Characterizing Multiple Institutional Logics for Innovation with Digital Technologies

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Abstract

Innovating with digital technologies is important for organizations in order to stay competitive in the market. Today, diverse actors drawing on multiple institutions drive such innovations, ranging from engineers, designers and customer facing units, far extending the scope of the IT function which used to lead digital efforts. Still, there is little research on how non-IT functions innovate with digital technologies. Using the lens of institutional logics and affordances, we examine case studies to address this research gap. We find that actors outside of the IT function innovate with digital technologies in various ways because - depending on the combination of institutional logics they draw from - they recognize affordances of digital technologies differently.

1. Introduction

Digital technologies are ubiquitous [25], they permeate virtually every aspect of organizational life [43] and are imperative for innovation [41]. Digital innovation is taking place in many different areas within organizations. For example, companies innovate with digital technologies by embedding technologies in products [14,16], by visualizing and simulating features of future buildings [4,13], or by establishing an online presence [20]. As a result, diverse organizational actors are innovating with digital technologies, pushing the boundaries of digital innovation in organizations.

In the past, the information technology (IT) function of an organization primarily led digital efforts. This function benefits from decades of professional experience in established methods, paradigms, and prescriptions for appropriate practice, which guides their efforts in system development, implementation, and governance [34]. However, now that actors external to the IT function are increasingly leading digital innovation, they typically do not draw on the IT profession for prescriptions to guide their practices. Instead they draw on their own local professions and institutional arrangements. To date there is little research into how areas outside the IT function in an organization go about innovating with digital technologies. Thus we ask:

How do professionals outside of the IT function innovate with digital technologies?

To begin addressing this question, we draw upon the institutional logics perspective of pluralistic organizations [3]. Organizations comprise of a variety of functional groups that often have different goals and assumptions, and draw upon different prescriptions ("scripts") for appropriate practice. The concept of institutional logics enables us to contextualize these goals, assumptions, and practice scripts in broad societal institutions [38]. The IT function draws upon the institutional logics of the IT profession as has been explored in existing literature [10]. However, there is a lack of research on the institutional logics that other functions draw upon when innovating with digital technologies.

To capture broad consistencies across micro practices within organizations, we use a qualitative meta-analytical approach [29]. We selected published case studies that explore digital innovation led by units outside of the IT function. We chose to look into three cases from different industries in order to gain first insights on the diversity of institutional logics that are relevant for innovating with digital technologies. Particularly, we looked into the cases of CarCorp, a car manufacturer, Adweb, a web designer, and ABC, an architectural firm. We code the data to assess the key elements of institutional logics and the affordances of the digital technologies following Seidel & Berente [32]. We find that areas outside of the IT function innovate with digital technologies in various ways. They combine aspects of existing practices with new ones, i.e. various institutional logics. These combinations lead to both innovative processes and outcomes [28] as affordances of digital technologies are recognized based on the logics actors draw from.

The remainder of the paper is structured as follows. First we provide a brief overview of the relevant literature on institutional logics and affordances. Analyzing three case studies, we characterize the logics in various initiatives. Concluding, we discuss implications of these distinct ways of using digital technology to innovate.

2. Theoretical lenses: Institutional logics and affordances

The power of the institutional logics perspective lies in tying local action to society's broader institutional structures [9]. Institutional logics can be defined as "a set of goals, values, and prescriptions associated with a specific institution." [3:378] Institutions refer to social structures that persist over time and are anchored in specific cultural perspectives and discursive domains (i.e. vocabularies) [18,38]. Examples of institutions include voting, marriage, wage, market, professions, and movements. Every institution has a central logic reflected in its material practices and symbolic constructions, which is available for organizations and individuals to draw upon [9]. Individuals make sense of situations by drawing on existing institutional logics, and new institutional logics emerge as a result of the idiosyncratic enactment of practice scripts rooted in this sense making [38].

