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Fostering an innovation ecosystem for a public digital health platform

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Short Paper

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Abstract

This short paper explores building innovation platforms in the public sector, particularly in public healthcare, through an ecological lens. While existing research has mainly focused on the platform owner's role in orchestrating innovation, this study investigates the strategies used by public organizations and widens the net to analyse how a digital health platform's complementing actors contribute towards innovation within the ecosystem. The paper further highlights the fundamental difference in market logic between public and private platforms. Using the case study of Helseplattformen, a public digital health platform in central Norway, the study aims to identify platform establishment strategies and ecosystem actor interactions that contribute to innovation emergence. The study contributes both theoretically and practically to digital platforms literature and provides guidance for decision-makers and project managers in the public sector who want to adopt or manage similar digital health platforms.

Keywords: Digital Innovation, Digital health platforms, digital platforms, ecosystems

Introduction

Literature from both academia and the industry has documented how digital platforms play a critical role in digital transformation by providing infrastructures that facilitate both transactions and collaborative innovation among different stakeholders(Gleiss et al. 2021). In healthcare, literature suggests that digital platforms can address the industry's main challenges of high fragmentation and low innovation by enabling interoperability and access to shared data repositories (Fürstenau et al. 2019). This is promising for a sector that has struggled with information silos for decades, where data has stayed in heterogenous information systems which has made it difficult for organizations to access and utilize it (Baseman et al. 2017). It is therefore, expected that the healthcare industry will leverage on the capabilities accorded by digital platforms to innovate new forms of delivering care (Ilan 2020; WHO and ITU 2020). Their access and accumulation of big data will allow collaborating stakeholders to reuse and innovate new products and services within healthcare. In Europe, most countries have launched or are in the processes of setting up digital health platforms aimed at capitalizing on both private and public resources to improve on the efficiency of healthcare delivery, empower patients, facilitate cross-sectoral communications and foster aggregation of knowledge (Vassilakopoulou et al. 2017; WHO and ITU 2020).

These digital platforms in public healthcare are positioning themselves as hybrid platforms, exhibiting characteristics of both transactional and innovation platforms. For instance, in Sweden, "*the national service platform*" and in Central Norway, *"the health platform"* have been developed by a consortium of Swedish regions and Central Norway municipalities respectively (Helseplattformen 2023; Inera_AB 2023). They are transactional in the sense that they offer a platform for interaction between patients and different healthcare providers and innovative as they also provide a foundation upon which other complementary applications and technologies within healthcare can be built (Bonina et al. 2021). Unfortunately, these

platforms have prioritized and focused on the transactional side of the platforms while neglecting the innovation side. Bonina et al. (2021) points out that is not surprising given the architectural complexity and the high cost of developing innovation platforms. Research has also shown that establishing such innovation platforms is challenging, particularly for organizations that are not technical or software companies (Schreieck et al. 2022). Furthermore, the healthcare domain presents additional challenges, such as stringent regulations and restrictions on data sharing across organizations (Pietronudo et al. 2022). Nevertheless, by predominantly focusing on efficient delivery of pre-existing healthcare services, these platforms lose out on the innovative potential provided by their digital capabilities.

The first step towards building an innovation platform is for public organization to collaborate with other public agencies, private and technological stakeholders in breaking down established silos and sharing data (Pietronudo et al. 2022). Echoing, Vega and Chiasson (2019) also point out that innovation is a collective effort of multiple actors from all sectors including non-governmental organizations, industry associations and even individuals through their reflexivity and creativity. Digital platforms have a unique capability to connect multiple stakeholders through its layered-modular architecture (Wang 2021; Yoo et al. 2010). However, one of the biggest challenges faced by platform strategists is how to attract potential users and innovation complementors to invest in a platform that has few users or services, what Cusumano et al. (2019) refer to as the *"challenge of the chicken and the egg"*. Similar concerns were raised by Aanestad and Jensen (2011) who talked about the "bootstrapping problem" when launching novel digital infrastructures where the user community is almost non-existent. To solve this problem, scholars have suggested that platform owners must first, create a technology that complementors can trust with innovating and building their products and services upon (Cusumano et al. 2019). Secondly, platform owners should be able to persuade their initial users by providing offers that target their needs(Aanestad and Jensen 2011). In the case of digital health platforms, they have the unique proposition of accumulated big data that is sought after by their potential innovation complementors. However, digital health platforms are also highly regulated and bound by law when it comes to the processing of health data, creating another "chicken and egg" situation. Currently, there is limited research on how public health organizations navigate the process of initiating, building, and fostering digital platforms for innovation within the healthcare ecosystem.

