2024

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Research Paper

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Abstract. Government as a Platform (GaaP) represents the notion that governments significantly benefit from the adoption of platform concepts from the private sector. While several governments are already implementing this notion, there is an insufficient understanding of what actually constitutes a successful GaaP approach. We apply a design science research strategy and, based on interviews with 26 experts and a survey, iteratively design and evaluate 10 guiding principles for GaaP. The principles show how technological and governance aspects complement each other and which platform concepts constitute GaaP. Our research has implications for scholars towards a detailed conceptualization of GaaP, while practitioners can use the principles as guidelines for implementation.

Keywords: Government as a Platform, Digital Public Service Delivery, E-Government

1 Introduction

Government as a Platform (GaaP) is an approach to the digital transformation of the public sector, which is increasingly followed by governments around the world (Brown et al., 2017; Cordella and Paletti, 2019; Margetts and Naumann, 2017; O'Reilly, 2011; Styrin et al., 2022; Upadhyay et al., 2022). The underlying idea is that the public sector can profit from the adoption of platform concepts (Brown et al., 2017), leveraging on principles nurtured in the private sector (O'Reilly, 2011).

While the term GaaP is used to describe a broad range of variations – from political participation via platforms to car sharing organized by local government – we focus on the application of platform concepts to digital public service delivery. Such an application promises both, more efficient and more user-friendly services (Brown et al., 2017; Janssen and Estevez, 2013; O'Reilly, 2011). In practice, GaaP for digital public service delivery has already been applied by various governments (Brown et al., 2017; Cordella and Paletti, 2019; Gil-Garcia et al., 2019; Margetts and Naumann, 2017; Styrin et al., 2022; Upadhyay et al., 2022) successfully, that is, yielding more efficient and user-

19th International Conference on Wirtschaftsinformatik,
September 2024, Würzburg, Germany

friendly public services. Furthermore, several governmental digital agencies have publicly advocated the approach, such as the "Government Digital Service" in the UK and "Team Digitale" in Italy (Bracken, 2015; Digital Transformation Team, 2018). Given its practical relevance, scholars have started investigating and conceptualizing the phenomenon (Bender and Heine, 2021; Brown et al., 2017; Janssen and Estevez, 2013), distinguishing different dimensions and constituting elements of GaaP.

However, there is still a lack of understanding of what constitutes a successful implementation of GaaP in practice. Extant research focuses on individual cases (Styrin et al., 2022; Upadhyay et al., 2022), emphasising how GaaP implementations differ between countries. Some scholars also started to investigate the similarities of the countries implementing GaaP (Bender and Heine, 2021; Brown et al., 2017), which suggest that – despite different contexts – there are some underlying principles that successful cases tend to have in common. Identifying these principles would provide "normative and directive statements that guide in decision making" (Janssen et al., 2013), supporting practitioners struggling with GaaP implementation (Kuhn et al., 2022b), and could contribute to its theoretical conceptualization.

In order to increase the understanding of GaaP, we pose the following research question: *How to successfully guide implementations of GaaP?* To address this question, we apply a design science research strategy (Hevner et al., 2004). More specifically, we interacted with 26 experts from five countries in three iterations to develop a comprehensive set of ten guiding principles for GaaP. The principles show, on the one hand, how technological and governance aspects complement each other and, on the other, which platform concepts actually constitute GaaP. Moreover, these results confirm previously existing design knowledge but also extend it. Based on our insights, scholars can further conceptualize GaaP while practitioners can use the principles as guidelines. The paper is structured based on (Peffers et al., 2007).

2 Theoretical Background and Objectives for a Solution

GaaP. In his seminal contribution, O'Reilly (2011) introduced the term "Government as a Platform" as the notion of learning from the success of digital platforms in the private sector and transferring the respective concepts to the public one (O'Reilly, 2011). Since then, various academic publications followed, covering diverse applications of platform concepts in the public sector (Al-Ani, 2017; Bender and Heine, 2021; Brown et al., 2017; Cordella and Paletti, 2019; Jamieson et al., 2020; Seo and Myeong, 2020; Upadhyay et al., 2022). The examples range from platform-based social funds (Zaramenskikh and Lyubarskaya, 2020) to platform concepts for digital public service delivery (Bender and Heine, 2021; Hautamäki and Oksanen, 2018). In this research we focus on the latter, which we will call platform-oriented digital public service delivery. This form of GaaP has been specified as a "government as a platform builder" (Thompson and Venters, 2021) approach, conceiving central governments as developers of central platforms on which local entities can then build digital public services independently. As described by Thompson and Venters (2021), the "government undertakes

architectural work to identify common capabilities, but remains open to a mix of possible delivery models". This role often assumed by a digital agency which therefore plays a central and strategic role in the GaaP approach of many countries. By bundling strategic decisions at such a central entity, GaaP is capable of speeding up digital transformation (Janssen and Estevez, 2013; O'Reilly, 2011), combining user-friendliness with efficiency (Fishenden and Thompson, 2013).

