Building National eHealth Platforms: the Challenge of Inclusiveness

Completed Research Paper

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Abstract

In this paper, we examine the introduction of public e-health platforms at the national level in three Scandinavian countries. Specifically, we investigate these initaitives with a focus on understanding how inclusiveness was pursued in relation to the political orientation of platform development, the coordination of work among multiple contributors, and, the handling of technical heterogeneity within the pre-existing and continuous evolving eHealth landscape. Inclusiveness is related both to the character of public platforms as “common goods”, and, to growth ambitions for public eHealth. The aim for inclusiveness sets the platforms studied apart from the market oriented ones that are mostly discussed in the literature. Our paper highlights the implications of sector differences to platform formation and contributes insights that are specific about public eHealth platforms.

**Keywords:** digital health, platform, public services, common goods, cross-country comparison

# Introduction

Whenever multiple actors need to contribute and build upon the same resources, several problems emerge related to the distribution of work required for producing and effectively managing resources and with regards to the appropriation of benefits (Hess and Ostrom 2006). Nevertheless, when there is a common interest, workable arrangements can be found and the literature on collective action and the governance of commons provides intellectual resources for thinking about such settings. This literature grapples “with the age-old problem of how to induce collaborative problem solving and other forms of collective action among self-interested individuals, groups, or organizations, assuming, of course, that they share at least some common goals” (Fulk et al. 1996, p. 60). While traditional studies in this area have addressed natural commons, such as fisheries, grazing land, or other natural resources, the commons perspective has more recently been applied to the study of digital initiatives, electronic networks, and information resources (Constantinides and Barrett 2014; Eaton et al. 2017; Hess and Ostrom 2003; Markus et al. 2006; Wasko et al. 2009). The commons perspective advocates governance arrangements that favour the community as a whole while still allowing single stakeholders or groups of stakeholders to pursue their own interests.

The governance of commons is a relevant conceptual framing for understanding the challenges of building digital platforms in the public sector. Digital platforms in the public sector are a new form of public good, central for public service delivery. Digitalization is changing the ways people communicate, work, and conduct their everyday living and this is significantly influencing the way public services are conceptualized and delivered. The public sector is attempting to transition towards new service models based on partnerships within and between levels of government and with the private sector. Digital platforms are seen as tools for driving innovation, facilitating social interactions, and are powerful engines of growth (European Commission 2016). The deployment of eHealth platforms is a key concern for most European countries since healthcare is a key public service domain in Europe. The interest in eHealth platforms shifts the focus from building novel end-user functionalities per se towards establishing capabilities that can facilitate the introduction of eHealth services by a wide range of actors at different government levels stimulating also the involvement of private companies. Many European countries have already launched or are currently in the process of setting up national platforms for eHealth services. Central drivers of these initiatives are visions for strengthening the patients’ role, for finding ways to capitalise better on public and private resources, for facilitating better knowledge aggregation across communities and, for providing means for wider and more radical service innovation. These platforms support communication within healthcare, information sharing, distributed data management, and peer-to-peer patient networks or flexibly organized health communities.

Public eHealth platforms aim at facilitating interactions across the diverse public health spectrum (Vassilakopoulou et al. 2016). Involving as many actors as possible, reaching out for all citizens by accommodating different needs and leveraging diverse existing digital capabilities is both an ethical concern for public service and a requirement for platform growth and sustainability. In other words, inclusiveness is a duty related to the common good character of public platforms, and also part of the explicit ambition of public eHealth platforms to become “resource dense” and to provide service exchange opportunities that involve resources from multiple parties both in the production and in the consumption of the services (Lewis and Gilman 2005; Lusch and Nambisan 2015). Such platforms are not built to bring competitive advantage to selected actors or to simply replace pre-existing solutions; instead, comprehensive coverage and synergies for leveraging capabilities that are already in place are sought after. However, including such a varied set of actors within a public service context is challenging. Public eHealth platforms aim at accommodating and appealing to diverse healthcare providers (e.g., in primary care and hospitals, rural and urban) and various digital service providers (e.g., providers already established in healthcare and newcomers in the domain, ranging from large companies to small startups) that address different patient groups (e.g., chronic patients and citizens with sporadic encounters with the health system).