The potential of digital technologies for innovation depends on the identity, values and prescriptions that the users follow but also on the "possibilities for goal-oriented action afforded to specified user groups by technical objects." [26:622] Grounded in extant literature on affordances, the suitability of this concept for investigating the relationship between institutional context and embedded sociomaterial practices, is described as [32]: (a) context-dependent, (b) contingent upon individual perceptions and interpretation, and (c) offering a relational view created between the human agency and IT artifacts [26]. This means that "when enacting the scripts provided by the institutional logic (and afforded by information technology), the actor acts upon an affordance." [32:5]

Local practices of organizational actors are strongly influenced by education and work experience of individuals in organizations [30]. Hence, a profession as one of the key institutions in this context, prescribes certain norms, values and identities to the actors [24]. Institutions such as the IT profession and other professions are characterized by organizing principles, practices, and symbols that influence individual and organization behavior. To tap into different aspects of logics, we build on the dimensions identified by Berente et al. [2] (e.g. applied in Table 1) in their study of ERP system use in NASA [2] based on Thornton et al. [38]. These dimensions are particularly valuable for characterizing institutional logics. They were deployed to reveal the logics that guided practices associated with the ERP system use at NASA [3].

Similarly, we investigate innovation with digital technologies and utilize the identified dimensions (illustrated in Table 1) to provide a comprehensive view of the underlying logics that guide different professionals when using digital technologies. The first dimension refers to the "organizing principles that guide activities, and thus embody the goals and values of the institution." [3:378] Second, assumptions are related to understanding how a goal can be reached by particular means. Third, identities are formed based on the enactment of selected scripts pertaining to certain institutional logics. And finally, the last dimension, domain of application, relates to the application area.

To illustrate the application of these abstract categories, we briefly look into the logic of managerial rationalism identified in the study of NASA's ERP system. The study reports that only organizational actors who espoused the logic of managerial rationalism (Table 1), actually used the system in a manner that was prescribed as proper. This is because the system was implemented under the guidance of this logic. Typically accounting and financial personnel followed this logic since managerial control is exposed by the budgeting functionalities of the system.

Table 1. Logic of managerial rationalism [2,3]

Dimensions	Characteristics
Principles	Accountability and control
Assumptions	Accountability and control through standardization and visibility
Identity	Standardized structure implies rational bureaucracy, objective criteria, namely cost for resource allocation
Domain	Manage financial activity

Recent theoretical work illustrates a shift away from treating organizations as permanent and homogeneous arrangements that respond to institutional pressures in a unified way [6,22]. More and more research suggests that organizations are heterogeneous entities composed of coexisting institutional logics [9,21]. Institutional complexity [12], plurality [21], or a hybrid organization [30] can be described as a state in which organizations confront distinct prescriptions from multiple institutional logics [7,27]. Some describe these prescriptions as conflicting [12], while others tackle rather seamless blending of logics [11]. In order to change existing trajectories it is necessary to handle the institutional multiplicity [15,38]. This can result in the replacement of the

dominant logic with a new one [15], combination of logics resulting in new organizational forms and novel practices [23], but it could also lead to "stuckness" or oscillation between logics [17].

3. Case analyses

Despite the growing number of interpretive studies in IS research [40], there are only few that use previously generated data as primary source for providing further insights [2,31]. Our approach follows the technique suggested by Noblit & Hare [29] to synthesize and re-interpret qualitative case studies by applying the lenses of institutional logics and affordances. The process of synthesis differs from presenting accumulated knowledge typically done in literature reviews because the focus is set on systematically comparing and "translating the studies into each other." [29] The goal is to understand the underlying mechanisms at work rather than provide an overview of generalizable factors across cases.

To explore how *professionals outside of the IT function innovate with digital technologies*, we examine three cases from organization science literature that fulfilled the following criteria:

1) provide a detailed description of the case (time duration, various data sources, details about occupational background of interviewees),

2) capture how several occupational groups use digital technology to change their practices, and

3) focus primarily on makers, meaning those whose work results from iterative practices to create an outcome that differs from previous outcomes [1,42].

According to these criteria, we selected cases from three different industries with the intention to gain a first but already relatively broad overview of institutional logics that can play a key role in innovating with digital technologies: the first case is CarCorp, a car manufacturer, the second one Adweb, a web designer, and the third one is ABC, an architectural firm. Furthermore, we code dimensions of institutional logics (Table 1) applying our theoretical lenses, and treat each case holistically, considering its context for further interpretation [29].

3.1. Case A: Towards the "Car Connectivity" vision at CarCorp

To gain a comprehensive overview of the case, our analysis started from a recent publication of Yoo & Henfridsson [15] and PhD dissertation of Svahn [35], including various publications of the research team [14,16,33]. The authors conducted several studies at CarCorp, the subsidiary of GlobalCarCorp - one of the three big US car manufacturers. We look into three implementation efforts of the company: embedded system platform, user interaction system and mobile platform.

