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Building a Digital Platform Ecosystem for Elderly Care: Core vs. Portfolio

Short Paper

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Abstract

Does strategy matter for early-stage health start-ups seeking to build platform ecosystems? Drawing on a multi-year ethnographic study of two early-stage platform start-ups, we analyze their strategic decision-making process as they decide between refining their core service or attracting complementary services. Fundamentally, we seek to understand to which degree startup teams formulate such strategies, stick to them, or adapt to a changing opportunity landscape in such a highly regulated environment. Our work sheds light on the relevance of strategic intent, opportunistic behavior, and simple luck in the build-up of nascent digital health platform ecosystems. Preliminary results reveal that start-ups frequently adapt their strategy to the environmental dynamics, and not every start-up can capitalize on opportunities presented by easing regulations or use them strategically. Our work provides practical implications for policymakers aiming to foster opportunities for healthcare start-ups and for early-stage start-ups seeking to navigate the complex healthcare environment.

Keywords: digital health platform, platform ecosystem, entrepreneurship, early-stage start-ups, strategic decision-making

Introduction

The COVID-19 pandemic has not only altered our utilization of digital technology but also accelerated the adoption of digital tools in healthcare. Traditionally, Health Information Technology (health IT) has been centered on enhancing electronic information management among stakeholders such as doctors, patients, health insurers, and providers through systems like Electronic Health Records (EHR). The growing influence of digital technologies and evolving institutional contexts have created new opportunities for entrepreneurial ventures in the healthcare sector. Although high expectations surround digital platforms, we still see very little activity or limited emergence of platforms in the sector.

In the literature, the implementation of digital platforms is frequently associated with cost reduction and innovative methods for sharing and utilizing health data (Pietronudo et al., 2022). However, there is a scarcity of notable examples of digital platforms significantly improving patient care. Google has acknowledged that the primary challenge in this sector is not a lack of innovative ideas, but the complexity of converting these ideas into scalable business models (Brown & Weihl, 2011). Nevertheless, the post-pandemic era has created new opportunities for the emergence of digital platforms in the healthcare sector, potentially enhancing the quality of treatments and the lives of many people.

In contrast to the majority of existing studies that tend to center around matured or maturing platforms (de Reuver et al., 2018), our research takes a step back to explore the factors preceding the emergence of early-stage ecosystems and the dynamics of the strategic decision-making of start-ups. To reflect this notion, we define a *platform ecosystem venture* in accordance to the platform definition of Tiwana et al. (2010) as a venture that seeks to establish a technological platform upon which an ecosystem of providers of complementary services subsequently evolves. This does not preclude them from also being part of an already existing ecosystem (e.g., Android store). Building upon this definition, we ask how start-ups make decisions in the pre-birth phase on the way to give birth to an early-stage ecosystem in healthcare. To investigate this issue, we are conducting an ethnographic study on two early-stage German start-ups developing a digital platform ecosystem for elderly care. By observing the platforms' development over two years, we aim to ascertain the extent to which strategic intent plays a role in this process, or whether serendipitous factors, such as fortuitous timing and favorable circumstances, may supersede strategic planning in determining success. Moreover, by analyzing decision-making in very early-stage platform start-ups, we derive insights on the causes of the limited emergence of platforms in healthcare. Monteiro et al. (2022) assert that the application of qualitative research methods in the field of information systems research can illuminate aspects that are typically concealed. As such, we posit that the ethnographic approach can elucidate the strategic decision-making processes of start-ups, particularly with respect to their deliberations over time regarding opportunities and serendipitous factors.

Our preliminary findings indicate that the strategic decisions of start-ups are often subject to changes in environmental dynamics. While more start-up-friendly regulation and emerging care technologies present a promising opportunity for start-ups, it is worth noting that not every start-up has the capability to capitalize on them and leverage them in a strategic manner. Our study holds significant practical implications for policymakers, as they can create opportunities in healthcare. Additionally, our insights can serve as a guiding reference for other start-ups seeking to navigate the highly regulated landscape of healthcare, enabling them to seize opportunities effectively while formulating purposeful strategies and to position themselves optimally in a dynamic and rapidly evolving market.

The remainder of the paper is structured as follows: In the next section, we present the theoretical background on platforms and strategic decision-making. Additionally, we elaborate on the driving factors behind our research. In section three, we describe our approach. Section four presents the findings from our preliminary analysis. In section five, we conclude, discuss the study's limitations, and introduce the next steps for exploring this research area.

