Building Adaptive Capacity for Volatile Business Environments: A Longitudinal Study of the Establishment of a Digital Innovation Unit

Annalena Lorson  
*Hasso Plattner Institute*, annalena.lorson@hpi.de

Christian Dremel  
*Norwegian University of Science and Technology*, christian.dremel@ntnu.no

Falk Uebernickel  
*Hasso Plattner Institute*, falk.uebernickel@unisg.ch

Follow this and additional works at: [https://aisel.aisnet.org/ecis2023_rp](https://aisel.aisnet.org/ecis2023_rp)

Recommended Citation

*ECIS 2023 Research Papers*. 240.  
[https://aisel.aisnet.org/ecis2023_rp/240](https://aisel.aisnet.org/ecis2023_rp/240)

This material is brought to you by the ECIS 2023 Proceedings at AIS Electronic Library (AISeL). It has been accepted for inclusion in ECIS 2023 Research Papers by an authorized administrator of AIS Electronic Library (AISeL). For more information, please contact elibrary@aisnet.org.
BUILDING ADAPTIVE CAPACITY FOR VOLATILE BUSINESS ENVIRONMENTS: A LONGITUDINAL STUDY OF THE ESTABLISHMENT OF A DIGITAL INNOVATION UNIT

Research Paper

Annalena Lorson, Hasso Plattner Institute, University of Potsdam, Potsdam, Germany, annalena.lorson@hpi.de.

Christian Dremel, Norwegian University of Science and Technology, Trondheim, Norway, christian.dremel@ntnu.no.

Falk Uebernickel, Hasso Plattner Institute, University of Potsdam, Potsdam, Germany, falk.uebernickel@hpi.de.

Abstract

To meet the challenge of digital transformation and remain competitive in an increasingly volatile business environment, many incumbent companies have established Digital Innovation Units (DIUs). Despite a growing body of knowledge, current research paints a rather static picture of DIUs due to a lack of studies that have collected data over time to examine DIU-related processes. Using empirical data from an in-depth, longitudinal case study of an established machinery manufacturer, we examine the process of building a DIU and how the main organization can develop and expand its adaptive capacity (AC) in the process. We identify three mechanisms that positively influence the expansion of AC, as well as five disturbing factors. In addition, we provide initial implications and point to the research avenue of the relationship between AC and trust.

Keywords: Digital Transformation, Digital Innovation Unit, Adaptive Capacity, Structuration Theory.

1 Introduction

Digital transformation “perhaps the technology-related phenomenon of our times” (Wessel et al. 2020, p.2) is well underway and those who do not adapt will disappear. To avert this fate - triggered by the continual change that new digital technologies entail (Hinsen, 2019) - more and more incumbent companies have set up so-called digital innovation units (DIUs) to meet the challenges of digital transformation (Barthel et al. 2020; Fuchs et al. 2019; Holotiuk and Beimborn 2019; Raabe et al. 2020; Svahn et al., 2017). We define DIUs as “organizational units with the overall goal to foster organizational digital transformation by performing digital innovation activities for existing and novel business areas” (Barthel et al., 2020, p.2). Due to their reduced socio-technical organizational complexity, DIUs can take advantage of dedicated, smaller structures within the organization and are able to accelerate and to scale the development of digital innovations (Arvidsson and Monsted, 2018; Fuchs et al., 2019; Holotiuk and Beimborn, 2019; Matt et al., 2015; Yoo et al., 2010). As DIUs are often an important initiative for incumbents’ digital transformation (Jöhnk et al., 2020; Matt et al., 2015; Wiesböck and Hess, 2019), a better understanding on how such units should be built is valuable for their efficient organizational use. Although DIUs are considered from a wide variety of theoretical perspectives - for instance, with respect to their role in a bimodal IT structure (Raabe et al. 2020), in the context of a company’s ambidexterity (Holotiuk and Beimborn 2019; Jöhnk et al. 2020), under the application of time as a research lens (Lorson et al., 2022) or a “dynamic capabilities” lens (Hellmich et al., 2021; Lorson, 2022) - the literature to date paints a rather static picture of DIUs. It is primarily
concerned with looking at the status quo of a DIU with few attempts to date to get a more detailed and nuanced picture of the successful build-up or development processes (Barthel et al., 2020; Hololiuk and Beimborn, 2019; Raabe et al., 2020). Barthel et al. (2020) suggest conducting in-depth, longitudinal case studies to examine the implementation of DIUs to get a more dynamic picture of these entities and to understand how the process should be designed to use the unit most efficiently. We take this as an opportunity to shed light on the topic and aim to contribute to a deeper understanding of a DIU’s implementation process and its challenges in IS research by answering the following research question: How does the process of successfully building a DIU unfold in the course of the digital transformation of an incumbent company?

We report on a longitudinal case study of a Swiss manufacturing company, “EngineeringCompany” (pseudonym), that successfully implements a DIU to initiate, accompany and drive its digital transformation leading to additional revenues through digital innovation. In our research we draw on the concepts of adaptive capacity (AC) and the influence of the structural dimension on it in the course of building the DIU. Companies with AC continuously develop new knowledge and apply it in a sustainable way that is difficult for competitors to imitate (Hanssen-Bauer and Snow, 1996; Oliver, 1997). Especially in volatile business environments, such as during digital transformation, ACs are a valuable organizational strategy that prioritizes learning, innovation, and collaboration (Staber and Sydow, 2002). Rooted in rich empirical data from a longitudinal case study, we argue that the implementation process of a DIU contributes to the expansion of AC along the three mechanisms of multiplexity enhancement, information redundancy generation and decoupling tendency.