Previous research suggests that building innovation platforms mainly involves aligning a platform's architecture with its governance strategy (Cusumano et al. 2019; Tiwana 2013). However, as this knowledge has been predominantly derived from research covering commercial or for-profit platforms, these approaches, overlook the fact that extrapolating this knowledge to the public sector platforms is problematic due to their differing strategies (Bozeman and Bretschneider 1986). The fundamental difference lies in their market logic, where public digital platforms aim to create public value, while private digital platforms seek to gain a competitive edge to maximize their profits (Cordella and Bonina 2012). Cordella (2007) also cautions that public organizations risk going against the spirit of public goods by treating their citizens as customers and implementing strategies based on the market logic of private companies. Furthermore, public healthcare, is a highly regulated domain with notoriously complex stakeholders (Agarwal et al. 2011; Pietronudo et al. 2022). Therefore, there is need to generate knowledge on strategies applied by public organizations in healthcare towards building their innovation platforms.

Moreover, while research has demonstrated that transformative innovation involves multiple technologies and stakeholders (Pentland et al. 2022; Pietronudo et al. 2022; Vega and Chiasson 2019), it has primarily focused on the role of platform owners in orchestrating innovation within an ecosystem, thereby overlooking the role played by complementing actors (Engert et al. 2023; Selander et al. 2013). On the other hand, research that has acknowledged the role played by third-party complementors, has related it to the agency of the platform owner, either by fully opening up their platforms or allowing controlled access (Eaton et al. 2015; Ghazawneh and Henfridsson 2013; Karhu et al. 2018). Hence, it is still unclear how platforms leverage innovation from third parties, particularly for public sector platforms that present a different market logic from the private sector. To address this multi-fold problem, this paper aims to explore the strategies employed by public organizations in the establishment of digital innovation platforms and the fostering of innovation within the unique landscape of healthcare ecosystems. The investigation will be carried out in stages: first, the focus will be on the initialization phase which is usually characterized by the platform owner's efforts to establish a platform, gain trust from potential users and complementors and encourage their initial participation in a platform. Second, the focus will shift away from the initial setup to the stakeholder interactions that lead to innovations within a platform.

To gain an understanding into the strategies applied during the initialization phase of a platform and how the subsequent stakeholder collaborations lead to innovations within a public digital health platform, this paper analyses the case of Helseplatformen, a digital health platform owned by the municipalities and the central region of Norway (Helseplattformen 2023) which is in its early developmental stage. The platform itself defines innovation *as "something new, useful, and which is made useful by the health service in Central Norway using the Health Platform. The innovation can be both everyday improvements and radical changes"* (Helseplatfformen 2022)(p9). In alignment with this view of innovation, the paper will not only identify the platform initialization strategies but also how different actors within the platform contribute to the development or improvement of services, products, processes, or even organizational structures within the region. It explores this through the following research questions:

In an innovation ecosystem of a public digital platform, how does innovation as a whole emerge:

1) *through the initial development strategies?*
2) *through the interactions of the multiple actors in the ecosystem?*

Theoretical Background

This paper draws from multiple complementary research streams focusing on digital infrastructures and platforms in general, digital platforms in healthcare, and digital platforms in the public sector. Analysing this literature enabled the identification of the singularities presented by digital platforms in the public health sector, highlighting the need for specialized knowledge generation. Strategies were also identified.

Singularities of public digital public digital health platforms

While both private sector and public sector platforms aim to enhance the delivery of healthcare services, they have different ways in which they approach the development and management of healthcare services. Firstly, public sector platforms are typically developed and provided by government entities or by a consortium of government entities like central, regional or local authorities and other healthcare stakeholders (Fürstenau et al. 2019). They are often funded by governments and their primary goal is to serve the public interest rather than generate profits (Hautamäki and Oksanen 2018). These platforms mainly focus on transforming healthcare delivery by providing universal access to healthcare services for the entire population (Vassilakopoulou et al. 2017) by enabling interoperability among different health information systems. Furthermore, efforts in digital innovation within healthcare have primarily focused on improving interoperability to enhance the seamless exchange of information amongst its heterogeneous stakeholders(Fürstenau et al. 2019).