Background and Research Motivation

Information Systems (IS) researchers have underscored the need to broaden the scope of health IT research by exploring novel areas (Fichman et al., 2011). This study responds to that call by focusing on the emerging phenomenon of digital platforms in healthcare. For IS researchers, understanding digital platforms' evolution in highly regulated environments is crucial (de Reuver et al., 2018). Moreover, the human-machine interaction through integrated features on digital platforms, such as the development of fall-detection sensors (Abouzahra & Ghasemaghahi, 2022), captures the interest of IS researchers, making this study also relevant to the medical informatics discipline. In addition, IS researchers predominantly focus on constructing incentive structures (e.g., Ayvaci et al., 2021), expanding data sharing regarding EHRs (e.g., Kohli & Tan, 2016), or measuring health IT benefits (e.g., Bao et al., 2020).

Increasing the usability of health information solutions presents numerous challenges that warrant attention to foster adoption, as demonstrated by various studies (e.g., Fichman et al., 2011; Ozalp et al., 2022). Likewise, expanding service scope is not straightforward in healthcare, as every service must be verified and certified. However, existing literature tends to overlook the challenges of developing platform ecosystems in healthcare, which are growing increasingly complex due to the diversity of activities and actors. Our research uniquely emphasizes the pre-birth phase of early-stage platform ecosystems, targeting the understanding of start-ups' decision-making processes concerning the core and portfolio of their business models.

In the healthcare sector, it is especially difficult for new entrants to expand their core services to build up their ecosystem, as it is a highly regulated environment. Entering this market necessitates careful management of tensions, as a viable business model must be developed while adhering to strict regulations

and maintaining control over the platform. Given the potential for loss of life, the platform must always be under stringent control, ensuring compliance with security and privacy regulations. Even more so than other industries, healthcare digital platforms face the challenge of reconciling the diverse interests and objectives of multiple stakeholders, including physicians, providers, and policymakers (Bardhan et al., 2020). The platform's design must not only consider the interests and objectives of these stakeholders but also accommodate the varying medical histories, physical traits, needs of patients, as well as the requirements of healthcare professionals, health insurance providers, and care delivery methods (Fichman et al., 2011). Consequently, designing a platform-based health IT solution involves a high level of complexity and effort, which discourages many start-ups.

Platforms in Healthcare

Health IT is a broad term describing the use of computer hardware and software to manage, process, and communicate healthcare information, data, and knowledge, aiming to facilitate decision-making. The primary functions of health IT include digital data storage, communication, and decision support. The ever-expanding health IT landscape encompasses various options such as EHRs, e-prescriptions, picture archiving systems, and videoconferencing for medical appointments. Health IT also includes applications like COVID apps that deliver targeted information, leveraging digital data to combat the pandemic. The adoption of EHRs has gained attention from researchers (Kohli & Tan, 2016); however, implementing and expanding the usability of health IT faces several obstacles. These challenges include the absence of interconnectivity among healthcare professionals from diverse backgrounds, misaligned incentives, misconceptions regarding patient and caregiver engagement, and trust concerns (Fichman et al., 2011). Nevertheless, health IT is viewed as a foundational brick to relieve pressure on the healthcare system and to improve the quality of care delivery (Bao et al., 2020). In this sense, digital platforms can significantly change healthcare, similar to how digital platforms have disrupted other industries (Ozalp et al., 2022). For instance, over the last years we have witnessed some platform approaches emerge in the health sector, such as Oura health, a tracking device for vital signs.

The German elderly care market in 2021 had a market volume of 45, 5 billion euros and it is expected that this market will continue to grow due to demographic change (Federal Ministry for Economic Affairs and Climate Action, 2023) Despite the considerable potential, we have seen only isolated solutions of start-ups in this market (e.g., Grandpad, Alvarium). Start-ups often face challenges when trying to attract early users, particularly when they offer just a singular core service such as HomeHero, which tried to connect families with caregivers (Comstock, 2017). While this service may be enhanced and equipped with interfaces to serve as a platform into which complementing services can integrate over time, in the very early stages of such entrepreneurial ventures these interfaces do not necessarily exist. In fact, the decision between refining the core service and adding interfaces and a technological core to attract partners is a key strategic question that we are focusing on in this study. As a consequence, however, it would be premature to label these very early-stage start-ups *platform owners* and we choose the label *focal firms* instead.

