

September 2023

How to Successfully Navigate Crisis-Driven Digital Transformations

Ralf Plattfaut

Vincent Borghoff

Follow this and additional works at: <https://aisel.aisnet.org/misqe>

Recommended Citation

Plattfaut, Ralf and Borghoff, Vincent (2023) "How to Successfully Navigate Crisis-Driven Digital Transformations," *MIS Quarterly Executive*: Vol. 22: Iss. 3, Article 4.
Available at: <https://aisel.aisnet.org/misqe/vol22/iss3/4>

This material is brought to you by the AIS Journals at AIS Electronic Library (AISeL). It has been accepted for inclusion in MIS Quarterly Executive by an authorized administrator of AIS Electronic Library (AISeL). For more information, please contact elibrary@aisnet.org.

How to Successfully Navigate Crisis-Driven Digital Transformations

The turmoil of the COVID-19 pandemic caused organizations to transform their operations on a massive scale, with many responding by increasing the use of digital technologies and digitally transforming themselves. However, these crisis-driven digital transformations happened under new and unknown conditions. In this article, we identify crisis-related challenges to established digital transformation “logics” and describe how small and medium-sized organizations in Germany (the “German Mittelstand”) responded to these challenges. Based on their experiences, we provide recommendations for successfully navigating crisis-driven digital transformations.^{1,2}

Ralf Plattfaut

University of Duisburg-Essen
(Germany)

Vincent Borghoff

South Westphalia University of Applied
Sciences (Germany)

Digital Transformations During a Crisis Are Fundamentally Different

Digital transformations taking place due to and in the course of a crisis differ fundamentally from those occurring in normal circumstances. Though there is a wealth of literature studying digital transformations,³ insights into the differences between well-understood and crises-driven digital transformations are scarce. The main differences with crisis-driven digital transformations are the triggers for the transformation journey, the decision-making approaches needed, and less resistance to changes among the workforce and value network partners.⁴

By way of illustration, the recent COVID-19 crisis had an enormous impact on organizations, making their existing value propositions obsolete and their established value-creation



1 Hope Koch is the accepting senior editor for this article.

2 We would like to thank all the Mittelstand companies that supported our research and especially the fruitful collaboration and constructive discussions with the three case organizations presented in this article. We would also like to thank the participants of the MIS Quarterly Executive Special Issue Virtual Workshop on Crisis-Driven Digital Transformation and especially the feedback from the editorial team, which helped us focus and improve this article. We also thank Catherine Niestroj and David Seabrook for their support in language editing and structuring the manuscript.

3 See, for example: 1) Vial, G. “Understanding Digital Transformation: A Review and a Research Agenda,” *The Journal of Strategic Information Systems* (28:2), February 2019, pp. 118-144; and 2) Wessel, L. Baiyere, A., Ologeanu-Taddei, R., Cha, J. and Jensen, T. B. “Unpacking the Difference Between Digital Transformation and IT-Enabled Organizational Transformation,” *Journal of the Association for Information Systems* (22:1), March 2020, pp. 102-129.

4 For a highly recommended literature review on the topic of types of crises and their impact on organizations, see Doern, R., Williams, N. and Vorley, T. “Special Issue on Entrepreneurship and Crises: Business as Usual? An Introduction and Review of the Literature,” *Entrepreneurship & Regional Development* (31:5-6), 2019, pp. 400-412.

processes no longer viable.⁵ In this type of crisis situation, organizations commonly react by adapting their value-creation processes to the new circumstances, often using digital technologies.⁶

In this article, we describe how small and medium-sized organizations in Germany—known collectively as the German Mittelstand—addressed the challenges of digital transformations during the COVID-19 pandemic. First, however, we provide an overview of the German Mittelstand and describe the “logics”⁷ of the conventional digital transformation process used in normal times.

Understanding the German Mittelstand

Mittelstand (composed of the words “mittel” for middle and “stand” for class) commonly refers to a group of stable mostly small- and medium-size (SME) business enterprises in Germany, Austria and Switzerland that have proved successful in enduring economic change and turbulence. The term is difficult to translate and may cause confusion to non-Germans. However, belonging to the Mittelstand is not only a matter of organizational size (as in the traditional SME definition); Mittelstand companies also have shared culture, values and beliefs.

Traditionally, Mittelstand companies are family owned, regionally anchored and often part of an industrial/economic cluster comprising multiple Mittelstand firms. They often concentrate on niche products, where they might be world market leaders (so-called hidden champions).⁸ The Mittelstand is, to a large extent, the backbone

of the German economy, contributing 36% of the total GDP.⁹

In comparison to larger organizations, Mittelstand firms struggle more with digital transformation,¹⁰ largely due to the specific characteristics of the Mittelstand—especially a strong sense of tradition and a corporate culture that values the company’s existing business models and products. While these characteristics enable Mittelstand firms to be successful in terms of incremental innovations like the optimization of existing products or processes, they also hinder more radical changes.¹¹ Like other SMEs, they have limited capacities and resources, which makes it particularly difficult for them to undertake large-scale efforts, such as digital transformation.

But what sets Mittelstand companies apart from other SMEs is their ownership structure and a very special corporate culture. They have very often been owner-managed or family-run for several generations and are strongly oriented toward this type of management where decision-making power is concentrated.¹² A Mittelstand firm is often regarded as a family legacy that must be preserved and safeguarded in the long term.¹³ This creates a culture of long-term orientation and rather conservative management, which is reflected, among other things, in a tendency toward self-financing and general risk avoidance. As a result of this long-standing cultural imprint and the preservation of values, as well as the previous experience of success and consistency precisely through this culture, Mittelstand

5 See, for example, Röglinger, M., Plattfaut, R., Borghoff, V., Becker, J. et al. “Exogenous Shocks and Business Process Management,” *Business & Information Systems Engineering* (64:5), February 2022, pp. 669-687.

6 Amankwah-Amoah, J., Khan, Z. and Wood, G. “COVID-19 and Business Failures: The Paradoxes of Experience, Scale, and Scope for Theory and Practice,” *European Management Journal* (39:2), September 2020, pp. 179-184.

7 In this article, the term “logics of digital transformation” is used to describe the dominant way of thinking about digital transformation in terms of assumptions, practices and values. As such, logics encompass practices but also include assumptions and values that describe how concepts interact with one another.

8 Heider, A., Gerken, M., van Dinther, N. and Hülbeck, M. “Business Model Innovation through Dynamic Capabilities in Small and Medium Enterprises—Evidence from the German Mittelstand,” *Journal of Business Research* (130), June 2021, pp. 635-645.