2 Theoretical Background

2.1 Digital Transformation and Digital Innovation Units

Incumbent companies strive to create value in the form of digital product, service, process, or business model innovations to remain successful in today’s rapidly changing business environment (Fichman, Dos Santos and Zheng, 2014; Nambisan et al., 2017). Yoo et al. (2010) define such digital innovations as “the carrying out of new combinations of digital and physical components to produce novel products” (p. 725). Digital innovation often requires and unleashes new organizational practices and forms (Wessel et al. 2020). The “combined effects of several digital innovations bringing about novel actors (and actor constellations), structures, practices, values, and beliefs that change, threaten, replace or complement existing rules of the game within organizations, ecosystems, industries or fields” (Hinings et al. 2018, p. 53) are referred to as digital transformation.

Digital transformation is a complex topic that affects many or all areas of an organization and deals with the “changes digital technologies can bring about in a company’s business model, which result in changed products or organizational structures or in the automation of processes” (Hess et al. 2016, p. 124). Digital transformation efforts are not trivial, as significant organizational inertia often needs to be overcome (Haskamp et al. 2021). One initiative to launch and drive digital transformation in incumbent companies is DIUs (Jöhnk et al., 2020; Matt et al., 2015; Wiesböck and Hess, 2019) - departments within the main organization or separate legal entities that bundle a company’s exploration efforts to foster digital innovation (Fuchs et al., 2019; Hololiuk and Beimborn, 2019). DIUs promote an innovation-friendly culture and strengthen the digital competence of an incumbent company. They have secure access to financial resources as well as a structured organizational embedding and execute projects together with one or more units of the main organization (Fuchs et al., 2019). In addition, DIUs build and leverage digital customer-centric expertise and agile methodologies, and maintain digital innovation ecosystems (Raabe et al. 2021). In this article, we follow Barthel et al.’s (2020) definition of DIUs as “organizational units with the overall goal to foster organizational digital transformation by performing digital innovation activities for existing and novel business areas” (p. 2). DIUs face a variety of challenges in supporting digital innovation, as they must both develop new capabilities without compromising existing product innovation practices and build new skills and relationships within the organization without neglecting external collaborations (Svahn et al. 2017). To best meet these
challenges, DIUs must align with the needs of the main organization. However, to the best of our knowledge, IS research has not yet investigated how the process of building a DIU should look like in order to be able to use a DIU as efficiently as possible (Barthel et al., 2020; Holotiuk and Beimborn, 2019; Raabe et al., 2020). In general, previous research provides a rather static picture of these units, as it is primarily concerned with considerations of the status quo of a DIU, with only sporadic initial attempts to gain a clearer picture of any implementation or evolution processes (see e.g., Barthel et al., 2020; Holotiuk and Beimborn, 2019; Raabe et al., 2020). Barthel et al. (2020) therefore propose to study the implementation of DIUs within an incumbent firm in order to obtain a more dynamic picture of these units. In addition, this will allow us to find out what positive implications the existence of a DIU has for an incumbent firm, but also what challenges arise in the course of its establishment.

### 2.2 Adaptive Capacity and Structuration Theory

The ubiquity of digital technologies and their socio-material impact on organizations (Leonardi and Barley, 2008), their practices and forms in the context of digital transformation and innovation (Zammuto et al., 2007) bring organizational change in the context of information systems into focus - which already has a long tradition in IS research (Leavitt, 1965; Keen, 1981; Robey et al., 2013). Against this background, several authors call for research on new forms of organizational design and their practices (Zammuto et al., 2007; Yoo et al., 2012; Hanelt et al., 2020). We answer this call by adopting an AC (Staber and Sydow, 2002) lens and investigate the build-up process of a DIU. Our focus is on the possible emergence of ACs - based on the work of Staber and Sydow (2002) - in this process.

In his analysis of social organizations Parsons (1964), describes AC as a search process that enhances the “ability to survive in the face of its unalterable features [...] and the capacity to cope with [...] uncertainty [...] and unpredictable variations” (p. 340). Such capacities appear to be useful with regard to the digital transformation of incumbent companies, which is also taking place in a volatile and unpredictable environment. For an organization to have AC means that learning occurs faster than the change in conditions which requires dismantling old routines and creating new ones (Staber and Sydow, 2002). Organizations with limited AC tend to seek solutions to problems based on the competencies they already possess and therefore understand. They may not even recognize the need to develop new knowledge in an evolving and uncertain environment (Cohen and Levinthal, 1990). ACs consist of three structural properties: multiplexity, redundancy, and loose coupling (Staber and Sydow, 2002).

“Multiplexity refers to the number and diversity of relations between actors in organizations or interorganizational networks” (Staber and Sydow, 2002, p. 414). It creates a “capacity for the evolution of a shared organizational mind” (Morgan, 1997, p. 104) as information spreads throughout the system and can be accessed from different angles. A multiplex relationship, for example, between employees of the sales and R&D departments of an organization means that they meet in different settings (projects, conferences, etc.) to discuss different topics related to the company (Staber and Sydow, 2002). Redundancy means excess resources, which are reflected in surplus employees, unused production capacity, overlapping jurisdiction, broad job descriptions, fault tolerance, parallel communication channels, or idle information and should make a system more “error-friendly” and encourage experimentation, improvisation and risk-taking (Staber and Sydow, 2002). Staber and Sydow (2002) distinguish between three forms of redundancy - information redundancy, task redundancy and redundancy of relations. Coupling refers to the strength of the connections between the system elements. Loose coupling in (inter-) organizational systems thus means that different units and activities are relatively independent and can adapt to changing demands in different ways and at different speeds (Staber and Sydow, 2002). Loose coupling reduces the risk of repeating mistakes (Masuch, 1985) as well as escalating commitments (Ross and Staw, 1993) and raises the AC of a system by increasing the variation in skills and competencies (Aldrich, 1979; Dawkins, 1986) ensuring the survival of the system in an uncertain environment (Staber and Sydow, 2002). Presumably, there are other dimensions of AC besides multiplexity, redundancy, and loose coupling that have not yet been explored (Staber and Sydow, 2002). Literature on inter-organizational networks, for example, often cited trust as an important enabler for organizational change and innovation (Sabel, 1993; Das and Teng, 1998; Sydow, 1998).
In their research, Staber and Sydow (2002) draw on Giddens (1984) structuration theory to gain a better understanding of AC and their influencing factors. Structuration theory deals with the dualism between structure and agency understanding structure as something that exists only in and through the activities of human actors (Giddens, 1984). Giddens (1984) identifies three dimensions of structure - signification, domination and legitimation - as well as three corresponding dimensions of interaction - communication, power and sanction - that are recursively linked through modalities of interpretive schemes, facilities, and norms. As one of the most influential social theories in IS research (Poole and DeSanctis, 2004), structuration theory allows us to better understand how a DIU as a new form of organizational design, and thus a structural feature, comes about through the actions of individuals.