In their quest for growth, start-ups often integrate complementary services on their platform to broaden their portfolio (Rietveld et al., 2019). Our terminology of *core service* and *service portfolio* relates to the notion of *core* and *periphery* established, for instance, by Jacobides et al. (2018). However, as the latter terms are typically applied to mature or maturing platforms, they are less fitting to the context of very early-stage start-ups. For these organizations, there is no stable core (Rietveld et al., 2019), yet, and the periphery encompasses anything beyond the core service. As a consequence, both refining the core service and attracting an initial set of partners which complement a service portfolio are potential growth strategies. When making decisions, focal firms need to consider their impact on their core and portfolio. Strengthening the core service involves accommodating more users through their own platform service with limited functionalities. Conversely, strengthening the portfolio primarily relies on a common goal between the focal firm and the complements, which results in a broad array of functionalities and services (Li et al., 2022).

The integration of complements highlights the diversification of the ecosystem and the scope of services that are brought to the portfolio. However, the focus on broadening the portfolio can create path dependencies for the focal firm, weakening the core service. Conversely, narrowing the focus only on the core service may result in a limited user base. Therefore, focal firms face a critical decision of whether to

focus on a wide portfolio of services by integrating complements or focus more on strengthening their core service to establish an early-stage ecosystem, particularly in the context of digital platforms in healthcare. Growth not only influences the success of the start-up but also constitutes its survival on the market (Gjerløv-Juel & Guenther, 2019). To better understand the decision-making processes of start-ups in regard to core and portfolio, further research is needed to explore the emerging phenomenon of digital platforms in healthcare.

Strategic decision making

Regardless of strengthening the core service or leveraging the portfolio, strategic decision-making greatly impacts a start-up's ability to survive. Start-ups face numerous challenges in platform-based settings as they strive to scale up their operations. The challenges faced by new ecosystems include displacement risks from established ecosystems and, difficulties in creating network effects across multiple sides, which require technical proficiency and strategic approaches to incentivize user adoption (Jacobides et al., 2018). Digital platforms can achieve rapid growth by reducing various costs, such as transaction and innovation costs, and through the use of highly scalable technologies such as microservices architecture (Ozalp et al., 2022). However, attracting complements to a platform requires a strategic approach due to the market's highly dynamic nature (McIntyre et al., 2021). Consequently, start-ups must develop effective strategies to successfully overcome challenges that hinder the integration of various services.

The expansion of the portfolio can be achieved through service diversification. In a platform context, this involves integrating additional services onto the platform or diversifying the services across other industry segments (Tanriverdi & Lee, 2008). Various strategy options for expanding the service scope emerge from platform literature, particularly following concepts of openness and platform envelopment, as well as platform governance. McIntyre et al. (2021) note that the decision about platform openness determines the focal firms' decision about broadening their portfolio. While opening up leads to growth, it simultaneously results in relinquishing control over the platform and thereby weakening the core service. Additionally, it exposes the platform to vulnerability by granting competitors access to vital information about the core service (Leong et al., 2019). Eisenmann et al. (2011) introduced the concept of platform envelopment, which involves a focal firm entering a different market by combining the core service with the target platform to gain an advantage. Strategic partnerships represent another way to expand the scope of portfolio (Mazzarol & Reboud, 2006). Strategic decision-making in platform-based settings is a dynamic process that often requires careful consideration of multiple factors. For start-ups operating in this environment, the ability to make high-quality decisions in a timely manner is critical to success. In light of the post-pandemic situation, it is imperative to understand how changing circumstances may impact decision-making for these businesses.

