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RESEARCH PAPER

A process perspective on platform design and management: evidence from a digital platform in health care

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Abstract

Multi-sided platforms have become the hallmark of the digital economy. However, their impact varies profoundly across different markets. We have done a longitudinal case study on HSPC, a platform jointly provided by a consortium led by multiple U.S. health care providers. Our focus is on the development processes of the platform over a period of five years and the underlying management decisions and design choices. We have developed a platform management framework to capture and reconstruct the influence and interdependencies of choices over time. The case highlights distinct strategic choices aiming at scaling of the platform and competitive positioning at an early stage of platform evolution. Our findings show four main conflicts regarding the implementation and scaling of the platform and its services as well as the processual interplay and interdependencies between different management areas. The paper thereby contributes to a process view on platform management and offers an understanding of specifics of platform evolution in health care.

Keywords Digital health platforms · Technical architecture · Platform governance · Standardization · Process perspective

JEL classification I1 & O3

Introduction: A process perspective on platform design and management

Digital, multi-sided platforms (MSPs) facilitate digital exchanges between two or more distinct, yet related stakeholder groups (e.g., Hagiu 2014; Ondrus et al. 2015; Yaraghi et al. 2015). Positive same- side but specifically cross-side network effects are key drivers of platform scaling (Rochet and Tirole 2003). MSPs thus enable coordination, interaction, and transaction. They have become drivers of innovation and digital transformation across numerous industries like tourism, retail, and health care (Evans and Schmalensee 2016; Ondrus et al. 2015).

Platforms are provided either by a single organization (e.g., Apple iTunes and App Store) or by multiple organizations forming a joint venture, alliance, or consortium, thereby representing key stakeholders of a platform (Eisenmann et al. 2009). As explicated by Gawer and Cusumano (2014), platform providers execute strategic leadership, drawing on practices to develop a vision for the platform and its community, to set up a technical infrastructure and connectors, to build a coalition/community around the platform, and

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evolving the platform while engaging in industry-coordinating activities. This view is sensitive to the interaction between the micro-level practices of key stakeholders and the macro-level diffusion of the platform.

While dynamism is a key facet of the platform concept, a nuanced perspective on the processes that happen between key stakeholders (inside the "platform core"), core partners, the platform (developer) community, the platform ecosystem, and wider environment is underrepresented in the extant literature. We argue that this omission should be addressed for several reasons: first, a process perspective allows analyzing practices of platform management and their so far mostly neglected relationship and interaction over time. Second, such a perspective goes beyond configurational approaches often demarked by ideas of equilibria. Instead, dualities of stability and change and entrainments between different platform design and management choices can be taken into account. Third, a process perspective allows the gathering of conflicts and tensions more systematically, which may or may not be resolved over time (e.g., Farjoun 2017), thereby influencing a platform's success. Moreover, the current literature on MSPs falls short in addressing the specific characteristics of strongly regulated and complex industries such as health care. In order to add to the development of a process perspective on platform management, we have analyzed the emergence of a provider-led, U.S.-based MSP in health care. We specifically address the following three research questions that are closely related to this case:

1. *How can we make sense of platform design and management decisions?*
2. *How can we explain the dynamic development of a health care provider-led platform consortium?*
3. *What does the case reveal about the specifics of platforms in health care?*

Healthcare Services Platform Consortium (HSPC), which is representative for a promising MSP in the U.S. health care market that is relatively far advanced, allows us to reconstruct the development path of a MSP over a five-year horizon on a detailed level of managerial decision-making. Our findings show that the strategy of HSPC follows an ambidextrous logic of pursuing the dual aims of interoperability and innovation. The MSP governance and architecture reflect this strategy, leading to conflicts and tensions that need to be addressed over time. Furthermore, we find that the development of HSPC can be broadly categorized in three phases: pre-formation, formation, and shifting the focus from internal to external. While specific areas of platform design and management came to the fore in certain phases, temporal and goal-related dependencies make it necessary to think holistically and to strategically plan ahead.

The paper thereby offers three contributions. First, we adapt and extend existing analytical frameworks that have begun to explicate strategic practices of platform design and management (e.g., Gawer and Cusumano 2002, 2014) by proposing a framework of platform design and management, which from our point of view is well-suited to grasp the dynamic and processual character of platform evolution. Second, by applying the framework to a MSP in health care, we reveal three distinct phases of early platform evolution. Thereby, we go beyond previous research on the scaling of platforms in early phases by adopting a micro-macro perspective revealing some of the tensions and conflicts that platform providers must address during the development of the platform. Third, our analysis also explicates certain characteristics and specifics of MSPs in health care, which offers unique entry points for academics and policy-makers interested in this field of research.

Theoretical background

Multi-sided platforms in health care

The development of networked businesses has been shaped by centralized platforms over the past decades. Multi-sided platforms (MSPs) facilitate coordination, interactions and exchanges between heterogeneous actor constellations regulated by participation rules. While covering a number of value-creating core functions (for an overview, see Table 1), they can address two main problems of health care provision: the first problem is the fragmentation of health care services. This concerns in particular issues of developing shared patient information repositories, data and process integration, and the interoperability of systems (Walker et al. 2005). The second problem is the lack of innovation (Estrin and Sim 2010; Huckman and Uppaluru 2015; Lluch and Abadie 2013; World Health Organization 2015).

Platform design and management framework

In order to structure platform management, we have developed a framework, displayed in Table 2, addressing four areas of relevant practices in order to design and manage MSP: Platform strategy and governance (1), the technical architecture design and standardization (2), participation and community building (3), and engaging with the platform's ecosystem and wider environment (4). The framework consists of a set of (managerial) practices that focus on key design and management choices. It builds on and extends the model of platform leadership practices proposed by Gawer and Cusumano (2014) (see also their earlier work, Gawer and Cusumano 2002). The framework is a methodological tool to reconstruct and link management choices and platform

Table 1 Core functions of MSPs in health care

Core functions	Expected impact
Shared patient information repositories	Enabling data-driven medicine, patient involvement and empowerment (e.g., via access to patient data, service marketing, community functionalities)
Service integration and interoperability	Combining services from different health service providers (platform contributors), allowing for information exchange and transfer as well as the design of continuous treatment and joint care pathways, including the integration of patient processes and data
Service innovation	Facilitating "innovation ecosystems" (Adner and Kapoor 2010) consisting of start-ups and/or incumbents; building on the collection, integration and analysis of patient data

development over time. It juxtaposes and links four distinct areas - strategy, IT architecture, community building, ecosystem development – and thereby suggests an integrative perspective.

Developing strategy and governance model

The vision of a platform (see e.g. Alt and Zimmermann 2001, who relate both vision and goals to the mission of a platform) provides strategic goals and sometimes even a common identity for both platform providers and contributors. It can thereby guide other platform management practices. This is also mirrored by Gawer and Cusomano (2014) who propose that platform providers need to develop a vision "of how a product, technology, or service could become an essential part of a larger business ecosystem" (p. 429). In other words, platform managers need to address – in addition to potential contributors of a platform – the ecosystem (Moore 1993) in order to facilitate the growth of the platform.

