

What is Digital Organizational Culture? Insights from Exploratory Case Studies

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Abstract

Whilst Information Systems research has focused on how products, processes, and organizations have to be transformed in the digital age, we know little about how and why the organizational culture of firms needs to be ‘digitalized’. Drawing on the organizational culture model by Edgar Schein, we analyze data from eleven cases across various industries to identify the facets of digitalizing firms’ organizational cultures. Specifically, we explore their Artifacts, Espoused Beliefs and Values, and Underlying Assumptions. Our study contributes by delineating a ‘digital organizational culture’ that underpins the motivation for firms to digitalize.

1. Introduction

To successfully develop digital innovations, organizational culture is supposed to be a prerequisite [31, 35]. Digital innovation refers to products that combine digital and physical components [34]. We term firms that pursue the development of such digital innovations as ‘digitalizing firms’. For example, Tesla is a digitalizing firm as it has recently announced to equip every newly produced car (physical component) with self-driving hardware and software including ultrasonic sensors, cameras with 360-degree visibility, and enhanced connectivity (digital components). The development of such digital innovations is not possible without changing the basis of the organization [20] and its culture [32]. Accordingly, Boynton and Zmud [4] recommend that firms which undergo severe changes during digitalization [35] should consider the importance of their Organizational Culture (OC) and its impact on IT. OC refers to common values shared by individuals within an organization [23]. OC originated from psychology but has been adopted in IS research to explain effects of culture on process management [11] or the impact of IT on work environments [29]. Researchers have

investigated the role of OC on absorptive capacity and IT success [14], IT adoption and diffusion [7], IT implementation [13], and user computer efficacy [30]. Recently, OC has been discussed to be an enabler for new knowledge and trigger for creativity [25], but also an obstacle regarding the adoption of new digital services [12].

However, there is no dedicated work focusing on firms’ OC when developing digital innovations. Hence, our motivation for researching organizational culture is promising and also in accordance with Nambisan’s call that “the topic of innovation ecosystems (particularly digital innovations) is one that has considerable contemporary significance” [20, p. 221]. OC may serve as a perspective on how *we should think about organizing for digital innovation*. Drawing on the identified research gap, we formulate the following research question:

What are the characteristics of an effective organizational culture in digitalizing firms?

We conducted exploratory case studies with 27 interviewees in eleven firms to understand their initiatives and managerial actions during digitalization.

The next section introduces the theoretical lens of Schein which is then applied in our research approach explained in section 3. In section 4, we embed our results into the levels of the OC model. A discussion of the main results is presented in section 5.

2. Theoretical Foundation

Schein defines organizational culture (OC) as “the deeper level of basic assumptions and beliefs that are shared by members of an organization, that operate unconsciously, and that define in a basic ‘taken-for-granted’ fashion an organization’s view of itself and the environment” [26, p. 6]. In other words, OC provides unwritten and unspoken rules for how to get along in the organization and conveys a sense of identity to employees [6]. To understand OC, Edgar

Schein [27] distinguishes between different levels (i.e., Artifacts, Espoused Beliefs and Values, and Underlying Assumptions) of culture according to the degree to which the cultural phenomenon is visible to the observer (cf. Table 1, Column 1: “Levels”). In the following, these three levels are explained.

2.1. Artifacts

“Artifacts include the visible products of the group, such as the architecture of its physical environment; its language; its technology and products; its artistic creations; its style, as embodied in clothing, manners of address, and emotional displays; its myths and stories told about the organization” [26, p. 24] but also “structural elements such as charters, formal descriptions of how the organization works, and organization charts also fall into the artifact level” [26, p. 25]. Particularly observing the latter aspect allows recognizing an alteration of the structures within digital organizations. Edgar Schein [26, p. 42] exemplarily describes such artifacts in the following scenario: “The company was organized in terms of functional units and product lines, but there was a sense of perpetual reorganization and a search for a structure that would ‘work better’. Structure was viewed as something to tinker with until one got it right. There were many levels in the technical and managerial hierarchy, but I got the sense that the hierarchy was just a convenience, not something to be taken very seriously.”

In general, structural elements can be partitioned into two areas dealing with the direct reorganization of market activities (i.e. external structuring) and indirect reorganization of the divisions (also known as business units, i.e. internal structuring) within which they reside [16].

