Towards “Government as a Platform”: An analysis framework for public sector infrastructure

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Abstract. "Government as a Platform" (GaaP) is a promising approach to the digital transformation of the public sector. The approach sees Government as an open platform on which people inside and outside the government can innovate and co-create better public services. On a technical level, this is enabled by public sector infrastructure that also follows the approach. However, it remains unclear how exactly GaaP can be applied to public sector infrastructure in practice. In order to tackle this challenge, we develop a framework for the analysis of public infrastructure regarding its platform character. We apply the framework to a current public infrastructure project in Germany to demonstrate its applicability and infer possible future improvements. We contribute to literature by integrating GaaP literature with ideas and concepts from general IS platform literature and contribute to practice by providing a tool that supports the application of GaaP.

Keywords: Government as a Platform, Digital Transformation, Platformization, platform-oriented architecture

1 Introduction

Government as a Platform (GaaP) is a promising approach to the digital transformation of the public sector. Following GaaP, the public sector is transformed to an open platform on which people inside and outside government can innovate and contribute in order to co-create better public services [1]. According to literature, GaaP results in increased user-friendliness of public services [2–5] and higher efficiency of the public sector [6]. On a technical level, these benefits are enabled by modular and open platform infrastructures [7] However, despite these benefits, there are no guidelines on how to apply GaaP to public sector infrastructure in practice. For example, Tim O'Reilly proposes the adoption of "service-oriented architecture for all your applications" [1], but the "how to" remains open. Arguably, this absence of concrete guidelines can hinder the spread of GaaP and, thus, the spread of its benefits. In IS literature the need for guidelines for such infrastructure transformations is discussed under the term "platformization" [8, 9]. However, this literature is comparably new and lacking concrete tools and methods that are applicable in practice.

A first step towards a method for platformization would include the analysis of the status quo. Consequently, this paper addresses the following research question: What

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is a framework for the theory-based analysis of GaaP in practice? To that end, we build upon existing literature and develop a three-part framework which allows the analysis of existing infrastructure regarding its platform character. The tool can be used for the application of GaaP in practice. To validate our findings, we apply the framework to a specific part of the public sector infrastructure in Germany in two workshops with technical experts from government. We discuss and infer ideas for future research.

2 Government as a Platform, platforms and platform-oriented infrastructure

The concept of GaaP was coined by Tim O'Reilly, describing it as viewing the Government as an open platform on which people inside and outside the government can innovate and contribute so that better public services can be co-created [1]. Over the years, several different perspectives on and conceptualizations of GaaP have been developed, e.g. GaaP as an approach to digital infrastructure [2]. Scholars have highlighted the benefits of GaaP, e.g. reduction of costs [6] and better outcome at the same time [10]. While the definition and conceptualization of GaaP is still subject of research [4], several reoccurring underlying principles of the approach can be stated. E.g. GaaP builds upon openness [1, 4] and harnesses the innovative power from the outside [1, 11] by fostering participation [1, 10]. Crucially, the role of the state changes from a service provider to the owner of the platform [1, 10, 11].

Platforms can be defined as systems that consist of a stable platform core and a variable periphery [12, 13], often in form of an ecosystem [14]. The link between the two parts has been conceptualized as boundary resources [15, 16]. For the resulting digital platform ecosystem three roles can be distinguished [17]: The platform owner owns the platform and makes fundamental decisions about the platform design and boundary resources. Complementors are external actors who create complementary functionality on the ecosystem and thereby create value. Users are other external actors who use the products and services created by complementors [17, 18]. This form of co-creation is a constituting feature of platforms and can be defined as "arm's length relations between the platform owner and third-party developers" [19, 20]. Regarding infrastructure, the transformation from silo-based to platform-oriented infrastructures is currently a topic in theory and practice [8, 9, 21].

3 Methodology

The methodology of this research follows the design-science research paradigm because of its problem-solving capability [22]. The problem that we tackle is the lack of guidelines on how to apply GaaP to public sector infrastructure in practice. To address this gap we follow [23] and develop a framework based on a literature review and then apply that framework to a case in Germany. The hermeneutic literature review [24] focused on seminal papers from platform literature in general and on GaaP in particular. Based on the snowball method, we started our review with the papers by

O'Reilly [1] and Hein et al. [17] and performed forward and backwards searches in order to find relevant literature. To validate the framework, we applied it to a specific part of the public sector infrastructure in Germany, which is currently under development. The development project is named "FIT-Connect" and consists of new software components that organize and perform the transport of application data. The actual application of the framework was performed in two online-workshops with experts from FITKO – the public agency that is responsible for FIT-Connect – and from the federal and states governments. The workshops were documented using the online collaboration tool Miro. The documentations have been sent to the participants for feedback. Table 1 displays more details on the workshops.

Table 1. Overview of the workshops

	Workshop 1	**Workshop 2**
Date	28th May 2021, 10am to 1pm	01st June 2021, 9am to 12am
Partici-pants	3 architecture experts from FITKO, responsible for the design and implementation of FIT-Connect	15 members of the federal architecture board of Germany, i.e. leading technical experts from government
Content	Application of the framework to FIT-Connect and discussion of the implications of GaaP	Discussion of the implications of FIT-Connect and general aspects of the application of GaaP

4 A framework for the analysis of public sector infrastructure

Building on concepts and principles from literature, we propose the following framework divided into three parts Table 2. The purpose of this framework is to allow for the analysis of public sector infrastructure regarding its platform character – i.e. the extent to which the infrastructure aligns with platform concepts and principles.