In this paper, we conduct an empirical investigation of the strategies by which public eHealth platforms are built in three countries -Denmark, Norway, Sweden- that are considered frontrunners in European eHealth (European Commission DG Communications Networks Content & Technology 2013; European Commission JRC Institute for Prospective Technological Studies 2014). Specifically, we investigate the formation of the three national platforms for eHealth services with a focus on understanding how inclusivess was pursued in relation to the political orientation of the platforms, the coordination of work among multiple contributors, and, the handling of technical heterogeneity within the pre-existing and continuous evolving eHealth landscape. We show how digital platforms as public goods are public investments with a long-term outlook with emphasis on their transformative potential for the sector rather than on realizing network effects as in private platforms. We contribute to the literature by identifying inclusiveness as a specific challenge faced by government initiated efforts to build common digital goods. Furthermore, we contribute to practice by pointing to the diversity of arrangements employed by eHealth frontrunners.

The remainder of the paper is structured as follows. First, we provide a brief overview of prior research on platforms. Then, we describe the three empirical settings and the method used to collect and analyse the empirical material. Subsequently, we present and analyse the different inclusivess strategies followed for political orientation, work coordination, and accommodation of technical heterogeneity in the three cases. We conclude by discussing insights from our analysis, pointing also to limitations of our work and possible directions for further research.

# Research on Platforms

In recent years, research on platforms has gained interest within the Information Systems (IS) domain (Porch et al. 2015; Schreieck et al. 2016; Sun et al. 2015). Although in general management literature many different entities have been labelled platforms including auto-body frames, videogame consoles, software programs, shopping malls, and credit cards (Baldwin and Woodard 2009), in the IS literature, the term is used for network-enabled (mostly web-based) information technology systems that are shared, evolvable, and allow the emergence of derivative products and services. A platform’s initial design starts with a set of closed specifications determining information technology capabilities and anticipated requirements for their extensions and combinations (Hanseth and Lyytinen 2010).

The definitions of platforms within the IS literature vary widely between the general and the specific (Schreieck et al. 2016). The concept has been treated in diverse ways and there is no single agreed upon and comprehensive definition in literature or in practice (European Commission 2016; Schreieck et al. 2016). However, as noted by Gawer, many online platforms share a number of important characteristics (Gawer 2016). They have the capacity to facilitate and extract value from direct interactions or transactions between users. Furthermore, they have the ability to collect, use, and process a large amount of personal and non-personal data in order to optimise, inter alia, the service and experience of each user. Platforms have the capacity to build networks where any additional user will enhance the experience of all existing users – so-called "network effects". They also have the ability to create and shape new markets into more efficient arrangements that bring benefits to users but may also disrupt traditional ones and the ability to organise new forms of civil participation based on collecting, processing, altering, and editing information.

Prior research has focused on specific roles of platforms and can be categorised based on these different platform roles. A stream of research investigates technical platforms in their role as centrepieces of innovative business ecosystems (e.g. Eaton et al. 2015; Gawer and Cusumano 2002; Ghazawneh and Henfridsson 2013; Tiwana et al. 2010). Another stream has a focus on the role of platforms as market intermediaries in two-sided or multisided markets (e.g. Armstrong 2006; Bakos and Katsamakas 2008; Tan et al. 2015). Other prior research explores platforms that are online communities enablers (e.g. Avgerou and Li 2013; Bock et al. 2015; Markus and Loebbecke 2013; Spagnoletti et al. 2015). Significant advancement has been achieved on the conceptualisation of the (potential) role of platforms in the public sector (e.g. Fishenden and Thompson 2013; Janssen and Estevez 2013; Linders 2012; Nam 2012). Nevertheless, although the benefits of introducing platforms in the public sector have been discussed, the singularities of establishing “public platforms” remain underexplored and there is limited empirical work on the formation of such platforms.

This gap is especially noticeable in the case of public healthcare platforms that are promoted by national and European-level policies, technical reports, and domain experts (e.g. Bush and Fox 2016; OECD 2016). Our research aims to contribute an empirically grounded investigation to the relatively underexplored area of public platforms for healthcare. The singularities of public healthcare are numerous: fragmentation is prevalent both at the institutional and at the technical level. Furthermore, in most European countries, the government has multiple roles as regulator, service provider, and financer of healthcare. Even more importantly, healthcare is notoriously complex and there are significant privacy and security issues. Taking a context-sensitive approach can bring insights about the variations of platform formation moving beyond using the concept as a “blanket term” for a new approach to innovation in healthcare.