GaaP technology and governance. Literature distinguishes technological and governance aspects of this approach, partially drawing on general information systems literature (Baldwin and Woodard, 2008; Bender and Heine, 2021; Brown et al., 2017; Hein et al., 2020). From a technological perspective, GaaP is associated with a shared digital infrastructure of software components, such as login and payment (Bender and Heine, 2021). This "platform core" often includes an interoperability layer, such as X-Road in Estonia (Brown et al., 2017; Margetts and Naumann, 2017), and serves as an "integration mechanism" (Bender and Heine, 2021). Building on this platform, an ecosystem of digital public services is enabled by platform concepts such as modularity (Brown et al., 2017) and open standards (O'Reilly, 2011).
Regarding governance, orchestration (Cordella and Paletti, 2019) and co-creation (Brown et al., 2017) are key elements of GaaP. The latter is based on the openness of the public sector to its stakeholders, enabling platform concepts such as participation (Millard, 2018). By doing so, the user of public services changes from recipient to being a central part in the ecosystem for public service delivery (Rantanen et al., 2019). The governance of GaaP is therefore connected to the question of how the aforementioned digital agencies can act as a platform owner, orchestrating an ecosystem of public and private actors (Cordella and Paletti, 2019).

Despite these theoretical insights, there is no common definition of GaaP (Seo and Myeong, 2020). For the scope of this paper, we build on the works of Bender and Heine (2021) and Thompson and Venters (2021) and use the following working definition: GaaP is the delivery of digital public services using platform concepts for both the technological setup and the governance of its stakeholders.

GaaP in practice. In practice, several countries are implementing platform-oriented digital public service delivery. Explicit references, for instance, can be found in Italy (Piacentini, 2017), Estonia (Margetts and Naumann, 2017), and the UK (Bracken, 2015). Finland (Yli-Huumo et al., 2018), the USA, and Australia (Gil-Garcia et al., 2019) also apply platform concepts to their digital public service delivery. While there are successful examples and various aspects already investigated, literature does not specify what actually constitutes a successful GaaP approach (Kuhn et al., 2022b). Many publications focus on individual cases (Styrin et al., 2022; Upadhyay et al., 2022), emphasising how GaaP applications differ across countries. At the same time, some publications indicate that successful GaaP approaches tend to follow the same principles (Bender and Heine, 2021; Brown et al., 2017). Such principles could guide practitioners, especially in governments struggling with the approach (Kuhn et al., 2022b). To our knowledge, however, there is no comprehensive investigation of these principles.

Objectives for a solution. Based on this, our overall objective is to develop a set of guiding principles for GaaP. The design of these principles will seek to meet three objectives: (1) provide normative and directive statements that guide decision makers when designing platform-oriented digital public service delivery, (2) built on successful examples from practice, and (3) provide indications for the further theoretical conceptualization of GaaP.

3 Methodology

To identify the guiding principles of successful GaaP approaches, we followed the Design Science Research (DSR) paradigm (Hevner et al., 2004), which brings detailed understanding about problem and solution domains through building and applying a design artefact (Baskerville et al., 2018; Gregor and Hevner, 2013; Hevner et al., 2004). Principles are design artefacts (Matheus et al., 2021) and principle-based design is considered "a specific form of the more general design science research methodology that focuses on extracting principles" (Bharosa and Janssen, 2015).

We follow the six-step DSR methodology (Peffers et al., 2007) and go through three iterations (Table 1). The empirical data sampling along the iterations was based on both expert interviews and a survey. In total, 41 interviews were conducted with 26 experts from five countries. Eight experts participated in all three rounds and two experts in two rounds. Eleven experts participated in the survey.

Table 1. Overview of the three iterations

	First iteration	Second iteration	Third iteration
Data collection	19 interviews	10 interviews	12 interviews and 11 survey responses
Time of data collection	May to July 2021	January and February 2023	June and July 2023
Resulting artefact	Design decisions	Guiding principles v1	Guiding principles v2

For the selection of experts, we considered people who have or had strategic positions and accountability for platform-oriented digital public service delivery in the respective countries. The experts were contacted via LinkedIn and through the network of the authors. In several cases, interviewees were head of a national digital agency - since those agencies play a central and strategic role in the governance of digital transformation of many governments. We also considered people who have been closely working with them. To avoid potential biases, we collected information from informants who were both in charge at the time of the interview and are not anymore (Leonard-Barton, 1990). Furthermore, anonymity has been promised to informants, encouraging candour. Regarding the countries of origin of the experts, we selected countries that have successfully applied GaaP, since principles are typically developed based on successful examples from practice (Matheus et al., 2021). We chose Estonia for its high

ranking in eGovernment scores (European Commission, 2022). We selected Italy and UK since they explicitly pursue GaaP and publicly reflect on it (Bracken, 2015; Digital Transformation Team, 2018). We added Denmark, for being mentioned by several experts as a role model, and Germany, which is progressing but also struggling with GaaP (Kuhn et al., 2022b). The interviews were recorded and transcribed for coding.

First iteration. The *problem identification and motivation* was based on research conducted by the authors (Kuhn et al., 2023b, 2023a, 2022b, 2022a, 2022c), which included a literature review and is retraced in the introduction. The *objectives for a solution* were derived from said publication and literature, as reproduced in the previous section. The *design and development* of the first iteration was based on 19 interviews with British, Estonian and Italian experts. The interviews lasted between 24 and 122 minutes and were conducted between May and July 2021. The interviews aimed at exploring how GaaP has been applied in the three countries. Exemplary questions were "Which are the main platforms/core services that constitutes the [country's] digital government and ICT infrastructure?" and "Which are the main advantages of GaaP adoption?" The interviews were coded regarding design decisions, distinguishing among decision issue, alternative, and justification (Potts and Bruns, 1988). The coding aimed to understand the various aspects and dimensions of GaaP and relative design decisions in the three countries.