2.2. Espoused Beliefs and Values

The second level of Edgar Schein’s model of OC defines Espoused Beliefs and Values as the embraced goals, ideals, norms, standards, and moral principles. An example of values is described by Schein [26, p. 43] in the following situation: “Employees at all levels were responsible for thinking about what they were doing and were enjoined at all times to ‘do the right thing’, which, in many instances, meant being insubordinate. If the boss asked you to do something that you considered wrong or stupid, you were supposed to ‘push back’ and attempt to change the boss’s mind. If the boss insisted, and you still felt that it was not right, then you were supposed to not do it and take your chances on your own judgment.” Espoused Beliefs and Values are important because even the

best-designed digital strategy may fail if the company’s values do not embrace the transformation. For instance, barriers evolve when employees resist transition towards digitalized customer channels or agile development principles.

Bughin et al. [5] revealed a strong positive link between values of a risk-taking culture and digital performance. Digital workers are inevitably constrained or empowered by the norms of the organization’s values within which they work, particularly as it relates to IT governance and the affordances of the IT resources that they can access.

2.3. Underlying Assumptions

Third, Underlying Assumptions deal with occurrences that are inexplicable when insiders are asked to outline their OC [27]. At this level, information can only be indirectly collected through the observation of behavior and through triangulating data from multiple sources. The reason is that the third level consists of unconscious and taken-for-granted conceptions and basic assumptions. These premises can be seen as the “starting point on which all values and actions are based” [11:3]. Yet, this oblivion impedes the understanding of certain Artifacts as well as Espoused Beliefs and Values to become manifest. Hence, to conclude why certain behavior occurs, one must identify the facets of the underlying assumptions and principles that establish an organization [24]. Apart from that, Schein argues that without understanding such assumptions it is not possible to interpret most of the behavior within a firm and “particularly the seeming incongruity between intense individualism and intense commitment to group work and consensus” [26, p. 46] remains unobserved. Further, he illustrates the importance of assumptions being connected because single elements of a paradigm cannot explain how an organization is able to function, or change, respectively. The following example introduces such an Underlying Assumption [26, p. 56]: “‘giving someone unsolicited information was like walking into their home uninvited’ came from a number of managers in subsequent interviews. It became clear that only if the information was asked for was it acceptable to offer ideas. One’s superior could provide information, though even that was done only cautiously but a peer would rarely do so, lest he unwittingly insults the recipient. To provide unsolicited information or ideas could be seen as a challenge to the information base the manager was using, and that might be regarded as an insult, implying that the person challenged had not thought deeply enough about his own problem or was not really on

top of his own job.“ This illustrates how statements are recurrently evolving but require an interpretation.

In the following section, we explain our research approach by stating how we integrated the results of our study into the levels of OC [26]. Specifically, we demonstrate how we structured the interviews’ and firms’ data into the three levels.

3. Research Approach

We collected data in eleven case studies, conducting 27 exploratory interviews, in order to understand how (*Artifacts*, and *Espoused Beliefs and Values*) and why (*Underlying Assumptions*) firms redesign their OC in times of digitalization (some of these firms are very successful and some face difficulties). Based on the recommendations of Eisenhardt [10] and Yin [33], the interviews followed semi-structured guidelines with open-ended questions to assure the examination of every possible research direction. We contacted senior managers responsible for strategy, R&D, innovation, IT, or marketing/sales from a variety of firms and asked for participation if the company publicly claimed initiatives regarding digitalization. In most cases we collected data from three different senior managers who agreed to participate. The firms were not limited to any industry or size in order to embrace differences in several sectors. In the following, we provide an overview of the cases (due to the space limitations only a very brief overview is presented):

- *A (Gearings) is very innovative. However, they perceive digitalization to be a management fad. (Interview Partner IP1; firm size/employees: 2,000)*
- *B (Online Bank) is a digital pioneer in developing digital innovations. (IP2-4; 1,500)*
- *C (Press Outlet) seeks to digitalize its products but is impeded by the firm’s publishers’ resistance. (IP5-7;350)*
- *D (Private Bank) stands out through integrating fintech companies. (IP8-10; 80)*
- *E (Agriculture Technology) successfully digitalizes its business clients’ farms in co-creation. (IP11-13; 18,000)*
- *F (Fund Services) is equipped with high financial resources but prone to resisting management. (IP14; 3,000)*
- *G (Retail Bank) is digitalizing through the creation of a new digital unit. (IP15; 100,000)*
- *H (Construction Materials) has hired a digital native to digitalize the firm’s products and process. (IP16-19; 700)*
- *I (Retail Bank) just appointed a chief digital officer for digitalizing from within. (IP20; 15,000)*
- *J (Aviation)’s digital innovations are constrained by legislative circumstances. (IP21-23; 2,000)*
- *K (Machinery) has a high volume in sales. Their digitalization efforts are hindered by ‘monarchs’. (IP24-27; 50,000)*