Staber and Sydow (2002) detail that the three structural dimensions of signification, domination and legitimation can influence the AC of an organization. For example, multiplexity can also stall or distort the flow of information and thus limit adaptive learning if knowledge is not shared, manipulated, distorted, or withheld. This is related to the signification aspects of structuration and depends on the rules in place and the way they are interpreted and used by actors to sanction events or behaviors (Staber and Sydow, 2002). With respect to the domination aspects of structuration, there is a risk that individuals in positions of power may instrumentalize multiplex relationships in ways that lead to conflict and resistance rather than adaptability (Staber and Sydow, 2002). Furthermore, the organization’s reward system may attach different importance to certain forms of relationships and limit adaptability (Staber and Sydow, 2002). Whether redundancy really makes the organization more “error-friendly” depends on whether the structuring processes promote change instead of persistence, risk-taking instead of risk aversion. The use of redundant information can mean different things to different actors, leading to conflict and resistance to change. Dominant actors may again instrumentalize task redundancy to pursue their personal interests rather than those of the organization (Staber and Sydow, 2002). Actors rely on rules of signification, e.g., to assign meaning to multiplexity, redundancy, and loose coupling. By reproducing domination, actors can create ACs for the system in which they operate. ACs depend on “on the use of rules of legitimation to which agents refer via norms” (Staber and Sydow, 2002, p. 419).

Drawing on the theoretical foundation of organizational AC and its interplay with structural dimensions, we aim to shed light on whether and how the process of building a DIU favors the emergence of AC and whether it is negatively affected by their interactions with structural dimension.

3 Research Design

3.1 Case Context

Guided by the objective to understand the implications of a DIU build-up process which is not (well) explored so far, we conducted an in-depth, inductive, longitudinal case study that lends itself well for developing grounded theory (Glaser and Strauss, 1967; Eisenhardt, 1989; Van de Ven and Huber, 1990; Yin, 2018). We studied one organization, EngineeringCompany, over a period of two years, from the moment the decision was made to implement a DIU to the final design and tasks of the unit. We chose this case because it provided us with the rare opportunity to follow in depth the development process of a DIU and how it unfolds in the course of the digital transformation of an established company. Our longitudinal approach allows us to examine “how certain conditions and their underlying processes change over time” (Yin, 2018, p. 87). Furthermore, the case is appropriate because it involves a multi-year, complex digital transformation effort, and the context of mechanical engineering is helpful in understanding the challenges associated with the digital transformation of an incumbent company that manufactures physical products. Although studying a single organization limits the generalizability of the findings, it allowed us to delve deeply into the organization and thus develop a more comprehensive understanding of the process of successfully building a DIU in the course of an incumbent’s digital transformation. In the process, we were able to identify mechanisms with a positive impact on the company’s AC that have only emerged over time and have also changed or intensified in some cases.

EngineeringCompany is a nearly 180-year-old international machine manufacturer headquartered in Switzerland and one of the world leaders in its field. The company is known for its reliability and high
quality standards, producing machines that work for decades. Product development was characterized by rigid and lengthy cycles for each machine model, which have not emphasized the integration of digital technologies. Although the industry as a whole is relatively slow and still in the early stages of digital transformation, competitors and digital natives are increasingly offering digital solutions to complement and optimize the use of machines, threatening EngineeringCompany’s market position.

Our unit of analysis is EngineeringCompany’s first digital transformation initiative, the build-up of a DIU. The DIU’s goal is to bundle previously isolated and uncoordinated digital innovation activities and to develop digital products and services along predefined strategic fields. The first step is to establish a unit with a core business related mandate that implements digital innovations “around the machine” such as predictive maintenance or remote support solutions. The first two years of operation should also be used to analyze and decide how the DIU will ultimately be set up. Until then, it will be a "virtual" unit within the main organization's IT department. EngineeringCompany is supported in its efforts by ConsultancyCompany (pseudonym), which specializes in customer-centric digital innovation. The DIU's work highlighted the importance of digital transformation to the main organization, leading to the development of an enterprise-wide digital strategy as part of a five-year strategic “mid-range plan”.

3.2 Data Collection

Our data sources are diverse and consist of interviews, meeting observations, and internal and external material (see Table 1) for triangulation (Yin, 2018). From January 2021 to July 2022, we conducted 26 interviews that lasted between 26 and 79 min. We worked with fixed time intervals (Yin, 2018), interviewing those involved in building the DIU (mainly the DIU core team) approximately every six months (see Figure 1). The first round of interviews took place in January/February 2021. The fourth and final round in July 2022. The interviews were conducted by the same interviewer, and with one person at a time. We used a semi-structured interview guide with open-ended questions to ground the interviews in the participants’ experiences and to allow the theory to emerge from the data (Corbin and Strauss, 1990; Strauss and Corbin, 1998; Gioia et al., 2013). The set of open-ended questions explored two areas of interest. First, the interviewer asked general questions about the main events and activities during the process of building the DIU. Second, we wanted to know the extent to which the DIU had changed the main organization from the interviewee's perspective. If respondents referred to specific events, we asked for documentation. We also gathered additional materials to familiarize ourselves with the context. To complement our findings from the interviews, we reviewed publicly available materials such as the company's website, press releases, and video footage. For the observations, the first author attended the weekly meetings of the DIU team from January 2021 to September 2022. After completing the qualitative interviews, we anonymized, transcribed, and analyzed the primary and secondary data using the computer-assisted qualitative data analysis software ATLAS.ti.