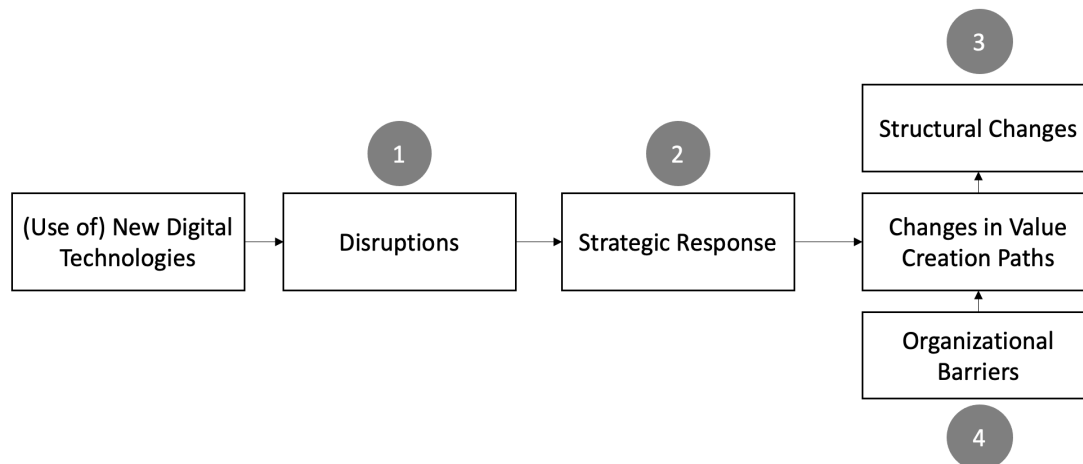
9 Overview—Mittelstand, Insitute for Research on the Mittelstand (Institut für Mittelstandsforschung), 2019, available at <https://www.ifm-bonn.org/en/statistics/overview-mittelstand/key-indicators-based-on-sme-definition-by-ifm-bonn/germany>.

10 Plattfaut, R., Litvinova, Y., Wang, H. and Kautz, K. “Paper-a-Thon Paper: Digital Transformation through the Appropriation of IIoT and AI—A Case Study of an Established Family-Owned Enterprise,” *ICIS 2022 Proceedings*, December 2022, available at https://aisel.aisnet.org/icis2022/ai_business/ai_business/18.

11 Nieto, M. J., Santamaria, L. and Fernandez, Z. “Understanding the Innovation Behavior of Family Firms,” *Journal of Small Business Management* (53:2), 2015, pp. 382-399.

12 Soluk, J. and Kammerlander, N. “Digital Transformation in Family-Owned Mittelstand Firms: A Dynamic Capabilities Perspective,” *European Journal of Information Systems* (30:4), November 2020, pp. 676-711.

13 König, A., Kammerlander, N. and Enders, A. “The Family Innovator’s Dilemma: How Family Influence Affects the Adoption of Discontinuous Technologies by Incumbent Firms,” *Academy of Management Review* (38:3), July 2013, pp. 418-441.

Figure 1: Conventional Digital Transformation Process¹⁷

firms are also strongly characterized by rigidity regarding their core value propositions.^{14,15}

Overall, the inherent characteristics of Mittelstand organizations limit their ability to transform themselves digitally.

Conventional Digital Transformation Logics

The aim of digital transformation is to improve an organization by triggering significant changes to the way it operates through the combination of information, computing, communication and connectivity technologies.¹⁶ In normal times, a successful digital transformation involves organizations typically applying practices following a set of logics (Nos. 1 to 4 in Figure 1). These four logics depict the relationships between the steps of the conventional digital transformation process shown in the figure.

Logic 1: The spread and changed use of (new) digital technologies trigger disruptions in society

14 Kraus, S., Moog, P., Schlepphorst, S. and Raich, M. "Crisis and Turnaround Management in SMEs: A Qualitative-Empirical Investigation of 30 Companies," *International Journal of Entrepreneurial Venturing* (5:4), January 2013, pp. 406-430.

15 Mittelstand companies have several other special characteristics. Here, we mention only those with relevance for digital transformation. Further information on these characteristics can be found, for example, in Pahnke, A. and Welter, F. "The German Mittelstand: Antithesis to Silicon Valley Entrepreneurship?" *Small Business Economics* (52:2), February 2019, pp. 345-358.

16 Vial, G., op. cit., February 2019.

17 Adapted and simplified from ibid.

and thus also in the environment of companies. Companies therefore keep a close eye on recognizing technological developments and their potential to trigger such disruptions.

Logic 2: Once organizations recognize these disruptions, they see them as an opportunity to launch their digital transformations, and they develop long-term strategies about the direction of their digital transformation journeys based on in-depth and comprehensive planning.¹⁸

Logic 3: The strategic response leads to drastic changes in the value-creation paths of the company, and to corresponding organizational structure changes. These changes include tighter integration of IT and business units. This integration can be accomplished by multiple measures, such as introducing cross-functional teams, appointing a chief digital officer (CDO) and upskilling employees.¹⁹

Logic 4: The implementation of these changes can be hampered by the organizational barriers of resistance and inertia. Employees may actively resist the implementation of radical changes because they are unclear about the expected benefits of digital transformation. Organizational inertia creates "path dependency"

18 Matt, C., Hess, T. and Benlian, A. "Digital Transformation Strategies," *Business & Information Systems Engineering* (57:5), September 2015, pp. 339-343.

19 For more on the role of CDOs see, Tumbas, S., Berente, N. and Vom Brocke, J. "Digital Innovation and Institutional Entrepreneurship: Chief Digital Officer Perspectives of their Emerging Role," *Journal of Information Technology* (33:1), May 2018, pp. 188-202.

Table 1: Summary of the Case Organizations

	Mittelstand Bank	Mittelstand Agency	Mittelstand Industry
Founded	1824	2008	1912
Sector	Regional Bank	Regional Development	Manufacturing

by discouraging variation from established technologies and practices, caused by entrenched routines and capabilities.

Digital Transformation in the German Mittelstand

Before the COVID-19 crisis, Mittelstand companies had made limited progress in digital transformation,²⁰ mainly due to their unique characteristics. However, these characteristics and their limited progress prior to the crisis make Mittelstand companies an ideal subject for studying crisis-driven digital transformations from the start of the journey and observing how these companies addressed the emerging challenges and adapted their value-creation processes.

Below, we describe how three typical Mittelstand organizations approached digital transformation during the COVID-19 crisis and use the measures they took as an example of the extent to which crisis-driven digital transformations differ from transformations in more normal times. We believe that the experiences of these three organizations are representative of the entire German Mittelstand and form a sound basis for the recommended actions for successful crisis-driven digital transformation we present in this article.

Our findings and recommendations will provide Mittelstand companies (and other SMEs) with a better understanding of crisis-driven digital transformation and how the challenges are resolved. Not only will this enable them to benefit directly and immensely from mastering digital transformation, but it will also prepare them to respond to the next crisis, helping to ensure their survival. The findings and recommendations are also highly relevant to society in general.

