

## The Role of Digitalization in New Practice Creation: The institutionalization of UX at AutoInc

Lena Hylving  
Halmstad University  
[lena.hylving@hh.se](mailto:lena.hylving@hh.se)

Annie Rydström  
Volvo Cars  
[annie.rydstrom@gmail.com](mailto:annie.rydstrom@gmail.com)

Magnus Bergquist  
Halmstad University  
[magnus.bergquist@hh.se](mailto:magnus.bergquist@hh.se)

### Abstract

*Although information systems research has brought the role of new practice creation in innovation processes to the fore, few studies focus on initial activities of digital innovation and how they eventually lead to institutional transformation. Using a framework of institutional enablers of digital innovation, this study analyses the role of new practice creation in digital innovation. The study is based on a 20-yearlong case study in the automotive industry and follows the emergence of User Experience (UX) practices in an automotive manufacturer. We do this study to understand how UX could develop from a marginal position scattered over the organization to the institutional core as the main logic of innovation. The study theorizes the role of organizational forms, digital institutional infrastructures, and digital institutional building blocks in the legitimization of new practices for organizational transformation.*

### 1. Introduction

Practice creation in institutional settings is defined as activity patterns across actors. These activity patterns are infused with meaning to provide tools for ordering social life and activities [2]. It is challenging to transform knowledge and competence into practices that provide opportunities for institutional change, which eventually lead the organization towards digital innovation [1]. It has been recognized how digital technology became institutionalized, how ideas travel through the institutionalization of technology [3], and how the process of digitalization can create new business model practices [4]. However, it has been noted that few studies have focused on the initial activities of digital innovation and how they eventually lead to institutional transformation [5].

The extant literature provides different suggestions for how new practices become institutionalized, such as new roles [6] and new capabilities [7]. There are examples of studies of the roles that technology paradigms play in developing new practices [8]. Yet, we still have limited knowledge on how initial new practices can rise to impact organizational structures and processes and eventually entire institutional arrangements [9]. Therefore, we ask: *How may initial practice creation lead to new institutional arrangements?*

To answer our question, we invoke a 20-yearlong case study of an incumbent firm in the automotive industry, AutoInc. AutoInc developed a range of practices around Human Machine Interaction (HMI) that gradually transformed the organization from having a product and technology focus towards innovation around the conceptualization of the car as a user experience during the studied period. HMI/UX went from being a peripheral activity, done by a few in isolation, to an activity that was seen as strategically important for the future of cars, and organized around a new category of staff, HMI/UX specialists (HMI, HCI, UX, etc.). As our study will show, a high degree of digitalization of UX practices plays a central role in explaining how initial peripheral activities can leverage an organization in digital transformation.

We build on previous research on digital innovation from an institutional perspective [6, 10, 11] and ground our study in an institutional perspective based on Hinings et al.'s [1] enablers of digital innovation, namely, digital *organizational forms*, digital institutional *infrastructures*, and digital institutional *building blocks*. The advantage of this perspective when analyzing new practice creation is that it identifies multiple grounds for where and how initial activities may gain institutional legitimacy in new practice creation.

The contribution of this paper is threefold. First, using a rich empirical case study, we show the role of

digitalization in the organizational impact of new practices. Second, based on the insight that institutional arrangements enabling digital innovation are “emergent, dynamic and sociotechnically complex” [12, p. 306], we show the value of using a framework recognizing that new practices can affect situational arrangements in various ways. Digitalization plays different roles in institutionalizing new practices depending on whether the practices lead to *organizational forms*, *infrastructure*, or *building blocks* [1]. Here, we specifically discuss how the digitalization of practices creates different types of enablers for digital innovation and how they can transform into each other and manifest in multiple ways simultaneously. Third, we suggest a framework (Figure 2 presented in the Discussion) to better understand the emergence of initial practices in institutional change.