Second iteration. The *demonstration and evaluation* of the first iteration was conducted in ten interviews with British, Estonian, and Italian experts. The interviews lasted between 19 and 57 minutes and were conducted in January and February 2023. The interviews aimed to systematically discuss the identified decisions from the first round. Exemplary questions were "Which governance decisions have been made in your country towards the application of GaaP?" and "Which governance decisions will or should be made in your country towards the application of GaaP?" The second round of interviews was also coded regarding design decisions. The first version of the principles was then *designed and developed* in workshops among the authors. Using dimensions from literature (Brown et al., 2017; Millard, 2018), the principles were designed to consider both, governance and technological aspects. Also, principles concerned with the platform core were balanced with principles concerned with the ecosystem. First insights were *communicated* in (Kuhn et al., 2023a).

Third iteration. The *demonstration and evaluation* of the second iteration was conducted in interviews with twelve experts from the UK, Estonia, Italy, Denmark and Germany. The interviews lasted between 25 and 67 minutes and were conducted in June and July 2023. The goal of the interviews was to evaluate the principles, preliminary sent to the experts. After a short introduction to the principles, the experts were asked for their opinion on the principles. Exemplary questions were "Do you agree with principle names, statements, rationales and examples? If not, what would you change?" and "Would you recommend them to practitioners from other countries? Why (not)?" The third round was coded regarding the general assessments, examples and potential improvements of the principles. Specifically, all statements about positive and negative features of the principles, missing features and proposals for improvement were extracted. In addition to the semi-structured interviews, the third round included a survey, which eleven out of twelve interviewees responded to. In line with triangulation, the

survey was designed to enhance the collected data to compensate for intrinsic biases of the interviews. The survey aimed to collect formalised feedback on the principles and specify their application. Most questions were posed as statements asking for responses on a 5-points Likert scale between "Strongly agree" and "Strongly disagree". Exemplary statements were "The principle is easy to understand" and "The principle has big importance for the success of GaaP in practice." The interviews and the survey results indicated that the principles were mature regarding the objectives for a solution, which is why only small changes to the order and naming were made by the authors. The final artefact is *demonstrated and evaluated* in the later sections of this paper based on an online discussion of the authors with decision makers from Germany. This paper also constitutes the *communication* of the artefact.

4 Results

In the following, we present 10 guiding principles for successful GaaP implementations in practice (cf. Table 2). The principles are targeted at strategists in central roles – such as the head of a country's digital agency.

Table 2. Guiding principles for successful GaaP imlementations

No.	Name	Statement
P1	**Political mandate**	Ensure political backing from the highest office of government.
P2	**Strong and clear governance**	Ensure and enforce a strong and clear governance between and over all relevant stakeholders.
P3	**Human resources**	Invest in hiring and further educating highly qualified personnel.
P4	**Openness and Co-Creation**	Create and cherish a culture of openness and co-creation in and outside the public sector.
P5	**Carrot and Stick**	Incentivise and regulate public entities from all levels of government to participate and contribute.
P6	**Deployment infrastructure**	Provide infrastructure for the performant and easy deployment of all software related to platform-oriented digital public service delivery.
P7	**Central core functionalities**	Provide the core functionalities of digital public services – such as identification/authentication and payment – for all public entities.
P8	**Interoperability**	Enable the seamless exchange of data between all public entities.
P9	**Decentral business logic**	Keep the business logic and business data with the responsible public entities.
P10	**User-facing frontend**	Improve user experience through excellent frontends.

P1: Political Mandate. The first principle concerns the political mandate for a GaaP approach. In literature, GaaP is associated with transformative changes in the government's structure and governance (Brown et al., 2017; Cordella and Paletti, 2019; Janssen and Estevez, 2013). The experts explained that, for these changes to happen, political backing is necessary: "*Countries that are successful tend to have very strong mandates.*" (I9, UK). Some experts even argued that this mandate needs to be from the very top of government, for instance, from the prime minister. If not, there is the danger

of unsolvable conflicts between ministries that hinders the structural changes to be enforced. An example of strong political mandate is the government of prime minister Mart Laar in Estonia from 1999 to 2002, which pushed the digital transformation resulting in the creation of X-Road in 2001. Based on this, we state principle P1: "Ensure political backing from the highest office of government".

P2: Strong and clear governance. The second principle is concerned with the governance of the GaaP approach. In literature, platforms are associated with a central owner that is orchestrating the relevant stakeholders (Cordella and Paletti, 2019). However, in practice this role cannot only rely on orchestration or quality assurance (Bender and Heine, 2021). The interviewees argue that this platform owner, often a digital agency, needs to be able to make and enforce decisions. "*I would say that this Ministry of Economy and Communication is a digital agency for Estonia. […] they are definitely leading*" (I10, Estonia). Such strong and clear governance of a digital agency can additionally be strengthened with a strong mandate for its head. In Italy, for instance, the head of the digital agency was also appointed a commissioner of the government: "W*e needed to have a commissioner with the power to substitute the administration in order to give impulse to [...] the implementation of the strategy.*" (I6, Italy). A primus inter pares is crucial for the approach. Based on this, we state principle P2: "Ensure and enforce a strong and clear governance between and over all relevant stakeholders".