Inevitably related to a platform's strategy is its organization (see e.g. Whittington 2003, for the processual and recursive interplay of strategizing/organizing), more precisely the creation (Gartner 1985) and development of the platform organization and its governance. Platforms can be understood as evolving organizations or even meta-organizations (Gawer 2014). As such they need resources, rules and routines that enable them to follow the platform's strategic goals. The platform rules are created both by the platform providers and contributors, as well as by actors within the platform's wider environment (see also area 4). Such rules address not only platform governance but also include rules of platform participation (see area 3) (Neumann 2007).

Platform governance refers, first, to formal decision rights and rules of control (Tiwana et al. 2010). Additionally, governance can also include coordination and resource allocation (Provan and Kenis 2008). Provan and Kenis (2008) have identified three modes of network governance that also apply to platform governance: governance by a lead organization, shared governance, or the set-up of a governance body called network administrative organization (Provan and Kenis 2008; for proprietary and shared platform governance, see also Tiwana et al. 2010). Platform governance mitigates the tension between control and participation: on the one hand, the platform owners need to exert enough control to ensure platform integrity, for example by keeping a "central position" (Gawer and Cusumano 2014, p. 429). On the other hand, they need to balance this with relinquishing control to encourage potential contributors to take part in the platform and to offer innovation (Eaton et al. 2015; Tiwana et al. 2010). Platform governance and its inherent conflicts and tensions thus influences platform evolution over time (Tiwana et al. 2010).

Designing technical architecture and selecting standards

A second area of platform management, which is closely related to organizing, is the management of the technical

Table 2 Platform design and management framework

Area of platform design and management	Scope and related tasks
1 Developing strategy and governance model	• Developing a strategy and vision for the platform • Designing a provider model and governance structures
2 Designing technical architecture and selecting standards	• Designing the technical architecture • Setting priorities for development • Architecting as a basis for interoperability and standard use
3 Facilitating participation and community building	• Facilitating especially the app developer segment of the platform • Fostering community building around the platform, e.g., through events and knowledge sharing
4 Engaging with the platform's ecosystem and wider environment	• Forging alliances, which imply technology/ standard choices • Entering into dialog with regulatory authorities

architecture (Gawer and Cusumano 2014). The technical architecture encompasses the selection, possibly creation and use of standards and "connectors", as well as a blueprint for the integration of the different technical components like reference architectures (Tiwana et al. 2010).

This area is also closely related to engaging with the platform's community and wider environment (see area 3 and 4), as manifested by the choice of open vs. proprietary gateways and APIs (Application Programming Interfaces). The architectural design thus has to address questions of modularity and openness in order to facilitate collaboration and third-party contributions. For instance, intellectual property (e.g., interface specifications, standards) can be shared with platform contributors to reduce their contribution costs. The technical architecture is also a governance mechanism (see area 1), as it enables or restricts decision and participation rights. With regard to digital health platforms, this area sets up important prerequisites for the management of the wider environment (area 4), as the technical architecture concerns data security and privacy.

Facilitating participation and community building

A third area of platform management concerns the facilitation of participation to enable platform growth. Gawer and Cusumano (2014) describe the related practices of platform leadership as building a coalition around the platform. According to these authors, the creation of mutually enhancing business models and risk sharing can add to coalition building. Additionally, an identity needs to develop and the platform provider needs to enhance its own legitimacy and trustworthiness (Barrett et al. 2016). Furthermore, the creation of different roles (Wenger et al. 2009) is contained in this area.

Platform management practices supporting the facilitation of participation aim for the enhancement of both a user and contributor base. Such a growing base can add to the creation of (cross-side) network effects (Eisenmann et al. 2009; Katz and Shapiro 1985; McIntyre and Srinivasan 2017; Rochet and Tirole 2003). MSPs facilitate digital exchanges between two or more distinct, yet related customer segments, or more broadly, stakeholder groups (e.g., Hagiu 2014; Ondrus et al. 2015; Yaraghi et al. 2015). Platform providers may opt for an incremental, sequential strategy of platform stakeholder mobilization to address their different needs (Aanestad and Jensen 2011). Both, the interactions and exchanges of the different customer segments and the dynamics of growth of these segments, require a processual lens.

Engaging with the platform's ecosystem and wider environment

A fourth area of platform management concerns the platform's ecosystem and wider environment (Thomas et al. 2014; see also Tiwana et al. 2010), which includes "industry coordination activities" (Gawer and Cusumano 2014, p. 429) that go beyond the platform boundaries, thereby touching for instance other platforms or even whole industries (e.g., during standard selection and standard setting). Practices of engaging with the wider environment do not only touch issues of standardization but also the management of regulatory issues: platform providers, especially in such highly regulated markets as health care, need to cope with regulations, laws and informal expectations regarding, for example, data security and quality control which can constrain but also enable platform development (Furstenau and Auschra 2016). Setting up collaborations and alliances with other platform providers or industry actors can support the aim to manage the wider environment.

A process perspective on platform design and management

A key problem of platform management is to facilitate the scaling of the distinct, yet interdependent customer segments (or stakeholder groups) as a basis for cross-sided positive network effects or externalities. For instance, the more patients (segment 1) are using a health care platform, the more attractive the platform will become to health care providers (segment 2), and technology vendors (segment 3). App developers (segment 4) will benefit from both, the sizes of segment 1 and 2, and vice versa. While network effects as self-reinforcing mechanisms are reasonably well understood, the processual mechanisms of facilitating the coordinated growth of the respective segments, such as incentives for participation, distinct value propositions, but also the critical thresholds or critical mass phenomena, have not yet been sufficiently researched.

First attempts have been made to take a process perspective on platform evolution and related management issues. Tiwana et al. (2010), for instance, underpin the importance of the co-evolutionary nature of platform architecture, governance, and environmental dynamics. A process view as adopted in this paper is sensitive to the dynamics of change and stability by paying attention to both structure and agency (Fortwengel et al. 2017). Practices – understood as recurring activities across time and space, thereby reproducing and changing structures – are thus an important element of such a process view (e.g., Giddens 1984; Reckwitz 2002). With its focus on structure, agency, unintended consequences and temporal dynamics process studies go beyond variance approaches that seek to analyze the influence of certain conditions on outcomes understood as independent variables at certain times. A process view is thus in contrast to configurational approaches (e.g., Lyytinen and Damsgaard 2011) analyzing the influence of combinations of structural influences on or co-occurrence with dependent variables. It takes the recursive interplay between dependent and independent variables as

well as the role of context and conflicts into account and goes beyond the aforementioned relatively deterministic understanding (Fortwengel et al. 2017).

