest value out of a study by helping to define proper tasks and questions, as well as by providing expertise on how to optimally improve the service given the outcome of the study. However, Feedbackstar consultants advise clients independently of the platform service.

One-time issuing Fee for Certificates: As an additional revenue stream, Feedbackstar supports external software providers to increase their success in the tender process with public administration. Feedbackstar hands out certifications that ensure the public administration that the process is developed in a user-centric approach and was tested by citizens.

🧮 Cost Structure

Initial Investments: To start its business, Feedbackstar requires a website and an app. This is connected to initial investments in human capital. Software engineers build up the website and program the mobile application. Additional software developers in collaboration with data analysts and

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See-through but no breakthough

High Transparency

Crystal Power Machine

Transparency of Public Administration

- Most deals are closed with external software providers due to limited internal capabilities
- Citizens are motivated to help push technological progress in the public sector
- Knowledge from data opens new revenue streams

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- Public administration uses Feedbackstar to develop most digital services in-house
- A high number of services are created to automate different administrative processes
- Trust and engagement in other public activities encourage citizens to join Feedbackstar

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Highly Manual   Highly Automated

Automation of Public Services

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- Feedbackstar appeals to citizens directly to drive the implementation of user-centered practices
- Fragmented digital strategies across states is a hurdle for expansion
- Broaden business to include already existing digital services

- Revenue due to selling knowledge to public entities via consulting increases
- Strong incentives must be offered to attract citizens
- More focus on facilitating information about public administration to citizens

Perpetuum Immobile

Low Transparency

Magic Black Box

UX experts are required to build up the data analytics tools for the website. Designers are responsible to create an appealing corporate identity for Feedbackstar and design an attractive layout for both the website and mobile application. Additionally, setting up the IT infrastructure is required, which includes the server for the platform and the website itself as well as user data storage in the cloud. Lastly, legal costs related to the setup of the legal entity must be considered.

Fixed Costs: Feedbackstar employs staff from different fields including user and customer support, marketing, and administrational staff. The main headcount consists of data scientists, IT workers, and consultants. Data scientist are important to evaluate and visualize the feedback in a way which extracts the most insights and consultants support and advise the public administration in improving their public services based on the received feedback. IT workers maintain the website and app and develop new features. Additional costs arise for office space and operating costs of IT maintenance and hosting.

Variable Costs: Once the company structure has been established, the largest variable costs occur due to marketing. To gain a critical user mass and to attract service developers, targeted marketing and marketing to partners is crucial. The awareness of Feedbackstar needs to be established and existing relationships need to be maintained. Additionally, variable costs arise due to potential expenses for some of the partners involved in providing rewards as incentives for giving feedback and from costs related to growing data storage.

Scenario Fit

See-through but no breakthrough: Public administration is trusted by the citizens due to providing efficient services and involving the citizens in the creation and evaluation of new offerings. Using Feedbackstar's crowdsourcing approach aligns with public strategy and is used by public administration to develop new services in-house in a faster manner while keeping the citizens engaged and at the center of the development. Given the drive of public institutions of bringing convenience to their citizens, many more services are created to provide seamless interaction with the government. This results in Feedbackstar being the go-to tool to meet the speed and user-centricity needed to deliver new services. Public administration uses Feedbackstar to develop most digital services in-house A high number of services are created to automate different administrative processes. Trust and engagement in other public activities encourage citizens to join Feedbackstar

Crystal Power Machine: Public services are efficient and public organizations possess the capabilities to implement them without external support. However, citizens remain excluded from the creation process and do not actively participate in most public enterprises. Still, user-centricity remains a goal of public administration. Feedbackstar is an option to achieve that, but citizens' data consciousness and mistrust make it harder to entice them into joining the platform. Therefore, more appealing incentives must be given to users in order to join Feedbackstar. In return, more features providing information about the public sector would be implemented to improve the understanding between citizens and the government. As gathering data becomes harder, the knowledge contained in the platform becomes more valuable. In that sense, offering usability consulting to public entities that aim to develop new services grows to be a stable and reliable sales strategy. This situation, however, would reduce the overall value of Feedbackstar's crowdsourcing platform as compared to other competing consultancies.