P3: Human resources. The third principle is concerned with the people inside the public sector who are working towards the application of GaaP. GaaP is associated with the organization of government and its technology – but with other ideas and rationales than classic public sector bureaucracy (Brown et al., 2017; Millard, 2018). To ensure the effectiveness of this reorganisation, GaaP requires personnel with the ability of "platform thinking" (Leijon et al., 2017; Trabucchi and Buganza, 2023). "*You need a political leader or a leader who has a very good ability to communicate in public and earn trust and negotiate with the politicians. [...] And, then, there has to be a team, an organisation, an agency with very strong technical competencies inside.*" (I5, Italy). In Italy, for instance, this leader was a former Amazon executive, Diego Piacentini, who led the Italian digitalisation efforts from 2016 to 2018. Attracting and keeping qualified personnel is difficult, which is why successful governments use all means available: "*There are many people whose salary is much less because they are working in the public sector […] whoever is setting up the system, they must create this opportunity for the people to be proud about.*" (I10, Estonia). Taken together, putting major resources and focus on human resources is critical for the success of GaaP approaches. Based on this, we state principle P3: "Invest in hiring and further educating highly qualified personnel".

P4: Openness and Co-Creation. The fourth principle concerns the engagement of the various stakeholders of GaaP. GaaP requires the cooperation of all entities of government but also civil society to achieve user-friendly services. As suggested by literature (Millard, 2018; O'Reilly, 2011), in the investigated countries this is achieved with a culture of openness and co-creation. A central cornerstone of this culture was the proactive communication of the respective GaaP approaches, for instance, via strategy documents and blog entries (Bracken, 2015; l'Agenzia per l'Italia Digitale and Dipartimento per la Trasformazione Digitale, 2020). Moreover, a lot of energy was put into

convincing people to participate: *"It's effort, effort. Effort of people explaining why you need [them] this thing to do.*" (I6, Italy). Also, in many countries, GaaP approaches are driven by communities: "*This is something that we've seen a lot in the Nordic context, this emergence of these joint collaboration forums, particularly between clusters of different authorities*" (I23, Denmark). Enabling and supporting such collaborations is a central element of GaaP. Based on this, we state principle P4: "Create and cherish a culture of openness and co-creation in and outside the public sector".

P5: Carrot and Stick. The fifth principle concerns public entities' participation in a GaaP approach. GaaP requires a critical mass of involvement of various public entities. To ensure participation, governments need to offer something to those entities (Millard, 2018). Literature suggests technical support through, for instance, software development kits to incentivise the usage (Bender and Heine, 2021). In practice, financial incentives are even more prevalent, for example the free use of software components or financial transfers: *"You also have to use the financial tools to convince municipalities to participate." (I24, Denmark).* Complementing such "carrots" governments also use "sticks" such as mandatory standards and veto powers: "*Yeah, you need veto power. You need to stop them doing stupid things.*" (I8, UK). However, it is important to find the right balance between incentives and regulation or, in other terms, carrots and sticks: "*I believe that it's not working to do this with rules only, instead I believe in standards*" (I25, Germany). Using a management approach that balances "carrot and stick" policies is an important element of a successful GaaP approach. Based on this, we state principle P5: "Incentivise and regulate public entities from all levels of government to participate and contribute".

P6: Deployment infrastructure. The sixth principle is concerned with the technical foundations for GaaP. GaaP is associated with deeply technical aspects such as IT infrastructure and the design of APIs (Pope, 2019), which enable cross-organizational IT services. As a basis for this technical side of GaaP, the deployment of software needs to be seamless. Deployment can be done via a central cloud infrastructure, such as foreseen by the national cloud strategy of Italy, but not only: "*There is a need for hosting definitely, but is it commercial providers, is it just governmental data centres? And if they want to use cloud technology, fine, but this is not critical by any means.*" (I10, Estonia). An important aspect of deployment infrastructure is the alignment with legal requirements, for instance, regarding data privacy (Bender and Heine, 2021). A working technical basis is a prerequisite for GaaP. Based on this, we state principle P6: "Provide infrastructure for the performant and easy deployment of all software related to platform-oriented digital public service delivery".

P7: Central core functionalities. The seventh principle is concerned with technical functionalities that are necessary for digital public services across public levels and departments. In literature, GaaP is associated with a certain architecture based on modular services (Brown et al., 2017), in particular shared functionalities, such as a common authentication/identification and payment services (Bender and Heine, 2021). In practice, these common functionalities are sometimes called platforms: "*I think you want actually a number of central platform services and they are experienced as a function in a page.*" (I8, UK). Sharing these functionalities can save resources and increases scalability by simplicity. As a technical implementation, some countries have

central components, such as the Italian eID SPID (L'Agenzia per l'Italia Digitale, 2023), others are built on standards and protocols, such as the Estonian payment functionality: "M*aybe [the GaaP approach] does not provide the core functionality, but the core rules, the core standards at the central level.*" (I3, Italy). The exact set of centrally provided functionalities can vary depending on the context, however, a central IT infrastructure with core functionalities is a commonality of the investigated GaaP countries. Based on this, we state principle P7: "Provide the core functionalities of digital public services – such as authentication and payment – for all public entities".