## 2. Theory

While digitization is the conversion of manual data into a digital format [13, 14], digitalization is the sociotechnical phenomenon connected to the digitization of practices. Such new digital practices transform sociotechnical structures and gradually change organizational roles and relationships [6, 15]. We define digitalization as the social change generated by new practices and the material changes that follow the transformation from analog to digital [15]. The material and the new practice creation, aka the digitalization, are co-constitutive [16]: new practices enable new forms of digitization while digitization facilitates new practice creation [17].

For new digital practices to impact the organization, the practices need to become recognized by institutional actors as legitimate forms of behavior [1]. Organizational legitimacy is “a generalized perception or assumption that the actions of an entity are desirable, proper, or appropriate within some socially constructed system of norms, values, beliefs, and definitions” [13, p. 574]. Legitimacy is the result of a social evaluation made by the individual or collective actors, such as groups, organizations, governments, media, and regulators [19], and occurs within organizations on different levels. There are many ways to gain legitimacy, for example, through grafting, bridging, and decoupling [6]. Yet, as this case illustrates, these strategies are often applied top-down, by, for example, a Chief Digital Officer, and not bottom-up.

Yet, legitimacy enhances the stability and comprehensibility of activities, respectively, and reinforces each other [18]. Hinings et al. [1] identify three aspects of institutional arrangements that operate

on different levels but are critical for institutional transformation: digital organizational forms, digital institutional infrastructures, and digital institutional building blocks. Digital organizational forms are “digitally-enabled arrangements of practices, structures and values constituting an organization’s core and that is appropriate in a given institutional context” [1, p. 54]. Digital institutional infrastructures are different digital technologies that create opportunities for actors to coordinate actions and interactions through the means of different digital platforms and ecosystems, such as digital product platforms and data infrastructures (e.g., blockchain). The digital institutional building blocks exemplified by Hinings et al. [1] are ERP systems, payment systems, WordPress, and the like. Such building blocks are defined as generally accepted, ready-made, and customizable modules that encompass sets of digital technologies for running or creating an organization.

According to Hinings et al. [1], these arrangements enable digital innovation, yet only described on a very general level. Hinings et al. [1] argue that digital organizational forms, digital institutional infrastructures, and digital institutional building blocks constitute the institutional arrangement and are crucial for how initial (digital) practices can lead to institutional transformation and exemplify with new types of organizations such as Airbnb, Uber, and GalaxyZoo. Yet, no prior studies have, to our knowledge, applied the framework to an empirical case to explain how initial innovation activities actually can impact digital innovation and lead to organizational transformation. Hinings et al.’s [1] conceptual work provides tools to analyze the initial activities of emerging digital institutional arrangements subject to different institutional logics to highlight under what circumstances digitalization will enable and constrain new practices and how these new practices gain legitimacy and impact the logic underlying an institutional arrangement. This detail is especially important when considering how initial peripheral activities in an organization can leapfrog into shaping the whole organization’s innovation activities. We use Hinings et al.’s [1] conceptualization of institutional arrangements as a sensitizing device in our analysis [20] to refine and improve our understanding of how new practices combined with digitization can open and transform institutional arrangements.

The interplay between existing and new emerging institutional logics has proven difficult to manage [7, 16], yet limited research illustrates how this interplay shapes institutional arrangements. Therefore, this research aims to provide insights on emergent digital

practices within an existing incumbent organization from an institutional perspective. We do this in close collaboration with the empirical organization to spark a theoretical contribution and articulate what the organization is blind to see in its own doings, thereby giving them new insights and understandings of their own digital innovation journey [12].

### 3. Method

The background of this research was the empirical observation in the ongoing study of AutoInc, a European car manufacturer, where the HMI (Human-Machine Interaction) and later the UX (User Experience) group of professionals at AutoInc had grown in volume and gradually progressed from a quite peripheral role in the organization towards a more central and strategic position. In conjunction with this progression, the car was redefined from a physical transportation product to an enabler of user experiences. A closer analysis showed that digital innovation was in important ways connected to the digitalization of practices stemming from a UX logic and that the institutional change happened because UX practices were digital (compared to previous practices) and therefore could interact on different levels with other digital organizational forms, digital institutional infrastructures, and digital institutional building blocks.