Moreover, other (larger) companies, especially those following a long-term-oriented paradigm, can also evaluate whether our insights are relevant for them and whether adopting the recommendations is sensible.

Overview of the Three Case Organizations

The three case organizations were selected from our wider dataset (see Appendix) and are referred to anonymously as Mittelstand Bank, Mittelstand Agency and Mittelstand Industry. Table 1 summarizes the characteristics of these three organizations.

Each of these firms was pursuing digital transformation only to a limited extent before the crisis, if at all. We show how the crisis put them on a path toward digital transformation and identify the challenges they faced and how they overcame them. Our analysis of their experiences takes account of both the specific characteristics of the Mittelstand and the changed environmental conditions resulting from the crisis. These three cases illustrate how a crisis can be used as an opportunity to start a digital transformation journey.

Mittelstand Bank

Mittelstand Bank, the result of several mergers, is a regional savings bank integrated into a nationwide association of over 400 institutions. Its earliest predecessor was founded almost 200 years ago. Today, it has over 300 employees and total assets of about three billion euros. The bank has a clear regional focus and traditionally concentrates on private customers as well as regional Mittelstand companies. Strategically, Mittelstand Bank aims at quality leadership within the market.

Before the crisis, Mittelstand Bank had been adopting new digital technologies provided by the nationwide association but had not initiated its own digital transformation program. One

20 Prögl, R. and Spitzley, D. I. "Responding to Digital Transformation by External Corporate Venturing: An Enterprising Family Identity and Communication Patterns Perspective," *Journal of Management Studies* (58:1), April 2020, pp. 135-164.

reason for this is the bank's strong reliance on personal contact in presales and customer service. Business customers who need information on corporate finance-related issues can get only minimal information online. Instead, they are required to meet their key account manager in person for consultations regarding any financing and investment needs. In addition, all activities relating to contractual agreements take place exclusively on-site.

Mittelstand Agency

Mittelstand Agency is tasked with promoting regional economic development. It works mainly on a project basis, has just under 30 employees and is partly publicly funded. Contacts with key stakeholders are mainly concentrated in the hands of the two managing directors, with employees having a degree of autonomy within the agency's projects.

Before the COVID-19 crisis, Mittelstand Agency had not launched a digital transformation initiative. Although it had introduced videoconferencing technology to reduce travel costs, this technology was only rarely used. Moreover, Mittelstand Agency's core services (promoting the region, ensuring economic development and marketing for tourism) were not supported by digital technologies. Though project-specific websites were set up, the agency's employees mainly met with decision makers and politicians in person to promote the region.

Mittelstand Industry

Mittelstand Industry is a manufacturing business that focuses on developing and building automation solutions. Most of the 1,500 employees are based in Germany with a few employed in overseas sales organizations. It has annual revenues of about 300 million euros mainly in the business-to-business (B2B) area (for example, sales of its building automation products to professional electricians or construction companies).

Before the COVID-19 crisis, Mittelstand Industry had begun to digitally transform its core products. It is a founding member of an association that defines standards for building automation products and corresponding Internet of Things (IoT) protocols. However, Mittelstand

Industry was lagging behind the general market in terms of providing technology-based services for its products. For example, customer training took place in person on-site. Questions from customers about product malfunctions were answered by a hotline and on-site technicians without any major support from digital tools. The firm relied completely on written manuals and traditional distribution channels through service partners.

How Mittelstand Companies Responded to the Impact of the Crisis on Their Value-Creation Processes

According to a study by the German national development bank, 66% of German Mittelstand companies experienced a drop in revenue in 2020 due to the COVID-19 crisis, with around a quarter also reporting lower equity ratios. This represented a double whammy for Mittelstand companies: because of their tendency to self-finance, lower revenues meant that they had reduced financial resources for investment and digital transformation, and their lower equity ratio made it more difficult for them to access external funds.²¹ As a consequence, the crisis directly challenged the value-creation processes of the German Mittelstand to various degrees.

Response of Mittelstand Bank

Mittelstand Bank was no longer able to maintain its in-person servicing of business customers. The contact restrictions and curfews at the beginning of the pandemic significantly limited the possibilities for direct on-site consulting. As one corporate client consultant retrospectively reported:

"Perhaps the most serious change in direct customer contact was that we no longer approached personal consultations openly. This means that, while adhering to strict measures, we only held personal meetings

21 For more information on the impact of the COVID-19 crisis on the German Mittelstand, see Schwartz, M. and Gerstenberger, J. *KfW SME Panel 2021: SMEs Have Shown Adaptability in the Coronavirus Crisis but Cracks Are Appearing in the Foundations of Small Businesses*, KfW, available at [https://www.kfw.de/PDF/Download-Center/Konzernthemen/Research/PDF-Dokumente-KfW-Mittelstandspanel/PDF-Dateien-Mittelstandspanel-\(EN\)/KfW-SME-Panel-2021.pdf](https://www.kfw.de/PDF/Download-Center/Konzernthemen/Research/PDF-Dokumente-KfW-Mittelstandspanel/PDF-Dateien-Mittelstandspanel-(EN)/KfW-SME-Panel-2021.pdf).

in real emergency situations. This means that the basis of our existence was no longer there."

As a consequence, the onboarding of new customers and the sales of new services to existing customers became almost impossible, thus endangering the bank's future profits. To mitigate this danger, Mittelstand Bank promoted the use of self-service in the form of web- or app-based offerings and, more importantly from a transformation perspective, provided customer consultation over videoconferencing and collaboration solutions. As one corporate client consultant explained:

"We have two new cornerstones. On the one hand, the build-up of personal consulting via digital communication channels and, on the other hand, online self-service, which has also been improved—both in terms of user experience and the range of services offered."

Thus, through digital transformation, Mittelstand Bank was able to mitigate the potential decline in future profits and sustain operations throughout the COVID-19 crisis.

Response of Mittelstand Agency

Mittelstand Agency needed to adapt its core services, which mainly consist of promoting the region and its companies as an economic area. To achieve these aims, the agency develops and runs events, launches marketing campaigns for its customers and coordinates public funding campaigns to promote regional economic development. The agency is funded by the regional companies (its customers), which are, for the most part, also Mittelstand organizations. As a manager highlighted, when asked about why Mittelstand Agency felt pressured to start its digital transformation journey during the COVID-19 crisis:

"We are financed through our shareholders, and our shareholders are the five district municipalities [and] an association of companies with about 350 members, [which make] an annual contribution to the regional marketing department. They co-finance our activities. So, if we are successful,

we can firstly ... avoid [companies] from leaving the association [and thus retain] our funding base. [Secondly] ... we can get more companies to join the association. This is why we had to reinvent ourselves during the COVID-19 crisis."