<table>
<thead>
<tr>
<th>Data</th>
<th>Interviewpartner (ID)</th>
<th># Interviews</th>
<th>Minutes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary Data</td>
<td>Chief Digital and Information Officer (CDIO)</td>
<td>4</td>
<td>289</td>
</tr>
<tr>
<td></td>
<td>Director Global IT Governance and Digital Transformation (ITGDT)</td>
<td>4</td>
<td>218</td>
</tr>
<tr>
<td></td>
<td>Digital Ambassador (DA)</td>
<td>4</td>
<td>178</td>
</tr>
<tr>
<td></td>
<td>Consultant in ConsultancyCompany (C1)</td>
<td>4</td>
<td>253</td>
</tr>
<tr>
<td></td>
<td>Partner in ConsultancyCompany (C2)</td>
<td>3</td>
<td>176</td>
</tr>
<tr>
<td></td>
<td>Head of Global Digital Business Operations (DBO)</td>
<td>2</td>
<td>74</td>
</tr>
<tr>
<td></td>
<td>Head of Sales Italy i.a. Service Division and Global Key Account Manager (HOF)</td>
<td>1</td>
<td>50</td>
</tr>
<tr>
<td></td>
<td>Data Scientist (DS)</td>
<td>1</td>
<td>49</td>
</tr>
<tr>
<td></td>
<td>Co-Founder and member of the board of directors of ConsultancyCompany (C3)</td>
<td>1</td>
<td>34</td>
</tr>
<tr>
<td></td>
<td>Senior Consultant in ConsultancyCompany (C4)</td>
<td>1</td>
<td>26</td>
</tr>
</tbody>
</table>
Adaptive Capacity for Volatile Environments

<table>
<thead>
<tr>
<th>Total Interviews</th>
<th>26</th>
<th>1347</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Secondary Data</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Observations</strong></td>
<td>34 hours of observation of weekly DIU meeting → ∑ 42 pages</td>
<td></td>
</tr>
<tr>
<td><strong>Internal Material</strong></td>
<td>51 internal documents such as strategy presentations, management reports, market, and competitor analysis → ∑ 340 slides</td>
<td></td>
</tr>
<tr>
<td><strong>External Material</strong></td>
<td>11 External documents such as annual report, website, press releases and videos from EngineeringCompany and their partners around the digital transformation journey</td>
<td></td>
</tr>
</tbody>
</table>

Table 1. Data Sources for the Longitudinal Case Study.

Initially, we followed a process approach to analyzing data (Langley, 1999). Based on interview statements complemented with our observation data as well as further internal and external material, we created a timeline of all events in the DIU implementation process (see Figure 1 for an overview).

In the process, we found that certain organizational structural, corporate policy, and social components recurred. We therefore decided to familiarize ourselves with the literature in the field of organizational studies and social theories and came across Giddens’ (1984) theory of structuration and, more specifically, the consideration of AC from a structuration perspective (Staber and Sydow, 2002). Since this theoretical approach seemed appropriate to better understand the processes involved in building a DIU, we returned to our data analysis with the newly acquired theoretical background knowledge.

Due to the lack of existing research on the process of DIU implementation and because of the novelty of the phenomenon, a grounded theory methodology was chosen to develop theory inductively from rich empirical data (Corbin and Strauss, 1990; Strauss and Corbin, 1998; Gioia et al., 2013). Guided by our AC and structuration theory lenses we reworked our data initial analysis and created first-order codes from the transcripts while trying to “adhere faithfully to informant terms” as suggested by Gioia et al. (2013, p. 20). The first-order coding resembled an open coding step (Gioia et al. 2013; Strauss and Corbin 1998) and resulted in 476 first-order codes. Based on our comprehensive compendium of first-order codes we distilled our second-order codes (24 in total) according to Gioia et al.’s (2013) approach. Both coding steps were conducted by the first author and independently double-checked by a second researcher. In the final step, we developed eight aggregated dimensions from the second-order codes within the research team. In alignment with grounded theory methodology (Urquhart et al., 2009), we systematically collected and analyzed our empirical data until theoretical saturation was reached. Specifically, we iterated until “no new data emerged” (Morse, 2003, p. 1) and a coherent picture of the
formation of AC over the course of DIU construction, as well as any confounding factors, emerged. Figure 2 provides an example of our data coding.

<table>
<thead>
<tr>
<th>First-Order Codes</th>
<th>Second-Order Codes</th>
<th>Aggregated Dimension</th>
</tr>
</thead>
<tbody>
<tr>
<td>Participants: Vice-President Sales of two divisions and sales representatives, Business Development, Managing Director of Subsidiary, Global Product Portfolio Manager, CDIO, Head of Global Digital Business Operations</td>
<td>Sales manager is partially included in DIU team and is mouthpiece of sales in DIU and vice versa to ensure information flow.</td>
<td>Higher information redundancy through involvement of people from other departments in DIU projects</td>
</tr>
<tr>
<td>Business Plan Operationalization workshop series: work with sales team to determine pricing strategies for digital portfolio</td>
<td>Collaboration of multiple departments on business model development for DIU</td>
<td></td>
</tr>
<tr>
<td>Strong involvement of sales in pricing and value proposition: Vice President of one division was also involved in customer interviews</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Coordination with controller, who has taken business plan strongly to himself</td>
<td>Employees of the main organization need to be involved earlier in DIU projects to ensure sufficient information exchange.</td>
<td></td>
</tr>
</tbody>
</table>

Figure 2. Coding Example.