Research design

In response to calls from scholars such as Grover and Lyytinen (2023) advocating for qualitative research methods, we employ ethnography to understand the emerging phenomena surrounding digital platforms in healthcare. Ethnographic methods are considered useful for gaining in-depth insights (Monteiro et al., 2022). This ethnographic study seeks to provide a comprehensive understanding and exclusive insight into the decision-making processes of start-ups. In fact, the application of ethnography permits the tracing of decision-making processes over time and the analysis of these processes according to the underlying events that influence them. We have also chosen the ethnographic approach because it provides deep glances into the technical, business, and social aspects of the start-ups to help us form a precise understanding on how these aspects work together. This methodology enables us not only to identify previously undiscovered factors that influence decision-making but also to capture opportunistic behavior and short-term considerations that are frequently overlooked in more general studies. Consequently, we are conducting a longitudinal study spanning two years, beginning in January 2022. We consider it important to conduct a more detailed examination of platform solutions for elderly people, given the demographic changes and the fact that they were among the groups most adversely impacted by the pandemic. Furthermore, elderly people are pivotal players who stand to benefit significantly from health IT solutions (Sixsmith et al., 2022).

Research setting

We have selected two early-stage start-ups in Germany operating in elderly care. Start-up A is forming an ecosystem to connect all digital care aids on one platform to ease the burden of relatives taking care of elderly people. The platform currently has functions such as a one-click video communication tool and a digital photo frame for elderly people. Features such as shopping list planning, a contact book for physicians, friends, and important contacts, a shared calendar for organizing, and a chat function to help relatives plan crucial appointments are all centralized in one place. Start-up B is orchestrating a digital collaboration platform for the care industry, aiming to ease the burden of caregivers. This platform is primarily an employee communication app for organizing tasks within the team and swiftly communicating essential information about elderly individuals. However, features for elderly people can be integrated according to the interests of the caregiving facility. This enables functions for elderly people supported by voice assistance, and further telemedical services can be integrated into the platform.

Data collection

Our data collection began in 2022 and primarily relies on field observations, including on-site and virtual observations. Unlike longitudinal case studies, the ethnographic approach represents a distinct type of case study that challenges its conventional boundaries by looking beneath the surface of the organization. In our ethnographic approach, we combine classical tools such as participant observations and interviews with more recent techniques such as virtual observations to get a comprehensive understanding about the hybrid context. As both start-ups operate fully virtually, most field observations are conducted virtually. In our research, we followed the leadership and team members of the start-ups. We conducted monthly interviews to track their current development, gain insights into situated practices, strategic planning, and challenges. We also joined virtual team meetings and informal events, such as dinners, to observe team members' informal interactions. Conversations were recorded and transcribed whenever possible, complementing field notes. Virtual observations also entailed analyzing written communication on platforms like Slack and Microsoft Teams, project planning, and how founders communicate essential information to the team. Additional written materials, such as press releases, blogs, and social media posts, were analyzed to understand the start-ups' marketing activities. Occasionally, we participated in events (e.g., pitching events) to observe how the start-ups' vision was communicated to others and how others reacted. After those events, informal interviews were conducted to capture immediate reactions from team members and the founder teams. For data analysis, we followed an abductive approach (Locke et al., 2008).

Start-up A had quarterly strategic meetings within the founder team, while start-up B conducted spontaneous strategic meetings within the founder team whenever they felt the need for it. As researchers, we learned about their strategic aims through the monthly interviews with the CEOs. During those interviews, we observed two different approaches from the start-ups. While start-up A sometimes granted access to internal documents that showed the strategic plan for the next three months, start-up B remained more closed and only explained their action plan verbally. Although we were somewhat dependent on key information from the leadership through written communication on the platforms or team meeting protocols, we could assess how the goals were communicated to the team and their involvement. Our virtual participant observation showed that virtual organizing tools such as Google Docs or Confluence allowed even external partners (e.g., developers, solution providers) to gain partial insight into the strategic plans. External partners could also edit these documents and comment on them; however, the final decision was made by the founder team. As a result, we collected all available information from written communication, informal conversations, documents, transcribed interviews, and field notes, and then triangulated the information through coding and categorization according to influencing factors on different level of analysis following the approach of Locke et al. (2022) to gain insight into the strategic decision-making process of the start-ups. We divided the collected information into three categories: impact factors on the existing business model, impact factors on the decision-making, and strategic changes. The findings derived from this categorization are presented as preliminary results in this paper.