To ensure it continued its political relevance during the crisis and preserved its finances by mitigating the potential withdrawal of funding partners, Mittelstand Agency adopted new forms of communication (e.g., online magazines or video formats) and set up a web shop to deliver marketing material to its clients. As a manager explained:

"We developed an online magazine, focusing on regional development concerning the crisis situation. We also shifted focus when talking about merchandise sales channels. We have set up an online store for merchandise with a local touch. We also digitally transformed the respective logistics solution."

Without this web shop and the new forms of communication, the added value of Mittelstand Agency in promoting the region could have become less clear. This would have potentially threatened the agency's existence because financiers and partners might have terminated their cooperation.

Response of Mittelstand Industry

The COVID-19 crisis affected Mittelstand Industry's ability both to train business customers (i.e., electricians and construction companies) on installing and using its products, which threatened to hamper sales in the medium term, and to provide additional product-related services. This Mittelstand firm relies heavily on business customers as a sales channel for its products. The lack of electricians and construction companies trained on their products makes it much less likely that those customers will sell them. However, Mittelstand Industry also relies on sales representatives directly approaching and interacting face-to-face with potential customers. The ability to do this was severely limited by the pandemic-induced legal restrictions. In response to these restrictions, the firm migrated its aftersales team to digital

channels and set up an e-learning academy for its professional customers:

"We relied heavily on on-site training because we sell a physical product which needs to be installed physically. We have several dedicated training centers that we operate. This approach was also very much appreciated by our partners. Due to the crisis measures, we were unable to continue this operation, but of course we could not discontinue it either. That's why we focused more on e-learning during the crisis." Product Manager, Mittelstand Industry

To support private customers in using its smart products, Mittelstand Industry produced specific tutorial and how-to videos. It also set up a service orchestration platform where product/service bundles of the firm's technological solutions and business partners' services (e.g., electrical installation) are offered to end customers:

"As a result of and during the crisis, customers are demanding end-to-end solutions, from product to installation via a service provider, and want to order and configure them digitally. We have therefore decided to make this [end-to-end service] possible." Product Manager, Mittelstand Industry

Further Insights from the Responses of the Case Organizations

In addition to the digital transformations of core value-creating processes described above, all three case organizations introduced remote working technologies to cope with COVID-19 curfews and contact restrictions. As reported by a Mittelstand Agency manager, the adoption of this technology happened in a very short time frame:

"We left the office virtually overnight; we could not guarantee social distancing to comply with the law. So, we had to switch to working from home." Project Manager, Mittelstand Agency

The case companies either created the technical and organizational framework for remote working if it did not already exist,

or massively intensified existing efforts. For example, Mittelstand Industry launched a mobile working initiative shortly before the start of the crisis and urgently ramped it up as the pandemic unfolded:

"At the beginning of [2019], we concluded a company agreement with the aim of enabling mobile work in the first place. At that time, we thought about a maximum of one day per week." Head of HR, Mittelstand Industry

The experiences of the three case organizations show that the Mittelstand was heavily affected by the COVID-19 crisis; it potentially endangered both immediate profits and long-term survival. To cope with the crisis, Mittelstand companies responded by digitally transforming their core value-creating and internal processes.

How the Crisis Changed Digital Transformation Logics

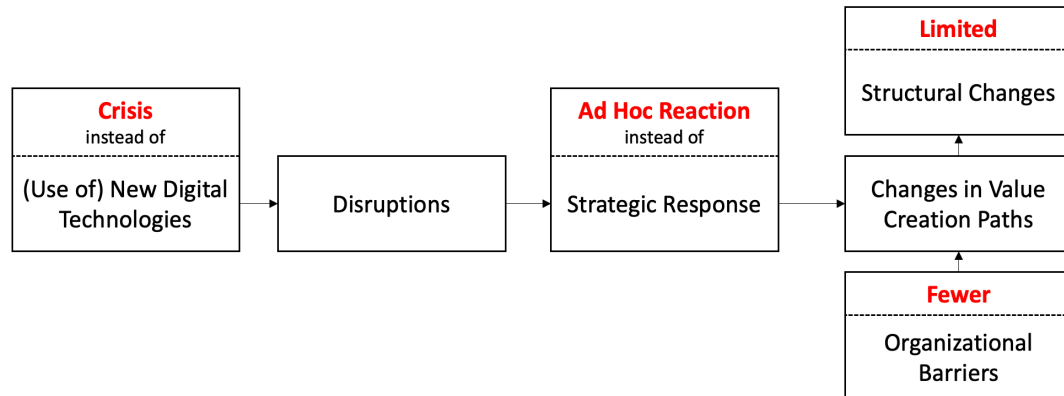
The crisis-driven digital transformations of the three case organizations did not follow the established logics of the digital transformation process outlined in Figure 1 because the onset of the crisis changed the circumstances underpinning them. Thus, the crisis forced these organizations to adopt new practices following the changed digital transformation logics shown in Figure 2.

Below, we explain why and how the crisis made the established logics obsolete and describe the crisis-induced changes to digital transformation logics and how the three Mittelstand case companies adapted their practices to these logics to digitally transform during the crisis. Table 2 summarizes and contrasts the changed crisis logics and steps with the established ones and describes the reactions we observed in the case organizations.

Change to Logic 1: Disruptions Are Caused by Crises, Not Technology

Prior to the crisis, Mittelstand companies followed the established logic of identifying technology disruptions by observing the development of key technologies and analyzing whether the extent of their penetration into their

Figure 2: Crisis-Induced Changes to Digital Transformation Logics



markets and society, in general, justified initiating a digital transformation of their value-creation processes.

For example, Mittelstand Bank recognized that remote consulting through videoconferencing could be a potential key technology to support its presales activities. As reported by a bank employee:

"Video consulting has [been] around for some time. The nationwide association [Mittelstand Bank is part of] has been implementing video consulting for years through various pilot projects. That was already possible. Therefore, there was already some prior knowledge." Corporate Client Consultant, Mittelstand Bank

As a medium-sized business, however, Mittelstand Bank sees itself as being strongly connected to customers on a personal level, and, pre-crisis, this culture applied equally to personal contact in the presales area. Before the crisis, therefore, there was no technology penetration trigger to induce the bank to switch to remote consulting across the board.

The culture of many other Mittelstand companies also causes them to favor on-site contact and not become part of the general trend toward more flexibility regarding work location. A representative from Mittelstand Industry put it like this:

"Regarding the topic of digitalization of work practices: I say no to this. ... I prefer to sit face-to-face, even with a cup of coffee in my hand; I prefer personal contact." Head of HR, Mittelstand Industry

This mindset of Mittelstand companies and the lack of adoption of new digital technologies by their customers (also often from the Mittelstand) explain why Mittelstand Industry continued to rely on on-site aftersales training and had not introduced and used e-learning to a greater extent before the crisis.