In relation to the body of knowledge on AC, and based on the eight aggregated dimensions, we formulated three mechanisms that positively influence the expansion of multiplexity, redundancy, and loose coupling in the course of the DIU building process, as well as five disturbing factors. Of these five disturbing factors, two were related to multiplexity, one to redundancy, and two to loose coupling.

4 Results

By conducting a longitudinal study of EngineeringCompany’s DIU-building process over a two-year period, we were able to identify three mechanisms and five disruptive factors that have emerged during this time period and sometimes intensified over time. Table 2 briefly depicts the three mechanisms and five disturbing factors along the three AC dimensions in relation to the DIU build-up process.

<table>
<thead>
<tr>
<th>AC Dimension</th>
<th>Mechanisms with positive impact on AC dimension</th>
<th>Factors disturbing expansion of AC dimension</th>
</tr>
</thead>
<tbody>
<tr>
<td>Multiplexity</td>
<td>Multiplexity enhancement: Continuous development and expansion of collaborations by DIU with departments and partner companies</td>
<td>Impairment of multiplexity by signification and legitimation aspects of structure: Department heads partly withhold information to pursuit own interests and reward system does not place emphasis on relations with DIU</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Impairment of multiplexity by insufficient conferral of legitimacy: Hardly any sanctions by management if departments deviate from role and task allocation by DIU for digital innovation projects</td>
</tr>
<tr>
<td>Redundancy</td>
<td>Information redundancy generation: Involvement of employees from other departments on a project basis or as official representatives in the DIU expands level of information and knowledge about the unit and its digital innovation projects</td>
<td>Artificial and uncoordinated task redundancy: Blind actionism and promotion of self-interests by dominant actors lead to parallel projects and defocusing of the DIU team</td>
</tr>
<tr>
<td>Loose Coupling</td>
<td>Decoupling tendency: Tangible results lead to recognition of competencies and higher acceptance and awareness of the potential of digital products, data science skills, and market and customer orientation</td>
<td>Persistence in strong coupling: Silo thinking, inertia, and skepticism of departments about DIU and digital transformation persist</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Limited process slack: DIU’s original goal of full process freedom was not achieved; great difficulty in deviating from standard processes</td>
</tr>
</tbody>
</table>

Table 2. Mechanisms and Disturbing Factors for the Expansion of AC.
In order to enrich the presentation of the results and to relate them to the underlying data, we provide an example quote from the interviews for each mechanism and disturbing factor. Furthermore, since temporality cannot be completely neglected in the course of the DIU implementation process, we also discuss whether and how the effectiveness of the mechanisms and disturbing factors evolved over time.

4.1 Multiplexity

The first mechanism we discover in our case study is the multiplexity enhancement mechanism - a process by which a company increases the number and variety of relations between organizational actors and interorganizational networks which has a positive impact on its AC. In the case of EngineeringCompany this means that through/with the implementation process of the DIU and the digital innovation projects it initiates, several new internal and external relationships are formed. Internally, they result from the fact that the DIU involves other business units directly - as part of the team - or indirectly - as the person responsible for an enabler project - in its projects. Through the collaborative work on digital products and services, both the DIU builds relationships with members of other departments and the departments build relationships with each other. As individual actors come together in new constellations and settings, the total number and variety of relationships within the EngineeringCompany increases, and so does multiplexity. This positive development of one of the three properties of AC favors the expansion of AC as a whole. We observed a similar process in the course of positioning the new data analytics team, which is part of DIU. The team began a regular exchange and internal collaboration with other departments to show how data analytics - and thus the DIU - can be useful to other departments. Through these positive experiences, the DIU was able to forge important relationships within the company. In addition to its internal impact, the multiplexity enhancement mechanism also takes effect externally. The DIU’s work brings new facets to the relationship with existing partners and changes their perception of EngineeringCompany as Interviewee C2 describes: “[M]any partnerships have existed for a long time and are now simply being given new facets. So [EngineeringCompany] has been working with [SoftwareCompany] for quite a while to prototype, prepare, think ahead, and so on. And, of course, this partnership will be built upon.” The additional product and service offering allows EngineeringCompany to position itself as a valuable partner on digital topics, resulting in requests for products and partnerships from companies with whom there was no previous contact. From a time perspective, the multiplexity enhancement mechanism was effective from the beginning but increased over time, especially in the second year of DIU operations.