# Empirical Setting and Method

## Scandinavian Healthcare Systems

The setting of our multiple case study is Scandinavian healthcare (i.e., Denmark, Norway, and Sweden). This setting has some key characteristics: universal access to health services is a main attribute, along with a strong government role with responsibilities being shared between central and local government (Magnussen et al. 2009). There is a distinction between hospitals, where the great majority is publicly owned, and primary care, where most healthcare providers (e.g., General Practitioners – GPs) are private. Both private and public providers are mostly financed from public funds. Although there are many country-specific attributes, overall, the Scandinavian countries are using a model where the municipal or county political bodies have a key role and are responsible for providing selected healthcare services and for managing healthcare providers. In Denmark, healthcare is provided with the involvement of the 5 regions and 98 municipalities. In Norway, healthcare is provided with the involvement of the 4 health regions and 428 municipalities, while in Sweden, the 20 counties and the 290 municipalities play key roles. Overall, the eHealth landscape in the three countries is densely populated; a lot of existing digital capabilities are already in place (Grisot and Vassilakopoulou 2017). Denmark, Norway, and Sweden are considered frontrunners in European eHealth and there is widespread use of electronic health systems in all three countries; for instance, all hospitals, GP offices, and nursing homes use electronic health records (EHRs) and a significant number of patient-oriented services are provided over the web (Aanestad et al. 2017; European Commission DG Communications Networks Content & Technology 2013; European Commission JRC Institute for Prospective Technological Studies 2014).

## Method

The research reported in this paper is based on the analysis of three different cases. In contrast to a single case study, multiple case studies allow for comparison across contexts, resulting in more robust conclusions (Yin 2013). Specifically, we analysed national eHealth platforms in the three Scandinavian countries of Denmark, Norway, and Sweden. The cases were selected because the three countries are front-runners in European eHealth and have managed to successfully develop national eHealth platforms. Furthermore, these countries share the Scandinavian tradition which shapes the healthcare and wider government-citizen arrangements (e.g., citizen registers including national identification numbers, significant role of the local government in health services provision, etc.) and share similar eHealth policy goals. Despite the similarities, as we discuss, the strategies followed for actually putting in place and governing eHealth platforms are very different.

Data were collected by three different teams of researchers (i.e., the co-authors of this paper). In the Danish case, data were collected through 13 semi-structured interviews conducted with staff at the central office of the national eHealth platform, as well as partners from the regions, ministries, and other health authorities. In addition, press releases, official papers, internal documents, and online information were included as data sources. In the Norwegian case, data were collected via three main sources: 28 interviews with officials from the public Agency, which is responsible for the national eHealth platform and technology providers, analysis of project documents, reports, strategy and policy documents, and observations of 55 meetings and workshops. In the Swedish case, data were collected through the active participation in design and development activities by two of the co-authors. The authors that collected the empirical material were holding dual roles (both in academia and in industry) during the 2009 to 2015 period. Specifically, one of the authors was a university professor in eHealth and R&D manager of the eHealth department in a major County Council. Another author was a doctoral fellow and deputy CTO at a major national-level organisation related to eHealth. Table 1 provides key facts about data collection in the three cases.

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| **Case**  | **Data collection** |
| **Denmark** | 13 interviews, document analysis of press releases, official papers, internal documents, and online information |
| **Norway** | 28 interviews, observation of 55 meetings, document analysis of internal project documents, policy document, and strategy documents |
| **Sweden** | Active participation in project activities, interaction with stakeholders (e.g., health organizations, developers, and vendors) and work with project documentation |

Table 1. Data Collection Overview in the Three Cases

The three cases were initially analysed separately as detailed case study write-ups (Eisenhardt 1989). The aim of within-case analysis was to achieve familiarity with the case stories and to harmonize data collection and analysis across the cases (e.g., make sure that data about the same type of events were available in each case). The data from the three cases were analysed with the same approach. First, they were organised in a timeline with attention to main events and decisions taken, and an overall case narrative was prepared. Within-case analysis was followed by cross-case analysis. Data analysis was guided by our research interest in tracing the concerns of building public digital platforms as common goods in healthcare with a special focus on inclusiveness. We worked with our data in an iterative way, cross analysing the themes identified in the three cases. The three themes that we present in the analysis section (political orientation, work coordination, handling technical heterogeneity) emerged from our material as common across the cases.

# Overview of the Three Platforms

The three platforms under study provide an impressive range of patient-oriented services: quality checked information on health and disease, information on the performance of different health institutions, access to personal health data stored in medical records across the health sector, administrative services (e.g., tracking of referrals, claims or requests), booking services, patient-provider message exchange, and e-consultation. Figure 1 provides an overview of the patient-oriented eHealth services provided by the platforms. Additionally, at the end of this section, we provide a table (Table 2) on the key milestones for each platform.