Prior to the crisis, Mittelstand companies, in general, observed whether changes in technology use might disrupt their current way of operation or their current value propositions and prepared to respond to such disruptions. In other words, they followed the process depicted in Figure 1.

As the COVID-19 crisis unfolded, however, it became clear that technology was no longer the driver of digital transformation. In effect, the crisis decoupled the connection between technological penetration and disruption because the use of certain digital technologies suddenly became essential. The disruption triggering digital transformation changed from technology-driven to crisis-driven, reversing the chain of action. In crisis-driven digital transformations, it is the disruptions triggered by the crisis that generate changes in the use and dissemination of certain technologies.

Table 2: Crisis-Driven Digital Transformation Logics Vs. Established Logics

Established Logics	Crisis Logics	Observed Practices	Example
Trigger Under normal circumstances, the trigger for digital transformations is the changed use of <i>digital technologies</i> in society at large.	In contrast, in a crisis situation, the crisis itself and the accompanying <i>external shock</i> form the trigger for digital transformations.	As a result, organizations try to understand the impact of the crisis and the potential changes in order to make adjustments as quickly as possible.	Before the crisis, Mittelstand Industry was well aware of the possibilities and proliferation of e-learning, but decided against implementation. With the COVID-19 crisis, e-learning was considered an inevitable reaction.
Decision-Making Digital transformations are long-term endeavors that require solid <i>strategic planning</i> , including the development of digital transformation strategies.	In a crisis situation, organizations do not have time for lengthy strategy development efforts but need to make <i>decisions on the spot</i> to ensure the survival of the organization.	As a result, organizations move to faster top-down decision-making and select achievable and satisfactory solutions, which might be suboptimal. The optimization of solutions once implemented in a bottom-up manner is postponed.	Mittelstand Bank's management reacted quickly to lockdowns and curfews by introducing online consulting via Skype Business and postal contracting. The process was not fully digitized and integrated but allowed operations to continue.
Structural Changes Under normal circumstances, digital transformation is accompanied by <i>structural changes</i> in the organization—e.g., appointing a CDO, forming cross-functional teams or large-scale upskilling of employees.	In crisis situations, the time horizons required for the upskilling of employees or the meaningful integration of new positions are not available because structural changes in organizations are not only long-term but far-reaching.	As a result, organizations structure their top-down decision-making through small steering groups including top management and workforce representatives as <i>structural changes are not possible</i> . In the aftermath of the crisis, some structural changes can be possible again.	Despite its strong owner-led culture and focus on the importance of co-determination/worker participation, during the crisis, Mittelstand Industry did not create a digital transformation unit or CDO position but instead formed a crisis team that was able to drive top-down decisions on digital transformation efforts.
Organizational Barriers Digital transformations need to overcome organizational <i>inertia and resistance</i> .	In a crisis situation, employees are aware of the need to change and <i>organizational inertia</i> can thus be quickly overcome. Nevertheless, <i>resistance can build up over time</i> once the crisis situation ends.	As a result, organizations directly start implementing digital transformation measures. However, they also look out for resistance building up over time and introduce change-management efforts and adaptations to their initial solutions later.	Before the crisis, Mittelstand Agency did not make much use of digital offerings to promote the region. This was strongly rooted in the culture of the stakeholders, which tended to demand direct contact. The crisis enabled the introduction of digital events without resistance from stakeholders.

When the COVID-19 crisis struck, Mittelstand Bank stopped observing and piloting small-scale interorganizational video consulting solutions and, instead, promptly and widely implemented specific technologies and organizational solutions. An employee described the changes as existential:

"Perhaps the most serious [transformative change] in direct customer contact was that we no longer aggressively approached personal consultations. This means that, while adhering to strict measures, we only held face-to-face meetings in real emergency situations. It means that the basis of our existence was no longer there. So, we had to find other ways of exchanging information [i.e., through video consulting solutions]." Corporate Client Consultant, Mittelstand Bank

During the crisis, the disruptions that trigger digital transformations were not generated by the spread of new technologies, but by crisis-induced radical environmental changes in the form of new legal requirements and the associated shifts in social norms.

Change to Logic 2: During Crises, Top-Down Management Replaces Bottom-Up Consensual Strategy Development

Digital transformation can have far-reaching effects beyond the mere introduction of technology. As such, it requires long-term planning and the development of corresponding digital transformation strategies to optimally harness the positive effects of the disruption.

Prior to the crisis, the German Mittelstand, in general, had created long-term digital transformation roadmaps for creating value through digitalized procedures or new digital offerings. But these roadmaps set out small, bottom-up initiated, incremental digital innovation initiatives over the next years—they did not include any measures for acting immediately. This long-term orientation was grounded in the ingrained Mittelstand culture of involving staff at all levels in planning for lengthy time horizons. Moreover, digital transformation is itself a time-consuming journey. The focus was always on the continued existence of the organization while preserving traditions and

established structures, business models and processes. This principle is culturally supported by close identification with the company:

"We are family run. Therefore, the company is also regarded as a heritage and property that should be passed on. Therefore, we do not plan for short-term successes. We are, of course, happy to take them. But the focus is on long-term growth and existence."
Product Manager, Mittelstand Industry

In a crisis-driven digital transformation, however, this principle is compromised by the fact that the environment changes unpredictably and rapidly. The resulting uncertainty makes many existing long-term plans obsolete and the initiation of new comprehensive longer-term strategic plans unviable.²²

When faced with the COVID-19 crisis, Mittelstand companies could not carry out in-depth planning using a consensus-based bottom-up approach and weighing a large number of alternative solutions and their consequences. Instead, they had to react immediately and adopted top-down ad hoc strategies to create solutions. The focus was not on finding the most permanent and optimal solution, with known effects on the organization, but on finding a satisfactory solution quickly.

Mittelstand top managers decided which solutions were initially implemented in the crisis. They were familiar enough with the operational requirements to design the solutions in a satisfactory manner. When pondering about how decisions were discussed and taken, one interviewee said:

"We had the management levels from all areas at the table, especially to make the initial decisions. This is particularly important to us for various reasons. The consistent representation of these decisions is extremely important. There should not be different points of view among the department heads. At least not in terms

22 Crises increase volatility in markets and societies, which may mean the environment has changed to such an extent that the basic assumptions of a longer-term plan no longer apply before it is implemented. For more information, see Fletcher, G. and Griffiths, M. "Digital Transformation during a Lockdown," *International Journal of Information Management* (55:5), July 2020, Article 102185.

of external perception.” Head of HR, Mittelstand Industry

A shortened planning horizon and a “satisficing” approach (i.e., deciding on and pursuing a course of action that will satisfy the minimum requirements necessary to achieve a goal) are vital in a crisis because the much-increased volatility requires many rapid readjustments. Whereas the focus at the beginning of the crisis tended to be on quickly deploying technology solutions that allowed the business to continue to function, over time the focus shifted to optimizing the solutions. As the crisis abated and the environment became less volatile, the Mittelstand case organizations were able to evaluate their technology solutions and make adjustments. The experience and specific knowledge at the operational level were used to adjust the initial solutions and strategies from the bottom up and to readjust the strategies. This rapid adaptation of digital transformation measures is more akin to a trial-and-error approach rather than following a grand digital transformation strategy.