Magic Black Box: Public institutions are unable to drive user-centered design on their own, and citizens are not comfortable dealing with public processes overall. Feedbackstar focuses on targeting citizens to allow them to claim better usability of the now ubiquitous digital public services. Still, it is a challenge to get citizens to sign up for Feedbackstar as they do not trust the capabilities of public administration to implement changes. Given the slow agility of the public sector to develop new services, Feedbackstar would broaden the scope to target existing non-optimized services, thus delivering more immediate value. To find a niche where the public sector is pushing user-centricity, Feedbackstar launches first in federal states that possess a high digital competency and where software developers are most encouraged to follow usability principles. Nonetheless, this comes at the cost of a limited area of influence for the platform.

Perpetuum Immobile: Public institutions are unable to drive user-centered design on their own, and citizens are not comfortable dealing with public processes overall. Feedbackstar focuses on targeting citizens to allow them to claim better usability of the now ubiquitous digital public services. Still, it is a challenge to get citizens to sign up for Feedbackstar as they do not trust the capabilities of public administration to implement changes. Given the slow agility of the public sector to develop new services, Feedbackstar would broaden the scope to target existing non-optimized services, thus delivering more immediate value. To find a niche where the public sector is pushing user-centricity, Feedbackstar launches first in federal states that possess a high digital competency and where software developers are most encouraged to follow usability principles. Nonetheless, this comes at the cost of a limited area of influence for the platform.

Challenges

- Acceptance of key partners in public administration to raise awareness of the importance of user-centered design.
- Achieving a reputation that makes Feedbackstar's certificates the industry standard.
- Implementing the right incentive system to engage users from the citizen side to reach a critical mass that allows for organic growth of the number of testers.
- Achieving a diverse user base representative of all possible target groups.
- Low digital literacy makes it difficult to attract users from the elderly population.
- Ensuring that a sufficient amount of crowdsourced feedback for each service is uploaded to the platform, which is necessary to provide accurate recommendations for improvement.
- An organizational shift towards more agile methodologies should occur in software development companies.
- Reluctance of software development companies to make their beta versions public on the platform.

Outlook

Feedbackstar is a platform that provides a testing environment to facilitate user-centered design in the public sector, leading to increased citizen satisfaction via more convenient digital services. In the short-term, with support from senior executives within PA and the first successful projects, Feedbackstar will become an exponent for the co-creation of public services with citizens. Close cooperation with the public sector will contribute to a change of culture in the government, making the user experience a priority when designing new public services. As the user base of testers in the platform grows bigger and more diverse, it will allow reaching very different citizen profiles and design for inclusiveness, enabling citizen-centered design also for services with marginal user groups.

In the long term, Feedbackstar would expand to other countries with a similar situation as Germany. At the same time, the platform will possess a big amount of data, which can be exploited to open new revenue streams. This data will produce proprietary knowledge resulting in improved recommendations for developers and consulting for public institutions and policymakers. By doing so Feedbackstar aims to build a bridge of understanding between citizens and PA.

FRIEDLICH

Providing Peace of Mind to You and Your Loved Ones

Estate planning is an overlooked topic. More than half of all Germans currently do not hold a living will [325]. This shows that many people do not comprehensively regulate their personal affairs to account for an emergency or their end of life. They tend to postpone important decisions and avoid a binding specification through official documents. As an additional hurdle, legal changes can disrupt the document's validity. In case of emergency, the affected person becomes dependent on the others' decisions, limiting their self-determination.

Estate planning is essential to prevent such detrimental situations. This involves the process of designating the distribution of assets upon death. It also dictates how affairs will be conducted if deciding independently is no longer possible. Thorough estate planning entails the use of a living will, a will, and different powers of attorney. However,

the whole process is often perceived as complex and non-transparent and is therefore often avoided.

Friedlich has the mission to change that by creating an accessible digital platform that enables users to take comprehensive provision measures for emergencies and the old age challenges. The service provides various resources and interactive template-based generators that allow the customers to make informed decisions and manifest them in legally binding documents. Friedlich also offers the legal expertise to keep these documents valid in the long term and to adapt them to legal changes. If desired by the customer, the service continues beyond their lifetime. By taking care of the bureaucratic processes, the grieving relatives are relieved. Friedlich also assists with the organization of the funeral or the representation of personal interests and wishes beyond death by acting as the executor of the will.

In the long term, Friedlich has the potential to revolutionize the predominantly analog and highly fragmented estate planning market. By leveraging this business opportunity, Friedlich makes an important but sensitive topic accessible to everyone and provides peace of mind to its customers and their loved ones.