Figure 1: Patient-Oriented eHealth Services Provided by the Platforms

Interestingly, while all platforms now offer a broad range of services, the initial starting points were different. In Denmark, the national platform was launched in 2003 and started by offering quality-assured medical information for both citizens and healthcare providers, and soon after that, information about waiting lists at hospitals was also included; services that require authentication were added in 2004. In Norway, the platform started by offering quality assured but non-personalised information on illnesses and treatments (started in 2010, launched in 2011); personalised services (that require patient authentication) were added in 2013. In Sweden, it started from a Stockholm County Council initiative to provide a “secure message feature” between patients and healthcare providers (initiated in 2000, first pilots in 2002 with a limited number of patient-provider interactions such as requests for appointment scheduling and prescription renewal).

## The Danish Public eHealth Platform

Denmark has been one of the pioneers in public eHealth services. In 2001, the Association of County Councils in Denmark and the Ministry of Interior and Health initiated the work of establishing a common public eHealth portal (sundhed.dk). A broad political governing body was established, consisting of the Association of County Councils, the Ministry of the Interior and Health, the Greater Capital’s Hospital Association, and Copenhagen and Frederiksberg Municipalities, to launch the eHealth portal in 2003. The eHealth portal is still governed today by this body, and a dedicated secretariat under its auspices is responsible for administration, marketing, maintenance, and daily running. This governance structure has promoted a collective and consensual work mode aiming for extensive integration and interoperability.

This initiative started as a portal and gradually evolved to a platform for eHealth services with the mission to contribute to the implementation of multiple parties’ joint public strategies in healthcare IT (Sundhed.dk 2014). The platform has the ability to connect and use a large amount of data in order to optimize the service and experience of each user. Health data and services provided are based on external datasets from various sources. Furthermore, through the platform users can access third party digital healthcare services, such as services for booking GP appointments provided by private software companies. A major initiative was launched in 2013, the healthcare record (sundhedsjournalen), which enables a ‘one-stop-view’ for both patients and healthcare providers to medical data and other health information.

## The Norwegian Public eHealth Platform

Norway experienced the development of eHealth through non-governmental initiatives (e.g., initiatives taken by EPR vendors and other private IT companies, as well as initiatives taken by professional associations and patient organisations). The central government has been a latecomer in the field. In 2010, it was decided to put in place a national eHealth platform to: “serve as a basis for new and innovative services from both the public and the private sectors. Making these services accessible for reuse via www.helsenorge.no will provide a platform for a new type of innovation in the health and care sector.” (Norwegian Ministry of Government Administration Reform and Church Affairs 2013). The responsibility for the new platform was taken by the Norwegian Health Directorate, which is a national-level governmental agency. Lately, the eHealth related units of the Agency were detached from the overall organization to form the “eHealth Directorate”, which was established on January 2016.

The platform was launched in 2011. In 2013, a number of personalised services were added under the label “MyHealth”. Since then, the personalised services are becoming richer with new additions every year. This is achieved by creating connections to diverse capabilities that are already in place (e.g. providing access to already existing repositories) and by adding new components (e.g. for secure patient-provider interactions) through in-house development and also through synergies with key actors such as vendors and healthcare providers. The main aim has been so far, to selectively develop new components, trigger new complementary developments in the sector and link to pre-existing components while ensuring the highest levels of security, reliability and (up to an extent) uniformity in user experience.

## The Swedish Public eHealth Platform

Sweden was also a pioneer in public eHealth services. In 2000, the Stockholm County Council took the initiative to provide a “secure message feature” between patients and healthcare providers. The first pilots started in 2002, with patient-provider interactions such as requests for appointment scheduling and prescription renewal. During the following decade, a number of significant advancements were made. By 2006, eHealth services were available across Sweden, and in 2007, there was an agreement for a National Reference Architecture. In 2011, the My Care Pathways project was set up with the ambition to create an open architecture for e-services as well as third party connectivity. All infrastructure was aligned with the national reference architecture, catering for future national uptake. This project delivered several back-end infrastructure components; e.g., the open data API and the Patient-Directed Connectivity Platform. The Patient-Directed Connectivity Platform was developed during three months starting in December 2011 with its first live demo on the national eHealth fair in April 2012. The demo third party application was a utility that re-published appointments as live, subscribable webcal links. The application offered patients a live view of appointments directly in the private native calendar application of any mobile device. Furthermore, an open data API was utilized to get access to healthcare organization master data (to display opening hours and contact information of the facility). More e-services and apps are currently being developed. More importantly, there has been a cultural shift where apps are requested by both caregivers, patients, and researchers, whereas before it was not considered safe.