For example, following the crisis Mittelstand Industry began using Microsoft Teams as a collaboration tool, though this represents the culmination of a longer evolution. Initially, in response to the crisis, the IT department implemented the first collaboration solution it found. While this solution allowed the work to be done, it was not entirely satisfactory. Therefore, in the course of the crisis, Mittelstand Industry made a major shift toward Microsoft Teams to further improve collaboration. According to a representative of this firm, this approach provided several advantages:

“[Management mandated] that we initially went for solutions that were available and cost-effective in the short term. We didn’t know how long we would be using them. As a Mittelstand company, this is always a question of resources. After some experience, the departments then asked for other, better and more permanent solutions, which management then approved.” Product Manager, Mittelstand Industry

In summary, the most striking aspect of decision-making in a crisis-driven digital

transformation is clearly the top-down approach. Uncertainty due to high volatility and the unpredictability of the impact of technological, economic, legal and societal developments force organizations to abandon bottom-up innovation approaches during a crisis. As the crisis abates and the environment becomes less turbulent, they can once again use bottom-up processes to adapt and optimize the solutions rapidly put in place in response to the crisis.

Change to Logic 3: During a Crisis, Accompanying Organizational Structure Change Is Deferred

Digital transformation implementations usually go hand in hand with changes in the organizational structure designed to ensure the full potential of the transformation can be achieved. As mentioned earlier, these changes include appointing a CDO, forming more cross-functional teams, creating separate units and deliberately upskilling employees.²³ What all these measures have in common is that they leverage the benefits associated with new technologies by networking certain skills and functions within an organization and help to institutionalize practices according to the changed logics of digital transformation during a crisis situation. Usually, this includes networking between the business and IT units and also upskilling employees in areas outside the respective specialist areas.²⁴

However, we observed that none of the three Mittelstand case organizations had made any significant organizational structure changes in the course of their crisis-driven digital transformations. All of the above measures require significant lead times or are based on longer-term strategic planning. Moreover, their already limited resources were tied up with acute crisis management. It was therefore just about impossible for them to carry out restructurings during the crisis. As a consequence, we could

23 See, for example, Sebastian, I., Ross, J., Beath, C., Mocker, M., Moloney, K. G. and Fonstad, N. O. “How Big Old Companies Navigate Digital Transformation,” *MIS Quarterly Executive* (16:3), September 2017, pp. 197-213.

24 See: 1) Dremel, C., Herterich, M., Wulf J., Waizmann, J.-C. and Brenner, W. “How AUDI AG Established Big Data Analytics in Its Digital Transformation,” *MIS Quarterly Executive* (16:2), June 2017, pp. 81-100; and 2) Colbert, A., Yee, N. and Gerard, G. “The Digital Workforce and the Workplace of the Future,” *The Academy of Management Journal* (59:3), June 2016, pp. 731-739.

Table 3: Normal Vs. Crisis-Driven Digital Transformation Structural Change Practices

	Normal Digital Transformations	Crisis Driven Digital Transformation
Transformation Focus	Digital transformation is a long-term project without a clear end.	Digital transformation is an ad hoc reaction to extremely volatile environments.
Practices	Digital transformation goes hand in hand with change in the organizational structure through long-term projects such as: <ul style="list-style-type: none"> • Forming cross-functional teams • Creating a separate digital unit • Appointing a CDO • Upskilling employees 	Ad hoc top-down decision-making processes fostered through: <ul style="list-style-type: none"> • Steering groups • Institutionalization of digital units as the crisis abates

not identify any of the restructuring measures described above in the organizations we studied, but we did observe other practices that are more aligned with the crisis constraints (see Table 3).

Instead of carrying out organizational and structural changes, the Mittelstand companies set up small steering groups to manage crisis efforts and the digital transformation more holistically. As highlighted by one interviewee:

“We have a ‘Corona’ coordination team. We formed a team with executive management, HR management and the works council. At the beginning, the team met every day to discuss the current situation and the measures we needed to take. ... We thought about a lot of things on our own. We created a framework plan and implemented the measures quickly.” Head of HR, Mittelstand Industry

The steering groups in the case organizations differed slightly in their composition, but most included top-level managers. While Mittelstand Industry included a representative from the lower works council level, Mittelstand Bank focused initially just on the board level.

In all cases, however, the steering groups formalized in-crisis top-down decision-making, accelerated responses to crisis-induced disruptions and enabled the satisficing approach because they facilitated quick decision-making.

The steering group approach was successful in introducing digital innovations but created issues within the organizations. Employees felt excluded and partly disregarded in decision-making and overburdened with the optimization

of the solutions. In response, as the crisis abated and environmental volatility and uncertainty decreased, Mittelstand Bank also appointed digitalization managers, located in a virtual digitalization department. Their purpose was to incrementally improve, optimize and consolidate the radical transformation approaches implemented at the start of the crisis as the bank reverted back to long-term bottom-up initiatives.

Though the literature argues that the implementation of digital transformation measures should be accompanied by changes in the organizational structure, the experiences of our three Mittelstand case organizations indicate that this does not hold true for crisis-driven digital transformation.²⁵ There is an evident tension between the digital transformation logics in normal times and the time constraints imposed by a crisis.

Change to Logic 4: Organizational Barriers Lose Significance During a Crisis, but Only in the Short Term

Organizations implementing digital transformation typically need to overcome barriers of inertia and resistance. To achieve this, they use change-management efforts to support employees in changing their behavior in line with the goals of the digital transformation strategy. Though inertia is, by definition, a mainly intraorganizational phenomenon, resistance can originate in every internal or external stakeholder of the corresponding changes. Table

²⁵ See, for example, Legner, C., Eymann, T., Hess, T. et al. “Digitalization: Opportunity and Challenge for the Business and Information Systems Engineering Community,” *Business & Information Systems Engineering* (59:4), July 2017, pp. 301-308.