In contrast, private sector platforms are typically provided by private healthcare providers or technological companies which prioritize profit maximization, even though they also aim to improve healthcare outcomes. These platforms are funded by private investors and often focus on innovating solutions that meet the needs of specific user groups or target markets that will earn them the highest returns on their investment (Gleiss et al. 2021; Hermes et al. 2020). Gleiss et al. (2021) further highlighted how the big technology companies are leveraging their cross-sectorial power to target different market segments in healthcare.

Another area of difference between private sector and public sector platform is in their innovation capabilities. Public sector platforms are often constrained by stringent regulations on their use of data to ensure privacy and security for users while in contrast, private sector platforms have more flexibility (Lupton 2014) in reusing platform resources like data. This enables them to leverage their data resources and other stakeholders to innovate and scale faster. In a study of scaling strategies applied by a public digital health platform, Fürstenau et al. (2019) pointed out that the platform lacked the fundamental drivers for massive scaling which often include heavy reuse of accumulated data, subsidies for cross network externalities and heavy capital investments. Additionally, public organizations face inherent limitations due to structural barriers, and the complexity of stakeholders involved often results in slow consensus building, which slows down the pace of innovation (Hautamäki and Oksanen 2018; Vassilakopoulou et al. 2017). To summarize and highlight the differences between public and private digital platforms, the reviewed

literature was organized according to their identified areas of difference and presented in table 1 as shown below.

Understanding these differences is crucial. Therefore, as implored by (Bozeman and Bretschneider 1986; Hautamäki and Oksanen 2018; Vassilakopoulou et al. 2017), it is worthwhile for the IS discipline to conduct more research on digital platforms within the public sector to generate knowledge rather than relying on extrapolation from private digital platforms. This is especially important since the users of such platforms often include the most vulnerable members of society, who should be protected from the undesired consequences of employing such platforms (Thompson and Venters 2021). Furthermore, such theoretical underpinnings will extend the existing knowledge on digital platforms.

	Areas of difference	**Private sector digital health platforms**	**Public sector digital health platforms**
1	Platform Ownership	• Provided by single organizations that are mostly technological companies. *(Gleiss et al. 2021; Lupton 2014)*	• Mainly provided by government agencies or a consortium of Central, Regional or Local governments and other healthcare stakeholders *(Fürstenau et al. 2019; Hautamäki and Oksanen 2018; Vassilakopoulou et al. 2017)*
2	Platform objectives	• Creating a competitive advantage • Maximizing profits • Fostering innovation *(Gleiss et al. 2021; Lupton 2014)*	• Focuses on Universal access of healthcare. • Focuses on interoperability over innovation. *(Fürstenau et al. 2019; Vassilakopoulou et al. 2017)*
3	Platform's target market	• Special target groups *(Hermes et al. 2020; Lupton 2014)*	• General population *(Fürstenau et al. 2019; Vassilakopoulou et al. 2017)*
4	Platform Innovation capabilities	• Flexible regulation on reuse of platform data resources for innovation *(Lupton 2014; Pietronudo et al. 2022)*	• Restricted reuse of platform resources by third parties • Slower pace of innovation-complexity of consensus building *(Fürstenau et al. 2019; Hautamäki and Oksanen 2018; Lupton 2014)*
5	Platform scaling	• Massive capital investiments • Subsidies for cross network externalities • Massive harversting of user data *(Fürstenau et al. 2019)*	• Limited funding • Limited or no subsidies for cross network externalities • Restricted data reuse *(Fürstenau et al. 2019)*

Table 1. A Market logic differences between the public and private sector.

Digital platform ecosystems

Tan et al. (2020) broadly define a digital ecosystem as a community of individuals, organizations and entities brought together through technological mediation for a focal value proposition. In the context of ecosystems cultivated around digital platforms for innovation, the principal goal revolves around harnessing the complementary innovations of ecosystem actors to foster the platform growth (Li et al. 2022). These ecosystem actors, often referred to as complementors or third-party developers or businesses develop products and services which extend a platform's value proposition. To better understand the ecosystem around digital platforms in healthcare, this research project adopts the WHO and ITU (2020) handbook definition which referrers to a digital health platform as *"a common digital health information infrastructure ('infostructure') that digital health applications and systems are built upon in order to deliver digital health services for supporting healthcare delivery in a consistent and integrated manner"* (p6).