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| **Denmark** | **Norway** | **Sweden** |
| 2001: Project start2003: Launch of sundhed.dk2004: Launch of services that require authentication2013: Launch of sundhedsjournalen (unified view of lab results, prescriptions, and medical records) | 2010: Government Mandate2011: Launch of helsenorge.no2012: Open Data and API2013: Launch of MyHealth (personalised digital services) | 2000: Project start2002: Launch of patient-oriented eHealth services in Stocholm2007: Agreement on a National Reference Architecture2011: My CarePathways |

Table 2. Main Milestones for the Three National eHealth Platforms

# Analysis

The three public eHealth platforms were put in place aiming for inclusiveness: involving as many actors as possible, reaching out for all citizens by accommodating different needs, and connecting diverse existing resources. Inclusiveness relates to the public nature of the platforms and to the complexity of healthcare services. The platforms were not considered competitive to other entities or pre-existing components of the eHealth landscape; instead, synergies were sought after. The platforms provide capabilities that facilitate direct interactions between users with the aim to improve connectedness. Therefore, they create opportunities for efficiency improvements and enhancement of the experience of the patients. Furthermore, they enable the collection and use of large amounts of personal and non-personal data to personalise the service and experience of each user. They are becoming part of the public infrastructure and are investments with a long term outlook. An important aspect of the platforms is their potential to enable a shift towards patient-centred health, implying the need to involve a broad range of citizens.

Our empirical analysis of the cases led to the identification of common themes. Specifically, in all three cases there were significant efforts for political orientation, for work coordination among many distributed actors and for handling tehnical heterogeneity. The concern for incusiveness manifests itself in the strategies adopted for these three themes. Ιn the following paragraphs we tease out the specific strategies with a particular focus on understanding how inclusivess was pursued. At the end of the section, we summarize the findings in Table 3.

## Addressing Political Orientation

The initiation of the platforms required a decision about how central and local government were involved in the formation of the platforms, and to what extent they had a leading role.

In Denmark, the eHealth platform was initiated by forming a governing body including the municipalities, the regions, and the Ministry of Health. This arrangement allows representation of interested actors in key decision making processes. The secretariat which is responsible for administration, marketing, maintenance, and daily running of the platform does not have any strategy-related mandate or responsibility, so the role of the governing body is significant. Up to today, this governing body promotes a collective and consensual work mode. Overall, there has been broad support from relevant players in the Danish healthcare arena. Especially the initial phase can be characterized as a political showcase for regional collaboration with solid political unity and common ambition. During this phase, there has been broad consensus concerning what services to be offered to citizens and healthcare providers. The political unity, the common ambition of having one access point to healthcare services, and the broad collaboration of stakeholders were described as key reasons for the success of the portal.

In Norway, the public eHealth platform was developed under the leadership of a centrally positioned actor: a Directorate directly reporting to the ministry of Health. The Directorate has both control and ownership of the core services and implements the political orientation as articulated in parliament whitepapers, allotment letters, and governance letters. The Directorate established close collaboration with all key actors including the health regions, the various private technology providers active in the domain, healthcare professionals’ associations and patient associations. The development of the platform advanced through multiple consultations with a consensus oriented culture.

In Sweden, there is an overarching set of rules, the National Architecture Framework for eHealth services, which has been implemented since 2007. This directs the different actors on the basis of principles without the need for a dedicated steering unit. The different actors include the county councils, municipalities, Inera (funded by the counties to support shared eHealth services), Vinnova (the innovation agency in Sweden) and numerous private developers. The framework is a vision-carrying foundation that has supported the evolution of the platform. The role of the central government is to establish principles and guidelines, and to set the political agenda for health and medical care. There is no hierarchical relation (chain of command) across the central government, the 20 county councils and the 290 municipalities.

## Addressing Work Coordination

Moving from politics to execution requires coordinating work. This entails operationalising the overall orientation, ordering work, and distributing resources. This is challenging to do in a context with multiple distributed actors that are not under one line of command. The coordinator needs to provide incentives for participation and to balance the need for requests and demands with the risk of some of the actors pulling out of the activity as a result of the demands made on them. Two main types of strategies were followed to coordinate work for the eHealth platforms. In Denmark and Norway, an organised process for defining projects, prioritising them and planning new development was followed. The case of Sweden was different in the sense that it allowed more organic change to happen with the contribution of multiple distributed actors.