An early initiative in the R&D team of CarCorp was the implementation of a Media-Oriented Systems Transport (MOST). This embedded system platform offered a potential to support service-oriented modularity in designing infotainment systems. The core feature was to describe functionalities of different components independently from hardware - common specifications of functions.

The motivation to introduce new principles to the architecture of infotainment was driven by the R&D, product planners and purchasers. The aim was to gain back control concerning system design, planning of functionalities for infotainment components and sourcing. The major concern was the high dependency on the suppliers because of the protocols and networks that they used for separate components such as radios or CD players in the infotainment. The new platform had a potential to provide a different approach, as a system architect described: "[…] at the heart of MOST, there is a kind of system level thinking that is not component-oriented. Instead it centers on the structure of logical elements or functionality." [14:34] The described system level thinking posed challenges in the adoption of MOST: it required new knowledge and forms of collaboration. The required knowledge encompassed software design practices to gain understanding of the separation between interface and functionalities i.e. modeling approaches (UML). This new skill set influenced the collaboration mode between the employees and shifted the roles of system architects into platform designers. Even broader, the change yielded a redefined business model that accommodates the potentials offered by the software's new functionalities.

The existing linear innovation path and involvement of suppliers on a component sourcing level created additional work for designers. This was a consequence of the traditional working mode where suppliers were not taking responsibility for the software, but for components. Consequently, the new design imposed challenging demands towards the expertise of suppliers. The lack of skills on the supplier's side regarding system level behavior reduced their action space to alter or suggest changes of components. Thus, designers had to specify the functions that span more components.

The working practices were altered, more control on the system level required new job profiles, as well as an iterative approach to perform changes in teams that involve suppliers. Despite the invested effort, the promise of software-centric modularity could not be

fulfilled since the environment was dominated by the existing hardware-centric mode of innovation, legally predefined role of suppliers to build components rather than software, and lack of software level liability. In the end, the initiative remained local and trapped by the dominant practices, eventually resulting in the decision to abandon MOST.

The second important momentum in CarCorp was the SoftClusterPlatform (SCP) initiative for standardizing in-car instrument cluster design. As described by a Human-Machine Interaction (HMI) engineer, the advantage of the platform was to test, visualize, and evaluate many more possibilities then it was feasible before [16:12].

The software was considered strategic and before the initiative has started, CarCorp recruited software engineers to create a new platform for instrument cluster design. Even though they played a central role, the existing processes in GlobalCorp were not tuned to these rapid changes and management did not provide mechanisms to enable flexibility brought by the platform. Thus, existing processes that involved the other organizational units such as marketing, and interaction design, could not accommodate the shorter implementation cycles. Moreover, software engineers had to circumvent the existing process as software-based opportunities were hindered by legacy systems and high dependency on hardware parts. A software group manager described the situation as "making the HMI different between cars that need to be managed […] results in high costs and a lot of administrative work. […] the most practical way to do this is to reduce the amount of variations of XML-files with the consequence that the HMI will be similar in all cars. I spend all this time explaining the benefits of using the tool for differentiation, but we cannot do it. We would need some sort of portfolio to explain to people […]." [16:14]

Both, the MOST and SCP initiative, addressed the design time of a car, while another more recent initiative addresses the innovation of infotainment solutions during the production time involving the infotainment engineers.

The "Car Connectivity" vision rooted back to the nineties with the idea of the embedded phone. The nomadic device solution (NDS) was an early predecessor that relied on a distributed telecommunication module, connecting the external mobile device with the in-car system. During the NDS development project, designers encountered the first tensions because they gave more relevance to this solution then the management. Rather than seeking to align with the tier-one suppliers, the outcome of close cooperation with Nokia engineers was that CarCorp designers aligned the requirements to the Nokia devices. Thus, the main problem became Nokia's fast changing interface specifications. As a consequence, the project resulted in no commercial product. The huge differences between car manufacturer and consumer electronics industry created a genuine temporal gap for development and planning. To overcome the challenge, engineers saw a potential solution in relying on Bluetooth. The strength of this solution lied in the wireless technology standard that the designers utilized to built the next Bluetooth-enabled NDS. However, the initiative failed due to insufficient standardization level of the technology. When again the rapid proliferation of consumer electronics brought competitive pressure on CarCorp's infotainment solutions, the designers were aware of differences in product life-cycles which made the integration on physical level impossible. The NDS and Bluetooth initiatives were evidences for that.

