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Understanding Digital Platform Generativity from a Sociomaterial Perspective

Short Paper

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Abstract

Research on digital platform generativity has predominantly taken a substantivist view, considering digital platforms as relatively static, self-contained entities separated from their human actors. We argue this view, while intuitive and common sensical, also has a downside – biasing researchers and practitioners from understanding the dynamic and processual nature of digital platform constituted through generativity in the flow of time. We offer a sociomaterial view to consider digital platforms as an assemblage of enacted sociomaterial practices, enabling researchers to move from studying platforms to platform becoming, and from generativity to generating. We illustrate these ideas via a preliminary empirical study of how generativity is constituted by the performativity of a digital platform, as it is enacted by the human agencies entailed in its design and management. Ultimately, our study aims to take steps towards a sociomaterial theory of digital platform generativity that can contribute to the digital platform literature.

Keywords: Generativity, Digital Platform, Sociomateriality, Becoming, Practice

Introduction

Generativity is defined as “a system’s capacity to produce unanticipated change through unfiltered contributions from broad and varied audiences (Zittrain 2008, p. 70).” It is important for digital platforms since it is one of the main mechanisms that drive platform evolution and enable innovation for an unknown future (Eck and Uebernickel 2016; Henfridsson and Bygstad 2013). The role of digital platforms in the context of generativity holds equal importance. These platforms provide a technological foundation that nurtures innovation, while also offering a virtual place for heterogeneous actors to explore ideas that might not have been conceived by the platform orchestrator (Yoo 2013). Consequently, understanding the co-evolution of digital platforms and their generativity is crucial for both scholars and practitioners, as it helps them to fully harness the potential of their platforms and drive value for users and other stakeholders.

While several studies have investigated the co-evolution of digital platforms and generativity (Fuerstenau et al. 2019; Fürstenau et al. 2023; van der Geest and van Angeren 2023; Henfridsson and Bygstad 2013), there has been little focus on a nuanced understanding of the underlying nature of digital platforms that enables and constrains the actors’ activities that produce generative innovations (Yoo 2013). We argue that this gap arises from the extant literature on platform generativity predominantly adopting a substantivist view based on the dualistic assumption that the social and the material exist separately (Cecez-Kecmanovic 2016; Langley and Tsoukas 2017). According to this view, digital platforms are often viewed as discrete and self-contained entities, and generativity is viewed as a property attached to digital platforms that can be managed through the interactions between the actors and technology within the platform ecosystem. We argue this view has some underappreciated downsides as it shifts generativity from something inherently uncertain (e.g., ‘unanticipated’, ‘unfiltered’ in Zittrain’s definition), to something that can be managed using various levers. By focusing attention on these levers, we suggest that past research has overlooked other

important aspects of generativity that only become apparent when we take a sociomaterial perspective. Thus, the purpose of our paper is to embrace this alternative perspective, explaining its advantages, while also responding to the call for a sociomaterial theory of generativity (Yoo 2013).

From a sociomaterial perspective, digital platforms are not unchanging entities with fixed identities isolated from the actors within the platform ecosystem. Instead, they are constitutive assemblages of sociomaterial practices enacted over time. They possess a dynamic quality that arises from the ongoing intra-action between technology and people. Generativity ceases to be an inherent property attached to digital platforms; rather, it materializes through processes of mutual accommodation and adaption of social and technology in platform evolution. The focus shifts from *generativity* to *generating*. Drawing on this conceptualization, our study sought to explore the co-evolution of digital platforms and generativity by addressing the question: *how does the becoming of digital platforms co-evolve with platform generating?*

To answer our research question, we first review the literature on digital platform generativity, problematize the assumptions, and introduce a sociomaterial approach to investigate it. Next, we conduct an empirical study of an Australian-based software company. Following an inductive theorising approach, we are at the stage of iteratively moving between collecting data, analysing data, and building theory. In this short paper, we present our preliminary findings and show that the resulting sociomaterial assemblage between multiple stakeholders and the evolving platform that delivers the generativity as a generating process is both emergent and contingent. As the study continues, we aim to develop a sociomaterial theory of digital platform generativity that contributes to the generativity literature. This will provide researchers and practitioners with a new perspective that reflects the relational and processual nature of their work and offers them new guidance for actions.