The benefits of the added multiplexity could be even greater if it weren’t for two countervailing factors clouding them. We identified impairment of multiplexity by signification and legitimation aspects of structure and impairment of multiplexity by insufficient conferral of legitimacy as such. The former refers to what Staber and Sydow (2002) negative influence of the signification and legitimation aspects of structuration on AC. For example, if an organization has a history of competing for resources among different subunits, this can affect the rules in place or how they are interpreted by actors in the organization and influence whether knowledge is shared, manipulated, distorted, or withheld. In addition, the organization's reward system may favor certain types of relationships, causing actors to question the legitimacy of sharing resources. We observed both situations at EngineeringCompany. Out of self-interest, some department heads withheld information about the DIU and its projects from their employees. Clear management decisions about the role and tasks of the DIU are not welcomed by all, so some try to go their own way within their departments, harming the overall progress of the project. Competitive behavior, political battles, and the pursuit of vested interests collectively lead to constant discussions, insufficient results, and unfulfilled tasks, resulting in considerable delays in digital innovation projects. Moreover, the current reward system does not place emphasis on the relation with the DIU, as departments with enabler projects for DIU work streams can achieve their respective goals without meeting DIU requirements: “[T]he core problem is that R&D and [the subsidiary], who have to deliver an essential part of the product, in the sense of [being an] enabler [project][...] can fulfill their own goals without enabling the DIU to achieve theirs. [...] So, I think that there is a conflict of goals” C1. The second disturbing factor, impairment of multiplexity by insufficient conferral of legitimacy, refers to inadequate management sanction when individuals instrumentalize multiplex
relationships to their advantage or create artificial task redundancies that slow general progress. In the case of EngineeringCompany, for example, a RASCI matrix (short for responsible, accountable, support, consulted, and informed) was developed by the DIU team to reduce ambiguity about its roles and responsibilities, as well as the roles and responsibilities of other departments within the innovation projects, which in many cases was not adhered to without sanction from management. This also shows the difference between active and passive management support: Although management is behind the DIU, it often does not take consistent action when other departments do not behave in the spirit of digital transformation and support DIU projects. The CDIO expressed this as follows: “[The] prospective CEO, says he thinks it is really cool how fast we are going. [...] But I will put it this way, the management actually only supports us passively. Actually, we could go even faster. We are also running uphill to some extent and these frictional losses are not addressed. [...] If they already think it is cool that we are going fast, then they should also remove stumbling blocks from our path, which may lead to us not going as fast anymore.” Active management support is therefore indispensable for unclouded progress. Both disturbing factors were effective from the beginning but should improve now in the wake of the new digital strategy and 5-year mid-range plan, with the revised DIU setup and clear (revenue) targets.

4.2 Redundancy

The second mechanism we identified in our case is information redundancy generation - a process through which the amount of (unused) opportunities to transmit information is increased, resulting in advantages for the adaptability of a heavily information-dependent system. Redundant information enhances the reliability of transmission because the failure of one information strand can be compensated by another (redundant) one. With higher redundancy, AC in general also increases. In EngineeringCompany this mechanism has manifested itself as follows: The DIU’s working mode which regularly involves representatives from other departments in its innovation projects favors the dissemination of information on these projects and on the development of digital products and services in general. Representatives from sales, product management, and controlling, for example, were closely involved in the “Business Model Development” workstream, where business model patterns for digital products and services were defined and the overall business case for the DIU was calculated. Thus, the information is no longer available only in the DIU itself but also in other parts of the organization, ensuring reliable information access and flow. For the purpose of sufficient information saturation and redundancy with regard to digital products and services, the DIU team also decided to make a representative of the sales department part of the team in late 2021/early 2022. She is to be the mouthpiece of sales to the DIU and, vice versa, the mouthpiece of the DIU to sales. The goal is to ensure that both the voice of the customer - represented by sales - was included in the development of digital products and services and that the sales team was adequately informed to be able to sell these products and services: “All in all, I think it is fair to say that the exchange has become much closer, better, and earlier. That we at the DIU now have a better understanding of what our sales colleagues are waiting for, what they need, so that they can say, okay, we now dare to go to the customer, announce something, promise something [...]. And conversely, I am hearing more and more frequently that there is at least a little more transparency about what the DIU is doing and developing. So things have moved much closer together. I think this also gives us better access to customers.” C2. Information redundancy is also being further expanded in other areas, as there were delays in the process flow when the first digital service was handed over. After initial development is complete, the DIU passes the digital products or services to the main organization for further development and operation, which happened too abruptly in this case. The new product owner did not have the full scope of information, resulting in many inquiries. In the future, the main organization will therefore be involved much earlier in the development process to ensure sufficient information redundancy and to create a transition phase rather than a transition point. Timewise, the mechanism of information redundancy generation really started to work in the second year of DIU operation, when the DIU core team was mostly clear about its role, structures, and processes, and was able to involve the main organization.

With regard to the AC dimension redundancy, we also identified a negative factor in the course of EngineeringCompany’s DIU implementation namely artificial and uncoordinated task redundancy.
refers to the influence of the domination aspects of structure on redundancy, for example, when dominant actors instrumentalize task redundancy to advance their personal interests rather than those of the organization. In relation to our case, we observed that “digital” had become a big and important topic in the company in a short time, which makes it interesting for many departments and employees. Blind actionism led to unwanted, uncoordinated parallel initiatives to the existing digital projects, i.e., artificial task redundancy, and the DIU team has to spend an unnecessary amount of time and effort uncovering and collecting these initiatives, which impairs its focus: “It's still a beauty contest [...] [T]his digital topic fascinates many people. And when the call to order comes and says, ‘the DIU is responsible for this’ then not everyone complies. [...] [A] not inconsiderable amount of our time [...] is just to [...] stop these multiple developments, to stop submarine projects. [...] And of course, we have to make sure that we don't lose our objective” CDIO. Something similar was also observed regarding dominant actors in the organization who instrumentalized artificial task redundancy - also in the form of parallel digital projects - to assert their personal interests, even though management had clearly communicated respective tasks and responsibilities. Tendencies towards this disturbing factor existed from the beginning and became properly visible about six to nine months after the DIU started working.

4.3 Loose Coupling

The third mechanism we identified in our case is decoupling tendency - the process through which various units aspire to become more independent of each other, allowing them to adapt to changing requirements in different ways and at different rates - which has a positive impact on a company’s AC. Decoupling tendency mirrors first steps on the way to a loosely coupled system, which is desirable in a highly uncertain and volatile business environment, as it is in the course of digital transformation. New system entrants - such as new organizational structures like the DIU - who have potentially useful information and resources are less likely to be viewed with suspicion or may be rejected outright, as in a strongly coupled system. In our case we see that the DIU’s work - especially the first, visible results and the increasing recognition of its competencies - is slowly loosening the strongly coupled system of the main organization. This is leading to greater acceptance of digital transformation and awareness of the potential of digital products, data science skills, as well as market and customer orientation. Two algorithms, several pilot customers, and initial revenues make the DIU’s work more tangible to the workforce, which has already convinced various skeptics that it is a sensible initiative: “I think that DIU has consolidated itself in [EngineeringCompany]. What I mean is that the DIU is known and we have also delivered concrete things and that means we have also become recognized [...] The people who understand that we exist and that we can deliver. [...] We have developed two algorithms [...] which are already tested and where we are already in the validation phase together with the customer. [...] And that is really something very concrete, that you can really measure.” ITGDT. The decoupling tendencies mechanism occurred around July/August 2021 and started to work properly in late 2021/early 2022 with the first pilots, finished algorithms, and revenues.