While several scholars in the IS field advocate a process perspective (Orlikowski and Iacono 2001; Reimers et al. 2014), it is often somewhat underrepresented. Works elaborating on the nature and/or governance of platforms often describe the longitudinal interplay of the elements of such organizational forms in a quite static way (e.g., Gawer and Cusumano 2014; Klein and Alt 2015). A process view as described above is thereby lacking. We have chosen this perspective in response to the void in platform theory and to be able to capture the dynamics represented on our longitudinal case study on platform evolution.

Research design and methodology

Industry context and case

The health care sector is a societally relevant and interesting setting to study MSPs, as platform management and evolution strongly differs in comparison to less regulated markets. Since the late 1990ies, the health care sector has seen a first wave of electronic platforms (in a broad sense); examples include online patient communities (e.g., Nambisan and Nambisan 2009), EHR (electronic health record) platforms established among others by Google, IBM, Microsoft, Apple (e.g., Google 2011), and national projects concerning eHealth infrastructure (Pouloudi et al. 2016; Wessel et al. 2017). While some of the online communities are thriving, many of the other initiatives have been either discontinued or are struggling.

Over the past few years, we have seen numerous digital health platforms initiatives by health care providers. These platforms promote on the one hand patient participation and co-creation ("pro-suming") to enhance patient services and care. On the other hand they target open innovation and co-creation by providers of technology and services in the health care sector ("innovation ecosystems", see Yaraghi et al. 2015). This second generation of health care MSP, to which we will just refer as MSPs from here on, is the focus of our study and this paper.

MSPs have begun to change health care delivery and are linked to promises and high expectations (Estrin and Sim 2010, see also Table 1). In the U.S., the health care reforms during the Obama administration have spurred the adoption of interoperable electronic health records (EHR's) and offered new opportunities for the emergence of platforms (Washington et al. 2017). Examples for such digital health platform initiatives in the U.S. include the Kaiser Permanente's Health Connect Platform, Common Well Health Alliance and SMART on FHIR (Boston Children's Hospital), as well as the Healthcare Services Platform Consortium (HSPC).

We focus on the development of **HSPC**, a provider-led initiative, described below. HSPC is a suitable case for answering our research questions for three reasons: first, HSPC is more advanced than many other digital health platform initiatives, maybe due to the long experience with digital health of some of its consortium members (Intermountain and Veteran Affairs, both healthcare providers). This enables us to analyze the development of the platform over a period of five years. Second, the case provides rich data, as many meeting notes (17 distinct meetings so far) and internal presentations from 2014 to 2018 are publicly available. Thirdly, the complex governance of a vendor consortium is conflictual and raises many worthwhile questions.

Data collection and analysis

We use an in-depth, longitudinal qualitative case study approach (Eisenhardt 1989; Yin 2013) to reconstruct the development path of HSPC. In order to heighten construct validity and to prevent potential biases, we rely on three sources to triangulate our data. First, we have analyzed a large number of secondary documents (e.g., meeting notes, steering committee notes, presentations, web page content, press releases and articles, covering the period from 2014 to 2018). Additionally, the first author has conducted 18 interviews and informal talks with platform owners and with related stakeholders (13 interviews with contributors to the HSPC platform, as well as 5 background interviews). Interviews were conducted personally or by phone between 2016 and 2017. The interviews lasted between 10 and 90 min and were formally recorded and transcribed if allowed by interviewees. In other cases, we wrote detailed field notes within 24 h. Third, the first author has participated in two field events that helped us to further understand the context for platform evolution. The field events gave us also the opportunity to gather additional data in informal talks, from which we also produced field notes. Table 3 provides a synopsis of our data.

Data was analyzed in several cycles, which can be roughly divided into four steps. First, all documents, interview transcripts and field notes were gathered, scrapped and stored in a case study database (Yin 2013). Second, two authors started to read the data for initial sensemaking on both the national context and platform evolution. In this stage, we wrote a detailed case description, focusing on the platform's purposes, key actors and roles of provider and contributors, key relationships, formal platform governance, and a timeline of important events. After developing an overall processual understanding of the case, we, third, coded our data following an abductive approach (Mantere and Ketokivi 2013). We thereby started to code for the practices of platform leadership proposed by Gawer and Cusumano (2014). If needed, additional

Table 3 Data sources

Secondary sources	Explanation	Covered period	#docs
Steering committee notes	Detailed meeting agendas and notes with action items, discussion, decision action (around 7–9 pages per document)	03/2014–06/2017	53
Meeting notes	Meeting agendas, presentations, and notes from general and other HSPC meetings (from 17 distinct meetings)	05/2014–02/2018	166
Presentations	Presentations of HSPC and its strategy, organization, and activities at industry fairs (e.g., HIMSS), community events (e.g., OSEHRA Open Source Summit, FHIR roundtable), and testimonies	07/2014–04/2017	17
Web page content	Content from HSPC official website, HSPC collaboration wiki, HSPC developer portal and App Gallery	11/2014–03/2018	32
Press releases and articles	Official press releases and journalistic content about HSPC consortium	06/2014–05/2017	13
Sum			281
Interviews	**Explanation**	**Covered period**	**#int.**
Interviews with platform consortium, key partners, and contributors	Interviews included CEO, Director of Board, Head of architecture work group, Chief Medical Informatics Officer, VA benefactor representative, 2 start-ups, among others	04/2016–02/2017	13
Interviews with wider environment	Representatives from large health systems and vendor organizations	04/2016–02/2017	5
Sum			18
Field events	**Explanation**	**Covered period**	**#meet**
Regional meeting	Health lunch San Diego	05/2017–07/2017	2
Sum			2

(sub-) categories addressing platform management where inductively introduced. Such exemple codes are "Develop a strategic vision, goals, milestones" (related to area 1), "Select standard candidates" (related to management issue 2), "Create tools and technologies for users and contributors" (related to area 3), and "Setting up collaboration agreements, and alliances" (related to area 4). Identified practices addressing platform management where, fourth, analyzed for their occurrence over time and interrelatedness. Furthermore, coding was sensitive to the conflict of platform management. This led to the identification of four main conflicts during the development of HSPC. The use of the software NVivo 11 supported the process of coding.

During coding, we traveled continually back and forth between data, literature, and emerging theory (Locke 2005). Regular meetings between all four authors to discuss both data analysis and theory development helped us to compare our impressions. We were also able to develop a reflexive stance towards the data, as two of the authors are not directly engaged with data collection and coding.

Findings

In line with the process view, Fig. 1 presents an overview of the development of the Healthcare Services Platform Consortium (HSPC) – divided into the four vertical **areas** established by the management framework – through its three most important **phases** so far: Pre-formation, formation of HSPC, and the shift from internal to external.