Views on Digital Platform Generativity

We began our study with a literature review on digital platform generativity across prominent journals and conference proceedings within Information Systems and Management. Our review timeline spans from 2006 to June 2023, encompassing the period since Zittrain (2006) first introduced the concept of generativity to describe the internet. This extensive timeframe ensures a broad understanding of the phenomenon. We then identified gaps in the literature and further problematized them to form our research questions. From our review, it became clear that IS scholars have studied digital platform generativity from diverse perspectives and with varying emphases. We identified three predominant research streams, as shown in Table 1. From the literature, it is evident that digital platform generativity has made significant progress and captured the interest of IS scholars. A predominant characteristic of this literature is that it has largely adopted a substantivist ontology, which is based on a dualistic assumption that the social (human actors) and the material (digital artifacts) exist separately (Cecez-Kecmanovic 2016; Orlikowski 2007; Scott and Orlikowski 2014).

We argue that this prevailing view may potentially lead to an incomplete understanding of digital platform generativity since it does not actually capture the essence of generativity, as it is defined, in studies to date. The “unanticipated change” and “unfiltered contributions” in Zittrain (2006)’s definition implies that the nature of generativity is somehow beyond the control of platform owners and developers. The current literature, on the contrary, assumes that generativity can be managed as planned, e.g., by adjusting the platform’s modularity (Tiwana et al. 2010) or boundary resources (Eaton et al. 2015), or by managing its heterogeneous and autonomous community (Ghazawneh and Henfridsson 2013; Hanseth and Lyytinen 2010; Yoo 2012), e.g., through generative governance (Thomas and Tee 2021). Put simply, the current literature has shifted generativity from something inherently uncertain to something that can be managed using various levers to facilitate it. We argue this shift have limitations in studying platform generativity for two major reasons.

First, following a substantivist ontology tends to oversimplify the nature of generativity, either as an intrinsic attribute of the digital platform or a product of human agency. This oversimplification may foster a false impression that digital platforms exist in a vacuum, detached from the messy, complex realities of practitioners and their work environments. It leads researchers to imagine that practitioners can stand outside the context from where they can observe and judge the platform’s characteristics, and then be given “levers” (like ‘modularity’) that they can use to adjust platform generativity. This is unrealistic for

practitioners who are typically “thrown in” to situations and simply have to make sense and respond in the flow rather than having the luxury of being about to stand outside it and use levers to adjust it.

Second, within the context of platform generativity, the substantivist ontology assumes that a digital platform exists a priori as a static and bounded substance, with a set of material properties, including generativity. According to this view, regardless of any great changes that occur on a digital platform, the platform’s being (existence) remains unchanged, with only its properties changed. This view fails to capture the processual nature of digital platforms. Of course, the substantivist view of digital platform make sense intuitively. After all, in everyday speech, a “platform” is something solid and substantial upon which you place things, such as a speaker, a vase, or an oil rig. Even when we think of conceptual objects placed on platforms (like the platform for a speech or a strategy), the word platform is used to connote something stable upon which a conceptual object sits. However, our point is that this view of platforms, while intuitive, and common sensical, biases us from understanding the *essence* of generativity and the dynamic nature of a digital platform constituted through generativity over time. This is because it may overlook the flowing character of experiences that practitioners go through, the uncertainties and emergencies of the world we are immersed in, and the temporality of innovation processes (Cecez-Kecmanovic 2016; Langley and Tsoukas 2017; Orlikowski and Scott 2008; Sandberg and Alvesson 2011; Scott and Orlikowski 2014). To have a more nuanced understanding of generativity and explain the dynamic nature of platforms, a holistic approach is essential – one that does not separate technology and humans when exploring platform innovation. Our study therefore aims to address this theoretical gap by adopting a sociomaterial view.