Interviews were conducted mostly onsite by two or three of the authors. The analysis of organizational efforts required us to create a trustful atmosphere by guaranteeing absolute privacy and to focus on the managers’ opinions. The interviews were conducted and recorded in German. The interview guideline was slightly updated during the interview cycle, to account for findings gathered from earlier interviews. The interviews took place from November 2015 to November 2016. All interviews were transcribed, and project documentation, related reports, financial statements, off-record notes, and observations were used to augment and triangulate the interview data. In the data analysis, we started with coding interpret the data and wrote narratives, and eventually revisited literature. Following Miles and Huberman’s [18] recommendations, this data analysis process was facilitated through the building of data displays in the form of tables and matrices (coding in MaxQDA v.12.2) to refine the concepts identified, and the development of tentative conclusions to capture the identified facets. The data analysis began with open coding, as soon as the first interviews were transcribed. It was done inductively, seeking to reflect the data as closely as possible. This stage led to the identification of over 1250 codings. Starting with the theoretical lens of OC, we identified the relevant concepts emerging from the data. Table 1 depicts these three levels (column 1) and the corresponding definitions according to Schein [26] (column 2), and our application of the three levels (column 3).

Levels	Description	Application to our results
Artifacts	Artifacts deal with organizational attributes that can be observed, felt, and heard as an individual enters a new culture.	In our study, Artifacts become manifest in the changing structures of digitalizing firms. These are the facets explicated by practitioners regarding internal and external structure of their firms.
Espoused Beliefs and Values	This level deals with the espoused goals, ideals, norms, standards, and moral principles and is usually the level that can be captured through interviews and questionnaires.	For digitalizing firms, we derived ‘digital’ goals and norms which have been expressed as vital for a new OC. These values are concentrating around the mentality and authority modes towards digitalization.
Underlying Assumptions	This level deals with phenomena that remain unexplained when insiders are asked about the values of the OC. Information is gathered by observing behavior carefully to gather underlying assumptions because they are often taken for granted and not recognized.	Firms operating in the digital age are driven by central tenets about digital innovations that are recurrently addressed in stories and business reports within the cases. Abstracting these stories allowed us to derive four central assumptions.

All codes of the data analysis were projected on the two levels *Artifacts* as well as *Espoused Beliefs and Values* of the concept of OC by identifying the relevant facets in the codings. Furthermore, we triangulated all cases and abstracted the content of the interviews to derive the third level *Underlying Assumptions*. Last, we have evaluated whether all identified *Artifacts*, as well as *Espoused Beliefs and Values*, conform to the respective case studies, and whether they were exclusively reported in the context of digitalization efforts of the firms. The overall process was highly iterative, moving between the levels and the codes as well as between data and theory. This approach allowed us to identify the facets of the three levels of OC that accompany the digitalization of firms regardless of the industry. Emergent foci have been identified as to the particular design of the questionnaire meaning that the identified findings in the different levels of Schein's model predominantly revolve around the topics asked by following the research guideline.

4. Results

In this section, we present the facets that we identified by taking the theoretical lens of Edgar Schein's OC model (introduced in section 2) and applying it to digitalizing firms. We allocated the set of initiatives and managerial actions of the analyzed digitalizing firms to the corresponding levels of Schein's model.

4.1. Artifacts

According to Schein [26], organizational structures fall under the definition of Artifacts. Hence, the altered structures we observed and analyzed due to digitalization in the cases match Schein's understanding of Artifacts. In our cases, OC in the digital age rests on novel ways of internal collaboration (namely: cross-functional teams, physical and virtual collaboration, and dual structures) and external collaboration (startups, platforms with competitors and partners, and customer integration).

First, in eight out of eleven cases we found evidence that firms form **cross-functional teams** that are composed of different operational functions. This relatively high number of occurrences within our sample indicates that cross-functional teams are a popular best practice in digitalizing firms. Such teams are designed to reduce conflicts and possible confusion between the functions. Furthermore, a more integrated view of different functions is needed to ensure faster innovation cycles. Hence, the procedure is characterized by mutual adjustment to the development of new products or processes. Thereby,

collaboration concentrates on a horizontal basis, which puts people from IT, marketing etc. at one table. As a result, cross-functional teams allow for *"everyone to have transparency over everything"* (IP15) and to form special teams for dedicated tasks with the needed input and know-how from different functions as the following quotation shows.

Cross-functional teams are a form of collaboration where *"for every decision, no matter whether it is IT or marketing, everybody sits together. Marketing is not sitting by themselves and deciding about marketing, but we sit together in one big round [...] ten to twelve people. All the decisions are discussed"* (Chief Executive Officer of Case G, IP15).