Thus, breaking up with a usual pattern of innovation, a new initiative has started to establish a common platform with application developers from the consumer electronics and mobile industry. The former Nokia project manager was in charge of the new project and envisioned "a design that boosts the car's capacity to handle the digital world." [35:138] This was a significant mind shift among the designers breaking with the dominant innovation paradigm.

The idea to switch to an open platform was considered highly uncertain and risky, because of the conservative automotive tradition. The software manager recognized that for finding fashionable solutions inspired by Apple or Google, they need to benchmark the initiatives of consumer electronics to build up the strategy and a build up an open platform. In the beginning, they wanted to develop their own application programming interface (API) and software development kit (SDK). However, ultimately considering the existing user base of Android and larger network effects, they abandoned the idea of a home grown platform.

Finally, the project received strategic relevance and approval from the executives of GlobalCorp. The head of after sales described the generative capacities of the new platform: "[…] there [were] no limits to the potential for innovation. We will be inviting the global Android developer community to use their imagination and ingenuity. [The platform] will give them [customers] the convenient, seamless connectivity they enjoy with smartphones, while adding new car-specific […] services." [15:6]

3.2. Institutional logics at CarCorp

The presented initiatives in CarCorp, show different attitudes to organizing, designing and

innovating in general. Two institutional logics seemed to be primarily determining individual agency of the involved employees (see Table 2 and 3). The designers drew on what can be called an institutional *logic of product design professionalism*. However, gradually, in the function of their own professionalism, they started incorporating and drawing on software engineering practices by involving software engineers in their teams and also altering responsibilities of existing employees. The adopted techniques such as unified modeling language (UML), computer-aided software engineering (CASE) tools, and MVC (model-view-controller) all belong to well established methods that served the IT profession for decades in developing and implementing software. In particular, object-oriented design and development that relies on principles like encapsulation, generalization, and specialization. For example, MOST supported generalization and system level thinking, while SCP helped to specialize / differentiate in cluster design.

In a more than 10-years effort, the institutional *logics of software based product differentiation* was accommodated organization-wide. The R&D were the first to identify with practices of the consumer electronics industry, and gradually other parts of the organization, such as product planning, purchasing and after sales activities recognized the value of the open platform approach. Finally, the internal processes and external relations with suppliers were redefined facilitating this shift and the establishment of new institutionalized practices.

Table 2. Logic of product design professionalism

Dimensions	Characteristics
Principles	Achieve continuous improvement in product/service variations
Assumptions	Integration through component coupling and hierarchy of parts; control through hiding interdependencies
Identity	Improvement of products based on precise and robust steps
Domain	New product development

Table 3. Logic of software based product differentiation

Dimensions	Characteristics
Principles	Achieve rapid and generative innovation in product/service variations
Assumptions	Differentiation in products achieved through the open platform compatibility (API, SDK, data formats), experimentation, and reusability
Identity	Rapid differentiation of products based on collaborative efforts (consumer electronics)
Domain	New product development

3.3. Case B: Mastering three-dimensional (3D) digital representations at ABC

ABC is an architectural company founded in 1976 which has received awards for excellence in this field. The main office was run by four senior architects, including two partners, and also employed junior architects, technicians, an intern, and an administrative secretary. The study [13] focuses on the period after the 3D software has been implemented. Thus, it is highly important to distinguish between two types of drawings used in architecture: 1) two-dimensional drawings for exchanging information between various parties - architects, engineers, and contractors and 2) 3D projections of the drawings used by architects to persuade the client.

ABC strived to be a first mover in using 3D software to create multiple drawings which are traditionally done by hands and quite resource intensive. After purchasing the software package, ABC employed an intern with relevant skills to efficiently use the software. As one of the partners described his vision "Young people, like Kevin [the intern], will give their ideas. When Kevin enters the drawing in the computer, as an architect, he will think in architecture terms – For him, the computer is his pencil." [13:662] As the authors describe, the 3D software changed the making process, from linear and staged to iterative and often changing. The intern relied on scanned photographs, and Photoshop to add a "realistic flavor." In contrast to this new form of work, the more senior architects thought that in digital drawings "the wedding between arts and technology has not occurred yet. Those who use technology are too "technological." I call that a "Black and Decker" aesthetics." [13:663] Thus they strongly believed in the traditional fine arts flavor. Nevertheless, there were also some believers in the potential of combining the two expression modes: "It is a good element even if some things are missing, like expressiveness. There are even some architecture firms I know in the United States that will use water color, actually putting it on computer visuals. I think it is beautiful when you can succeed in mixing the two." [13:663] As one of the technicians described: "It is not enough to know the computer commands of 3D software. You need to give the drawings an artistic flair, something that few can do." [13:663]