We focused on developing user-centeredness in the R&D (Research and Development) division within the automotive manufacturer. As digitalization became more relevant for, and present in, the organization, it could be observed how the R&D division transformed and gradually focused on developing digitalized experiences and the physical product – the car.

#### 3.2 Data collection

Our main data collection method was to interview, but we also gathered documents to understand how institutional arrangements gained social approval and legitimacy within the organization.

The active data collection began in early 2010 as an engaged scholarship endeavor [21]. Data has been gathered both continually and in retrospect. As the research question for this study emerged, we conducted complementary interviews to gather knowledge about particular events and how and when decisions and strategic choices were made in the organization. Therefore, the research approach is best described as a continual iteration between bottom-up and theoretically driven research [22].

*Interviews.* In total, 87 semi-structured interviews with people within AutoInc have been completed

between 2010 and 2020. The respondents have had different roles ranging from directors and strategists to developers and testers, mostly operating within or connected to the HMI/UX domain. Sixty-four of the interviewees had at some point worked with HMI/UX, but several of them had at the time of the interviews moved to other roles within AutoInc, both within and outside the R&D division.

*Documentation.* The authors have had access to documentation on the intranet, and it has been possible to look for relevant documentation continuously throughout the process. The documents were analyzed as devices for sensemaking through which the organizational members understand themselves [23]. We organized the documents chronologically to identify how and when new roles, groups, departments, and strategies became legitimate rhetorical devices for describing the product definition and how the organization supported this definition.

*Participatory observation.* Empirical input to this research includes participatory observation since one of the authors has been working within the organization since 2010. The insider account has given the research valuable knowledge about circumstances hidden to an outsider and appreciated interactions between scholars and practitioners for improved awareness of institutional engagements [10]. Participation has been crucial for understanding the context for decision-making and descriptions given in documents and interviews.

#### 3.3 Data analysis

The analysis can be described as an iterative process of three steps, namely; (1) collecting empirical data, (2) constant comparison of relevant theoretical concepts and frameworks, and (3) the empirical data [24]. At the same time, we started with structuring the empirical data in data displays [25]. This approach made it possible to analyze the transformation the group had undertaken and identify important entities and actions that assisted in transforming the organization, both in terms of what they did and what they thought about their product.

In the analytical process, we used the three types of analytic tools developed by Hinings et al. [1]: digital organizational forms, digital institutional infrastructures, and digital institutional building blocks. For example, we first coded *emails* as a building block as we thought it is a ready-made and customizable module encompassing sets of digital technologies [1]. However, we later interpreted it more as infrastructure as it was “enabling, constraining and coordinating numerous actors’ actions and interactions” [2, p. 54]. During this analysis phase, we

started to notice less obvious details such as the email example. What we had coded once was re-coded when it became clear that, for example, ready-made resources, such as touch screens, could digitally connect and coordinate several components and institutional actors due to their flexible and expandable interfaces. Consequently, it became evident that categories and themes initially defined as building blocks also could work as infrastructure by connecting and coordinating other actors and resources than in the initially identified case.

We continued with thematic coding [22] to identify phenomena that indicated new digital practices and how they were legitimized in the organization. For example, the Usability Lab was first questioned but later used by people from different groups within the R&D organization.

We also coded expressions of organizational changes in parallel, such as the formation of new organizational groups, name changes, decisions, and expressions of new strategical directions during the studied period.

Given the large dataset, we applied segmentation to assess the overall quality of the data and facilitate the exploration of themes based on similarities, dissimilarities, and relationships between thematic elements [26]. As a next step, we applied data reduction techniques to summarize and create overviews.

## 5. Analysis

### 5.1 Modular logic leading to connecting digitized modules.

Around 2000, digital innovation was limited. The function was inscribed in the physical materiality and could only be changed when the development process allowed every twentieth week. The organization followed an institutional arrangement dominated by a *modular logic*. Each car module was largely developed in isolation from other modules, and engineers worked in homogenous groups with limited interaction and problem solving with other groups.