Next, in six cases collaboration broadens from **physical to virtual collaboration**. The importance of teamwork in the office without walls is almost equally important to teamwork happening virtually, i.e., independently from space and time. Physical collaboration builds on a *"restructuring of the office space with the elimination of isolated departments and the creation of space where everyone sits together"* (IP02). Wide spaces without boundaries and demanding people to mingle together are justified as knowledge is more easily shared within units than between them, even when activities within a unit are distant from each other.

Physical and virtual collaboration are strongly needed, but managers feel *"currently we do not have those 'remote working' people, who are delivering something from the home office or from Indonesia. This form of collaboration, working together with distant people, is currently a great challenge"* (Product Group Manager of Case E, IP11).

Third, we observed **dual structures** in six of the eleven cases, which build on the concept of ambidextrous organizations where breakthrough innovations must be balanced with evolutionary improvements of existing products or solutions. Here, the balance between digital innovations and development of the core business are needed to reach the combination of 'the best of two worlds'. Dual speed mechanisms separate the organizational structure into two parts with different foci. In our cases, the separation goes as far as two different locations where the predominant difference is speed. The traditional core functions (part 1) still focus on traditional physical products less impacted by digitalization and, hence, require a lower speed of adaptation and change. These activities are operated with more traditional waterfall-like development methods and a greater long-term orientation. Contrary, the speed of innovation largely increases for business functions closer to the customer (part 2). Teams use agile product development approaches to constantly incorporate changes.

As a result, firms “operate at two speeds with the goal to reach again one speed in the future” (IP18).

The dual structure is a new organizational structure where managers would “follow two strategies simultaneously. So, I can say, on the one hand, I also have here a clear development of the structure and parallel [...] I would start a competition with an acquisition that can do that already” (Head of Automation and Controls of Case E, IP12).

Furthermore, the Artifacts of the OC do not only require new internal structures but also stronger external collaboration. We found in eight of our cases that through the **collaboration with startups** firms can profit from the dynamics in the market and gain knowledge that was not accessible previously. Startups can help the firms to accelerate their product innovation and can infect them with their entrepreneurial spirit. Hence, firms continue with their integration aspiration of external partners and use different ownership models ranging from joint-venture to acquisition in order to improve collaboration [17]. Furthermore, firms extend their collaboration with financial investments in startups, which allows them “to secure strategic partnerships with a financial involvement” (IP18) and with the goal to “genuinely cooperate with Fintechs for many years” (IP14). Furthermore, firms are offering new products and innovations to startups for further development of the idea and increasing knowledge exchange.

We observed collaboration with startups where “the focus clearly lies on finding fin tech companies, with whom we can cooperate, in the sense, that we can improve our business for the customer” (Chief Marketing Manager of Case H, IP18).

Next to startups, in five out of eleven cases, we observe firms strengthening their external collaboration efforts towards **establishing platforms with partners and competitors**. Platforms are perceived as an organizational structure, in the widest sense, to gather different partners in one central place and enhance the exchange between partners. These partners are then used to infuse the traditional products of firms with digital capabilities externally provided. Examples are firms producing traditional machinery partnering with IT partners for sensor technology (IP11). The partners allow the firms to compete with startups on an equal playing field which would not be the case without partners. The external collaboration goes as far as to include competitors, where firms try to partner for special applications or to increase market boundaries. In the end, external collaboration often culminates in a platform where the different entities come together. Platforms are seen as a way for open exchange where firms can let their products be “tested and refined” (IP14). Furthermore, plat-

forms are used to ensure the sharing, transparency, and integrity of data via different partners. Collaboration builds on external support from “[...] platform[s], where we are participating as a partner with others. That is also driven in the interest of the customers to establish a platform where firms are working together with others, like app developers, to produce various things” (Product Group Manager of Case E, IP11).

Finally, in all cases, firms’ collaboration efforts do not longer exclude the customer. Specifically, in seven of our cases, the Artifacts of OC include ways to **integrate customers** into the innovation chain and external collaboration. Hence, those firms are aiming for ‘co-creation’ with their customers where customers and firms are developing products jointly (IP14). Hence, direct feedback loops are implemented and the organizational structure provides a lot of interaction between employees and customers. The early integration of customers via customer product presentations and beta-testers allows generating reference customers, which test and review new products for other customers. Reference customers are provided with more information from the core of the product development and can support the firms’ marketing better than if firms have to confer, “we have only tested it in the lab but it should work” (IP12). In the end, the collaboration with customers is the best to fully develop the product to the end and build final touches on feedback from integrated customers.