P8: Interoperability. The eighth principle is concerned with the data exchange between public entities. GaaP is associated with digital public services that exchange data across levels and departments (Brown et al., 2017). To ensure that this is possible, data exchange needs to be enabled by the technical architecture of the respective digital infrastructure, for instance, via APIs, middleware, and/or standards and protocols: "*The problem with interoperability is not only the data and the regulation behind the data, but also the integration between the different systems.*" (I24, Denmark). Apart from enabling data exchange, interoperability also simplifies processes on the socio-technical level: "*The decision process, if I want to have, let's say, the tourism ministry agree or the health minister agree on a specific interoperability with the finance ministry. […] it takes one year to decide that. What, instead, if you have a common digital identity layer on top, it comes out naturally.*" (I6, Italy). This makes interoperability a constituting element of a successful GaaP approach. Based on this, we state principle P8: "Enable the seamless exchange of data between all public entities".

P9: Decentral business logic. The ninth principle is concerned with the business logic and data. Platforms are associated with a balance between centralization and decentralization (Baldwin and Woodard, 2008). To ensure that, common functionalities should be centralized, but at the same time business specific software should remain with the decentral entities: "*The business logic should reside where jurisdiction is.*" (I6, Italy). Keeping the business logic with the responsible entity ensures that the business software is where the know-how is. This allows for agile improvements, better troubleshooting and innovation. Also, "B*usiness logic is power and excessively centralizing power needs to have a safeguard in a democratic state - checks and balances.*" (I6, Italy). Finding the context-specific balance between centralization and decentralisation is critical to GaaP success. Based on this, we state principle P9: "Keep the business logic and business data with the responsible public entities".

P10: User-facing frontend. The tenth principle is concerned with the frontends of digital public services. GaaP is associated with user-friendly services such as integrated and proactive public services (O'Reilly, 2011). To achieve that, frontends should be designed for excellent user experience: "[It's] *about providing a user experience that is in line with […] what the citizen is used to when using digital services on the internet.*" (I5, Italy). To ensure that countries have introduced unified frontends, such as gov.uk, or set standards, e.g. regarding accessibility and design: "*Providing templates also achieves the goal of harmonizing because you standardize. But you achieve the goal of really good user experience, only if the templates are also top quality, which is not a given.*" (I5, Italy). The success of GaaP is ultimately connected to the success of

platform-oriented digital public service delivery with its users. Based on this, we state principle P10: “Improve user experience through excellent frontends”.

5 Demonstration

The use of the principles is demonstrated by their retroactive application to the current GaaP approach of Germany (Table 3). We chose Germany because despite progress in recent years, it is struggling with GaaP (Kuhn et al., 2022b). We show how the principles help explain the success and lack of success in Germany’s GaaP implementation. We also show how to principles provide an orientation for strategic decisions and, thus, their ability to serve as guidelines for practitioners. The German GaaP approach has its roots in the Online Access Act of 2017 (Bundesministerium der Justiz und für Verbraucherschutz, 2017) which regulates that egovernment portals and eIDs of the federal and state governments shall be interoperable. Moreover, a digital agency (FITKO) was founded in 2020 with the task of orchestrating the various stakeholders. FITKO also took ownership of an increasing number of shared components and standards over the years. The following demonstration is based on an online discussion between the authors and decision makers form Germany in November 2023 (*NEGZ Spezial*, 2023).

Table 3. Implementation of the GaaP approach in Germany.

No.	Principle	Implementation in the German GaaP approach
P1	**Political mandate**	Not followed because digital government not a priority of chancellor and minister for the interieur.
P2	**Strong and clear governance**	Not followed because unclear responsibilities between several bodies and entities on the federal and state levels.
P3	**Human resources**	Not followed because lack of qualified people in quantity and quality.
P4	**Openness and Co-Creation**	Partially followed because increasing number of core components are publicly documented and feedback channels open.
P5	**Carrot and Stick**	Partially followed because financial schema extended during covid. Yet, participation is only slowly gaining traction.
P6	**Deployment infrastructure**	Partially followed because deployment infrastructure exists but is scattered and not up to date.
P7	**Central core functionalities**	Partially followed because several components exist (eID, payment) but with different owners. Need for consolidation.
P8	**Interoperability**	Partially followed because several solutions exist, but roll-out only slowly gaining traction.
P9	**Decentral business logic**	Followed because the culture of jurisdiction is strong which results in business logic residing where the jurisdiction is.
P10	**User-facing frontend**	Partially followed because, despite efforts toward interoperable portals, there is still a lack of standards and templates.

The discussion showed that the German GaaP approach is mainly suffering on the governance side. Especially the principles on political mandate (P1) and the strong and

clear governance (P2) are not followed. The discussants agreed on the necessity for a clarification of the responsibilities of the various ministries and agencies involved. Also, human resources (P3) are currently not in the focus which is mirrored by the small size of the digital agency FITKO (30 employees). Regarding openness, co-creation (P4) and the integration of public entities via carrot and stick (P5), first steps have been made, for instance, with open sourcing, public documentations and feedback channels. Yet, reservations remain, slowing down progress.

On the technological side, the discussion showed that deployment infrastructure (P6) and central core functionalities (P7), while not perfect, have a decent status in Germany. However, interoperability (P8) is a major open task. This is exemplified by the existence of several components with the same functionality of routing data between IT silos, making the seamless exchange of data complex. The principle of decentral business logic (P9) is followed since Germany retains a strong culture of jurisdiction and federalism. For the same reasons, however, the user-facing frontends (P10) suffer from lack of standards and incentives for user-friendliness.