*“We basically got a design proposal from Design (Department) on how a (physical) button should look like and then did we add symbols, and the hardware people did the function. That is how it worked in 2000.”*

This logic was motivated by the overarching goal to enable and secure stability and control in the development process. This practice led to cohesion within groups and functions. However, with little communication between groups as digitalization was introduced, new possibilities for digital innovation

opened up as physical and digital modules could be connected for new innovations. However, the institutional arrangements established for physical modularity caused constraints. For example, all specifications were based on the physical module, not what required software or how the HMI should look. Yet, new digital building blocks and infrastructures, such as emails, enabled the organization to continue the digitalization journey, connecting people and modules. This approach, of course, caused problems since the specifications and all other practices were based on the physical modules.

*“These guys sit and specify the hardware, and we are supposed to have a speaker that can handle two sounds, not one, but two. But haven’t received that, so they have probably used some old hardware spec from 2001 because the one we got can only play one sound, but the goal is something completely different.”*

### 5.2 Coupled logic leading to digitizing development.

The first iteration towards HMI was legitimized through increased possibilities to connect communication buses such as CAN and LIN in the car – to explore and exploit data – which generated a need to connect the different separated modules. Digitized communication practices together with a goal to exchange information between different functions in the car became initial tools that developed into a vision of enabling information exchange through tightly connected modules so that the organization could take advantage of digital opportunities when developing a new car model. This *coupled logic* connected the previously separated functions. It led to an increased demand for digitized communication between groups that the growing electronic communication infrastructure could now facilitate.

*“We started to send emails to each other, which was a revolution. We did not have any routines to handle emails prior you sent (paper)mail or fax. This is true! You did so, for real! We felt ‘I can reach anyone anywhere in the world!’ ”*

A consequence of the new practice was an increased interdependence between departments, roles, and procedures. Thus, the new practice led to increased cooperation and interaction. The coupled logic was an enabler for developing a more collaborative organization and innovation practice. However, it was also constraining as it demanded increasingly heavy documentation practices to keep track of dependencies between modules. Yet, digitized development commenced as digitized modules increased, and with an increase of digitized modules came an increase of information to be presented to the

users of the car. Therefore, the introduction of HMI-related competence was legitimized by a need for capacity in requirements elicitation and methods for structuring documentation and the information presented to the user.

*“AutoInc’s first SUV was being developed, and a bunch of new infotainment functions were introduced. All the new functions put tremendous pressure on the user interface. A new thing introduced was the new control panel that should handle both radio, CD and telephone. Before that, radio and CD had been separate modules, completely stand-alone components.”*

### **5.3 Decoupled logic leading to networking operationalization.**

Although HMI resources were initially motivated to cope with the coupled institutional logic constraints, it opened for new networking practices. HMI competence introduced a whole new set of practices related to simulation and visualization. In an interview from 2010, one of the HMI designers said:

*“Yes, we are doing some progress with working with simulations. Before, it was more like working with paper and figuring out much more hardware-related issues. And the interaction on the display was only supposed to be solved in some way or another. There is a better understanding now that it is not that easy (developing interfaces).”*

Instead of documenting, HMI practices created ways to use simulations and other digital building blocks that increased development speed and reduced the need for complex and lengthy documentation and could be distributed in different networks. These tools and practices opened for usability thinking as a resource for other professions in R&D. They created space for more user-oriented interface design connected to digital functions in the car. The new digital building blocks also made evident the potential of screens and software applications in the car.

*“When suddenly anyone could run around with an iPhone, it’s not a technical nerd running around or a trend anymore, but rather ‘oh, they have sold 400 000 (iPhones) in Sweden, they (Apple) must do something right’, management started to see things in a new light.”*

Inspired by external game-changers, such as the iPhone and Tesla electric vehicles, new potentials recognized and opened for possibilities once the hardware and software were decoupled. Based on a decoupled logic, practices connected with the creatively digitized car separated hardware and software specifications. This change, in turn, enabled a digital infrastructure accessible for new types of

features with the flexibility of, for example, frequent software updates. The new networking practices connected to software development were increasingly appreciated, and the decoupled logic was legitimized as more software practices were introduced and accepted. At the same time, as digitized HMI practices and ideas spread in the organization, constraints to digitized development were manifested as it threatened established practices and roles.