3.4. Institutional logics at ABC

In case of the architectural firm, the intern was the key actor for introducing innovative practices to the organization. His background in architecture and knowledge in using the 3D software created a new way

of crafting projections of drawings. The process of making involved various physical and digital media, thus going beyond the traditional logic of architects (Table 4) and creating new practices that add a "realistic flavor" to the drawings (Table 5).

In addition to the process of creating 3D projections of the drawings which are traditionally used to persuade the client, also the information exchange between various parties - architects, engineers, contractors, and clients - was reshaped. Due to the simple and endless opportunities to alter existing drawings, it became easier for clients to demand changes. Often, such changes were conflicting with traditional ideas of architects because they "destroyed the esthetics" and put too much emphasis on legal and administrational issues (see assumptions in Table 4). The changed relations with clients led to more iterative and experimental interactions. Overall, the inclusion of the client became easier and less cost demanding.

Table 4. Logic of architecture design professionalism

Dimensions	Characteristics
Principles	Deliver unique architectural artifacts
Assumptions	Win clients through artistic style and hand-made draft
Identity	Create drafts with "artistic flavor"
Domain	Design of visually appealing architecture

Table 5. Logic of software based projection drawing

Dimensions	Characteristics
Principles	Deliver novel visually appealing designs
Assumptions	Win clients through mixture of digital and artistic style providing various perspectives on the building
Identity	Create drafts with "realistic flavor"
Domain	Design of visually appealing architecture

3.5. Case C: Crafting websites at Adweb

Adweb is an interactive marketing firm founded in the 1990s with around 600 peoples worldwide, and had offices across the United States and Europe. The organization is characterized by temporary teams, decentralized decision making, distributed accountability and no clear lines between occupational roles [20]. The primary goal is to deliver highly customized Web-based solutions for the clients. The study [20] reports on practices of four different occupational groups: 1) Client service employees in charge of continuous identification of client requirements, development of presentations and documentation, as well as customer relationship management. 2) Project management members who develop work plans, set milestones and measures to monitor, and accordingly adjust plans over time. 3) Creative members ensure the aesthetical appeal of the website by designing images, graphic concepts, vocabularies, navigations and process flows. 4) Technology members were programming (reusing, testing and debugged program code), and taking care of technology standards, and nurturing good connection with the client's IT groups.

To stay flexible and reach fast responsiveness to the changing clients' requirements, the teams engaged in three main practices [20]: displaying work (visibility and access), representing work across boundaries (express work in a form understandable to the others), and assembling (reuse, iteratively revision and alignment). The authors describe two projects: one in which the team is creating a "pitch" for Furniture Inc., and one concerned with the "discovery and planning" for Insurance Inc.

During the creation of the "pitch" for Furniture Inc. the team consisted of representatives from all four occupations who collectively used a Power Point presentation. It was the key means for aligning mindsets. Mainly, simple and straightforward slides with bullet points served this aim. However, a new member of the creative team started using Macromedia's Web technology (Flash) to integrate multimedia content and build interactive interfaces. The creatives argued for embedding animations in the Power Point as it is "the only way to convey the graphic design aspects." [20:35] However, the client service employees thought the slides were "too crowded." The creative member described the situation as follows: "It's hard to teach these account people [Client Services]. They think that we'll wow them [the clients] with a Power Point [presentation]." [20:35]

In general, technology and creative members sometimes resisted the use of the Power Point because they thought "things get so reduced to bullet points that both client services and the client don't understand what we really mean." [20:35] Similarly, creative members' opinion was that presenting overly simplified solutions and under developed ideas threatens their reputation: "I'm not a big fan of Power Point. I hate it that we use such a primitive program. It is such a low-end presentation mechanism for a creative deliverable." [20:35]

Similar to having different views of the "proper" use of Power Point, the suggestion of a client services member to use a new technology for cross-selling in Adweb, was not welcomed by the creative members because the software was not visually appealing enough to be included in the presentation.