Firms are extending their external collaboration to the customers “because we are clearly saying, ok, if we are looking at the tension between time and content, we don’t want to say, that the trend is necessarily going towards ‘banana product’, which mainly ripe with the customer, but we see a shift of the ripening phase from internal to external” (Head of Automation and Controls of Case E, IP12).

4.2. Espoused Beliefs and Values

Espoused Beliefs and Values, as the second level of OC, cover soft factors which are hard to anchor in rules or specifications, but which have to be valued and lived by the employees [27]. Organizational beliefs and values are a vital component of an OC and can contribute to a firm’s sustainable competitive advantage [2].

First, in eight out of eleven cases, we distilled a **startup mentality**, which is conceptualized as a very collaborative way of working with little to no formalization, less hierarchy, higher adaptiveness to change, and strong customer focus [3]. In order to do so, the startup mentality builds on the ability to channel resources to new projects and supports the generation

of new ideas to solve customer problems. These ideas are submitted from all levels of the organization and the idea generation is integrated into the work tasks of everyone. This mentality is usually only found in startups since established firms have difficulties in incorporating values which are usually found in smaller, less mature firms like direct communication and greater openness.

Creating a startup mentality is a novel approach to enable digitalization and the goal is *“that this mindset is ideally with every employee. This is, as far as I know, important for the overall process – especially to the question: Where are the ideas coming from? How are we dealing with the idea? [...] What is happening in the world? [...] Each employee can submit improvements.”* Chief Technical Officer of Case B (IP04).

These values are closely connected to digital innovation and are believed to trigger new product development. For instance, one practitioner explained that they are establishing a place with values *“where colleagues can come up with something completely different”* (IP03). This *“bravery to try out new things”* (IP04) is rooted in a startup mentality which connotes the concept of intrapreneurship [1].

In seven of the cases, we identified the consequent further development to a culture **where failures are accepted**. The so-called ‘failure culture’ motivates employees to take risks and try out new things even if negative effects might be the result. Employees are encouraged to build prototypes which focus primarily on the direct customer experience without engineering the product until the end (IP03) and possibly risking to over-engineer the product.

Failure culture requires accepting something that does not go as planned and to *“believe in it anyway”* where *“we will lead it to success against all the odds, even if it might take longer.”* (Innovation Manager of Case A, IP01).

In order to cultivate such a mindset, resting on a greater startup feeling and acceptance of failure, we found in six cases that employees **embrace digital skills** which they do not have at the moment. These firms question *“if we have the needed skills to develop money-making business models”* (IP 11). Hence, they are looking for *“people with digital skills”* (IP11) who entrench digital values and favor digital solutions. In the end, the required skill set has certainly changed (IP05), demanding new skills and an open mindset to digital technology. On one hand, firms are satisfying their need for new skills by developing and reassessing available skills internally (IP20), on the other hand, they are acquiring new skills externally from the labor market (IP04).

A digital world requires firms to embrace digital skills where *“we had and have capabilities in the firm [publisher] which are mainly no longer needed in this way. [...] we need completely different people now who can work for the firm. But this shift happens very slowly.”* (Head of Business Development of Case C, IP04).

In order to support the organizational structure of firms (e.g., the Artifacts), even the most fundamental values like power structure within firms [19] and decision-making mechanisms do change. Finally, the role of IT is empowered allowing digital demands to be reflected in the values, too. In eight cases, we observed firms that support **power equality** amongst employees and across the hierarchy. Power and the responsibilities are distributed in those firms across business units to improve the alignment of digital innovation processes. We learned that with agile development frameworks like Scrum, responsibilities of each employee are clearer and the new role system is favored by the employees (IP05). Generally, the power is more distributed in the firm and around the individual employees. Hence, power has moved towards the middle and lower management and is less concentrated at the top, which allows a faster reaction to change in the business environment. Furthermore, power is also given to the lowest hierarchy level as *“each employee can make improvements”* (IP04) and thereby contribute.

Equal power might raise questions at the beginning of *“Who is actually responsible for the product? Is it the publisher? Is it the development department? Or is it the editorial team?”*, but allows everybody to contribute in a structured way. *“Now in the agile world, the roles are still clearly assigned. [...] Product owners and the editorial team are developing stories together. [...] And developers implement them.”* (Deputy General Manager of Case C, IP05).

Further, the next value in the digital age, visible in seven out of eleven cases, is active practicing of **mutual decision-making**. Where it was easy in the past to separate decision-making with respect to the department, decisions are now made jointly and historical separations are given up (IP05). Furthermore, we see decisions being made at lower levels and are, hence, more distributed in the firm. Decisions are then aggregated in order to match the overall firm’s objectives.