Perspective	Description	Example Studies
Technology-focused perspective	Considers generativity as an inherent characteristic of a certain system or technology. Generativity is designed into the digital artifacts through the recombination of various digital resources or enabled by the modular and open nature of digital technologies.	Generativity is a consequence of the combinatorial capacity and diverse characteristics of digital artifacts, such as modularity (Tiwana et al. 2010; Yoo et al. 2012), malleability (Kallinikos et al. 2013; Nambisan et al. 2017; Richter and Riemer 2013), openness (Boudreau 2010).
Human-centric perspective	Emphasizes the role of human actors in designing and controlling the digital technology’s generativity. Generativity goes beyond a platform’s generative properties and primarily relies on governing human actors’ (platform owner and complementary third parties) interaction and activities in the digital platform ecosystem.	Generativity of digital artifacts can be leveraged through the creative input and diverse skill sets of various human actors within the platform ecosystem. This generative capability is governed by platform-controlling actors in managing the tensions between a platform’s flexibility and stability, or control and autonomy (Cennamo and Santaló 2019; Foerderer et al. 2014; Ghazawneh and Henfridsson 2015; Grisot and Vassilakopoulou 2013; Jarvenpaa and Standaert 2018; Pauli 2020; Staub et al. 2022; van Osch and Avital 2010; Yoo 2012).
Socio-technical perspective	Digital technology and human actors mutually shape each other in interactions which enable the generative evolution of digital technologies.	Generativity can be defined as the capacity of a socio-technical system, wherein the interplay between technical and social components results in the recombination of resources to generate innovations. The intricate patterns of interactions between human actors and digital artifacts play a pivotal role in driving the evolution of digital platforms.(Eck and Uebernickel 2016; Fürstenau et al. 2023; Jain and Ramesh 2015; Msiska and Nielsen 2018; Nielsen and Hanseth 2010; Thomas and Tee 2021).

Table 1. Three Predominant Research Streams on Generativity in Literature

Towards a Sociomaterial Perspective on Platform Generativity

Given our interest in understanding the dynamic and processual nature of digital platform generativity, we adopt a sociomaterial perspective for our empirical study. The essence of sociomateriality is that it assumes the social and material are inherently inseparable; entities, human beings and things exist only in relations which each other: they are continuously brought into being through their mutual and emergent interconnection and entanglement (Cecez-Kecmanovic et al. 2014; Orlikowski 2007; Orlikowski 2010; Orlikowski and Scott 2008). We believe this perspective can address the challenges of adopting the substantivist ontology in studying digital platform generativity since it recognizes “the dynamic, distributed, and interdependent nature of technologies in use today, and the multiple and unprecedented ways in which they are shaping and will continue to shape organizational realities” (Orlikowski and Scott 2008, p. 437).

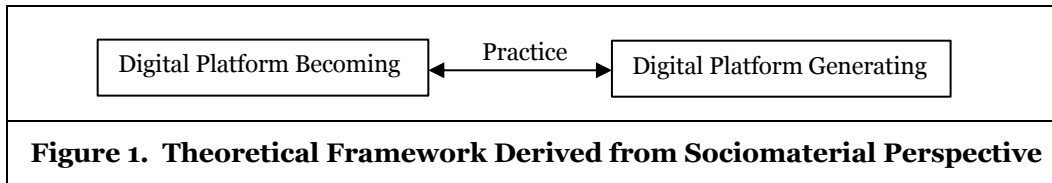
Approach	Technology-focused or human-centric (predominant view)	Socio-technical (predominant view)	Sociomaterial (proposed way)
Ontological priority	Discrete entities (whether human or technologies)	Mutually dependent ensembles	Sociomaterial assemblages
Ontological commitment	Substance metaphysics	Substance metaphysics	Process metaphysics
Ontological status of process	Substance	Substance	Relational and becoming
Primary mechanisms	Impact; moderation	Interaction; affordance	Entanglement; Performativity
View of social and technical worlds	Social and technology are discrete, independent entities with inherent characteristics.	Social and technology are interdependent systems that shape each other through interaction.	Social and technology exist only through their temporally emergent constitutive entanglement.
Conceptualization of digital platform	A distinct, static and self-bounded entity	Ensembles of platform, applications, techniques and people (being precedes doing)	Assemblage of sociomaterial practices enacted over time (doing precedes being)
Understanding of generativity	Property of digital platform	Ability/capacity to keep changing platform properties	Generative materiality that emerges from the ongoing entanglement of social and technology
Nature of change in platform in time and relationship with generativity	Platform does not change. Generativity is a property of digital platforms. Its level or value may change over time, but not its essence.	Changes happen to platform properties, such as its level of generativity, but the platform itself is essentially unchanging in character.	Platform keeps changing its being as it is constituted by generating processes.
Table 2. Comparing the Predominant Theoretical Views on Digital Platform Generativity with the Sociomaterial View (adapted from Orlikowski & Scott 2008, p. 457)			