Table 4: Inertia and Resistance in the Course of a Crisis

Barrier	Pre-Crisis	During Crisis	Post-Crisis
Inertia	Inertia caused by: <ul style="list-style-type: none"> • Rigidity • Path dependency 	No inertia due to: <ul style="list-style-type: none"> • Pressing urgency • Ignoring rigid and entrenched structures 	Inertia can reappear when: <ul style="list-style-type: none"> • The crisis achievements (solutions and structures) are rolled back • The new solutions and structures are not further developed
Resistance	Resistance caused by: <ul style="list-style-type: none"> • Innovation fatigue • Lack of visible benefits of digitalization 	Initially, no resistance because employees see the urgent need to act As volatility and urgency decrease during the evolving crisis, resistance slowly grows due to: <ul style="list-style-type: none"> • Oversaturation • Culture • Insufficient change-management efforts 	Resistance level depends on: <ul style="list-style-type: none"> • Change-management efforts • Solution revision efforts

4 summarizes how the barriers of inertia and resistance changed before, during and after the crisis.

Inertia Barrier

Typically, organizational inertia arises from the rigidity of core processes and the resulting path dependencies. This rigidity manifests as inflexible organizational routines, culture and individual mindsets, which are institutionalized over time and form a barrier to any type of change.

However, we did not observe inertia being a barrier in the crisis-driven digital transformations at the three Mittelstand case organizations. The onset of the crisis resulted in a pressing urgency to act, meaning that most of the workforce knew that action and change were now obligatory. Entrenched routines and established structures were bypassed by the strong urgency of the needed organizational responses to the crisis and the associated changes. This not only applied to internal processes and structure but also to rigidities arising from the close integration in value networks. The societal and organizational turmoil caused by the COVID-19

crisis even opened up the possibility of making more extensive changes in processes and routines that would have been unthinkable in normal times. As explained by a Mittelstand Industry representative:

“I would definitely agree with that [greater commitment to management decisions]. Many employees themselves say they would behave differently under normal circumstances. [Our] Corona [team] changes behavior dramatically; we experience fundamentally different reactions.” Head of HR, Mittelstand Industry

After the crisis, however, inertia reappeared either because innovations introduced during the crisis were withdrawn in favor of the status quo prior to the crisis or because the innovations introduced were regarded as a fixed new status quo. As a result, the innovations can become ingrained as new rigidities and thus result in inertia when changes become necessary again.

Resistance Barrier

Resistance to digital transformations can often stem from innovation fatigue or a lack of visible

benefits of digitalization initiatives. However, these factors do not apply in a crisis. The benefits of transformation efforts are obvious, as they guarantee the continued operations of the organization, and the urgent need to act removes innovation fatigue. For example, when Mittelstand Industry was forced to cancel on-site training and switch to remote training using its e-learning platform, the reactions of the service partners concerned were surprisingly positive, despite being Mittelstand organizations themselves and normally strongly insisting on on-site training.

During the later stages of the crisis, as the initial shock was overcome and the environmental volatility and the respective urgency decreased, resistance slowly grew again. For example, even though Mittelstand Industry had developed e-learning strategies and capabilities and the content of the e-learning platform had matured, service partners gradually reduced their use of the platform:

“At first, of course, our service partners used [the e-learning platform] as soon as it was online. But we have also noticed that it is becoming less frequent. They started to request ... on-site training again.” Product Manager, Mittelstand Industry

After the crisis, we observed that resistance in all three case organizations reappeared. There were three main sources for the renewed resistance. First, is what we term “digital oversaturation,” arising from the fact that large parts of the economy and society may have digitized during the crisis, leading to an overload of digital products and services. Second, culture-based resistance may have reemerged as the crisis abated, especially in organizations that did not use the crisis as a catalyst for their own digital transformations. Such organizations may have wished to revert back to the products and processes of the pre-crisis status quo. Third, the level of post-crisis resistance strongly depends on the success of change-management efforts. Post-crisis, since the immediate survival of the organization is no longer the driving force for digital transformation, management needs to actively manage change to reduce resistance to transformation.

In summary, the organizational barrier of inertia does not apply in a crisis-driven

digital transformation because it is overcome by the urgency to act to ensure the survival of the organization; however, it can reemerge post-crisis. Organizations also face increasing resistance over time to crisis-driven changes. As urgency fades, employees focus more on the effort needed to work with new digital processes and technologies. In the same vein, customers might also build up resistance to new methods of service delivery implemented during the crisis.

Recommended Actions for Successful Crisis-Driven Digital Transformation

Our findings from the crisis-driven digital transformations at the three Mittelstand case organizations highlight the importance of reevaluating existing digital transformation practices. Though our findings were based on the COVID-19 crisis, the Mittelstand has faced, and is facing, other crises, including the 2010 eruptions of the Eyjafjallajökull volcano, Brexit (2016-2020), the U.S.-China trade war (2018-2020) and the current Russian-Ukrainian crisis. As the world becomes increasingly volatile, uncertain, complex and ambiguous, such crises will likely become more frequent.

Our research shows that crisis-driven digital transformation follows different logics and requires different practices from those used in more normal times and that tensions arise that require resolution. Specifically, the trigger for crisis-driven digital transformation is a different kind of disruption, making consensual bottom-up decision-making infeasible. The crisis-induced urgency means there is no time to make structural organizational changes. Moreover, even though a crisis initially eliminates resistance to digital transformation, it can reemerge as the crisis abates. Based on these observations, we provide four recommended actions for successful crisis-driven digital transformation. These recommendations will help organizations navigate the challenges of crisis-driven digital transformation and ensure that they emerge stronger and more resilient in the face of adversity.

1. Suspend Bottom-Up Decision Making and Provide Guidance Through Top-Down Management

A crisis requires quick responses to ensure the continued functioning and thus the survival of the organization. These responses must encompass the entire organization. In situations of extreme urgency, coordinating decentralized, bottom-up decision-making is difficult and creates the risk of conflicting impacts. For this reason, we recommend using a top-down approach to decision-making during a crisis. However, to ensure that the concerns of as many stakeholders as possible are taken into account, organizations should set up steering groups comprising top-level managers of the relevant organizational units. The purpose of these groups is to ensure ongoing coordination between the most relevant internal stakeholders on how to navigate through the crisis. Concrete measures can be planned, coordinated and swiftly adopted, and communication and change-management efforts can be better targeted. Steering groups also ensure that decisions are equally supported and advocated by representatives of all organizational units, which in turn has a positive impact on overcoming resistance.

For businesses that have a centralized culture, effective change management is crucial to successfully implement crisis-driven digital transformations. It is not enough to simply convey the need for changes; it is equally important to communicate how the changes will emerge within the organization. Decision makers must clearly communicate the cultural values that underpin their approach to digital transformation. This is particularly important in times of crisis when the organizational culture needs to align with the needs of digital transformation and crisis management.

2. Start with a Satisficing Approach, but Satisfactory Solutions Can Become Problematic Post-Crisis

All aspects of crisis-driven digital transformation are difficult, complex and challenging. Driven by necessity, organizations will quickly find solutions that are sufficiently functional and can be implemented swiftly, but these solutions can subsequently become problematic and need to be optimized. This

optimization can either relate to the adoption of digital technologies or to the digital technologies themselves. The adoption of digital technologies and the introduction of corresponding solutions requires strong adaptation efforts from both employees and partners in the respective value networks. While a crisis suppresses organizational inertia and, to a certain extent, active resistance, both inertia and resistance will reemerge once the crisis-induced volatility subsides.