While digital platforms indeed create ecosystems centred around them, it's important to note that they often, along with other platforms, exist within a wider digital ecosystem (Tan et al. 2020). In alignment, Selander et al. (2013) also pointed out that it's a platform's digital properties that allow firms to engage with multiple ecosystems, bolstering their innovation potential not only at a single innovation layer but on multiple innovation layers (Yoo et al. 2010). They used the notion of capability search and capability redeem to demonstrate how a non-focal actor extends their own innovative capabilities by participating in multiple ecosystems. To illustrate this perspective, the paper draws on the metaphor of the natural ecosystem as proposed by Wang (2021). It aims to investigate how complementary actors contribute to the initial development of a platform and how their interactions further contribute to the emergence of innovation in a public digital health platform ecosystem. Although the project follows the ecosystem of a single digital health platform, it does not exist in isolation, implying that the domino effect of its complementors' interactions will have an impact on the platform itself.

Taking an ecological lens, Wang (2021) explains how a digital innovation ecosystem is not only a complete whole (holon) consisting of several smaller parts but can also be part of other innovation ecosystems at a higher level. That several individual or organizational actors make up a service or product ecosystem, which are in turn part of a larger business ecosystem, and so forth. They refer to this hierarchical nature of ecosystems as the "*holarchy of digital innovation ecosystems*". Within these ecosystems, Wang (2021) argues that innovation can manifest as either structures or functions at both levels of the holon, either at the constituent complementor level or at the ecosystem level. They define structure as patterns of actions or interactions where actors might alter their product offerings, business models or processes. These structural modifications, in turn, lead to changes at the ecosystem level as other actors realign to accommodate them. They point out that this is in accordance with the principle of holon which states that *"every holon has the dual tendency to preserve and assert its individuality as a quasi-autonomous whole; and to function as an integrated part of an (existing or evolving) larger whole"* (p403).

The following section explores some of the strategies that have been employed during the initial establishment of digital platforms, as discussed in existing literature. These strategies offer insights into how digital health platforms could navigate the challenges of attracting and retaining complementors while fostering innovation within their ecosystems.

Platform establishment strategies

As earlier pointed out, literature on platform establishment has mainly focused on strategies employed by a platform owner. Hanseth and Lyytinen (2010) focused on the design strategies applied by the owner to attract users to a new infrastructure. They proposed design principles that emphasized the designer's strategic decisions and role in addressing the bootstrapping problem when the user base was not readily available. The first principle they proposed was to prioritize the immediate use value of the infrastructure by designing for its 'direct usefulness'. Here, they argued that the infrastructure designers should create IT capabilities that directly attract the early adopters. That on the onset, they should focus on creating solutions for the targeted small groups rather than creating solutions for a large user base and that issues

scaling, and complete solutions should only be considered after the early adopter's needs have been sufficiently met.

Secondly, the proposed that designers should leverage already existing infrastructure ('installed base') as opposed to building new infrastructures that might deflect the attention away from the capabilities offered by the installed base. That designers should also focus on building bridges and gateways to other existing infrastructure and that this lowers the adoption barriers for the users. Lastly, Hanseth and Lyytinen (2010) proposed the principle of using persuasive tactics to create momentum for installed base. Here, they brought in the aspect of governance by arguing that the user base is way more important than functionalities and that owners should develop governance strategies that build a large user base and provide incentives for the use of the IT capabilities of the infrastructure. they insisted that any additional functionality to the installed base should be considered only if it's beneficial and can be sustained by the accumulated user base.

On the other hand, Aanestad and Jensen (2011) accurately pointed out that although these design principles provide normative knowledge on generating attractors that draw users to an empty platform or infrastructure, they foreground the platform owner and designer while giving other actors and users a passive role. They argue that this might not be a sufficient representation of goal-oriented digital health platforms, especially those initiated by public agencies for interoperability purposes where multiple stakeholders are involved. They argue that initiating such platforms need go beyond design strategies to include mobilization and coordination of the multiple stakeholders within the ecosystem as agency is distributed among them. Following two such cases that involved many stakeholders, they observed that the project that devised strategies consistent with Hanseth and Lyytinen (2010)'s design principles was successful when compared to the other that did not. Notably, Aanestad and Jensen (2011) also failed short of identifying the specific mobilization strategies nor stakeholder agencies in the establishment of these infrastructures. They however, pointed out that the successful project leveraged on the platform's modular architecture to strategically mobilize stakeholders by allowing them to decouple from the base to hence giving them the flexibility to only adopt partial solutions relevant to them. They argued that while Hanseth and Lyytinen (2010) saw this as a design principle for scaling, modular architecture could be leveraged as a platform establishment strategy towards mobilizing heterogeneous stakeholders onto the platforms, a notion they referred to us 'modular implementation strategy' (p173).