The sociomaterial perspective challenges the prevailing substantivist ontology commonly used in the digital platform generativity studies. It embraces a relational ontology and a becoming ontology, both of which help capture the dynamic nature of digital platform generativity as it emerges from the entanglement of humans and technology (Cecez-Kecmanovic et al. 2014; Orlikowski 2010). Table 2 overviews these contrasting ontological views, highlighting how the sociomaterial view departs from the predominant substantivist ontology and offers a new way to comprehend and conceptualize digital platform generativity.

In essence, adopting the sociomaterial perspective fundamentally alters our conventional view on digital platforms as static and bounded entities with generativity as a mere property. Embracing both a relational

ontology and a becoming ontology leads us to consider the being (existence) of a digital platform as contingent upon people’s involvement with it and its position within a holistic world of activities and identities (Riemer and Johnston 2017). Essentially, the ontological stance of the sociomaterial perspective invites us to view the digital platform as constituted by the dynamic interactions and practices of individuals and communities engaged with it in the platform ecosystem. Generativity is no more a property attributed to the platform. Instead, it takes on the form of generative materiality that emerges through the on-going entanglement of human actors and digital platform. To emphasize the dynamic role of generativity in shaping and co-constructing the digital platform, we employ “generating” (as a process) instead of generativity (as a property) in our study to account for its active and constitutive nature.

In light of this, studying the co-evolution of digital platform and generativity involves comprehending how the platform as a sociomaterial phenomenon transforms through time and how generativity emerges as a subprocess of the platform’s becoming. Central to this investigation is the exploration of practices, in the form of activities, interactions, and engagements of individuals and communities in the platform ecosystem as they contribute to the platform’s becoming and generating process (Orlikowski 2000; Orlikowski 2007). It is through these practices that the platform takes on new forms, evolves, and generates for its users and stakeholders. Figure 1 illustrates the theoretical framework derived from the sociomaterial perspective, providing an analytical structure for us to conduct the empirical study.



Research Methods

Our study aims to develop a sociomaterial theory of digital platform generativity by exploring the coevolution of platform becoming and generating. To gain an in-depth understanding of the dynamics, we are conducting a qualitative case study. Since Feb 2023, we have been systematically collecting data from an Australian-based software company. This company specializes in the continuous development and enhancement of a Software-as-a-Service platform – Axe (an alias) - with a variety of applications and tools that offers cloud-based job management solutions tailored to field services.

Based on Zittrain (2006)’s definition of generative technologies, we selected Axe as our case study for two reasons. Firstly, Axe has transitioned from an on-premise product to a cloud-based platform, and from hosting on private servers to AWS. This evolution allows us to track the platform becoming. Secondly, Axe encourages innovation from both internal and external stakeholders by providing APIs to their end-users, integration partners and complementors. Over time, several innovations have converted into new platform products, which enables us to study the unanticipated innovation from unfiltered contributions.

To conduct the case study, we draw on three main data sources: semi-structured interviews, archival data and on-site fieldwork. We examine multiple innovation projects on the platform both retrospectively and prospectively. Table 3 summarizes the data collection thus far. Data analysis is being conducted together with data collection following an iterative, grounded-theory approach (Charmaz 2006; Urquhart 2022).