### **5.4 Networked logic leading to servitizing customer offerings.**

The decoupled logic centered around digital infrastructures that were increasingly layered and legitimized a focus on human-machine interaction in the car. The organizational need for HMI competence was recognized, and HMI capabilities started to be understood and appreciated.

*“Something big was changing. When I started, it was only about safety and how to reduce distraction. But then we moved into something that focused more on the wow-feeling (for the user) and that it should be attractive for the user.”*

This change also opened new fields for the HMI group to mimic successful external products, such as the touchscreen, which promised even more flexible HMI and new innovative solutions. With a growing network of people involved, both internally and externally, HMI turned into UX and became important for the former HMI people and everyone in the network. With this increased legitimization in the organization, UX gradually merged into an institutional form for how to promote new practices and ways of thinking about users and user experience that materialized into the Usability Lab.

*“We need a place like this (a lab) to test things before we put them on the road (in the car). We can make quick loops, and we can test things in a safe way. And it works great! We have got all the technology installed, with eye-trackers and so on, so we can measure where people look when they use our HMI solutions, and we can change interfaces really quick. So, we use it a lot!”*

The new organizational form reinforced the group’s position as a strategically important factor in digital innovation by emphasizing how end-user input could be a resource for innovation that supported the emerging focus on the servitization of the value offered to the customer. The increased legitimization gradually moved the HMI/UX people towards the center of innovation and created a path for increased focus on the end-user and not only the product per se. Fewer constraints emerged as the digitalization process moved faster when more digital

infrastructures and building blocks were legitimized. UX people used newly created institutional forms as a platform to establish relations with more external parties. The newly established Human Centric Lab assisted in networking with internally and externally partners and was now supported by the new institutional arrangements based on a networked logic.

### 5.5 The emergence of experience-centered logic.

The network-oriented organization created a platform for HMI/UX practices to expand into new areas in the R&D division. The Usability Lab and Human Centric Lab gradually evolved into resources that connected different feature teams and external partners and acting as system integrators and boundary objects and were recognized in the organization as a valuable infrastructure for diffusing HMI/UX practices to different projects and initiatives thru out the organization. Different newly established organizational forms, such as feature teams, Usability lab, Human Centric Lab, and United UX, legitimized a user-centered approach that permeated all aspects of the car that involved a user experience and thus required UX practices to be established throughout the R&D organization and beyond.

*“Function owners can now write requirements for other function owners, and these requirements belong to different feature teams, for example, telephone or navigation, so the requirements exists early in the requirement specification process. It hasn’t been like that earlier. Before it popped up, lots of stuff that they (function owners) wanted to present, and then we (interaction designers) had to figure it out somehow. Now, we can direct everything – this is how the HMI will look like, and this is how we structure it. “*

HMI/UX competence was needed in the organization to support other resources. However, the entire R&D process was built around UX practices to offer customers a new type of user experience, which was increasingly seen as the main value offered to the customer. Gradually, the R&D organization transformed the networked logic into an experience-centered view on innovation where new innovative services were core. Consequently, the new strategy was to service the car, using digitalization as a key enabler. The connection of new digital infrastructures (i.e., internet connectivity), new organizational forms (i.e., United UX), and digital building blocks (i.e., touch screen) opened for user-centered digital practices. Previously well-defined borders between the car and the internet (legitimized by safety arguments) and associated practices hindered digital innovation. Instead, the car-as-user-experience