Preliminary Results

The COVID-19 pandemic led to increasing loneliness among the elderly, as they were unable to visit their relatives, particularly grandchildren. Video communication became the primary means for them to connect

with loved ones, causing a noticeable shift in elderly people's behavior. Initially resistant to using digital technology, many seniors were compelled to embrace it (Sixsmith et al., 2022). This prompted start-up A to reevaluate their offerings and introduce a one-click communication platform for the elderly, strengthening their core service. It was primarily a response to customer needs during the pandemic that was not preplanned by the start-up. By clicking on a person's picture, elderly users could easily initiate contact with them. This feature gained popularity during the pandemic, temporarily prompting the start-up to focus their business model on this product and move away from the ecosystem idea (Fieldnotes, 16 February 2022; informal conversation with CEO of start-up A, March 8, 2022). Nonetheless, the founding team decided to temporarily maintain two business models to test the communication function's usage after the pandemic and generate revenue from it, moving away from their initial core service. However, plans to scale this solution were soon abandoned due to intense competition from established communication channels like WhatsApp (Fieldnotes, July 15, 2022). After a few months, they focused more on strengthening their core service and considered the further development of the communication function. Through a start-up pitch event, they came into contact with therapists and worked together on a solution to use the communication platform for therapy. Initially aimed at dementia patients, the therapy uses cards displayed during the conversation to help patients remember the answers, while relatives receive assistance in asking certain questions to train the elderly people (Fieldnotes, May 4, 2022).

Another option for widening the portfolio is entering strategic partnerships, although not every partnership creates value for the start-up. There is a notable difference between partnerships with established companies and start-ups. The start-up B in this study almost fell victim to exploitation by an established company due to a lack of transparency (Interview with CEO, January 24, 2023). This company was primarily interested in the core service of the start-up, the start-up's internal knowledge of employee app development and did not treat the start-up as an equal business partner. In contrast, start-up A partnered with another start-up that had successfully raised a significant sum in its first financing round (Fieldnotes, April 10, 2022). This start-up produced bed sensors that start-up A wanted to integrate into its portfolio. Initially, both parties were satisfied with the partnership; however, they eventually realized that they had not thoroughly considered the partnership's operational details, such as the incentives the bed sensor start-up would receive for referrals. This experience led the bed sensor start-up's developer team to consider which interfaces were needed to integrate their solution. Due to the bed sensor start-up's early-stage, start-up A had to assist them in complying with legislation. As a consequence start-up A, reconsidered the openness of their core service, and documented critical aspects for smooth onboarding (Interview with CEO, 20 April 2022). This partnership provided valuable learning experiences about what to consider in future partnerships and how much they wanted to rely on others' solutions (Fieldnotes, August 30, 2022). The integration of the bed sensor function took several months, significantly hindering the start-up's development (Fieldnotes, August 30, 2022).

In recent years, policymakers have enacted laws to support healthcare innovation and facilitate start-ups' entry into the sector. The Digital Care Act, for example, provides a financial benefit for the provision of digital care applications (*DiPA*) and supplementary support services, totaling up to 50 euros per month. These applications can be used by care recipients or in collaboration with relatives, volunteer caregivers, or care services to reduce impairments to independence or abilities and prevent the worsening of care needs (Federal Ministry of Health, 2023). Despite the law's potential benefits, start-ups were initially hesitant to become official care apps or digital health applications (*DiGA*), another byproduct of the Digital Care Act, due to the substantial financial burden of certification (Fieldnotes, 16 August 2022; fieldnotes, March 2, 2023). By the end of 2022, start-up A expressed interest in pursuing certification if it proved profitable in the long run (Fieldnotes, December 6, 2022). Both start-ups complained about the lack of clear information on the certification process and faced rejection when attempting to acquire more details from relevant institutions (Interview CEO start-up A, August 29, 2022; interview with CEO start-up B, June 9, 2022). This legislation could have provided an easy opportunity for the start-ups to increase their visibility on the market and attract more users to the core service.

During the summer of 2022, the construction industry expressed interest in start-up A's innovative solution, and a partnership was formalized at a major construction trade fair (Fieldnotes, October 6, 2022). This agreement involved integrating the solution into two existing housing projects and a new construction project designed for elderly-friendly living. The start-up A was to assist the construction company in connecting care aids used by elderly residents and operating the platform (Fieldnotes, October 6, 2022). This partnership was of significant importance for start-up A as it enabled the expansion of the core service

and the offered portfolio across sectors. Although other construction firms expressed interest, the partnership was terminated in autumn 2022 due to the energy crisis caused by the Russian invasion of Ukraine (Fieldnotes, December 20, 2022). This incident demonstrates that generating more value through a strong core service and widening the portfolio can be overshadowed by unforeseen events, regardless of the recognized relevance and importance of such solutions. These challenges can hinder start-ups from focusing more on their core or the scope of their portfolio, leading to suppression.