First, we conduct a basic analysis to construct chronologies for the platform and its main products evolution to map the platform becoming and product generating. This helps us to identify different episodes in the innovation process through time. Second, aligning with sociomaterial perspective, particularly emphasizing the relational ontology and becoming ontology, we follow Riemer and Johnston (2017)’s approach which employs Heidegger’s analysis of equipment to analyse and synthesize data into vignettes. This approach is hermeneutic and iterative in nature and focuses on the different ways of being of a platform in the world of multiple stakeholders throughout the evolution of platform becoming and generating (Riemer and Johnston 2017). Furthermore, we are focusing on coding events, actions, activities, and changes rather than actors and entities themselves. We then group open codes together to develop the selective codes in the form of practices and form the categories. Third, we relate the categories and identify relationships between them and develop the theory. Finally, we will conduct a checking process to ensure the reasonableness of the data and theory. This will involve sharing our findings with participants and seeking their feedback to

ensure that the data and analysis reflect their experiences. At this stage, we are in an iterative process between step one, two and three, and we will continue the data collection and data analysis process with the goal of eventually developing a sociomaterial theory of digital platform generativity.

Data Type	Details of Data
Semi-structured Interviews	<ul style="list-style-type: none"> • Number of interviews: 10 • Total length of interviews: 510 mins • Number of transcribed pages: 86 pages
Archival data	<ul style="list-style-type: none"> • User case studies: 19 • Product release notes: from 6 April 2022 to May 2023 • Webinar videos (e.g., product demonstration, conversions between users and product managers): 39
On-site fieldwork	<ul style="list-style-type: none"> • Participant observation materials: field notes, research memos • Informal conversations in the field work • Observe public events, e.g., annual summit, customer communication events
Table 3. Progress of Data Collection to Date	

Preliminary Findings

The preliminary findings of our study suggest that the generativity is constituted by the performativity of digital platform, as it is enacted by the human agencies entailed in its design and ongoing management. And the resulting sociomaterial assemblage between multiple stakeholders and the evolving platform that delivers the generativity as a generating process is both emergent and contingent. To date, we identified two repetitive episodes in the coevolution of platform becoming and generating that help explain how a digital platform becomes generative. These episodes should not be viewed as having a simple linear relationship; instead, they may occur temporarily in parallel and mutually constitute each other.

Changing Ways of Being Platform in Fostering or Constraining Generativity

We found that the ways of being of the platform had undergone significant changes as it had been extended and used by developers and users over time. As one of the founders explained, the platform right now was not designed as an intuitive platform at the start. Instead, it was originally designed as an on-premises software with a very limited functions that was installed and run on the customer company’s server. The innovation process was quite monolithic, and the company was solely responsible for updating and maintaining the software. This way of being a platform resulted in very little generativity because it did not encourage input from a diverse audience outside the company.

In the late 2010s, the way of being a platform as a “platform” in the literature (Gawer 2022) had just emerged at the same time as the company underwent a transformation when they moved the infrastructure into the cloud, developed the product in the cloud, and shifted their business model from a perpetual license to a subscription-based model. At this point, the platform was considered a platform (Gawer 2022) because it was used as a backend to store data, include add-ons on, and add new features. The platform also began fostering generativity by the company actively collecting ideas from the industry and customers through launching its “online ideas portal.”

Since 2020, the way of being of the platform further transitioned into a platform-centric ecosystem. In addition to developing add-ons on the platform, the company has been developing standalone products that connect with the platform to build an ecosystem for the field-service industry. They also built Application Programming Interfaces (APIs) on the platform to allow customers and complementors to access the platform and generate many diverse possibilities. The ecosystem way of being began to reveal to the company a new way of generating through integrating with partner companies’ products to build and expand the ecosystem, fostering platform generativity.