Despite these positive developments, the organization retains its persistence to strong coupling as silo thinking, inertia, and skepticism about digital transformation activities are still present. The DIU as a new entrant in the system is viewed with suspicion, indicating that there is still a long way to go before a culture is created in which the digital and traditional worlds can coexist. Interviewee C2 implied as much: “[I]n general, what strikes me is that the silos are still not broken down between the individual organizational units. The entire collaboration for the development of digital products is actually based on goodwill. And sometimes things go quite well for a certain phase and you get the feeling that, yes, things seem to be falling into place. And then there are just as many backsliding, setbacks, fronts closing again”. This persistence also affects DIU processes and conditions a second disruptive factor for the expansion of the AC dimension loose coupling which is limited process slack. The DIU team never achieved the process liberation it had initially aimed for. In fact, there were noticeable difficulties in departing from standard processes, such as decision making - “[T]hat is one of the reasons why you build a Digital Unit: Faster decision-making process and doing things a little differently. That is where I think we have not arrived yet. It is very, very easy that we get back into our normal decision-making
process. [...] [F]or this reason [the goal] is not yet fulfilled. [...] We are still linked with the old processes at the company.” ITGDT - or hiring new staff - “So if you want [...] to take degrees of freedom for yourself, you have to do that from the very beginning. As soon as you put the first footstep into a standard process or a standard tool, then the grinder catches up with you. That is what happened [to the DIU] in the case of recruiting.” CDIO. Thus, the main organization remains a tightly coupled system with deeply entrenched legitimacy structures and internalized processes, making it difficult for the DIU to properly exploit the degrees of freedom intended. For instance, the new CEO recently decided that the DIU should leverage and accelerate the existing innovation process rather than create its own. Timewise, both disruptive factors have played a role since November 2020, with the former - persistence in strong coupling - declining slightly over time.”

5 Discussion

To ensure that a DIU meets the expectations of the main organization and is accepted by it, the build-up process is a crucial phase that sets the course. The literature does not provide any information on this process while painting a rather static picture of DIUs in general, as they are usually analyzed at a specific point in time in relation to their current status quo (e.g., Barthel et al., Fuchs et al., 2019; 2020; Raabe et al., 2020). Our results show a positive relation between the establishment of a DIU and the expansion of the AC of the overall company, which in turn has a positive influence on the acceptance of the DIU. The three mechanisms we identify - multiplexity enhancement, information redundancy generation and decoupling tendency - are therefore both initiated by the DIU and required by it. A closer look at the mechanisms reveals that one of the great advantages of a DIU is to bring the entire company “closer together”. It increases the number and variety of relations within the main organization, which leads to a higher multiplexity. It also contributes to a stronger exchange between the departments and thus e.g., to information redundancy. Finally, it paves the way to more loosely coupled systems of the main organization. Ultimately, the DIU increases the overall AC of the organization, making it more adaptable to survive in volatile and unpredictable environments, which is important in the course of digital transformation (Hinings et al., 2018; Vial, 2019). At the same time, the DIU must act in a way that is conducive to these mechanisms in order to position itself successfully within the organization. DIUs with a core business related mandate are dependent on input from the main organization. EngineeringCompany’s DIU, for example, needs access to customers, access to the existing IT infrastructure, and interaction with the R&D department to develop and bring to market digital products and services. Consequently, it is keen to create and maintain as many points of exchange with the main organization as possible, and to share essential information about digital innovation projects to ensure smooth collaboration.

Furthermore, the five disruptive factors we identified are detrimental to both the development and expansion of AC as well as to the establishment of the DIU and its work. With respect to multiplexity, our results show the importance of active management support - at all levels – to ensure an appropriate reward system and information flow, as well as the imposition of sanctions when the new structure - in this case the DIU - is counteracted. Similarly, with respect to redundancy, blind actionism and the pursuit of self-interest by dominant actors are detrimental to both AC development and the DIU. Finally, the inertial forces of the main organization and its tendency to be a strongly coupled system have a negative impact on the expansion of the AC and on the building of the DIU and its work. In their consideration of the relationships between AC and the structural dimensions of structuration theory, Staber and Sydow (2002) point out that there are likely other properties of AC besides multiplexity, redundancy and loose coupling. They cite the factor “trust”, which is regularly mentioned as an important “lubricant” in the course of organizational change and innovation (Sabel, 1993; Das and Teng, 1998; Sydow, 1998). However, how and whether trust and other factors are related to AC has not yet been investigated (Staber and Sydow, 2002). Our current data do not yet allow us to make a final judgment on whether trust should be designated as a fourth structural property of AC. What we can see, however, is that it plays an important role in the process of building a DIU and makes a positive contribution to the three mechanisms described above. For example, EngineeringCompany made a
conscious decision to integrate esteemed individuals from the main organization, who enjoy the trust of the workforce, into the team for building the DIU. Some of the trust placed in these employees can thus be transferred to the DIU and its projects. This not only has a positive effect on its acceptance, but also helps, for example, to increase the number and diversity of relationships within the organization, which benefits the multiplexity enhancement mechanism. Another DIU measure to gain trust is the creation of a “Digital Ambassador” position - the face of the DIU internally and externally. This dedicated contact person is intended to lower the inhibition threshold to contact the DIU and to take away the feeling of external partners getting directly into a sales situation to enable an open discussion. The Digital Ambassador positively contributes to all three structural properties of AC, as new relations are forged internally and externally, information is shared, and silo-thinking is somewhat weakened.