Mutual decisions eliminate previously established boundaries between business and IT as now *“it is much more technological. And we recognize that it is not something where we can keep up the separation. [...] We have to overcome the past and we must actually collaborate much more intensively”* (IT and Deputy General Manager of Case C, IP05).

We observed changes in the perception of IT in all cases. The role of the IT unit does fundamentally change where firms are undergoing changes in the organization due to digitalization. Specifically, in seven cases, the new role of IT is best described as: **IT as a business creator**. IT is cutting loose from traditional ties to a service provider role (focused on receiving orders from business) and moves into a more independent role where it actively designs essential features of new products during the innovation process. As a result, “*IT is now playing a very crucial role*” (IP02). This goes as far as IT now being integrated with business units in decision-making around new products. More competencies are delegated to IT and IT is developing to a respected and equal partner for the development of new online service or digitally enhanced products. Contrary to the traditional view where IT was seen as an order taker, the new role of IT is the driver of digital initiatives in the firm (IP18) and digital enabler for new products (IP05).

In a digital world, IT is now seen as a business creator and is “*no longer responsible for the maintenance of the server, nor are we the person who is called if a projector is not working*” (*IT and Deputy General Manager of Case C, IP05*).

4.3. Underlying Assumptions

In this section, we present the Underlying Assumptions that deal with the phenomena that remain unexplained when experts are asked about characteristics of organizational culture [26]. Therefore, we critically reflected and triangulated the interviews with the OC literature to arrive at the Underlying Assumptions. We abstracted the central issues of digitalizing firms from the facets of the Artifacts as well as Espoused Beliefs and Values (hence, they are presented along with direct quotes from the interview in italic). We used the input given in the interviews to interpret what the analyzed firms have in common and present our four central results as Underlying Assumptions in accordance with Schein [26]:

The first underlying assumption identified in our research is: *We are lacking skills needed for digitalization, and, even worse, often digital talents favor hip competitors* (i.e., ‘**Perceived Need for Digital Skills**’). In all cases, we recognized difficulties in attracting the sparse but highly qualified talents with the needed digital or IT background. Digitalizing firms have to recognize that their current OC does not meet the requirements of the employees these firms are currently targeting. Hence, firms are engaging in the war for talent and try to be attractive for digital talents. Only with the right human resources, they assume to be prepared for the future. What we ob-

served is that firms adopt fairly uncommon values to create atmospheres digital talents feel comfortable in. As such firms try to attract young technology-affine employees by reaching for more *equally distributed power* to trigger employees own decision-making or by providing conveniences, *usually only found in startups* like pool tables, fridges with fruits, scooters, and coffee shops. Further, they adopt a *failure culture*, i.e. allowing to test risky ideas without being sanctioned, to motivate employees to try out new things and come up with novel solutions. Moreover, OC is redefined by *new forms of collaboration with partners* to source the required skills from the outside, eventually aiming at their transition.