We also found that the changing ways of being of the platform did not always foster generativity; it can also hinder it. As several product managers mentioned, one challenge in fostering generativity is ensuring that new features or products on the platform align with users’ perception of the ways of being platform over time. This is because platform users hold a persistent impression of what the platform is, and significant

changes to its way of being platform may cause confusion or even alienation. Therefore, it is crucial for the platform company to maintain a consistent way of being platform that aligns with users' expectations while allowing for evolution to keep up with the changing needs of the market.

Generating Unexpected Architectural Debt in Platform Becoming

In the evolutionary process of platform becoming, generativity may not always lead to positive outcomes. The constant push for innovation and platform development can unexpectedly lead to the accumulation of architectural debt over time, subsequently impeding the generating process. In our case, the platform was initially completely coded in PHP, which was a cutting-edge language at the time and gave the company an advantage over its competitors. However, as technology rapidly evolved, the coding framework of the platform changed significantly, requiring a new coding framework, and PHP became outdated for maintaining infrastructure and writing applications on the platform. This posed a challenge for the platform as it needed to update its technology stack to continue generating and meeting the evolving needs of its users. However, the outdated codebase created an architectural debt that has dragged down the generating process. As one Engineering Director explained,

“If you rewrote an application today, you would have a much more modular application, lots of separation concerns, probably much more split up services, things like that... And there isn't that sort of thought process around, we'll actually hang on these two areas are consuming similar data so they should be going through a central point so that we can encapsulate logic in that space and therefore modularize things and isolate change, that stuff doesn't really exist. And that's just because the nature of it (code base) being so old.”

In addition to the technical challenge, the accumulation of architectural debt also yields negative consequences on the organizational level, making it difficult for the company to recruit developers as they are not interested in working with outdated coding frameworks. Therefore, fixing the accumulating architectural debt becomes a priority in the company's strategy. However, fixing the debt does not mean replacing the entire legacy system because it would require significant cost and time investment. Instead, the company has gradually updated the codebase while keeping the infrastructure as it is. Additionally, they start taking advantage of Infrastructure-as-a-Service platforms such as Amazon Web Services to build new products and features on top of their existing system to address the architectural debt issue.

Discussion and Future Work

To summarize, these preliminary findings are derived from the early stage of iteration between data collection, data analysis, and theory building. we summarise them and relate them with the existing literature to present the potential contributions in Table 4.

Drawing on these findings, we argue that digital platforms become generative in tandem with their evolutionary trajectory. This emphasizes that platform generativity is inherently intertwined with the concurrent process of platform evolution. The goal of our study is to develop a sociomaterial theory of digital platform generativity that contributes to the literature in Information Systems and Management by revealing the dynamic and processual nature of digital platform and its generativity. For practice, we believe the sociomaterial view can provide practitioners with insights they can use to appreciate both its sensibility and uncertainty of continuous innovation on the platform.

Preliminary Findings	Relationship with Existing Literature	Potential Contributions
Changing Ways of Being of Platform in Fostering or Hindering Generativity	The changing ways of being platform highlights the importance of “being of platform” in generating new possibilities for platform innovation practice from a sociomaterial perspective. This answers the call for putting the “being of IT” on IS agenda to authentically investigate how people encounter IT in their local worlds (Riemer and Johnston 2017).	Our study potentially provides empirical details of how various stakeholders in a platform ecosystem engage with the “being of a platform” in generating new possibilities in practice.

Generating Unexpected Architectural Debt in Platform Becoming	IS scholars have investigated the interactions between digital options and technical debt on platform management (Rolland and Lyytinen 2021; Rolland et al. 2018). However, there is a gap in the literature concerning how technical debt hinders platform innovation.	Through our study, our findings may potentially extend this literature by uncovering the details of how a platform company can work on fixing its architectural debt to foster their platform generativity.
Table 4. Summary of Preliminary Findings and Relationship with Existing Literature		

This short paper marks the initial phase of our empirical study. Next, we will continue data collection, data analysis, and theory building. We will also further investigate the preliminary findings to provide more details on these episodes and explore how they relate to each other and fit into the platform becoming and generating process.

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