Phase I: Pre-formation

HSPC is the brainchild of James Smith, a Chief Medical Information Officer at Intermountain Healthcare, a Utah-based Hospital System, and Charles Lopez (names changed), a leading manager at Harris, a middleware vendor related to IBM, as an initiative for "*provider-driven, vendor-supported interoperability*" (2014-06a). Smith was dissatisfied with the closeness and specificity of existing electronic health record systems in use at Intermountain and in the health system more generally, creating major obstacles to data sharing and facilitation of decision support modules integrated into clinical workflows. He contended: "we [HSPC] want to create software on a vendor platform without the vendor." Furthermore, he noticed the need for interoperability especially on a semantic level, which had brought him to develop with his team a large set of detailed clinical information models, an effort that would later become leveraged in the HSPC-related Clinical Information Modeling Initiative (CIMI). In turn, he saw the goal of HSPC especially in "*help[ing] providers achieve interoperability by emphasizing open systems, keeping it provider-led and creating market-driven solutions*" (2014-06a). The provider-led character of the initiative, rather than vendor dominance, has influenced the allocation of decision rights and governance structure (interaction between area 1 and 2). By 'market-driven solutions', Smith emphasized that

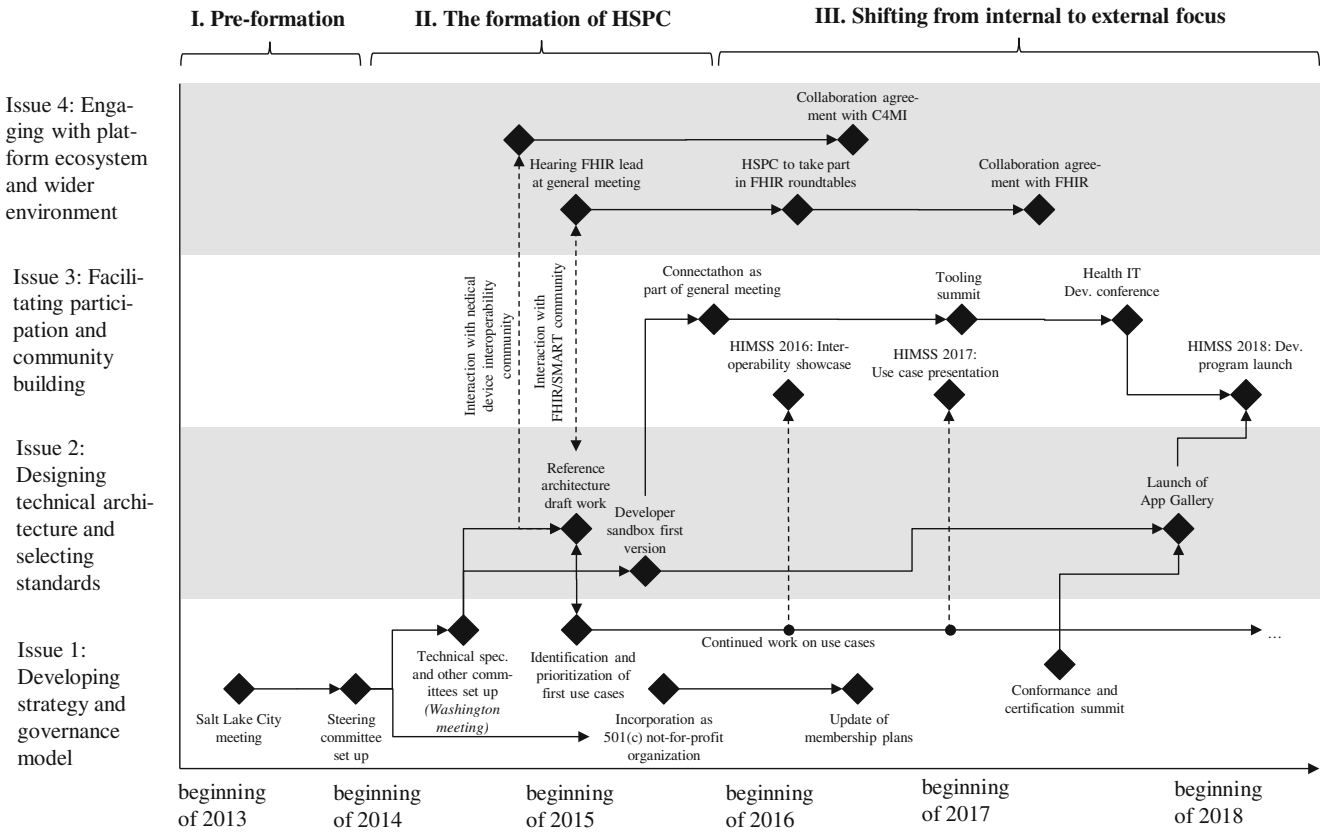

Fig. 1 Main phases of the development of HSPC from its emergence until early 2018

HSPC should "*create a marketplace for new companies*" *and enable* "*new revenue for existing companies*" (2014-07a), especially to encourage the desired participation of commercial vendors of decision support modules and applications (area 3). Intermountain had noticed that in order to remain innovative, they had to make greater use of external innovations. Smith noted that while Intermountain already had 150 interoperable apps, he would like to see many more: "*With the budget we have and other constraints, we'll never get from 150 to 5,000 … We realized that we needed to change the paradigm*" (2016-08a). Charles Lopez, in turn, was also an experienced health care veteran and at Harris he saw business value in creating interoperability on a technical and processual level, using service-oriented (SOA) integration technology. He was later to become the first CEO of HSPC. To gather support for their idea of "*truly interoperable data services and exchange standards*" (2014-07a), Smith and Lopez engaged in organizing a number of meetings, the first being held in Salt Lake City in May 2013.

Phase II: The formation of HSPC

In March 2014, after some further meetings, an HSPC steering committee – including Smith, Lopez, and representatives from LSU and Jackson Healthcare amongst others – was set up to work out the initial organization and governance structure, advising on creating a business entity, and planning further meetings [area 1]. Different constellations and governance models were discussed until the incorporation as a business entity was eventually reached about 1.5 years later in September 2015. Intermountain Healthcare and LSU acted as founding members of HSPC as a not-for-profit organization, illustrating the decision to put providers rather than vendors into the lead. Later, in the first quarter of 2016, the Department of Veteran Affairs joined the consortium as another prominent provider of health care services. According to the bylaws agreement, a CEO and an operational arm were installed together with a board of directors [area 1]. Members of the board were recruited from member organizations at large. The consortium also worked on a membership agreement, establishing different membership categories (benefactor, associate, and individual) with different decision rights. Benefactor members were expected to provide the most funding and other resources but were in turn privileged to participate in the board and steer the direction of the initiative most directly [area 1]. Initially, HSPC had planned to use venture capital to accelerate platform scaling, which, in the end, was not implemented. Furthermore, the steering committee considered that vendors should become benefactors and to establish a vendor governance board. These plans were not pursued later, which is also reflected in the vision of HSPC for 2015/2016. It says: HSPC should be "*a provider-led*

organization accelerating the delivery of a platform that supports innovative healthcare applications for the improvement of health and healthcare" (2016-02a). This indicates the dominance of the provider perspective within HSPC and also shows the interaction between vision and governance. Setting up a governance structure also included determining decision rights, decision processes, and voting processes, which was finalized until the August 2014 meeting in Washington.