The preliminary findings suggest that start-ups encounter significant complexity in determining their optimal positioning within the healthcare sector. Given the potential threat posed by established companies, the decision-making process of these entrepreneurs must be strategic and fast. Additionally, external factors, such as policymakers, user behavior, and collaborations with other start-ups or firms, as well as current events, can significantly influence this decision-making process. As summarized in Figure 1, it is imperative for start-ups to balance the core service and the portfolio simultaneously to enhance their survival prospects in the highly regulated market and seize every opportunity for growth. The overarching aim of this study is to delve deeper into the longitudinal decision-making process of start-ups and gain valuable insights from the pre-birth phase of emerging ecosystems. This phase is critical, as it is uncertain whether start-ups should prioritize their core service or broaden their portfolio by attracting complements. These decisions are often interdependent, further complicating the decision-making process. By analyzing the factors that influence the success or failure of early-stage digital platform ecosystems in healthcare, this study aims to shed light on the impact of these factors.

Impact factors	COVID-19 pandemic: Seniors were isolated from their relatives	Regulated markets, which are dominated by established companies	Introduction of a new law (Digital Care Act)
Action	Introduction of the Video communication function	Forming up strategic partnerships	Becoming an authorized digital care/ health application
Focus	Strengthening the core	Widening the portfolio	Strengthening the core
Strategic plan	Building up a second business plan → Additional way of value creation	Integration of additional functions & services → Creation of network effects	Certifying the digital platform with the core service → Additional way of value creation
Challenges	Threat through competitors Easily imitable	The way of cooperation Need to open up the platform	Getting the certificate by fulfilling the expected criteria
&			
Risks	No longevity of the function High sunk costs	Giving up control Transparency	Not rewarding High sunk costs
(Potential) solutions	Resetting the strategic focus back to the core Improving the function by adding a new purpose to it	Wise selection of partners If partnerships take time to form, focus on strengthening the core or choose new partners	Policymakers (a) should provide more insights about the certification process and (b) should design the process efficiently If the start-up has enough funds and if the certification would strengthen the core, certification should be done

Figure 1 Overview of the influencing factors

Concluding Remarks and Outlook

The greatest challenge for start-ups remains attracting enough users and complements to establish a viable business model and finding a successful balance between their focus on core vs. portfolio. Although it is undeniable that healthcare can benefit from innovative platform solutions offered by start-ups, failures of healthcare start-ups are not uncommon. Another difficulty that start-ups must grapple with is aligning with institutional requirements (e.g., certification), which often hinders the expansion of the ecosystem. Our research does not intend to evaluate the appropriateness or correctness of the decision-making focus to navigate through external shocks, such as the COVID-19 pandemic, or the ability to capitalize on ensuing opportunities. Instead, our emphasis is on understanding the underlying decision-making processes over time, and the extent to which strategic planning versus chance occurrences shape the outcomes. Figure 1 provides an overview about how such decisions are shaped. By gaining these insights, policymakers can develop appropriate legislative frameworks that facilitate start-up growth and promote the broader adoption of digital technologies in healthcare. Other start-ups gain valuable insights into when to seize opportunities or make strategic moves in highly regulated environments.

Although our study is limited to single cases, we believe that an in-depth understanding of the decision-making processes within the start-up could provide valuable insights for other start-ups operating in healthcare. Ethnography enables us to analyze this process over time in great detail. This serves as a good starting point for enhancing our understanding of building platform ecosystems. Second, we do not claim that our preliminary results paint a complete picture of the challenges in healthcare, but they do offer a glimpse into what influences decision-making processes and how institutional changes in laws are perceived by start-ups. To create a more comprehensive picture of the challenges faced by start-ups, the focus should be on additional factors (e.g., platform competition, power dynamics, resource management, and platform control), which could lead to alternative explanations. Future research could incorporate a perspective that focuses on multiple stakeholders and further analyze why start-ups succeed or fail in creating platform ecosystems in healthcare. We believe that this article stimulates and lays the foundation for such work. By the time of December, we expect to provide more insights of the strategic decision-making of the start-ups over time and how it related to key performance indicators.

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