Business Model

🤝 Key Partners

- Public administration
- Network of notaries and lawyers
- Funeral homes

🧑‍🏭 Key Activities

- Customer acquisition and marketing
- Development and maintenance of the online platform
- Maintaining legal legitimacy
- Document management
- Interaction with stakeholders after death

🏭 Key Resources

- Qualified personnel, particularly paralegals for customer support
- Legal expertise and know-how
- IT infrastructure
- Expertise from partners

🎁 Value Proposition

- Empower customers
- Ensure representation
- Provide peace of mind

❤️ Customer Relationships

- Elderly Aged 65+
- Tailored assistance, focus on offline interaction
- Personal relationship through comprehensive counseling
- Middle-Aged People and Families:
- Tailored assistance, focus on online interaction
- Regular exchange in the form of newsletters

🚚 Channels

- Online
- Content & social media marketing
- SEO & SEA
- Email communication
- Offline
- Telephone hotline
- Postal communication
- Promotion events

👥 Customer Segments

- Elderly aged 65+
- Middle-aged people and families

🏦 Cost Structure

Initial investments

- Development of online platform
- Set-up of internal knowledge base & expertise about legal topics

Fixed Costs

- Personnel costs
- IT Infrastructure
- Office space and equipment

Variable Costs

- Cloud services
- Registration and process fees
- Client support
- Customer acquisition

💰 Revenue Streams

- Lump-sum payment per created document
- Subscription fee for further services, such as maintenance of legal validity and unlimited access
- Commission fee from affiliated lawyers, notaries, and funeral homes
- Reward for being the executor of the will

Value Proposition

Empower Customers: The sensitive topic of estate planning is unpleasant and often overlooked. Planning the end of life can be challenging due to the complexity of the underlying process. Friedlich aims to change that by providing structured and up-to-date articles dealing with all considerable aspects. Template-based, interactive generators make the creation of legal documents more intuitive. The combination of in-depth information and online tools empowers customers to make informed decisions on their estate planning strategy.

Ensure Representation: Planning is not enough. Friedlich makes sure the customer's volition is represented and executed after their passing away. The online platform allows users to create and update legally binding documents, thanks to the excellent network of legal experts accessible to them. After death, Friedlich initiates the probate process, among other services. If desired, Friedlich can act as the executor, taking over the responsibility of securely handling the customer's properties according to their will after their death.

Provide Peace of Mind: Planning the end of life is necessary to unburden the relatives and heirs in times of grief. Especially the days after the event of death present the relatives with bureaucratic challenges. Additionally, the whole process can be very cost-intensive and often leads to conflicts within families. Friedlich's goal is to dramatically decrease the bureaucratic burden of relatives in grief by proactively and securely storing all relevant documents of the customer. After the customer's passing, documents can be shared with preselected parties within the social circle. In the case that contracts have to be canceled, the service also extends to external stakeholders. Friedlich thus provides peace of mind both to its customers and their loved ones throughout the process, while ensuring that customers can reduce the financial burden through proper planning.

Customer Segmentst

Elderly Aged 65+: Friedlich's main customer group consists of elderly people aged 65 years and older. Retirement marks a new stage of life that makes many elderly people aware of their aging process, even though the end of life can still be decades away. With higher age, some of them decide

to name their adult children as authorized representatives for financial or medical affairs. By thinking ahead about the distribution of their assets and what happens in the case of an emergency, elderly can avoid stress and anxiety and make the provision for any unforeseen event that might occur in their last years.

Middle-Aged People and Families: With life events of great significance such as marriage or having children, middle-aged people and families start worrying about the consequences an accident or even death could have on their loved ones. For newly married couples, estate planning documents should be updated for each spouse, so their estate plans may be merged, and the new spouse can become a joint owner, primary beneficiary and fiduciary. Additionally, when building up wealth, middle-aged people contemplate what happens to their assets beyond their lifetime. This segment includes diligent and thoughtful people who like to be assured of having their documents in place and avoid exposure to risk. Some customers may have experienced the sudden death of a close relative in the past, which made them realize the importance of being prepared and secured. Thus, Friedlich caters to their need for higher security by clarifying their affairs and providing emotional stability.