Parallel to organizational issues, HSPC also began to work on technical architecture / standards (area 2). It used primarily its meetings to discuss "*minimum technical requirements for first clinical use cases*" (2014-05a) and it formed technical committees, pointing to an interaction between area 1 and 2. The committees were supposed to discuss and determine a "*reference architecture*" (2014-07a) for HSPC, meaning a blueprint how specific HSPC-conformant implementations and services should look like. The reference architecture of HSPC builds on existing health care provider systems such as electronic health records and uses standardized data profiles based on Fast Healthcare Interoperability Resources (FHIR), a technology standard now facilitated by HL7, as well as FHIR interfaces (REST API) to provide read and write access for (third-party) applications and services. Applications and services can thereby be qualified as (1) SMART Web Apps, a technology promoted by Children Hospital Boston as well as other prominent health care providers, or (2) more complex service-oriented architecture (SOA)-based orchestration services. At HSPC, the shortcuts "tier-1" (SMART on FHIR) and "tier-2" (integration/orchestration services) became established, pointing to a major area of conflict, namely between simpler yet more agile "tier-1″ and more complex/advanced yet more sluggish "tier-2″ services. Examples for tier-1 apps by HSPC include a tool estimating a patient's cardiac risk, a SMART patient portal, a paediatric growth chart, or an app for bilirubin measure documentation. As an example for tier-2, HSPC created an interoperability showcase that simulated providing optimal care for an automobile victim while hospitalized in an Intensive Care Unit. The conflict is manifested in internal controversies over prioritizing scarce resources between these different service categories. From early on, since the first meetings in 2014, HSPC has started to establish ties to the FHIR community and the associated Argonaut project. Contact with the SMART community, which also opted for the FHIR standard, was also established at an early stage [area 4]. Yet, it was initially unclear how HSPC could align its own goals with these initiatives. In 2015, the head of the SMART on FHIR group, Peter Parker wrote (2015-03a): "*There's very strong alignment with SMART's goals (and solutions) at least for the* "*basics*" *of what HSPC is looking to accomplish.*" Revealing this conflict, in one steering committee meeting (2015-02a), James Smith from HSPC noted that "*they [some SMART proponents] want HSPC to be a standards effort for developing FHIR profiles [tier-1]. This will definitely be a major focus. … [other] members … were interested in the orchestration framework and the data virtualization layer [tier-2]… [SMART proponent X] was concerned that HSPC had changed direction.*"

Over these conflicts, the head of business development, who had favored a fast expansion approach based on tier-1-SMART-services, eventually left HSPC and others lowered their level of engagement. While the discussion over tier-1 versus tier-2 services remained somewhat controversial over time, it also helped HSPC to re-shape its value proposition and to position the initiative more clearly against other initiatives such as FHIR and SMART on FHIR. Resolving the conflict in a dialectic way by aspiring a co-existence between both approaches, from 2017 onwards, the relationship between SMART and HSPC had stabilized to a co-opetition where "*HSPC is helping the SMART on FHIR community by creating reference artifacts and hosting public sandboxes*," as noted by Tim West an active member of HSPC. At the same time, HSPC was aware that the two initiatives follow partly different missions requiring them to develop and maintain separate developer programs, app stores, and technical artifacts. For HSPC, the essential integration between tier-1 SMART on FHIR apps and specific tier-2 SOA orchestrations at provider organizations (e.g., VA, Intermountain, or LSU) is modeled via the FHIR standard API and specific FHIR data profiles, as well as additional data mappings (e.g., for patient record data). In such cases, as demonstrated in interoperability showcases at HIMSS 2016 and 2017, a more complex (reference) architecture is necessary, which requires additional interface specifications on the orchestration layer. While the found co-existence has helped the initiative to proceed further, it can be speculated that it may not be fully resolved and that the conflict between tier-1 and tier-2 services may come to the fore again at a later point in time.

In summary, we see that strategy (area 1) and architecture (area 2) influence and shape each other through emerging conflicts and tensions. From the previous discussion, it also becomes clear that engaging with the ecosystem (area 4) is also closely related to area 1 and 2.

Phase III: Shifting the focus from internal to external

Essentially and thus far, the consortium had a mostly internal focus. To achieve its goal of being a platform that supports "plug-and-play applications" further efforts were made to facilitate developer participation and to gain visibility and legitimacy in the relevant communities (area 3). As part of the work of the technical committees, a first version of a "developer sandbox" was created and launched in 2015 (see e.g. 2015-02a), which would eventually allow third-party developers to access the platform and program their own applications. A first "connectathon" was held as part the February

2015 general meeting in New Orleans, marking for us the beginning of phase III in the development path of HSPC: a shift from an internal to an external focus.

Many more steps were necessary to achieve the goal of launching a "*marketplace [that] will be a vibrant ecosystem of healthcare applications that speak the same language, making them truly interoperable*" (2017-02a) – a so called "App Store" for third-party developers to plug-in. Among them were certification, conformance, and testing of services, hosting, deployment, payment model and commercialization, security, and customer support (2017-02b). Certification meant that services and applications that should go in the App Store would need to undergo a process to demonstrate it as "HSPC-compliant". This was seen as vital *to* "*address safety and security concerns that span the supply chain*" (2017-06b) and to "*mitigate risk to achieve true, seamless information exchange*" (2016-02a). By doing so, it was expected to conform to the standards selected by the consortium and other quality requirements, for example regarding data interoperability, (SMART on) FHIR compatibility, as well as more complex requirements for tier-2 (SOA) services. The consortium held a meeting in June 2017 to discuss these HSPC conformance and certification goals, hearing vendors and exploring their current approaches and best practices to conformance testing and certification. As an outcome, a plan to get HSPC Conformance and Certification process in place was developed. Regarding payment model and commercialization, continued discussions emerged between the consortium and the (start-up) ecosystem community. While most members of the core favoured a full open source model, many (start-up) developers were in favour of a payment model due to their commercial interests, pointing to a further main conflict, namely, between open source versus commercial third-party payment/business models, and also pointing to an interaction between area 3, accelerating and managing participation, and area 1, strategy/governance. Eventually, HSPC announced that it will "*support both free and commercial offerings*" (2017-02a), trying to resolve the conflict between open source proponents and commercial interests by allowing both models to co-exist. In the fall of 2017, an App Gallery was launched, displaying important and useful HSPC-compliant apps such as a bilirubin dashboard for post-natal care.