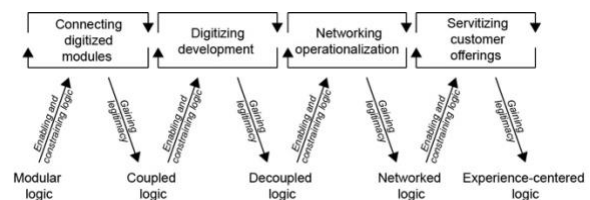
required more features that connected the car to mobile communication resources to enable digital value creation. With this approach, the organization continued networking with companies outside of AutoInc to develop their solutions and started to create new business models that focused on user experience and mobility services. New organizational forms, such as cross-organizational teams, emerged as a necessary enabler for innovation of digital end-user solutions and new digitized experiences for car services such as flexible mobility solutions. UX had now expanded in the company and as a manager said:

*“UX is very high on our strategic agenda in order to move with the future.”*

### 5.6 Summary

During the analysis, we identified five different institutional logics underlying the arrangements that had importance for how initial practices could develop to affect digital innovation practices in the R&D department as a whole. The five institutional logics are: modular logic, coupled logic, decoupled logic, networked logic, and experience-centered logic. We also found four instances of digital practice creation that shaped the logic of each institutional arrangement: connecting digitized modules, digitizing development, networking operationalization, and servitizing customer offerings.

Figure 1 concretizes UX digital practices and institutional logic development over the studied period (Figure 1). The analysis showed that institutionalization could both enable and constrain the emergence of new digital practices.



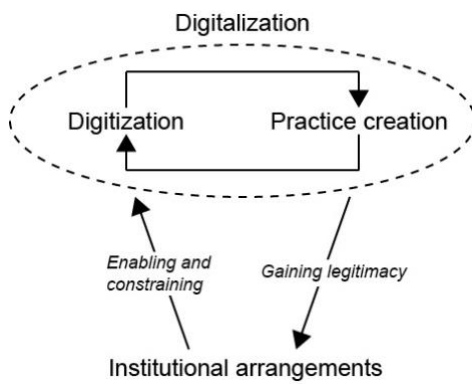
**Figure 1. Digitalization and new practice creation and the influence on institutional arrangements at AutoInc**

## 6. Discussion of New Digital Practices and the role of institutional arrangements

Previous IS research has contributed to our understanding of digital transformation (e.g. [1, 10, 11, 27–30]. Transforming includes the challenges of organizing for digital innovation [e.g., 7, 31], that is, how to harness opportunities created by the conversion

of analog information to digital information [32] and what capabilities that are necessary in order to proceed [7]. New practices are needed that are aligned with digital capabilities to make this innovation happen. Nevertheless, little has been said about how new practice creation can lead to new institutional arrangements and how the practice can gain legitimacy and become a foundation for a new innovation logic.

The figure we developed presented below (Figure 2) depicts on a conceptual level how digitalization, that is, digitization of new practices, impacts institutional arrangements. As new practices become legitimate arrangements of behaviors and ideas, it enables or constrains new loops of digitalization through their underlying logic(s).



**Figure 2. The relationship between digitalization and institutional arrangements**

This paper relates an empirical study about how UX practices develop from a non-existing institutional practice to becoming the main logic for digital innovation. The five identified institutional logics reflect how UX as a digital practice gradually incorporates other parts of the organization as they become digitized by providing practices that enable the organization to harness digitalization as a resource for innovation. These innovation practices, in turn, enable novel institutional logic to be established and gain legitimacy. The new practices orchestrate the organization towards the possibilities of digitalization with its generative capability [33], entrepreneurial potentiality [31], and malleability [29]. Although this specific case describes how a sovereign main practice organized around requirements and documentation of the product becomes a resource for digital innovation when provided with practices and tools based on actionable insights on user values and needs as digitalization increases, it also highlights how the role of practices in the initial innovation phase is connected to institutional forms and arrangements, and how

digitalization of practices can support processes of legitimization by providing resources for digital innovation, which in the next phase establishes the practice as an institutional logic.