In Denmark, development projects are prioritised in collaboration with multiple partners as the secretariat that runs the platform does not have the mandate for project prioritization. This prioritization can be a rather lengthy process. Partners represent different interests and it was not uncommon for the priorities of the partners to shift after certain tasks have been initiated, making it difficult to keep up with the pace of demands. Furthermore, the partners raised their concerns about the need to constantly discuss service prioritisation. While the platform had a visionary start, it could easily lag behind in the fast moving sector of digital health services where there are always new needs for linking up with data sources and providers. To ensure responsiveness to needs, a re-organisation took place in 2015 to increase the delivery capacity and strengthen portfolio management in the secretariat.

In Norway, we find a similar process of addressing needs and prioritising development. During the early stages of development, a number of studies were prepared with the contribution of multiple stakeholders to plan the expansion of the platform over time. The views and needs of the health sector and of the technology providers were taken into account and processes for “anchoring” the initiative within the sector were implemented. These anchoring processes allowed stakeholders to voice their concerns and shape the plans, while the designers of the new services were able to expose their concepts and explain their rationales. All these efforts ended up with the identification of priority service areas and led to the formation of specific projects.

In Sweden, coordination is spanning multiple levels. The principle of local contribution to the national ecosystem is formalised and is one of the six architecture principles of the national reference architecture. In the cases of local and regional needs that are not aligned with national prioritizations, county councils, municipalities, and application vendors have been able to join forces and develop solutions on their own for local and regional use. Another principle of the national reference architecture (i.e., the principle of national functional scope) secures that the solution can grow to a national scale in the future. As time passes by, county councils, municipalities, and solution vendors continuously negotiate to bring their local or regional solution to a national level, sharing the solution with all publicly funded care in Sweden.

## Addressing Technical Heterogeneity

Addressing technical heterogeneity relates to dealing with the multiple pre-existing and newly developed technical capabilities within densely populated eHealth landscapes. National health platforms of universal character need to find ways to be inclusive regardless of the technical specificities of the various solutions available. It is challenging to aim for inclusiveness in such a context. The challenge lies in deciding the way forward selecting which components to build on and which to replace, as well as devising ways in which the old and the new can interoperate. This further requires a strategy and concrete mechanisms for achieving this together with all participants.

In Denmark, the portal solution was introduced in an eHealth landscape which supports different technological solutions to “work together”. This is because specific standards are used for information flows between medical practices, hospitals, and pharmacies. The Danish solution embraced heterogeneity to a great extent. For example, the portal directs patients to the GP websites (provided by various vendors) for appointment booking and for conducting email consultations. Overall, the health data and services provided are based on various existing heterogeneous sources. In some cases, data are extracted from their sources (such as hospital systems, GP systems, prescription databases) and used for native services or presented through the portal’s presentation layer. In other cases, services are “framed” to achieve a consistent “look and feel” although the service is located and run somewhere else.

In Norway, the heterogeneity of the existing eHealth landscape was addressed by a series of decisions. One important decision was to forgo linking the new platform with the existing private eHealth portals used by several GPs for communicating with patients. So, differently to the Danish approach, the platform does not redirect users to private portals. Instead, new integration with the existing GP office EPR systems was developed in collaboration with the EPR vendors. The main reasons for this decision were to ensure a uniform user experience and to control the level of security offered. Although the private portals were not linked to the platform, several components of the public eHealth infrastructure were linked (such as the pre-existing national services for changing GPs and for accessing vaccination history). Furthermore, the platform provides access to prescriptions (leveraging the national e-prescription system) and to summary care records (leveraging the national Summary Care Record system). The platform did not only embrace national-level eHealth initiatives, but also regional ones that align with the platform’s strategy and have the potential to be scaled to a national level. One such initiative provides access to medical records and another one supports message exchange between hospitals and patients. Overall, the aim has been to homogenise the quality levels and user experience for services offered nationally.

In Sweden, heterogeneity is embraced as long as a uniform user experience is ensured. For example, it is possible to allow e-services to be developed and deployed using different technologies but this should be accomplished by ensuring that they would bring the same user experience as that of an e-service developed and deployed using the platforms’ tools and infrastructure. This allows the introduction of national e-services using the development and deployment infrastructure of choice. Since 2013, the overall Swedish eHealth architecture includes a component which facilitates the engagement and innovation of external actors. This new component is the Health Innovation Platform (HIP.se) and includes a software development kit, several APIs and methods, guidelines and program code to support the development of services by freelance developers and software companies, both within and outside healthcare industry. HIP is nationally offered by Stockholm county council and HIP AB.