Customer Relationships

Elderly Aged 65+: Estate planning is a complex topic that requires a relationship of trust and understanding among all parties. Friedlich fosters a personal relationship based on respect, empathy, and professionalism. To achieve that, Friedlich is discrete in the interaction with customers and provides personal counseling. This way, it is possible to respond to individual life situations and own wishes. Especially for clients considering Friedlich as the executor of their will, this relationship is essential. To cater for the currently digitally illiterate clients, the communication with this group takes place offline. The relationship must be built on excellent customer service, which is crucial to establish positive word-of-mouth. For instance, representatives at Friedlich are available seven days a week, while customers can choose their preferred medium to reach them (phone calls, emails, and, in selected cases, personal assistance). Especially for clients who are considering Friedlich as the executor of their will, this type of close relationship is essential.

Middle-Aged People and Families: Friedlich provides high-quality assistance to support customers along their journey. It is important to build up an outstanding user experience and ensure a seamless digital interaction, with the possibility to send messages or to call whenever necessary. To provide a satisfactory service, it is essential for Friedlich to regularly interact with the customers to make sure that the documents are up-to-date or to remind them to register new ones. While not being overly obtrusive, Friedlich reaches out to customers via email per default, but notify them through a push notification on the Friedlich app. This communication serves to inform customers about legal changes, to explain them in a simple way, and also to consider potential changes in their environment sufficiently. The exchange is essential during the probate process to ensure the binding character of all documents. Every client has different questions and needs, so customer relationship building by Friedlich aims at creating an atmosphere of calmness, transparency, and security.

Channels

Friedlich should be understood as a reliable and trustworthy service provider, which is reflected in the choices of communication channels.

Online: To create awareness, Friedlich uses a variety of content marketing strategies. For example, informative blog posts educate readers on the topic of estate planning. Branded video content on platforms like YouTube and Facebook circle around selected testimonials (such as celebrities, everyday heroes) and their measures for provision. This form of content marketing is particularly suitable for conveying Friedlich's message. It also creates an emotional access to a topic that is usually perceived as complex and abstract. As a guiding principle, Friedlich tries to stay a neutral and discrete entity: A prospective customer should be convinced of the service's advantages because of the importance of the topic, not because of an eye-catching campaign. Adhering to the same principle, Friedlich offers a neutral email newsletter on estate planning topics, such as legal changes and new opportunities. Within the realm of SEO, Friedlich excels due to high-quality content that organically pushes its listings to prominent spots. Prospective customers are also targeted with ads on relevant search terms such as "provision", "estate planning" or "living will".

Offline: Some elderly customers are more comfortable using offline services for communication. To cater to this need, Friedlich guarantees 7-day availability via a phone hotline that is free of costs for customers. Postal communication is used, for example, to send condolences letters to those left behind and to show participation in the life events of the customers. Prospective customers are targeted through promotion events during fairs and neighborhood festivals. In particular elderly people can be well addressed by information booths located on those events. Offline advertising in the form of billboards or postal advertising also supports getting traction within this age group.

Key Activities

Customer acquisition and marketing: Most people are not informed about the topic of estate planning and the necessary steps it involves. To get traction for this topic and to ensure business success, cross-channel marketing and customer acquisition efforts are essential. The generation of quality content bears high potential, as information provided free of costs on the website act as a primary channel for customer acquisition.

Development and maintenance of the online platform: Customers primarily interact using the online platform available through Friedlich's website. Therefore, a robust online platform must be developed and maintained so that customers can access all the updated information and continuously generate relevant documents.

Maintaining legal legitimacy: An essential role of Friedlich is to ensure that all the provision documents submitted by the customers are legally binding. To achieve this, Friedlich first provides legal experts access to generate the documents and then registers the original documents at the Federal Notary Association (Bundesnotarkammer). If a legal change causes a document to be invalid, Friedlich will proactively inform the customer and remind them to change the respective document.

Document management: Once the provision documents submitted by a customer are legally binding, Friedlich safely stores them digitally as well as physically. Using the online platform, customers can access these documents whenever they want on their personal device, make changes, and even share them with other stakeholders to inform them or to take action.

Interaction with stakeholders after death: In the unfortunate event of death, Friedlich supports the family of the deceased. Once the partner, relative or companion reports the passing of a customer, Friedlich will start executing its services. This includes requesting the death certificate, canceling active contracts with insurances or memberships, executing the customer's will if desired, and granting relatives access to all documents of the deceased on Friedlich's platform.