We applied Hinings et al.'s [1] framework for analyzing digital innovation and transformation. It provided us with a framework specifically developed for analyzing institutional arrangements critical for digital innovation as a response to the identified lack of such theories [2]. Since the framework, to our knowledge, has not been used in empirical studies, a goal with applying it has been to test its usefulness. The case shows that the framework provides analytic tools to further our understanding on for example, how practices can transform a digital building block (e.g., using a touch screen for digital design) to infrastructure for designing autonomous cars using UX tools and methods; or how an organizational form (e.g., the Feature team) increasingly acts as a platform, connecting different existing groups and practices to a joint digital practice by providing a user-oriented design platform for digital innovation. In addition to Hinings et al.'s [1] framework, the study shows the transformation of arrangements and how a digital practice can connect to two (or more) arrangements simultaneously.

In the following discussion, we will discuss the results from two perspectives that the empirical case shows are critical for how organizations can turn initial activities into resources for digital innovation with a capacity to transform institutional arrangements: the role of digitization in new practice creation and the role of institutional legitimacy of new practices in digital innovation.

*Digitization and new practice creation.* Using the case of how UX practices developed at AutoInc for 20 years, this paper set out to deepen our understanding of the role of digitalization in new practice creation. While previous research has identified how institutional arrangements can enable and hinder new practices from becoming recognized and get status as legitimate ways of doing things in the organization, less is known about digitalization in such processes. As argued by Lounsbury and Crumley [2], the emphasis on structural aspects of institutionalization processes in neo-institutional research has led to a dominant interest in the role of institutional entrepreneurs when tracing how novel activities become taken-for-granted practices. Instead, they argue for studying the emergence of new practices, as they often result from “spatially dispersed, heterogeneous activity by actors with varying kinds and levels of resources” [1, p. 993]. In their study, Lounsbury and Crumley [2] conclude that the performance of practices is intertwined with the

existing logic in a practice field and generates a coherent set of practices despite varieties. Based on our case study of AutoInc, we could empirically validate how HMI/UX practices gradually gained terrain in the organization and lead to a new practice field [34] dominated by an experience-centered design logic. We identified that the new practices developed, gained legitimacy and eventually changed the institutional arrangement for innovation, first within and gradually also outside the R&D division at AutoInc. These empirical advances provide important theoretical insights into on the role of digitalization of practices to the literature on practice creation and institutionalization.

Based on the empirical evidence, we can conclude that a modular institutional logic initially can hamper the evolvement of digital practices. Digital practices can exist as islands in the organization in the form of local practices that will not have the power to affect institutional arrangements. In the studied case, the digital practices did not gain momentum until they were combined with an initially disconnected digital infrastructure established as part of the product development. The infrastructures conflicted with the digital practices that constrained digitalization and forced organizational actors to invent new practices to avoid the negative effects of digitalization on the level of technical product development. However, when the organization had created an answer to this organizational constrain – in the form of visual techniques and methods that replaced heavy documentation practices – digitalization generated opportunities for new HMI/UX practices by gradually interconnecting practices. In the studied case, it is obvious that the parallel digitization of technical product development and communication infrastructure made developer teams both connected to and dependent on other teams' work, which reinforced the need for new digital practices that, once established, enabled new connected digital practices. Digitalization became a self-reinforcing mechanism [35].

A second important insight on the relationship between digitization and new practice creation is how new collaborative practices reconnect different layers into new institutional forms. In the studied case, this resulted in a coupled institutional logic. Digital communication tools became building blocks for new cross-organizational work practices that integrated previously separated parts in the design of the car: the increase of data, stemming from new digitized components in the car, created a need to communicate more across the modularized teams. Instead of focusing on the component and not considering what was beyond the “edges” of the component, data

allowed for communication and interactions across different groups that were responsible for different modules.

The study suggests that when emerging practices that form digital building blocks are connected to digital infrastructures, they can eventually create dependencies that hamper the next level of digitalization as they create a fundamental isomorphism [36]. At AutoInc, the constrain was generated by existing documentation practices that were an established institutional form for product development to deal with organizational interdependencies. When digitized, they caused tensions between the older modular and the newer digital practice. The solution was to introduce digitally mediated coordination practices to manage the interface between humans and machines. The change that made the next step possible was the digitalization of coordination work practices by changing from documentation in the text (defined as requirement engineering) to applying digital tools taken from interaction and HMI practices based on visualization techniques. In contrast to previous institutionalization studies that have emphasized how technology development in organizations tend to lead to similar practices (i.e., isomorphism) despite different ways to appropriate the technology [3], this study shows that digital practices can generate tensions that push forward new digital infrastructures that are aligned with the institutional logic of the practice, which will then carry the new practice as it is homologous with the logic of the digital practice.