While the elements of the framework originate from literature, the final composition of which aspects to included and how, is the result of an iterative process and based on discussion with experts from the case. The part "elements and roles", for example connects to various decision on the best graphical representation of the components of FIT-Connect. The inclusion of principles follows the observation that a platforms need a platform dynamic which relies on "living" certain principles. Finally, the part on management and governance is especially relevant to FITKO as a platform owner.

The part "**Elements and Roles**" draws on literature on platform elements and roles [13, 15, 17] and aims at identifying the components of the platform and their relations. The platform elements are concerned with the attribution of infrastructure components and resources to the typical platform elements *platform core, boundary resources* and *ecosystem* [13, 16]. By attributing existing components to these platform elements, missing or redundant components can be identified. The platform roles are concerned with the relevant infrastructure stakeholders and consist of the *platform owner*, the *complementors* and the *consumers*, following [17]. By attributing those roles, the relations between the actors can be defined and optimized.

Table 2. Framework for the analysis of public infrastructure regarding its platform character

1. Elements and roles	2. Theory-derived principles	3. Management and governance
Platform elements What is the core, the boundary resources, ecosystem of the platform? *E.g. the app store is the core and apps are the ecosystem of the google play platform* **Platform roles** Who is the owner, the complementors, consumers of the platform? *E.g. Google is the platform owner and app developers are complementors*	**Openness** How is the openness of the platform designed? *E.g. Developers need to be approved but in principle everyone can develop apps* **Participation** How is participation within the platform enabled? *E.g. comments and ratings serve as feedback loops from users to developers* **Decentral Coordination** How are the actors coordinated without a central entity? *E.g. demand and supply*	**Facilitate and Orchestrate** How does the platform owner facilitate and orchestrate the co-creation on the platform? *E.g. Google provides tutorials and other resources for developers* **Provide Tools** Which tools are provides on the platform? *E.g. SDKs and reference implementations* **Manage Assets** How are the assets of the platform managed? *E.g. through forums*

The part "**Theory-inferred principles"** draws on general GaaP literature [1, 3, 5, 10] and aims at evaluating the existing infrastructure regarding constituting principles of GaaP. GaaP and platforms in general are built upon *Openness* [25] which enables *participation* of various actors [1, 10] who are *coordinated in decentral manner* [3, 5]. By assessing these principles the degree to which the infrastructure aligns with platform characteristics can be determined and improvements inferred.

The part **"Management and governance"** is based on [10], who defines tasks for the public sector as a platform owner. The three tasks are "*facilitate and orchestrate*", "*provide tools*", and "*manage assets*" [10]. By analysing the existing infrastructure owner regarding these tasks, the management and governance of the platform can be assessed and potential shortcomings can be identified.

4.1 Exemplary Application

In order to evaluate our findings, we apply the framework to the case of FIT-Connect in Germany. The results are summarized in Table 3. The platform elements of FIT-Connect consists of a middleware component ("Zustelldienst") which is considered the platform core and online-portals plus business applications ("Fachverfahren") that use this core and constitute an ecosystem. The boundary resource of FIT-Connect consists of the middleware API and documentations as well as reference implementations on how to use the interfaces. The alignment with platform principles differs. I.e. the openness of the platform is secured via a public specification of the API using a well-

known standard (OpenAPI). At the same time, the participation is still restricted, e.g. contributions to the development of the API specification cannot be made by everyone. The analysis showed that the platform owner, the FITKO, does not yet have concrete ideas on how to manage the platform apart from providing a developer website. Especially, the management of the platforms assets remains open.

Table 3. Analysis of the FIT-Connect infrastructure using the presented framework

1. Elements and role	2. Theory-derived principles	3. Management and governance
Platform elements Core: Middleware ("Zustelldienst") Boundary Resources: APIs, SDKs, Ecosystem: Portal, Business Applications **Platform roles** Owner: FITKO Complementors: Developers/ IT services providers Consumers: Citizens, Companies	**Openness** OpenAPI Spec, Sign up required **Participation** Feedback via Mail, but not in the code repository directly **Decentral Coordination** Via existing groups and boards	**Facilitate and Orchestrate** Developer website with information and documentations **Provide Tools** Reference implementations **Manage Assets** ?

The application yielded several insights for the further development of FIT-Connect and the framework. With regard to FIT-Connect, the application showed that the platform approach of FITKO is still sketchy and needs further specification. Also, the consistency and completeness of the project in its current form is not optimal yet. Regarding the framework, the lack in granularity has implications for its applicability. E.g. the principles are too abstract to perform a proper analysis.

5 Discussion and first Conclusion

Based on this first evaluation of the framework, we make two observations. First, the application of GaaP to public sector infrastructure struggles from the lack of comprehensive guidelines. Drawing from general IS platform literature can help complement existing insights and help in practice. This raises the question how general platform literature can be further exploited in order to underpin the application of GaaP to public sector infrastructure. This should also lead to further enhancements of the framework and allow for feedback to theory on how applicable some frameworks are, e.g [10]. Second, the obvious limitations of this research in progress lies in its lack of evaluation. Although we find evidence that concrete tools and methods can help the application of GaaP in the case of the FITKO, the application in broader (government) infrastructure remains unclear. This question also touches on the suitability of the framework for general "platformization" as discussed in literature [8, 9]. Further research should include the evaluation of the framework with heterogeneous cases from practice in order to ensure its broader applicability.

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