Key Resources

Qualified Personnel: To run the complex operations of Friedlich, qualified personnel are required for finance, marketing, sales, and customer support activities. Since Friedlich is primarily a digital product, IT professionals with knowledge in systems engineering, data science, and mobile and web development are crucial.

Legal Expertise and Know-How: To navigate the complex jungle of regulations, Friedlich relies on legal expertise within the firm. To achieve this, it is necessary to hire talent with sufficient competence on topics such as inheritance, pension, and provision measures to build up a comprehensive knowledge base around all topics of estate planning. Leveraging talent at the intersection of law and UX design unlocks the possibility of creating both legally sound and user-centric solutions for document generation. The legal expertise has to be present throughout all products and channels. Besides the document generators, all information material provided has to be legally validated, and the client advisors must possess this expertise as well.

IT Infrastructure: Friedlich is an online-first service provider. Therefore, one of its key resources is the IT infrastructure, which develops the online platform that serves as a landing page, content provider, and account management tool. It also maintains cloud storage to manage all the customer documents. With its interactive tools and on-demand legal expertise, the platform is the central element of Friedlich's services. Thus, the IT infrastructure necessary to build the online platform is a vital resource.

Expertise From Partners: Since Friedlich's activities are focused on several areas of estate planning, the expertise of different service providers is significant. Notaries and lawyers focusing on estate law provide Friedlich with relevant knowledge and take over part of the service delivery. Furthermore, funeral homes offer Friedlich's customers with specific knowledge on ceremony planning and also support them emotionally. As part of the public sector, registry offices and the Federal Notary Association guarantee the registration of documents and smooth operation of Friedlich.

🤝 Key Partners

Public Administration: The Federal Notary Association is a public corporation that professionally represents notaries on a federal level and stores estate planning documents. Their two main registers provide a centralized approach to archive documents and ensure their nationwide accessibility. Once the customer has completed the setup of a document, the original is transferred to the notary association. Once this is done, different authorities can access it, independent from their location. Therefore, frequent interaction occurs between this entity and Friedlich, making the Federal

Notary Association a key partner for the service. Another public partner is registry offices, where the death certificate can be obtained, which is required to initiate most estate planning services. Friedlich can also get involved when a customer passes away and a pending pension needs to be passed onto a spouse or partner.

Network of Notaries and Lawyers: While paralegals are employed directly at Friedlich, exchange and collaboration with external lawyers and notaries ensure a lasting quality of service. If a customer requires more in-depth legal advice, Friedlich provides him with a list of selected notaries and lawyers within a region.

Funeral Homes: If customers or their relatives want to plan the funeral, Friedlich relies on a vast network of trustworthy partners to meet the individual needs. By forwarding the customers and offering the documents to the respective funeral homes, Friedlich can ensure a ceremony fulfilling one's wishes. However, Friedlich exclusively takes on the role of a mediator. To be able to focus on other business areas in the first place, the majority of services are taken over directly by funeral homes. This helps Friedlich relieve the customer's family of the bureaucratic burden after the passing of a loved one.

💰 Revenue Streams

Lump-Sum Payment per Document: Anyone facing an immediate need for a particular estate planning document can access the Friedlich website and make use of the interactive generator. If subscribing to the annual plan is not desired, the customer can simply create the document, download it, and pay for it directly with a single payment. The lump-sum payment amounts to 20 EUR per generated document.

Subscription Fee: Customers with a subscription can make unlimited use of all document generators. Friedlich registers their documents at the Federal Notary Association and ensures their long-term validity. Advice from paralegals, access to the expert network, and shipping costs for any document are also free of charge. As estate planning should be addressed as early as possible, the annual subscription fee varies depending on the customer's age. People younger than 50 years old pay a discounted fee of 25 EUR annually, while people between the age of 50 and 65 are charged 35 EUR. The elderly from 65 years onwards pay the full subscription fee of 50 EUR. This group pricing strategy does not only provide an incentive to arrange the personal estate

plan early but also exploits the differences in the willingness-to-pay between the age groups.

Commission Fee From Partners: If a customer requires legal advice from the expert network, Friedlich connects them with notaries and lawyers. For funeral and ceremony planning, clients are forwarded to funeral homes. In both cases, Friedlich targets a commission fee of 3% of the billing amount for handing over the lead.

Reward for Executing the Will: The executor of the will can determine an appropriate remuneration independently, regardless of whether a relative, a notary, or a company is taking over the role. Friedlich deducts the reward from the amount of the inheritance. By taking around 2-4% of the estate, this amount is in line with standard market remunerations of executors of the will [326].