The Swedish experience shows the possibility of positive consequences of technical heterogeneity and redundancies when mechanisms for connections and reuse are in place. These mechanisms are provided by the National Architecture Framework which includes service contracts, legal agreement templates, procurement templates, interoperability standards, procedures for tests and certification, and a reference architecture that applies to nationally as well as regionally funded projects. For instance, the county councils of Uppsala and Stockholm developed competing viewers of health records - both with national ambitions. At the end of 2015, the Uppsala solution had a significantly larger number of users, so Stockholm’s county council decided to decommission their viewer in favour of the Uppsala one (but parts of the Stockholm viewer were implemented in the Uppsala viewer). The service contracts and the integration platform of the Stockholm solution were retained and used as national level components. Hence, the solution eventually used is a combination of Uppsala’s and Stockholm’s solutions.

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|  | **Denmark** | **Norway** | **Sweden** |
| Political Orientation | Achieved through a political governing body which includes the municipalities, the regions, and the Ministry of Health. | Achieved through a dedicated, centrally positioned Governmental Agency.  | Achieved through a vision-carrying National Architecture Framework. |
| Coordination of Work | Achieved through discussions on the prioritization of services among all partners. | Achieved through a formalised planning process that leads to the definition of projects “anchored” in the sector. | Achieved through semi-autonomous local contributions to the national level. Possible developments for local and regional use. |
| Technical Heterogeneity | Handled through implementing loose connections with most available resources. | Handled through selective integrations to homogenise the quality levels and user experience for services offered nationally. | Handled through reuse and connections. New developments encouraged allowing some redundancies. |

Table 3. Overview of the different strategies used in the three cases

# Discussion

The case analysis shows the strategies employed for dealing with political orientation, work coordination, and technical heterogeneity. In all three cases these three themes were addressed with an overarching concern for inclusiveness although the specific strategies vary significant. Inclusiveness entails involving as many actors as possible, reaching out for all citizens by accommodating different needs and leveraging diverse existing digital capabilities. The three platforms are not driven by a market logic and their role is not competitive to other pre-existing components and actors of the eHealth landscape. The public eHealth platforms have an infrastructural nature and are investments with a long term outlook; there was little focus on swiftly realizing network effects and more emphasis on providing the foundation for transformation in the sector. These characteristics set them apart from the market oriented platforms that are mostly discussed in the literature. In prior literature, there are extensive investigations on issues related to achieving network externalities and arranging pricing and value sharing arrangements (e.g. Bakos and Katsamakas 2008; Eisenmann 2008; Ghazawneh and Henfridsson 2013; Gnyawali et al. 2010; Thomas et al. 2014). These issues are hardly relevant to the cases we studied. Our paper contributes with insights that are specific about the formation of public eHealth platforms.

The three themes identified are related to the political orientation of the public eHealth platforms, the coordination of work among multiple contributors, and the handling of technical heterogeneity within the pre-existing and continuous evolving eHealth landscape. The political orientation relates to the central and local government involvement in the steering of the platforms. The coordination of work relates to the need for distributed action taking by multiple loosely connected actors (both public and private). Finally, the need to handle technical heterogeneity relates to the universal character of the platforms that aim to embrace and connect multiple pre-existing and newly developed technical capabilities within densely populated eHealth landscapes. As already noted, these themes have been addressed in all three cases with attention to inclusiveness. That said, this common interest was pursued in dissimilar ways.

The analysis of the approaches followed for political orientation shows that there are differences in the governance structures (McGinnis and Ostrom 2012; Weill and Ross 2004): in Denmark, a federal model that entailed wide representation was followed; in Norway, one national government agency took the leading role; and in Sweden, a model of polycentric governance was put in place. These differences are interesting as the three countries share significant political and institutional similarities. Overall, according to prior research on IT governance (Weill and Ross 2005), decentralised approaches are associated with growth and innovation, while more centralised approaches (including executive committees for decision making) are associated with aims for resource efficiency. This brings forward an inherent tension in the role of government for public eHealth platforms. On the one hand, there is a need for efficiency and public accountability in the use of resources, and on the other, there is a need to nurture innovation and encourage action taking and experimenting by multiple (frequently publicly financed) actors. The three different countries ended up with different resolutions on the issue.

The analysis of the approaches followed for coordinating work reveals more differences across the three cases. Orchestration has been identified as a critical aspect for public governmental platforms in prior literature (Janssen and Estevez 2013). In the three cases studied, orchestration was approached in different ways. In the case of Denmark, multiple partners are collaborating to prioritise and plan projects. This collaborative approach is different to the formalised planning process followed in Norway and different to the approach followed in Sweden where development happens through semi-autonomous, not fully pre-planned local contributions.