5.1 Implications for Research

Our research responds to the call for a better understanding of new forms of organization design and their practices in three ways. (Yoo et al. 2012; Zammuto et al. 2007; Hanelt et al. 2020). First, the existing literature discusses adaptive organizational design as a solution to the challenges that digital transformation poses to organizations (Hanelt et al. 2020). Building on the work of Staber and Sydow (2002) and Giddens (1984), we provide empirical insights into the building process of a DIU - one initiative of incumbent companies’ digital transformation efforts - with a particular focus on how AC emerges along the way. In addition, we show the influence of the structural dimensions of signification, domination and legitimation on both AC and the DIU. Our longitudinal case study addresses the request of other DIU researchers (Barthel et al., 2020) and lays the foundation for a dynamic understanding of DIUs rather than the image of a static entity. It also provides information for theorizing about the construction of new organizational forms in the course of digital transformation in incumbent firms.

Second, we identify three mechanisms that unfold during the two-year setup process of EngineeringCompany’s DIU and contribute to the expansion of the organization’s AC. At the same time, it is advisable and important for the DIU team to initiate and work towards these mechanisms, as they are equally relevant for the successful positioning and acceptance of the DIU in the workforce. Future research may expand this knowledge to include possible additional mechanisms involved in the implementation of a DIU in general, as well as with respect to the expansion of ACs. In addition to the three mechanisms, we discovered five disturbing factors with a negative impact on the expansion of EngineeringCompany’s AC, which are also counterproductive to the process of building and operating the DIU. Following Staber and Sydow (2002), we provide empirical evidence for the relationship between AC and structuration theory. Their examples of the negative influence of the signification, domination or legitimation dimension of structure on a firm’s AC could be identified in our data. Future research can build on this and identify other disturbing factors and provide quantitative evidence for our results.

Third, we uncover preliminary evidence on the role of trust in a firm’s AC, supporting Staber and Sydow (2002). While our data do not currently allow us to identify trust as a structural property of AC, we see a connection to the other three properties and recognize its importance for DIU adoption. We present two concrete actions taken by EngineeringCompany’s DIU to gain the trust of the main organization, which simultaneously provide for greater DIU acceptance, multiplexity and redundancy. Further research is needed to conclusively clarify the role of trust.

5.2 Implications for Practice

Companies that are currently implementing a DIU or are planning to do so, can use our findings as a framework to ensure that the three mechanisms that we discovered can unfold their full potential and that the disturbing factors are eliminated as much as possible. As mentioned above, one of the major benefits of a DIU is to increase cross-departmental collaboration and take advantage of interdisciplinary teams, shared information, and other synergies. Managers should focus on expanding the DIU’s intra- and inter-organizational network to create multiplex relations and to provide the basis for a shared organizational mindset where information is disseminated throughout the system and can be accessed.
from different perspectives. The reward system must be designed so that departments working with the DIU cannot achieve their goals without also empowering the DIU. In addition, the DIU needs to be actively supported and, for example, individuals who disregard their roles and tasks in innovation projects need to be sanctioned accordingly.

To take advantage of the information redundancy generation mechanism, DIU managers should involve employees from other departments in digital innovation projects at an early stage. In this way, diverse perspectives flow into product development, and the main organization becomes better acquainted with the goals, tasks, and working methods of the DIU. It is important that the euphoria in the wake of digital transformation does not turn into blind actionism, with individuals or departments launching their own projects - in parallel to those of the DIU - to make their mark.

Finally, a DIU can help the organization evolve into a less tightly coupled system, increasing its adaptability to survive in a highly uncertain environment. Concrete results can help ensure that the DIU’s competencies are recognized and lead to greater acceptance and awareness of the potential of digital transformation. Silo thinking, inertia, and skepticism cannot be eliminated, but they can be mitigated.

Managers can consciously control the degrees of freedom with which the DIU is endowed and whether they are implemented.

6 Conclusion

The intention of this paper was to understand how the process of successfully building a DIU unfolds to advance the digital transformation of an incumbent company. Relying on empirical data from a longitudinal single-case study, we show that the establishment of a DIU sets in motion three mechanisms that positively influence AC. At the same time, the actions that make up these mechanisms also promote the acceptance of the DIU within the company. In addition, we find five disruptive factors that hinder both the expansion of AC and the successful positioning of the DIU. We provide empirical evidence for the elaboration of the relationship between AC and the structuration theory of Staber and Sydow (2002). In our discussion, we present preliminary evidence for the relationship between trust and the three structural properties of AC. With respect to the DIU literature, we contribute to a better and more dynamic understanding of these entities.

By its nature, our research is not without limitations. First, our results are closely tied to the context of a product-driven manufacturing company, which has clear constraints on our findings. We expect the results to be generalizable to other manufacturing companies, and most likely to other industries as well. Outside of manufacturing, some mechanisms or disruptive factors may be stronger or weaker. However, further research with companies in other industries is needed to confirm this assumption. Second, our data collection was affected by a global pandemic, resulting in all interviews and observations being conducted in an online environment. Although this facilitated access to the sessions, the lack of face-to-face interaction may undermine our theoretical claims. In addition, all interviews were conducted by the first author of the article, which may have biased the results through personal feelings and understanding. Third, while access to the rare long-term data of a DIU implementation process justifies a longitudinal single-case study, further research is needed to confirm the generalizability of our results. We encourage researcher to conduct additional qualitative and quantitative studies to gain further insight into the process of building a DIU in the course of digital transformation of incumbent companies. In addition, the building of AC and its relationship to trust should also be explored in more detail.

References