A typical activity of project management was to take care that all involved team members have the right information available at the exact time they need it. During the Insurance Inc. project, a project management member reported that he "logged on to check-in on burning e-mails" [20:36] to make sure the improvisation elements of the project don't get out of control. In line with that, the communication activities of client services and project management members relied on e-mails extensively, both with the team and the client. This resulted in information overload, as described by technology members: "The buzzword is that we have to over-communicate: Give people information even if it isn't relevant—just in case." [20:37] Such occasions were apparent because the project management members were concerned with planning and milestones. The technology employees thought that the plans are far too fine granular "Now every item has a timeline. It helps Project Managers predict whether we can deliver on time on budget. But in reality the project plan changes every day. Because it is so detailed, there is not much buffer. People ignore the project plan […]." [20:38] Similarly, the creative members thought such planning was in favor of speed rather than content.

Another discrepancy between the groups was apparent when client services and project management often suggested that creatives could make more use of codified knowledge on the intranet. However, they didn't consider this an efficient solution because they found that loads of codified knowledge does not necessarily lead to actually using the stored information. As opposed to this view, a Technology member showed a contrasting attitude towards reuse of existing materials to utilize the existing knowledge of the client accumulated as a part of a previous project with Insurance Inc. This was not well accepted by client services because "reuse would be distracting and time consuming." [20:35]

3.6. Institutional logics at Adweb

When analyzing the four occupational groups, we identified the *logic of project management professionalism* as described in previous research [3]. The actors drawing on this logic focus on time constraints and risk-reduction by continuously communicating and aligning the diversity of groups involved (Table 6). The project management and client services at Adweb enacted these practices when communicating and seeking consistency across projects of creatives and technology members. Considering that creatives highly valued novelty and visual appeal of their artifacts, following the *logic of web design professionalism* (Table 7), they were often not acting according to the requirements of early planning and transparency. The creatives rather made choices regarding technology use that complied with their identity as artistic and unpredictable members. Further, the IT specialists enacted certain practices that we previously identified in the case of CarCorp, and are typical for software design "best practices" such as reusability.

This case is not tracking a distinct change process, but rather points into the perceived affordances of actors based on their logics. In particular, creative members as key designers chose new technologies (e.g. Flash Web technology) based on the assumptions of their logic to deliver highly unique design artifacts. For example, incorporating a very "fuzzy" flash animation in a Power Point presentation, was perceived as "disturbing" for those seeking a clear cut communication style with clients that is lead by customer services.

Table 6. Logic of project management professionalism [2,3]

Dimensions	Characteristics
Principles	Deliver web applications to clients
Assumptions	Project results through tracking and communicating project progress
Identity	Track and communicate unpredictable activity
Domain	Project management as well as other domains associated with projects

Table 7. Logic of web design professionalism

Dimensions	Characteristics
Principles	Deliver novel visually appealing designs
Assumptions	Highly unique design artifacts through use of new techniques and recombination
Identity	Be artistic and unpredictable
Domain	Design of visually appealing website or other artifact

4. Discussion

To address our research question how professionals outside of the IT function innovate with digital technologies, we characterized various institutional logics in three cases: making of cars, web site design, and drawing architectural drafts. We identified logics that are already present in existing literature, such as the logic of project management professionalism. However, we also found that incumbent logics are reshaped as the organizational actors perceive different affordances of the used technology. In the NPD process of CarCorp, the team started strongly identifying with the consumer electronics industry.

They learned by using various technologies and developed "new" practices that were blended with the "old" ones. Similarly, the creative intern at the architectural firm seemed to be guided by principles of "new" and "old" rules of artistic esthetics since for him the 3D software serves as a pencil.

The selected cases are metaphors for digital innovation focusing on recombination and generation of novelty [5,41] as well as new organizational applications of digital technologies [37]. As the organizational actors attempted to accommodate new digital technologies, they were changing the logics they draw on. For example, dominant logics like *product design professionalism* and *architecture design professionalism* are gradually altered to accommodate a "contemporary" way of design that relied on digital technologies. This resulted in a combination of the scripts as part of the logics of *software based product differentiation* and *software based projection drawing.* Thus, both incumbent and "contemporary" logics pertain to the profession of (web, product, and architecture) designers as institutions (see Table 8, last column).