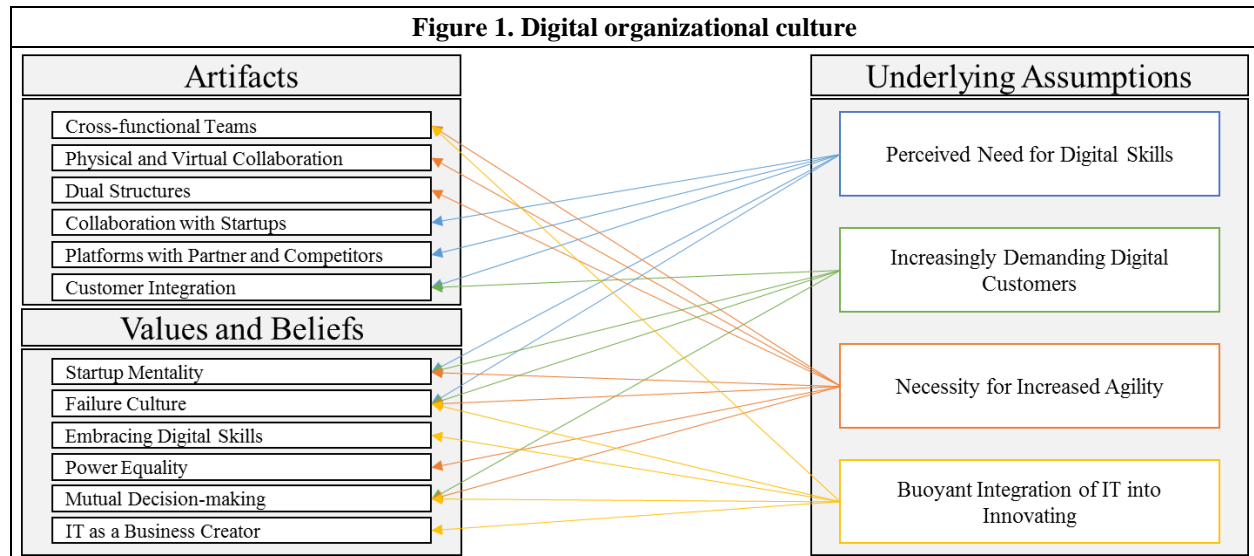
The second Underlying Assumption that evolves from our interviews is: *We feel a pressure from demanding customers who request the affordances of smart, connected products* (i.e., ‘**Increasingly Demanding Digital Customers**’). Many firms perceive that they need to exploit the new affordances of smart, connected products, i.e. continuous development, continuous monitoring, post-hoc adaptation, product-as-a-service, cross-product integration [cf. 22] in order to stand the test of digitalization. These affordances allow for novel approaches to engage with customers in digitalized ways for their convenience. This is combined with the fear that firms that do not adopt a digital culture, e.g., adopting the identified Artifacts and Values, may lose customers to competitors that provide these convenient affordances. Thus, most of our interview partners mingle product development employees with IT employees in *cross-functional teams* to combine the skills and capabilities to integrate ‘digital materiality’ into non-digital products and the know-how to handle digitalized products. Further, traditional firms radically flatten their hierarchies to allow *mutual decision-making* for faster reaction and joint decisions on new products. The *failure culture* encourages employees to integrate their ideas to enable faster innovations.

The third Underlying Assumption is: *We need improved agility to react faster to changes and to protect ourselves from faster competitors* (i.e., ‘**Necessity for Increased Agility**’). Due to the fact that digital transformations are unpredictable [32] and technological uncertainty in general [9], firms face uncertainties from ‘everything’ being digitalized (e.g., shoes, fridges, cars, bottles of wines, etc.). This trend incurs the need for more agility in order to react quickly to threatening competitors and to defend a firm by transforming the firm. Eventually, improved agility is achieved through *internal and external collaboration*, but also through *equal power distribution* which strongly empowers the employees by integrating their ideas into new innovations. Hence, firms

establish *cross-functional teams* to collate knowledge sets from different disciplines, and to spur numerous and more creative ideas. This is complemented by introducing a *startup mentality* which is more open and inclusive to new ideas. Again, in order to speed up *decision-making processes* when developing new solutions firms delegate decisions down to lower-level employees. Furthermore, *collaboration with customers* is being established to receive faster feedback to, once again, further enhance digital products.

Fourth, the following basic assumption emerged from our research: *We need to understand IT and its employees as an integral part of the product we sell (i.e., ‘Buoyant Integration of IT into Innovating’)*. From our case studies, we learned that the business side of firms is frequently focusing strongly on traditional sales procedures while neglecting the digital transformation. Without eradicating barriers created through the legacy and stopping power games by resistant managers, firms will find it hard to recognize IT as an essential part of digital innovations. We learned that firms try to realize their digitalization by reducing retarding forces (identifying *digital skills*, *equalizing power distribution*), and increasing accelerating forces (getting support from everybody from

top management to lower level *like in a startup* and finding *new organizational structures*). Firms address these ‘crusts’ by adopting a *failure culture* that promotes mistakes because one can learn from them. Although some managers still perceive IT as a service unit that focuses on helpdesk tasks, we observed the need to establish a ‘Digital IT’ [15] or *IT as a business creator* which has strong implications for the role of IT. In order to integrate digital capabilities into previously non-digital products, firms need to place people with IT and business background in *cross-functional teams* on projects and assure an atmosphere of *mutual power*, trust, and respect to allow for digitalizing firms to develop products that integrate both digital and physical materiality. In Figure 1, we provide an overview of how Artifacts, Espoused Beliefs and Values, and Underlying Assumptions appear in the ‘Digital Organizational Culture’. We arrived at this depiction by relating the statements that were identified as Artifacts or Values and Beliefs to the topic that was convened on in the interview guideline. Hence, the Underlying Assumptions were the underlying reasons for the particular Artifact or Values and Belief to be mentioned (which we indicate through the arrows in the overview model):