Taken together, further directions for improvement of the German GaaP implementation can be summarized from the discussion: (1) a clarification of ownership, in particular regarding the core elements for interoperability, backed by a strong political mandate, (2) a better orchestration of the various public entities, in particular regarding the adoption of central components and standards, (3) enabling of innovation by opening up to competing frontends, in particular through public documentation of APIs.

6 Evaluation and Discussion

In the following, we evaluate the final form of the principles regarding the three objectives (cf. chapter 2) and then discuss the implications for theory and practice.

First, the principles provide normative and directive statements for decision makers. The experts approved of the principles and considered them helpful: "*I believe those principles are universal and I believe – independent in which stage [of GaaP] you are – it makes sense to go through these ten principles and say 'Well, where are we?* " (I24, Denmark). Moreover, the survey showed that the catalogue of principles was comprehensive, that the individual principles were easy to understand, and that they were important for the success of GaaP. All experts agreed or strongly agreed that the principles are covering the main aspects of applying GaaP. Finally, the principles overlap with findings from several papers as pinpointed in the results section.

Second, the principles are based on successful examples from practice. The survey confirmed that the principles have been applied in the investigated countries, which speaks to the practical relevance of the principles. Also, existing literature on successful applications of GaaP (Brown et al., 2017; Cordella and Paletti, 2019; Margetts and Naumann, 2017) have been systematically integrated into the design process. In addition, we interviewed several heads of digital agencies from internationally recognized role models such as the UK, Estonia, and Denmark. Their experience and examples were incorporated into the principles and are therefore contributing to this objective. Furthermore, our insights can be added to the body of knowledge (Hevner et al., 2004).

Third, the principles provide several indications for the further theoretical conceptualization of GaaP. For example, the term "Government as a platform builder" (Thompson and Venters, 2021) raises the question what exactly the government is building. According to our results, to apply GaaP for digital public service delivery, governments should build a deployment infrastructure, core functionalities, and an interoperability layer. Similarly, regarding governance, our results suggest that platforms ownership can be broken down into political mandate, clear governance structures and human resources, providing input for theoretical work toward the conceptualization of GaaP.

Based on this evaluation, our results carry implications for theory and practice. We find ten guiding principles of successful GaaP approaches that experts across five different countries consider important and useful. With regard to theory, these findings support the hypothesis that successful GaaP approaches have similarities across countries and therefore relevant aspects of GaaP can be generalized. This also encourages the conceptualization efforts of GaaP, potentially leading to a common definition of GaaP. Moreover, the results confirm aspects that have been discussed in literature before, namely the prevalence of central core functionalities (P7) and interoperability (P8), which have been theorized as constituting (technical) elements of GaaP (Bender and Heine, 2021). Similarly, governance aspects, such as openness and co-creation (P4) have been elaborated by previous literature (Millard, 2018) and are confirmed by our results. Our results suggest additional aspects that play an important role in the implementation of GaaP but are not prevalent in literature yet, for instance, the role of the political mandate (P1) and human resources (P3). The importance of those aspects reconnects to GaaP fundamentally being a form of digital transformation, requiring a holistic approach that is more than yet another platform (Brown et al., 2017; Janssen and Estevez, 2013; O'Reilly, 2011). Future research can build on these results and investigate the role of these aspects for proper GaaP implementations. With regards to practice, the principles provide guidelines when implementing GaaP, supporting the efforts to profit from the application of platform concepts in the public sector. In particular, decision makers can use the principles to evaluate, develop and speed up their GaaP efforts, for example by governments struggling with GaaP (Kuhn et al., 2022b).

7 Conclusion

We present 10 principles for the successful implementation of GaaP with several implications for theory and practices. However, limitations apply to the results and their implications. First, since the selection of experts was limited to five countries from Europe, the principles might not be generalizable to other contexts, such as emerging economies or countries that differ in their political culture. Future research needs to investigate the applicability of the principles in those contexts. Second, the principles have been developed retrospectively, which means that the experts applied the principles, explicitly or implicitly, before knowing they would be asked to comment on them. Future research could explore introspectively the principles, once applied in practice. Third, the principles are generic and need to be broken down into actionable items to be better applied to the context of the government in question. Future research could

support this by designing corresponding models and methods. Despite these limitations, we believe the principles to be useful for both practitioners and scholars and hope their publication will support the successful application of GaaP in practice.

References

Al-Ani, A., 2017. Government as a Platform: Services, Participation and Policies, in: Friedrichsen, M., Kamalipour, Y. (Eds.), Digital Transformation in Journalism and News Media: Media Management, Media Convergence and Globalization, Media Business and Innovation. Springer International Publishing, Cham, pp. 179–196. https://doi.org/10.1007/978-3-319-27786-8_14

Baldwin, C.Y., Woodard, C.J., 2008. The Architecture of Platforms: A Unified View. SSRN Journal. https://doi.org/10.2139/ssrn.1265155

Baskerville, R., Baiyere, A., Gregor, S., Hevner, A., Rossi, M., 2018. Design science research contributions: Finding a balance between artifact and theory. Journal of the Association for Information Systems 19, 3.