At roughly the same time, HSPC spurred its efforts to attract outside developers [area 3]. In December 2016, it conducted a tooling summit in order to "*discuss requirements for model authoring,*" "*share information about existing tools and initiatives*", and to "*make a plan to share resources to support open source authoring tools*" (2016-12a). In March 2017, HSPC conducted its "*first annual Health Information Technology (HIT) Developers Conference*" (2017-03a), inviting developers to learn about SMART on FHIR, existing HIT vendor approaches and developer programs, as well as evaluate existing developer tools and frameworks. At HIMSS 2018, HSPC officially announced its own developer program and aimed at further increasing the adoption by third-party developers. These events can be understood as measures to accelerate and systematize the participation of third party contributors.

Further efforts were targeted towards interacting with and influencing the wider environment [area 4]. Early after its inception in 2014/2015, HSPC had begun to discuss, hear, and build relationships with other initiatives as well as government authorities. Among them were most importantly the FHIR community and the Center for Medical Interoperability (C4MI). Over the years, HSPC increasingly became a supporter of the FHIR standard and began to work more and more closely with the FHIR community. In 2016, HSPC announced that it would participate in FHIR roundtables, demonstrating their willingness to use and further develop the standard. In February 2017, HSPC and HL7 announced that they had reached an agreement to pursue the development of the FHIR standard by conducting joint projects. This step can be interpreted as proactive expectation management for relevant stakeholder groups, as it shows vendors, developers, competitors and administrators which direction HSPC is taking. The collaboration with the SMART on FHIR initiatives also gained in importance over time, but it remained on a more operational level where HSPC began to develop and provide reference implementations for the SMART on FHIR community, which were broadly used. Strategically, the somewhat diverging goals of both initiatives regarding "tier-2" services led to a more "co- opetitive" character where both initiatives prefer to have their own App Stores, meetings, mailing lists, and so forth.

Another cooperation was announced with C4MI, which is another large health care provider-driven organization, being more concerned with medical device interoperability. The agreement was reached in 2016 and can be interpreted as a step toward increasing the disciplinary scope, i.e. getting the medical device vendors on-board "via the back" of important provider organizations. The partnership focusses on the creation of a shared reference architectural model, spanning the continuum of interoperability from instruments / devices (C4MI) to electronic health / medical record applications (HSPC), establish tooling strategies and sandboxes, as well as advancing use cases, and establishing a marketplace for innovative solutions based on a joint HSPC-C4MI architecture. HSPC also engaged in discussions with the Office of the National Health Coordinator for Health Information Technology (ONC) and the Centers for Medicare and Medicaid Services (CMS) in order to explain the need for interoperable health care applications and their own approach.

At the end of our data collection, HSPC was building further support in the developer community and planned to migrate the App Gallery to an App Store model, including fully worked out certification and conformance testing as well as

monetarization processes for commercial app/application developer. The final business model for the App Store was still open at the end of the investigation, but it was known that HSPC would perform a for-fee certification and compliance testing for apps provided (2014-05a). In an interview in June 2016, the CEO Lopez envisioned the App Store as follows:

> "*We do have a couple of applications, but we are not yet an App Store per se. So, the model we would like to see is just kind of an open marketplace where you put applications up for sale, if you want, or you can barter them among different providers, or different vendors, you can put them up as open source … and the idea is that there are certain constructs that support each of those models so that the provider of the application is comfortable with the sourcing of the app. We wanna be able to certify them, and have a conformance testing that makes it compliant to certain baseline aspects of the reference model. And then we wanna be able to have frameworks for versioning and supportability of the … applications*"

From its inception in 2014, the initiative had grown to approximately 300 (individual) members from the entire health care spectrum including further hospital systems and provider organizations (e.g., Regenstief Institute), technology and decision support module vendors (e.g., Allscripts, Cerner, Cognitive Medical, Vigilanz), and health care community organizations (e.g., OSEHRA).

Discussion and outlook

Making sense of management decisions and design choices of HSPC

In response to our first research question and using our management framework, we have provided explanations for decisions in four key areas.

Developing strategy and governance model

HSPC has developed a dual vision of facilitating interoperability and service innovation in health care. While many platforms have been initiated by technology providers, who retain their identity as software companies rather than members of the industries they are working in, HSPC has opted to be a health care provider-led platform, while technology vendors are welcome as partners. It is thus an incumbent driven – rather than an entrants- or third-party driven – innovation initiative.

Despite credibility advantages, provider-led platform consortia typically follow a slower pace of platform development given the complexity of consensus building and the limited resources available for the organization. Not surprisingly, HSPC has voiced a plan to roll out the platform over a period of eight years. As part of the scaling and development strategy HSPC is following, the consortium has significantly extended the number of members, which have a dual role of being platform provider and platform users, i.e. as customer segments 2 (health care providers) and 3 (vendors). The HSPC consortium can in fact be seen as a coalition, bringing together partners with different identities and agendas. In the sense of Provan and Kenis (2008), its board represents the different partners and their agendas. It functions to monitor the activities of the HSPC organization and to create trust where goal consensus may be absent. The governance decisions include the definition of distinct roles and related mandates (1) as well as levels of engagement (participation and collaboration), separating customer segments of the platform (2) and members of the ecosystem and wider environment (3).

Designing technical architecture and selecting standards

Due to the complexity of health care, platform architectures of MSPs in this industry also tend to be complex and nested. As a result, platform providers are confronted with a high number and variety of standards. The case of HSPC shows how platforms try to navigate in this jungle and adopt rather than develop standards themselves. Against this backdrop, the efforts of HSPC show how critically important it is to closely collaborate with other platform ecosystems and the wider environment (area 4) in order to avoid proprietary solutions and to gain legitimacy in the community. HSPC has directly profited from the rise of FHIR over the last years and has adapted its strategy and use cases (area 1) in order to reflect its increasing prominence over the last years. However, the consortium continues to pursue its own strategy, which is reflected in the multi-level reference architecture and the launch of its own App Gallery.

Facilitating participation and community building

In addition to the technical design, which provides an "architecture for participation," HSPC has engaged actively in community development and stewarding (Wenger et al. 2009) of their (prospective) user and developer communities. Examples include meetings, content provision in their collaboration wiki, providing a developer sandbox and support, 'connectathons', tooling summits, and projects of HSPC member organizations with developers on specific use cases/scenarios. Several measures such as hearing clinicians, vendors, patients, and prospective developers as well as building

the necessary tooling, certification, and support had to come first before the actual developer program could start. This shows the importance of strategic foresight in facilitating participation and community building. Over time, the HSPC community has grown steadily. However, the buy-in of larger groups of developers was still awaited and sustainable business models need to be worked out. Regarding doctors and clinicians, increased interest could be noted over time, for instance, when more than 100 "health IT nerds" gathered together as HSPC together with HL7 launched a Clinical Information Interoperability Council (CIIC) initiative in 2017. Their motives, however, were diverse and need further theorizing.