In case of CarCorp, material properties of technologies – functionalities such as: open API, entering parameters for simulation, XML-based HMI, proffered particular affordances for the designer user group. The description follows Svahn [35] and provides an additional insight through affordances (see Table 8): in the beginning, the designers perceived the affordance of generalization (as a key principle pertaining to software engineering), during the HMI system development, they mastered specialization (another key principle), in the end, after not only building the software developer team, but also changing sourcing strategies, purchasing and after sales, the surrounding organizational practices facilitated the new logic. This was a shift from incremental product development innovation to iterative software development practices [14]. The more the designer group facilitated the new logic, the more the technologies afforded to them (see Table 8). Many features of the embedded system platform and the user-interaction system were not utilized because of the prevailing logic in the organization. In the end an enterprise-wide shift was reached with executive support. However, one has to note that it is not only the logics which shaped the perceived affordances but also vice versa. This observation is aligned with the understanding that material properties of technology influence incumbent logics [19]. By adopting certain practices while using the HMI system and thereby also incorporating more software developer practices, the designers enacted the "scripts" of the new logic.

Both the car producer and architecture firm exibit a gradual accommodation of change which points into the relevance of the temporal dimension significant in the process of institutionalization. It includes the development of new skills (employed software engineers and intern in our cases) as well as changes in identity (from creating architectural drafts with "artistic to "realistic" flavor).

Web designers in Adweb drawing on their logic altered Power Point presentations to incorporate the animations created by Flash player. It is something that other members find disturbing, however, for them, the affordance of visualization of motion in web sites is key to get closer to describing the reality (Table 8).

Table 8. Overview of affordances and logics

Key profession	**Digital technology**	**Affordance**	**Institutional Logics**
Case A			
Product designers	MOST	Generalization (reusability)	Product design professionalism & Software based product differentiation
	HMI System	Specialization, visualization	
	Android	Differentiation, accessibility, compatibility	
Case B			
Architects	3D software	Rapid editability of drawings	Architecture design professionalism & Software based projection drawing
	Photoshop	Recombination of physical and digital components	
Case C			
Web designers	Flash player	Visualization of motion	Project management professionalism & Web design professionalism
	Power Point	Presentation of content	

Across the cases we see elements of scripts typical for software development (see affordances in Table 8). All selected cases refer to "makers" that experiment and iteratively improve their products and services similar to prototyping in agile development [1]. Thus digital technologies afford this actionable space for them.

These arrangements very much differ from what we tend to understand under IT innovation. The predominant concern of Information Systems (IS) scholars is to investigate the diffusion and assimilation of digital technology and provide insights to differences in the adoption behavior across organizations and across technologies [8]. This research stream grew out from the IT department,

where IT specialists are in charge of the process [10,37]. Hence, the perspective of IT department is often present in these studies. The innovation process is typically triggered by the decision maker and her initial awareness of the innovation, to be followed up by potential formal adoption and techniques to accommodated full-scale usage [36]. The IT department has clearly defined responsibilities and a controlled approach which is reflected in staged diffusion patterns [44] and avoidance of drift and improvisation. It has a long institutional establishment and is equipped with competencies to evaluate which off-shelf software to adopt [39]. In some cases, this approach is aligned with the logic of managerial rationalism as identified in previous research (Table 1).

Table 9 provides an overview on the main findings and implications of our research.

Table 9 Overview of key findings and implications

Key findings	Implications for research and practice
Professionals outside the IT function innovate with digital technologies in various ways in that they draw from various institutional logics.	Research and practice should further learn about those institutional logics to be able to also consciously shape them.
Organizational actors reshape institutional logics by combining old and new practices and symbols to then appropriate digital technologies.	Understanding the materiality of institutional logics is necessary for appropriating digital technologies in a comprehensive way.
Incumbent logics are reshaped as organizational actors perceive different affordances of the used technology.	Future research should study how far different professions recognize different affordances in the same technology over time.

5. Conclusion

The paper provides first insights to characteristics of institutional logics that guide innovation behavior of actors outside of the IT department with relation to material properties of digital technologies. This study informs research on digital innovation, and emphasizes that organizational actors make sense of technologies in their local context. We argue that these actors trigger organizational change by combining distinct practices from various institutional logics and incorporating them into their own profession. Furthermore, we suggest that decision makers need to gain in-depth understanding of logics that drive innovation by abandoning a classical top-down digital technology adoption decision view.

6. References

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