Bender, B., Heine, M., 2021. Government as a Platform? Constitutive Elements of Public Service Platforms, in: Kö, A., Francesconi, E., Kotsis, G., Tjoa, A.M., Khalil, I. (Eds.), Electronic Government and the Information Systems Perspective, Lecture Notes in Computer Science. Presented at the International Conference on Electronic Government and the Information Systems Perspective, Springer International Publishing, Cham, pp. 3–20. https://doi.org/10.1007/978-3-030-86611-2_1

Bharosa, N., Janssen, M., 2015. Principle-Based Design: A Methodology and Principles for Capitalizing Design Experiences for Information Quality Assurance. Journal of Homeland Security and Emergency Management 12, 469–496. https://doi.org/10.1515/jhsem-2014-0073

Bracken, M., 2015. Government as a Platform: the next phase of digital transformation - Government Digital Service. Government Digital Service Blog. URL https://gds.blog.gov.uk/2015/03/29/government-as-a-platform-the-next-phase-of-digital-transformation/ (accessed 3.29.23).

Brown, A., Fishenden, J., Thompson, M., Venters, W., 2017. Appraising the impact and role of platform models and Government as a Platform (GaaP) in UK Government public service reform: Towards a Platform Assessment Framework (PAF). Government Information Quarterly 34, 167–182. https://doi.org/10.1016/j.giq.2017.03.003

Bundesministerium der Justiz und für Verbraucherschutz, 2017. OZG - Gesetz zur Verbesserung des Onlinezugangs zu Verwaltungsleistungen [WWW Document]. Gesetze-im-Internet.de. URL https://www.gesetze-im-internet.de/ozg/BJNR313800017.html (accessed 6.10.21).

Cordella, A., Paletti, A., 2019. Government as a platform, orchestration, and public value creation: The Italian case. Government Information Quarterly 36, 101409. https://doi.org/10.1016/j.giq.2019.101409

Digital Transformation Team, 2018. Report Digital Transformation Team.

European Commission, 2022. eGovernment Benchmark 2022 - EXECUTIVE SUMMARY.

Fishenden, J., Thompson, M., 2013. Digital Government, Open Architecture, and Innovation: Why Public Sector IT Will Never Be the Same Again. Journal of Public Administration Research and Theory 23, 977–1004.

Gil-Garcia, J.R., Henman, P., Avila-Maravilla, M.A., 2019. Towards "Government as a Platform"? Preliminary Lessons from Australia, the United Kingdom and the United States, in: Proceedings of Ongoing Research, Practitioners, Posters, Workshops, and Projects of the International Conference EGOV-CeDEM-ePart 2019. Presented at the EGOV-CeDEM-ePart 2019.

Gregor, S., Hevner, A.R., 2013. Positioning and presenting design science research for maximum impact. MIS quarterly 37, 337–355.

Hautamäki, A., Oksanen, K., 2018. Digital Platforms for Restructuring the Public Sector, in: Smedlund, A., Lindblom, A., Mitronen, L. (Eds.), Collaborative Value Co-Creation in the Platform Economy, Translational Systems Sciences. Springer, Singapore, pp. 91–108. https://doi.org/10.1007/978-981-10-8956-5_5

Hein, A., Schreieck, M., Riasanow, T., Setzke, D.S., Wiesche, M., Böhm, M., Krcmar, H., 2020. Digital platform ecosystems. Electron Markets 30, 87–98. https://doi.org/10.1007/s12525-019-00377-4

Hevner, A., R, A., March, S., T, S., Park, Park, J., Ram, Sudha, 2004. Design Science in Information Systems Research. Management Information Systems Quarterly 28, 75.

Jamieson, D., Wilson, R., Martin, M., 2020. Is the GaaP wider than we think? Applying a sociotechnical lens to Government-as-a-Platform, in: Proceedings of the 13th International Conference on Theory and Practice of Electronic Governance, ICEGOV 2020. Association for Computing Machinery, New York, NY, USA, pp. 514–517. https://doi.org/10.1145/3428502.3428580

Janssen, M., Estevez, E., 2013. Lean government and platform-based governance—Doing more with less. Government Information Quarterly, ICEGOV 2011 Supplement 30, S1–S8. https://doi.org/10.1016/j.giq.2012.11.003

Janssen, M., Flak, L.S., Sæbø, Ø., 2013. Government Architecture: Concepts, Use and Impact, in: Wimmer, M.A., Janssen, M., Scholl, H.J. (Eds.), Electronic Government: Proceedings of the 12th IFIP WG 8.5 International Conference, EGOV 2013, Lecture Notes in Computer Science. pp. 135–147.

Kuhn, P., Balta, D., Matthes, F., 2022a. Closing the GaaP: Lessons Learned from a Web-based Analysis Tool for Practitioners, in: Ongoing Research, Practitioners, Posters, Workshops, and Projects of the International Conference EGOV-CeDEM-ePart 2022. Presented at the EGOV-CeDEM-ePart 2022, Linköping.

Kuhn, P., Buchinger, M., Balta, D., Matthes, F., 2022b. Barriers of applying Government as a Platform in Practice: Evidence from Germany, in: Proceedings of the 55th Hawaii International Conference on System Sciences. Presented at the Hawaii International Conference on System Sciences. https://doi.org/10.24251/HICSS.2022.328

Kuhn, P., Dallner, S., Buchinger, M., Balta, D., 2022c. Towards "Government as a Platform": An analysis framework for public sector infrastructure, in: Wirtschaftsinformatik 2022 Proceedings. Presented at the WI 2022.