Cost Structure

Initial Investments: As with many other software products, the initial development and setup of the online platform require a high upfront investment. During the development, the main cost drivers are the interactive consulting tools and document generators, as well as the implementation of a high IT security standard. Friedlich also builds up a broad knowledge base in the legal field, which requires legal experts' advice and, therefore, is equally resource-intensive.

Fixed Costs: Significant fixed costs are due to personnel costs for marketing, sales, and platform maintenance. Expenditures on operational infrastructure, such as equipment and office rent, are also part of the fixed costs. The online platform forms the core of Friedlich's services. Thus, investments in an appropriate IT infrastructure that support an enjoyable and seamless customer interaction are crucial. Primarily, this concerns the costs of website hosting and data processing. Any storage capacity booked with cloud providers leads to step fixed costs.

Variable Costs: Certain parts of the IT infrastructure are cloud-based and therefore scaled up and down dynamically, depending on the current number of users. Therefore, they are billed based on the pay-as-you-go principle. For each document created on Friedlich, processing and registration fees of the public administration are incurred and supplemented by shipping costs for paper-based processes.

Furthermore, variable costs are mainly driven by the number of customers. This includes increasing client support as well as costs related to lead generation. Particularly the expenditure on performance marketing activities constitutes a considerable part of the variable costs for customer acquisition. With economies of scale emerging over time, a long-term reduction of customer acquisition costs can be expected.

Scenario Fit

See-through but no breakthrough: In this scenario, PA services are highly transparent but mostly manual. Due to the low automation of public services, customers are unsatisfied with the experience of interacting with the PA due to time and effort constraints. This leaves a high demand for intermediary services such as Friedlich, which take over the bureaucratic processes. Manual public services result in high operating costs and hindered scalability for Friedlich if more personal interaction is required. Generally, the PA is very transparent, and that also applies to the estate planning processes that are directly executed by public authorities. Since comprehensive estate planning involves both public and private measures, and especially the consulting aspect is not necessarily covered by the state, there is still a customer need for counseling. Friedlich's adaptation to this scenario includes an increased focus on

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See-through but no breakthough

High Transparency

- Manual public services result in high operating costs and limited scalability
- Transparency in PA creates awareness for estate planning but leaves room for private counselling
- Focus on increasing internal efficiency to offer a fast and convenient alternative to PA services

Crystal Power Machine

- Automated and efficient public services positively affect operating costs and scalability
- Transparent PA estate planning services and the possibility that PA offers these services themselves
- Extension of the funeral planning segment to ensure sustainability

Transparency of Public Administration

Highly Manual ← → Highly Automated

Automation of Public Services

- Manual public services result in high operating costs and limited scalability
- High demand for guidance due to low transparency of PA
- Focus on increasing internal efficiency to fully exploit the high demand and profit potential

- Automated and efficient public services positively affect operating costs and scalability
- High demand for guidance due to low transparency of PA
- Extension of the funeral planning segment to establish a holistic ecosystem

Perpetuum Immobile

Low Transparency

Magic Black Box

operational efficiency to offer a fast and convenient aid for customers' interaction with public administration services.

Crystal Power Machine: In this scenario, PA is highly automated and equally transparent. Citizens are well informed about estate planning processes that are executed by PA directly, but also about how the state will handle their affairs if they did not take adequate measures beforehand. The interaction with PA, which is characterized by trust and convenience, may lead to a decline in demand for intermediary services. Nevertheless, Friedlich benefits from the high level of automation in the administration. If most of the processes are handled digitally, and with little human interaction, this positively affects both operating costs and scalability. In the case that the PA itself starts attractively offering some of the services, Friedlich can adapt its business model to focus on the direction of funeral planning. The extension into this business area, which emphasizes personalization and therefore is less prone to disruption by automation, ensures differentiation to public service offerings.

Magic Black Box: In this scenario, PA is highly automated, resulting in fast operations. However, due to the low transparency of PA operations, the exact workings of a public service process can be harder to grasp. It is often unclear what data is needed by the public sector to kickstart a process such as provision. This provides an ideal scenario: Friedlich's offerings make estate planning simple and approachable for citizens. With the help of user-friendly document generation tools and access to legal experts, Friedlich is a trusted and reliable partner for estate planning from a customer's perspective. From a business perspective, efficient interactions with PA can also reduce costs. Friedlich knows how to handle the complex apparatus because of routine interactions with PA. Consequently, cost savings allow Friedlich to further expand to other relevant service offerings like funeral planning. Thus, the scenario helps Friedlich to develop into a more complete ecosystem.