5. Implications and Limitations

To our knowledge, this analysis is the first to identify the facets of OC in digitalizing firms. Through extracting initiatives and managerial actions from 27 interviews in eleven digitalizing firms, we have learned what firms undertake on the *Artifacts* level (i.e., cross-functional teams, physical and virtual collaboration, dual structures, collaboration with startups, platform business with partners and compet-

itors, and customer integration; cf. Section 4.1) and on the level of *Espoused Beliefs and Values* (i.e., startup mentality, failure culture, embracing digital skills, power equality, mutual decision-making, and IT as a business creator; cf. Section 4.2) to digitalize their firms. Further, a process of profound interpretation and abstraction allowed us to derive four *Underlying Assumptions* (i.e., perceived need for digital skills, increasingly demanding digital customers, the necessity for increased agility, and buoyant integra-

tion of IT into innovating; cf. Section 4.3) from an extensive set of empirical data. We conclude that these assumptions form the intrinsic motivations for firms to digitalize and present forces in digitalizing firms. According to Schein [26] these forces are powerful because they operate under limited awareness and can explain the new OC currently developed in digitalizing firms.

We have also captured the relation of business and IT units in digitalizing firms. When previously *non-digital products* (consisting only of physical materiality) *are enriched with digital materiality* [35], firms need to reconsider how they organize for innovating [36]. Consequently, we found that previously *non-digital development teams* (consisting only of conventional business functions) *are enriched with digital skills* (IT professionals). Starting from the Artifacts level, several initiatives and managerial actions (e.g., cross-functional teams, physical and virtual collaboration, and dual structures) indicate that managers increasingly integrate IT professionals into the development of digital innovations. These IT professionals come either from within the firm or through the integration of startups or hiring professionals (some firms build digital units or appoint new chief digital officers for this integration). This is complemented by adopting a set of Espoused Values and Beliefs (e.g., startup mentality, failure culture) that further pronounces the practices from software development (i.e., digital skills) in previously non-digital development teams. Following, the boundary between business and IT functions dissolves in digitalizing firms because the relation between employees of IT and business is being internalized in cross-functional teams and no longer delineated by traditional unit boundaries. This perspective deviates from classical perspectives [16, 17] as the relationships between organizational units are replaced by relations between individuals with different capabilities within the cross-functional team. Thus, boundaries among organizational units disappear.

From these contributions, we derive the following implications for practice: First, firms may follow the examples collated from our cases and place employees from IT and business functions in one team for developing digital innovations. The rationale is bringing knowledge resources (from the physical and digital materiality perspective) closer together and removing internal boundaries between them. Second, practitioners can use our results to evaluate which Artifacts, as well as Espoused Values and Beliefs, are beneficial to them, and deploy them when they are digitalizing and start the development of digital innovations. Third, digitalizing firms are facing greater uncertainty due to technological changes, knowledge

intense tasks, and high-performance expectations. Therefore, the hierarchy is now often only exceptionally employed since the number of exceptions increases until hierarchy becomes overloaded [10]. Hence, firms shift their forms of coordination towards mutual adjustment [19] because they are better suited for knowledge workers who possess fungible knowledge that is not limited to a specific task but applicable to a wide range of activities [22].

Besides the implications, there are also some limitations of our work. First, the results may appear to be ‘cherry-picked’ as we could not use a chronological structure nor an order based on popularity due to the heterogeneity of our cases and interviewees. Yet, we account for that by taking a theoretical lens [27], following this lens’ aspects, and validating the coding between the researchers. Second, Schein [26] introduces a multitude of aspects for each level which are not necessarily mutually exclusive; thus, we adopted the concepts as they matched best. Third, the authors have conducted interviews with managers in eleven companies which will prevent a deep understanding of the situation in each company. Organizational culture is not an easy concept to understand and two or three interviews for each company may not be enough. We avert this aspect by triangulating company reports, and additional data that we retrieved from the firms under scrutiny.

Last, we investigated firms from different but not all industries, which may raise concerns due to generalizability. Although, we acknowledge this ongoing debate, we are in accordance with Schwarz et al. [28] who claim that few cases have the benefit of providing more thoroughness in the analysis process.

On the other hand, while including firms from different industries might blend and even obfuscate many contextual factors such as regulation intensity and particular industry or professional cultures, our aim is to take a more cross-sectional perspective and identify constituents of a digital organizational culture. Based on our results we see promising avenues for future research in looking deeper into these constituents and how their interplay with particularities of various industries shape the respective digitalization landscapes.

Hence, research and practice should further investigate the ‘digital organizational culture’ so that firms are able to consciously shape it. Then, organizational actors can restructure *Artifacts* and *Espoused Beliefs and Values* for combining physical and digital components as well as capabilities to develop digital innovations. Consequently, understanding the manifestation of a ‘digital organizational culture’ is necessary for digitalizing the firm in a comprehensive way.

6. References

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