Closely linked to design strategies, Fürstenau et al. (2019) observed that when faced with the choice between interoperability and innovation, public digital platforms often chose to prioritize the technical infrastructure by creating interoperability standards over engaging innovation partners like the app development communities. That by focusing on interoperability, they improve the productivity and coordination among the collaborating stakeholders. Furthermore, they argue that the basis for innovation in such platforms is mainly geared towards integration with existing workflows and infrastructures. In this regard, the platform owner can adopt various strategies to ensure a platform's success, however, limited attention has been paid to the role that complementors play in the platform ecosystem although they play a significant role in attracting users and adding value to a platform.

Methodology

Case description

The project tracks a public digital platform as it launches its innovation platform through a sandbox. A sandbox is a "safe space" that allows innovators to test their products and services before deploying them to the general population. It serves as an environment for both testing and regulatory assessment (Leckenby et al. 2021). Initially, financial technologies (FinTech) used the sandbox approach to enable regulators, financial institutions, FinTech companies, and academia to test new innovations without affecting the existing systems (Leckenby et al. 2021).

The public digital health platform is owned by the municipalities and the central region of Norway. The region signed an agreement with Epic Systems to provide a generic platform solution. The platform includes a common electronic health record for citizens, which improves efficiency in healthcare delivery services and empowers citizens by providing accessibility to their healthcare providers. The transactional side of the platform was launched in November 2022, and now the platform has begun to focus on building an

innovation platform through a sandbox testing environment provided by Epic Systems. This article follows the project as they launch their sandbox to stakeholders while analysing their strategic choices.

In this case, the platform is also targeting to solve the main problems of healthcare, which are interoperability and faster innovation within the region. They plan to offer a test and development environment for suppliers and research and development, enabling them to innovate while also providing them with a chance to retrieve data for research innovation. Additionally, they plan to drive innovation through patient-facing applications like the patient health management app called "Healthy Me."

Drawing upon Wang (2021)'s holarchy of digital innovation ecosystems, Helseplattformen's ecosystem actors can be identified as patients and citizens, owners who are also customers (region and municipalities), technological suppliers and health clusters, other public agencies, and research and development entities. These same actors are also reflected in other regional platform ecosystems as well as the national ecosystem. At the business level, some suppliers, such as Epic Systems, have their own larger business ecosystems spanning across different product and service ecosystems within the digital health ecosystem category.

Data collection

Initial data was collected through open stakeholder webinars organized by the platform owners, and two major suppliers in the platform ecosystem. Further data will be collected qualitatively through attending information webinars, reviewing documents, interviewing platform owners, developers, and collaborators. The targeted collaborators are the two major suppliers who are playing a major role in the initial establishment of the platform. As of now, the stakeholders have already collaborated to create video consultation services to be used by the region's inhabitants through the platform.

Data analysis and future plans

Using the ecological lens to establish the platform actors' patterns of actions. What will be the next step is to collect enough data for substantial analysis of the actor's interdependent interactions and patterns of actions that facilitate the establishment and further innovations on the platform. By examining specific projects and collaborations like the video consultation service within the platform, the analysis will highlight and theorize the actors' role in facilitating innovation within the platform.

Expected Contribution

This paper makes both theoretical and practical contributions. Firstly, it contributes to the existing literature on platforms by specifically analysing and examining the strategies applied during bootstrapping and the resulting innovations from the ecosystem actors' actions, rather than solely focusing on the platform owner. Secondly, it is expected to extend the literature on digital platforms by focusing on public platforms, which will provide guidance for decision-makers and project managers within the public sector who are responsible for adopting or managing similar digital health platforms. This could involve identifying best practices for fostering innovation, promoting collaboration among ecosystem actors, and overcoming challenges related to interoperability and regulatory compliance.

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