Engaging with the platform's ecosystem and wider environment

HSPC has reached out to and actively managed the relationships to corporate and institutional stakeholders to explore collaboration opportunities. While some of the relationships are obviously collaborative (HL7 FHIR, CIMI, C4MI), other appear to be co-opetitive (SMART on FHIR), or even competitive (Common Well). Over time, some of the relationships with platform stakeholders have changed, for instance the relationship with HL7 FHIR thrived while the relationship to SMART on FHIR seemed to become less intense. Ecosystem management is crucial for platform development to secure necessary alliances, but also requires processual and reflective management to accommodate for a dynamically changing environment.

Dynamics across and between areas of platform design and management

In addition to the explanations provided in the previous section about participation, community stewarding, and ecosystem engagement, the dynamics across the four areas provide additional insights into question 2 (consortium development).

The HSPC case reveals how the board has shaped strategy across the four areas of the platform management framework by addressing issues sequentially, yet mindful to intersections and interdependencies across the areas (*research question 2*, see also Table 4). The vision and identity of HSPC are impacting the architectural, governance, and collaborative design. The development of the interoperability architecture (area 2) involves close engagement with a wider technology vendor community (area 4). The introduction of the developer sandbox (area 2) is closely linked to the community development (area 3). The collaboration with FHIR (area 4) is reflected in area 2 (architecture of the App Gallery) and 3 (tooling summit).

The case also reveals a temporal sequence. Roughly, the development process of HSPC can be seen as a step-wise process of (1) pre-formation, i.e. coming together and conceiving the platform, (2) formation, setting up an organization, governance structure, and technical architecture, and (3) shifting the focus from internal to external. In consequence, different areas are more important in different phases than others. In the first phase, strategy and vision is primordial. In the second phase, governance and architecture become more important. In the third phase, facilitating participation and engaging with the platform's ecosystem and wider environment comes to the fore to let the platform disseminate. Yet, we also

Table 4 How the management of HSPC dealt with conflicts: Responses and interpretations

Conflict	Response	Interpretation
(1) Provider-led vs. *vendor-led consortium*	Health care provider-led consortium, (technology) vendors are welcome as partners.	Specific to health care (priority of medical over business or technical perspective), consortium design as signalling mechanism to build trust in the health care community and attract further health care providers to the consortium. Consortium operates as a coalition (Stevenson et al. 1985) of organizations with different identities and agendas, willing to engage in a common goal (vision).
(2) Emphasis on interoperability vs. *on service innovation (apps)*	Initially emphasis on interoperability reference architecture, i.e. prioritizing technical infrastructure, before engaging the app developer community.	Ambidextrous strategy, i.e. combining exploitation and exploration. Initial emphasis on exploitation. The consortium design, the engagement with the ecosystem and the architectural choices all signal a strategy based on open standards.
(3) Commercial vs. *open source app community (revenue model)*	Architecture as basis for app development, increasing consortium as incentive for app developers. Extending scale and scope of the platform.	Revenue model for apps not quite clear, most likely a combination of patient, hospitals, insurance providers as payers.
(4) Choice of partners, make (proprietary) -or-buy-or-cooperate	Forging a broader set of alliances. Piggybacking on and endorsing the SMART on FHIR and the C4MI initiative.	Managing expectations for consortium members, technical providers, app developers and prospective patients that HSPC aims to collaborate with the FHIR initiative.

show how strategic foresight is necessary and involves interactions across areas: some activities are anticipated and prepared long before they actually become reality. Developing a reference architecture was a prerequisite for successfully accomplishing use cases, yet it required interacting with the vendor and standards community. Creating a developer sandbox was a prerequisite for launching a developer program, yet it also made interacting with the (FHIR) community necessary. Launching an App Gallery required a critical number of useful apps, which needed to be certified against existing architectural and organizational guidelines HSPC was aiming for. These examples demonstrate the temporal sequence of platform development activities ("path creation"), but also highlight temporal and logical interdependencies between activities.

Areas of conflict

During the development of HSPC, different areas of conflict have arisen that required reflexive management by the platform providers (see also Gawer and Cusumano 2002) and indeed a process lens of research. If the platform providers had failed to resolve or at least alleviate these conflicts, the survival of the entire platform would have been at risk (e.g., if not enough collaborates are attracted to trigger network effects).

A first area of conflict concerns the **governance** of the platform and relates to the question if a platform should be managed by health care providers or technology vendors. HSPC decided for a provider-led consortium (the board functioning as network administrative organization in the sense of Provan and Kenis 2008), where vendors are welcomed as partners. We argue that this approach is specific to health care, which is characterized by a conflict between the logic of (medical) care and the economic or managerial logic (Dunn and Jones 2010; Scott et al. 2000). In the case of HSPC, the influence of the medical logic so far seems to have priority over the managerial logic, as the consortium design works as a signalling mechanism to build trust in the medical logic and competence applied by HSPC (e.g., for patients in terms of data security).

A second area of conflict relates to **interoperability**, i.e. improving efficiency and aiming for productivity gains (exploitation), **versus service innovation**, i.e. exploration. This conflict was alleviated by dealing with the two issues sequentially: HSPC initially emphasised an interoperability reference architecture, i.e. prioritizing technical infrastructure, before engaging the app developer community. This pattern fits an ambidextrous strategy (O'Reilly and Tushman 2008; Raisch et al. 2009) that combines and balances initial exploitation (of the existing capabilities and structures with respect to the reference architecture) with subsequent exploration (by engaging with the developer community to build and integrate innovative apps). Exploitation is thus geared towards improving productivity and coordination across participating health care providers, while exploration is geared towards innovation and the redesign of service provision.

A third area of conflict is closely related to designing an architecture of participation and concerns specifically the question if apps should be developed on an **open source or commercial / proprietary basis**. This impacts the revenue model and is therefore strategically important. HSPC has tried to design the platform architecture for openness to facilitate growth. However, due to the distinctive logic of the health care sector that among others advocates for the protection of patient data and develops a critical stance towards business models that rely on data selling, the revenue model for HSPC apps is still unclear. Some apps are sponsored by member organizations, universities, or research grants, while commercial app developers do not yet derive economic benefits from participation in the consortium other than strategic access to clinics.

A fourth area of conflict concerns a **make-or-buy-or-cooperate decision** with regard to the choice of partners. On the one hand, a health care platform can set up proprietary standards (make). On the other hand, existing standards like FHIR can be adopted and endorsed (buy/cooperate). HSPC decided to engage in a set of alliances, for example to endorse the SMART on FIHR and the C4MI initiative. HSPC thereby signalled to stakeholders in its wider environment (e.g., consortium members, technical providers, app developers, patients) that the platform will collaborate with FHIR. This also implies the choice of open APIs, which provide extended opportunities for the app developer segment with potential network effects for patients and health care providers alike.

The specifics of MSPs in health care

While MSPs share distinctive economic mechanisms by definition, such platforms also differ in diverse instances across industries. To highlight the characteristics of provider-led health care MSPs – based on the example of HSPC – we highlight a few strategic characteristics (area 1 of our framework) and thereby address our third research question.