Perpetuum Immobile: In a world with a highly manual and non-transparent PA, the automation of public services is rudimentary, while communication towards all stakeholders is scarce. This circumstance considerably increases the demand for estate planning services like Friedlich. As a company with expertise built up over the years, Friedlich has the potential to close the resulting gap between citizen and PA. Friedlich can take over the inefficient PA processes

and unburden its customers of direct interaction with bureaucratic matters. Additionally, the non-transparency of public administration creates a need for tailored guidance and advice that Friedlich's experts can provide. Low automation inside the PA makes it difficult for Friedlich to

digitalize and streamline the interaction with them, which considerably increases the operating costs. However, this outcome is opportune for Friedlich to increase its margins due to the higher demand and growth of the estate planning market.

Challenges

- Establish and maintain a nationwide network of partners: All partners of Friedlich come from industries with relatively low competition. Therefore, strong incentives and effective negotiations are needed to initially convince them of the advantages of a partnership.
- Build a strong reputation: Working on a highly sensitive topic, the successful communication of competence and legal expertise is essential to gain customers' trust.
- High dependency on legislative and administrative developments: The close collaboration with public and legal authorities leads to a strong dependency. Friedlich needs to adapt quickly to any kind of legal or structural changes.
- Streamline the interaction with public administration services: Cooperation with a decentralized administration requires optimized back-office processes to enable scalability and ensure service delivery nationwide.

Outlook

In consideration of current developments, Friedlich has a promising future ahead. In the next 10 years, the elderly will become more digitally literate and feel increasingly comfortable using digital services. Additionally, the most relevant customer segment grows as the generation of baby boomers retires. Friedlich profits from these trends by reaching a higher number of potential customers via online channels. Furthermore, the will for self-determination in society rises. People prefer individualized solutions that enable them to plan ahead and take personal matters into their own hands. Friedlich caters to this need by offering user-centricity and options for add-on services for higher personalization. With public administration being on track to provide public services digitally by 2023, Friedlich can lower operating costs and scale services easily. Generally, Friedlich benefits from future technological advances. Distributed ledger technologies especially offer numerous possibilities for efficient automation while also ensuring high security and tamper-proof storage of data. Increasingly sophisticated AI solutions have the potential to facilitate customer interaction and consulting. After securing dominance in the German market, Friedlich can successfully expand its business opportunities to countries with fewer bureaucratic requirements and achieve a far-reaching reputation.

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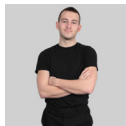
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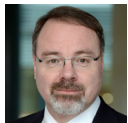
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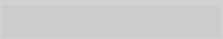[272] M. Turley and W. Eggers, "Government Trends 2020," 2020.

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PUBLIC ADMINISTRATION IN THE DIGITAL ERA

Digital technologies are constantly pushing us towards an ever more connected world and have a significant impact on our daily private and business life. Our interaction with public and governmental institutions and processes, however, have largely remained unaffected by these new digital possibilities. At the same time, with an increasingly complex social environment and growing population of digital native citizens, new technologies provide an ideal starting point to enable - and even demand - a shift towards a digital public administration.

This new environment requires government and public administration to re-evaluate its roles and responsibilities towards citizens in order to steer digitalisation into a direction in conformity with the social market economy. Their interaction with citizens – both digitally and personally – need to be evaluated and designed in a way to increase both efficiency, security and trust in public and governmental authorities, especially in the light of current political turmoil shown by a rising cleft in society.

What role do digital technologies play in this context? How can public administration make use of completely new and unused modes of service accessibility across authorities? In what areas does the government need to remain sovereign in e.g. how can the government secure the protection of citizen's identification in the digital age? How can processes and decisions by public administration be made more efficient and transparent? In a nutshell: What will the future public administration look like in 2040, twenty years from today?

This report identifies current trends (political, economic, social, technological, environmental, and legal) that affect the future of public administration until 2040 and derives four future scenarios as well as five related business ideas. The generated business concepts range from digital personal identity and public process management, a feedback system for public service design, a citizen`s engagement platform, to the democratization of public administration data or digitally integrated estate planning.

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