*Legitimation of new practices.* Legitimacy systems of socially constructed norms, values, beliefs, and definitions lay the foundation for accepted practices for which an audience appreciates and aims. The legacy can either constrain or enable new practices to emerge. Legitimacy is created and maintained through the relationship with the people in the organization, its audience rather than being considered possession of an organization. Consequently, the creation of legitimacy is difficult to identify and explain due to its volatility. However, in this research, we recognize two different streams of influence in which legitimacy can be gained – the internal and external streams in which the “hype” of digitalization took place.

As innovation, adoption, and scaling of different digital organizational forms, infrastructures, and building blocks increase, they become self-reinforcing [35]. In the studied case, they were self-reinforcing in that the more arrangements that were founded on and depending on digitalization, the more and faster the digitalization process emerged. The case showed that Internet technologies enabled faster communication



buses in the technology platform and increased network capacity enabling better connection and speed. Within this digitalization process, the legitimization of certain practices and processes was forced upon the organization as a whole. Although specific, more or less isolated groups introduced new practices, the legitimization of these practices was difficult to resist as digitalization unfolded, expanded, and accelerated. We call this *forced legitimization*. Forced legitimization is when, in this case, digitalization initially disrupts the existing institutional arrangements so that it creates a whirlwind of possibilities to change existing practices. It assists people working directly within certain institutional arrangements change their practices based on new values and beliefs, and people in the vicinity of the whirlwind are affected. The agency of forced legitimization of new practices lies not only in the social aspects of the material aspects separately but in the sociomaterial intertwining of digitalization [16, 37]. However, it is manifested in human beliefs, norms, and values [18].

The external stream, where the hype of digitalization was manifested, can be connected to new innovative and groundbreaking products alien to an incumbent firm, for example, the iPhone and Tesla. These external streams can be used to redefine a product and used as influential resources legitimizing the newly introduced practices. The influential external resources make people share the same beliefs and values and agree with what is important.

Lastly, this research has helped us better understand the legitimization of new practices through acknowledging how different institutional arrangements transform into other types of arrangements and by that becoming legitimate. The case indicates that an arrangement can turn into another type of arrangement. And still, gain enough legitimacy to work as an established institutional arrangement. This reiterative legitimization process shows how legitimacy is gained by increased links within and between institutional infrastructures, building blocks, and organizational forms. The intensification of interconnectedness varies as the organization is moving along the continuum between a modular architecture and a layered hierarchical architecture [15, 16]

## 7. Conclusion

This study specifically focused on how digitalization disembed organizational actors and created opportunities for new practices that can lead to organizational transformation. The framework developed as presented in Figure 2 can be used as a

tool for practitioners to understand what phases need to be undertaken to proceed towards digital innovation. It is a dynamic and iterative process. It also assists academics in identifying the specificities of this iterative process. For example, what institutional arrangements shape a specific logic, and what enables and constrains new practices to become legitimate.

Guided by the question: “how may initial practice creation lead to new institutional arrangements?” we found that digital practices (UX) can gain momentum when they are in the position of digitally connecting initially disconnected institutional building blocks, digital institutional infrastructures, and digital organizational forms. Our empirical study concludes that an institutional arrangement for digital innovation consists of a combination of institutional forms, infrastructures, and building blocks concurrently. Within a digital institutional arrangement, the elements are constantly rearranged, take on new shapes and functions in the arrangement, and transform from one state to the other. New digital practices can be self-reinforcing, in the sense that the more arrangements depend on digitalization, the more and faster digital practices emerge and become legitimate. We name this process *forced legitimization*.

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