Kuhn, P., Maragno, G., Balta, D., Gastaldi, L., Matthes, F., 2023a. Government as a Platform in Practice: Commonalities and Differences Across Three European Countries, in: Lind-

gren, I., Csáki, C., Kalampokis, E., Janssen, M., Viale Pereira, G., Virkar, S., Tambouris, E., Zuiderwijk, A. (Eds.), Electronic Government, Lecture Notes in Computer Science. Springer Nature Switzerland, Cham, pp. 34–47. https://doi.org/10.1007/978-3-031-41138-0_3

Kuhn, P., Zavolokina, L., Balta, D., Matthes, F., 2023b. Toward Government as a Platform: An Analysis Method for Public Sector Infrastructure, in: Wirtschaftsinformatik 2023 Proceedings.

L'Agenzia per l'Italia Digitale, 2023. What is SPID [WWW Document]. Spid. URL https://www.spid.gov.it/en/what-is-spid/ (accessed 10.13.23).

l'Agenzia per l'Italia Digitale, Dipartimento per la Trasformazione Digitale, 2020. Piano Triennale per l'informatica nella Pubblica Amministrazione.

Leijon, E., Svenheden, J., Svahn, F., 2017. Platform Thinking in Incumbent Firms: From Concept to Capability, in: HICSS Proceedings. https://doi.org/10.24251/HICSS.2017.580

Leonard-Barton, D., 1990. A Dual Methodology for Case Studies: Synergistic Use of a Longitudinal Single Site with Replicated Multiple Sites. Organization Science 1, 248–266.

Margetts, H., Naumann, A., 2017. Government as a Platform: What can Estonia Show the World?

Matheus, R., Janssen, M., Janowski, T., 2021. Design principles for creating digital transparency in government. Government Information Quarterly 38, 101550. https://doi.org/10.1016/j.giq.2020.101550

Millard, J., 2018. Open governance systems: Doing more with more. Government Information Quarterly, Platform Governance for Sustainable Development 35, S77–S87. https://doi.org/10.1016/j.giq.2015.08.003

NEGZ Spezial: Government as a Platform in Deutschland, 2023.

O'Reilly, T., 2011. Government as a Platform. Innovations: Technology, Governance, Globalization 6, 13–40. https://doi.org/10.1162/INOV_a_00056

Peffers, K., Tuunanen, T., Rothenberger, M.A., Chatterjee, S., 2007. A Design Science Research Methodology for Information Systems Research. Journal of Management Information Systems 24, 45–77. https://doi.org/10.2753/MIS0742-1222240302

Piacentini, D., 2017. Towards the new "operating system" of the country. Team per la Trasformazione Digitale. URL https://medium.com/team-per-la-trasformazione-digitale/new-operating-system-country-technological-competence-plans-11b50a750ea7 (accessed 3.29.23).

Pope, R., 2019. Playbook: Government as a Platform.

Potts, C., Bruns, G., 1988. Recording the reasons for design decisions, in: ICSE. pp. 418–427.

Rantanen, M.M., Koskinen, J., Hyrynsalmi, S., 2019. E-Government Ecosystem: A new view to explain complex phenomenon, in: 2019 42nd International Convention on Information and Communication Technology, Electronics and Microelectronics (MIPRO). Presented at the 2019 42nd International Convention on Information and Communication Technology, Electronics and Microelectronics (MIPRO), pp. 1408–1413. https://doi.org/10.23919/MIPRO.2019.8756909

Seo, H., Myeong, S., 2020. The Priority of Factors of Building Government as a Platform with Analytic Hierarchy Process Analysis. Sustainability 12, 5615. https://doi.org/10.3390/su12145615

Styrin, E., Mossberger, K., Zhulin, A., 2022. Government as a platform: Intergovernmental participation for public services in the Russian Federation. Government Information Quarterly 39, 101627. https://doi.org/10.1016/j.giq.2021.101627

Thompson, M., Venters, W., 2021. Platform, or technology project? A spectrum of six strategic 'plays' from UK government IT initiatives and their implications for policy. Government Information Quarterly 38, 101628. https://doi.org/10.1016/j.giq.2021.101628

Trabucchi, D., Buganza, T., 2023. Platform Thinking: Read the past. Write the future. Business Expert Press.

Upadhyay, P., Kumar, A., Dwivedi, Y.K., Adlakha, A., 2022. Continual usage intention of platform-based governance services: A study from an emerging economy. Government Information Quarterly 39, 101651. https://doi.org/10.1016/j.giq.2021.101651

Yli-Huumo, J., Päivärinta, T., Rinne, J., Smolander, K., 2018. Suomi.fi – Towards Government 3.0 with a National Service Platform, in: Parycek, P., Glassey, O., Janssen, M., Scholl, H.J., Tambouris, E., Kalampokis, E., Virkar, S. (Eds.), Electronic Government, Lecture Notes in Computer Science. Springer International Publishing, Cham, pp. 3–14. https://doi.org/10.1007/978-3-319-98690-6_1

Zaramenskikh, E., Lyubarskaya, M., 2020. Integration of Digital Services Within the Framework of the Implementation of "Government as a Platform" (GaaP) Model on the Example of a Social Fund, in: Zaramenskikh, E., Fedorova, A. (Eds.), Digital Transformation and New Challenges, Lecture Notes in Information Systems and Organisation. Springer International Publishing, Cham, pp. 1–10. https://doi.org/10.1007/978-3-030-43993-4_1