The new platforms had to be introduced within eHealth landscapes that include numerous existing technical solutions both for healthcare providers (e.g., different EHRs, different workflow systems, different administrative systems for prioritising referrals and arranging appointments) and for patients (including digital services for health that were developed independently by various private and public providers). In all three cases, it was important to create the conditions of linking as much as possible to the existing heterogeneous technologies. This is important for ensuring good coverage for citizens and health actors and for achieving the infrastructural quality of embeddedness for the platform (Monteiro et al. 2013). The approaches followed were again different across the three countries. In Sweden, reuse and connections were controlled by the National Architecture Framework which was used as a strategy instrument (Vassilakopoulou and Grisot 2013). The Norwegian platform followed a selective approach aiming to homogenise the quality levels and the user experience for services offered nationally. In Denmark, aiming for homogeneity and loosely linking to various existing technical capabilities were both observed.

Similarly to prior platform research, our fidnings show that the platform-environment dynamics are shaped by complex processes that relate to actors’ actions, technical decisions, and governance (Tiwana et al. 2010). Also, overall, all three platforms exhibit most of the key characteristics noted by Gawer (Gawer, 2016). However, in the analysis of our empirical material, we bring forward the concern for inclusiveness which is specific to cases of public eHealth platform and not much discussed in the previous platform literature within IS research.

Hess and Ostrom (2006) state that “the essential questions for any commons analysis are inevitably about equity, efficiency, and sustainability”. We find that all three are relevant to the cases studied and the different arrangements employed for addressing political orientation, work coordination, and technical heterogeneity were shaped by the different answers that governments give to these three fundamental questions. Issues of equity relate to the way contributions are organized and how non-exclusivity is ensured. Issues of efficiency have to do with how well the overall arrangement functions. Different arrangements can lead to time delays, high costs, error-prone practices, etc. Issues of sustainability address the platform in a long-term perspective. A crucial aspect here is the ability to ensure durability over the long term being evolvable and accommodating emerging needs.

# Conclusions

Thirty years ago, Bozeman and Bretschneider noted that there are fundamental differences between information systems for the public and private sectors. They explained that cautiousness is needed for extrapolating to the public sector from knowledge derived in the private sector, and that specific research on information systems in the public sector is needed (Bozeman and Bretschneider 1986, p. 475). In the case of platform related information systems research, the public sector is particularly under-studied. Further empirical studies are clearly needed in the domain. The aim of this paper has been to highlight some of the singularities of the public health environment. These singularities make our cases not comparable with the cases of major commercial eHealth platforms. Hopefully, our findings will provide motivation for more empirical research, especially in view of the strong expectations articulated at the European level (European Commission 2004; European Commission 2012).

Our study can be used as a starting point for future research. One possible direction is towards the analysis of more cases of national eHealth platforms within different countries. This direction can lead to analytical generalization through the comparative examination of multiple cases. This direction can also be a remedy for a key limitation of our study; i.e., the fact that it is confined to the Scandinavian environment. Furthermore, it can provide insights that might help clarify if the particular “inclusiveness concern” identified in our cases has contributed to the advanced positioning of the three countries in terms of eHealth within Europe. Our hypothesis is that our insights can be valuable in contexts where platforms are introduced in healthcare through significant public investments irrespectively of the specific characteristics of the health systems. We think that inclusiveness is key also for public health platforms within health systems that do not follow a model of universal health coverage (such as USA). Public investment entails political orientation and a strong interest for the longevity – durability of platforms. The creation of a durable platform relies on the ability to allow innovative expansions by users and third parties, so inclusiveness when dealing with work coordination and technical heterogeneity can be pivotal.

A second future research direction is related to extending our analysis by following the trajectory of the three platforms in the future. By following the evolution of the platforms over an extended period of time, we can get insights into the outcomes of the different approaches adopted in each case. Finally, a third possible direction would be to explore how the concept of “platform” itself is translated, changed, and shaped as it circulates from domain to domain (Czarniawska and Joerges 1996; Latour 1986). One could start by studying how the concept entered the public eHealth domain and the meaning that it acquired in this context. Such studies would explain the diverse treatments of the concept in the literature and the difficulties in articulating a comprehensive definition that captures all the essential properties and characteristics of platforms (European Commission 2016; Schreieck et al. 2016). The research outcome of this third direction can serve as building block for a much needed conceptual clarification.

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