- HSPC is an incumbent provider-led initiative in contrast to, for example, technology start-up, i.e. new market entries platforms aiming at changing existing markets (e.g., Uber or AirBnB).
- In line with the incumbent's role, the vision and strategy priority has been set on issues of improving interoperability of existing systems (exploitation) over – or as basis for – innovation (exploration, app development). Even for the apps, the goal is integration into existing workflows, infrastructures, patient pathways etc. Less emphasis is given to stand-alone apps. The choice of standards and the engagement with the wider platform community suggest a

more inclusive approach, in contrast to strategies of market dominance and monopolization attributed to, for instance, Uber or Google.

- HSPC is a platform, which has shown a dynamic development, yet we do not see any of the three drivers of massive scaling, which often appear in combination: (1) extensive venture capital as basis for massive investment and compensation for initial losses, (2) extensive cross-side externalities, typically combined with substantial subsidies for one customer segment or stakeholder group, for example suppliers sponsoring the platform to provide its services for free to customers (consumers) in order to grow the customer segment (3) harvesting user data usually in return for free platform services in order to generate revenue from advertisers.[1] We, therefore, see (and expect) slower scaling of health care platforms, driven by productivity gains and innovative service, in comparison to MSPs, which combine the three drivers of scaling (e.g., Google or Facebook).
- While the providers are typically well-versed with the complexity of the industry, the regulatory constraints and have adapted to the requirements of patient privacy protection and informed consent requirements, these factors not only require substantial management attention. Their transformation over time is also fairly slow process.

In terms of generalizability, this qualitative work relies on *analytical* in contrast to statistical generalizability (Schoefield 2002; Yin 2013). It may thus be possible to transfer applied practices, development patterns, and areas of conflict to other, similar platforms. Such platforms may exist beyond health care in other regulated environments such as the financial sector, education, or pharmaceuticals. Caution should be given, however, to generalize beyond consortium ownership and non-incumbent-driven platforms, since our findings have been derived in such a setting.

Avenues for future research

Our analysis provides several avenues for future research; the first is to reconstruct the processes of platform design and management for other cases and types of digital health platforms, including for instance platforms set-up by start-ups (Barrett et al. 2016) or governments. Despite the fact that our case data is quite extensive, some of our findings are exploratory and based on first conjecture so far. We therefore suggest (and have started ourselves) to do more extensive, comparative studies across different platforms and initiatives in different countries.

Second, given the initiator's perspective of an eight-year horizon for the platform development, our study covers round about 50% of that period. Despite the practical difficulties of doing longitudinal research over extended periods of time, we suggest that this is indeed necessary. One option may be to look at later phases of platform development and to examine, for example how ecosystem extension continues or if at some point of time a saturation point is reached (e.g., for national health platforms set up by governments).

Third, each of the areas of our framework warrants further research, whereby we hope that future studies would use similar approaches to be able to critically build on what has been done already. The analysis of development dynamics across the areas of platform design and management is as promising as it is intellectually demanding. This could include the detailed description of feedback loops and self-reinforcing mechanisms, for instance, regarding the development of shared meanings and commitments on the group level (e.g., Knight and Pye 2005) and the co-evolution of the platform (HPSC) and particular interoperability standards (e.g., FHIR) in the environment (e.g., Tiwana et al. 2010).

Fourth, industry and ecosystem studies are important to further our understanding of platform competition and market dynamic, but more importantly as part of technology foresight in a field that is crucial for societies' wellbeing. We expect platform competition and platform battles as strategies for market domination and consolidation like in other industries.

Fifth, the impact of digital health platforms on national health systems is an interesting area of study. For instance, will some digital health platforms (e.g., provided by Apple or Amazon) become important enough to influence practices and regulations of national health systems? How do they engage in standard setting and field-wide initiatives? Additionally, will supra-national digital health platforms evolve?

And sixth, it is important to explore the effects of digital health platforms on the performance of health care delivery (e.g., measured along multiple dimensions such as information impact as well as quality and the cost of care). For instance, what is the potential of digital health platforms for cost reductions that benefit patients? (How) Can platforms contribute to the quality of care and do they really enable patient empowerment? We suggest interdisciplinary and longitudinal research designs to monitor and analyze these developments.

Practical implications

With respect to RQ1 (platform design and management decisions) we have developed a framework and discussed promising responses to areas of conflict, which we see as beneficial

[1] Platforms with consumers as one customer segment and advertisers as the second (major) segment are quite particular cases of MSP as they partly violate the condition of direct interaction between the segments, for example the interaction of a Google search user with a company advertising on Google captures only a subset of searches. In most cases, the ads will be viewed as distraction or even a nuisance by the consumers who are searching for information.

for de-facto or prospective platform providers. Despite the specificity of the case, we are confident that we have been able to illustrate the insights that a process perspective offers, including but not limited to issues of path creation (see e.g. Garud et al. 2010), signaling, and ambidexterity. The framework can act as a sense-making device for the "reflective practitioner" (Schön 1991; Johns 2017) to understand important areas of managerial discretion in cultivating platform establishment and scaling.

With respect to RQ2 (consortium development) we have highlighted the importance of extending the consortium, stewarding the app developer community, and engaging with the platform ecosystem and wider environment, while at the same time being clear about necessary controls, for example implemented in the governance structure, the composition of the board, and the different roles.

With respect to RQ3 (specifics of health care) we have highlighted the distinctive logic of provider-led health care platforms in contrast and comparison to the popular MSP examples in tourism and social media. This should lead to more realistic expectations regarding the speed and extent of scaling but also sensitize platform providers to the needs of mobilizing resources through collaboration (with vendors) and to engage in community development for patients and app developers.

Conclusion

One of the key questions in MSP research is how platform providers can scale distinct customer segments to jump-start positive cross-sided network effects. Our paper contributes to this question in three ways: conceptually, methodically, and empirically. The paper has developed a conceptual framework of platform design and management, which analytically separates into four areas and integrates them by highlighting intersections and interdependencies between these areas over time. We provide a rich and extensive longitudinal case study of the development of a MSP in health care to apply this framework. Methodologically, we have been taking a process perspective on these areas and engaged in reconstructing the development path of the platform. Some of the most interesting key insights from this endeavour are how to relate the ambidextrous vision for the platform (interoperability and service innovation) to the design of an architecture and governance structure, which facilitate both, health care provider control and broad participation across the provider, vendor, and developer community. Endorsing open standards and collaboration enabled HSPC to productively engage with their platform's ecosystem and wider environment. Empirically, our study highlights the specifics of MSPs in health care, including the specific, health provider-led governance structure with industry incumbents taking the lead, the specific business model, which is not designed for rapid scaling as in other industries, and the importance of considering regulatory constraints. In light of rising concerns about what Zuboff (2015) has coined the uncontrolled and widely invisible "surveillance capitalism" of MSPs, health care platform providers have an opportunity and indeed an obligation to design benign models of MSPs, which will facilitate innovation in the health care community while at the same time protecting and facilitating patients' well-being and privacy.

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