To counter growing inertia and resistance, organizations should engage in active change management to encourage adoption. Initially, this will involve clearly communicating the benefits of technological changes and providing a guided introduction to them. Organizations will also need to provide employees with initial training and foster knowledge transfer and development among and between employees and partners in the medium term.

However, if the adoption of a digital transformation solution does not provide the expected benefits, the problem will likely lie in the technology itself, which must be optimized, adapted or, in case of doubt, discarded and reimplemented. For example, if the technology solution is causing undue stress or frustration for employees, it may be necessary to consider alternative or adapted solutions that better meet the organization's and employees' needs.

To counteract any active resistance that may arise post-crisis, organizations should adopt a bottom-up approach to optimizing, which can harness the implicit operational knowledge of employees. Employees should therefore be encouraged to actively participate in the iteration and continuous improvement of solutions. This approach will reduce resistance, include knowledge from all levels and again strengthen the power of innovation.

3. Use a Crisis to Establish an Error-Tolerant Culture that Will Be Valuable for Future Digital Transformations

Digital transformation requires a strong culture of accepting errors. Scholars and practitioners agree that organizations must understand and internalize experimentation and failure as an inherent part of their digital

transformation journeys.²⁶ A positive error culture allows organizations to find innovative solutions to urgent problems by freeing creativity and productivity at all organizational levels. However, establishing such a culture is challenging because organizational barriers, such as inertia and resistance, prevent or at least slow down cultural change.

Crisis-driven digital transformation and the respective satisfactory (rather than optimal) solutions that are implemented as ad hoc responses to the crisis provide a unique opportunity for organizations to take the first step in implementing an error-acceptance culture. As described above, organizational barriers to cultural change are partly or wholly removed at the start of a crisis. Evaluating whether a rapidly implemented solution is in fact satisfactory can only be done through trial and error. During a crisis, middle managers and employees will be well aware that not every decision will be perfect, not only because of crisis-induced time and planning constraints but also because of the ongoing environmental turbulence caused by the crisis.

Though top-down management is essential at the beginning of a crisis, decision makers must communicate clearly that the solutions initially selected are not irrevocable. Employees will be more accepting of the solutions if they are made aware of the probability of errors and the intention to optimize or replace them in the medium term when capacities are freed up. Crisis-driven digital transformation should therefore be understood as an agile process where solutions are improved and optimized, starting as soon as resources become available. Accepting that there will be initial errors and that their impact will be limited is inherent to the iterative approach. In this way, a crisis can be used to create a “safe-to-fail” environment with a strong culture of error tolerance and thus pave the way for even more digital transformations in the future.

4. Evaluate Which Crisis-Mode Practices Should Be Retained Post-Crisis

One interviewee from Mittelstand Industry argued that returning to pre-crisis digital transformation practices is neither feasible nor beneficial because the organization’s digital transformation efforts were lagging behind before the crisis. Instead, Mittelstand Industry is currently planning to preserve some of its “crisis mode” digital transformation practices, arguing that these practices facilitate digital transformation regardless of whether it is crisis-driven or not:

“I absolutely believe that ... [crisis mode practices] will remain, especially regarding the aspects that are driving digital transformation for us. We are keeping a close eye on what is happening, what has brought us benefits.” Head of HR, Mittelstand Industry

We therefore recommend that organizations evaluate their crisis-mode practices to determine which will still be valuable once the crisis is over.

In particular, the agility and decisiveness needed to respond to the crisis and internalized during the course of the crisis should be retained at all costs—organizations should preserve and nurture the crisis-driven “just do it” culture. Post-crisis, this culture will facilitate trial-and-error experiments that may not be successful. It will also create a safe-to-fail environment in which employees feel supported and encouraged to make their own decisions and to innovate themselves. Creating this environment will require the top-down decision-making process used during a crisis to be scaled back. Though top-down decision-making enables fast and functional solutions to be quickly developed and lays the foundation for an error-tolerant culture, in “normal” conditions it can slow down innovation. On the other hand, basic structures established during the crisis—e.g., steering groups—should be retained. Having these structures in place will create valuable leeway at the beginning of a new crisis because this removes the need to “reinvent the wheel.”

Once a crisis is over, organizations should evaluate the success of the digitalization measures they took during the crisis. This

²⁶ See, for example, Singh, A. and Hess, T. “How Chief Digital Officers Promote the Digital Transformation of their Companies,” *MIS Quarterly Executive* (16:1), March 2017, pp. 1-17.

evaluation can serve as a basis for deciding how digital transformation practices can be adapted for the post-crisis environment. As part of the evaluation, organizations should assess the fit between the newly developed capabilities and approaches and the overall market situation. They should also reevaluate the requirements and expectations of customers and value-creation networks in the post-crisis environment. The focus during a crisis on quick responses and delivering satisfactory solutions, and the need to adopt a trial-and-error mindset, makes organizations very agile and flexible. However, there is a risk that, post-crisis, these ways of working may preclude organizations from taking long-term societal and technological developments into account or including them in planning—i.e., risk thinking in too small a way.

Concluding Comments

Our research has found that digital transformation can be triggered by sources of disruption other than technological advancements, such as the crisis caused by the COVID-19 pandemic. Understanding the changing dynamics of digital transformation during a crisis and adopting our recommended actions will help organizations to navigate through crises and even emerge stronger. This insight is particularly valuable in today's volatile, uncertain, complex and ambiguous world. In such an environment, innovation and transformation strategies become obsolete before being implemented, causing major challenges for organizations with a long-term focus, such as those in the German Mittelstand. To build resilience, organizations must adapt to change and develop organizational flexibility and independence from physical products and processes. Digital transformation is a key aspect of resilience in today's world. Understanding and building on the logics of and practices used in crisis-driven digital transformations will help organizations become more adaptable and enable them to respond more quickly and effectively to the next crisis.

Appendix: Research Methodology

The aim of our study was to understand the unique aspects of crisis-driven digital

transformation and provide actionable recommendations. The research was conducted using qualitative data from 14 organizations from the German Mittelstand. We chose to study the German Mittelstand for four reasons. First, it is a significant part of the German economy. Second, companies from the Mittelstand operate globally and are thus more susceptible to crises. Nevertheless, they have a strong domestic presence in Germany, which facilitated data collection and analysis. Third, the Mittelstand generally lags behind in digital transformation, which enabled us to observe transformation initiatives from their inception. Fourth, German Mittelstand companies are open to collaboration with researchers and were easily accessible to the research team.

We conducted workshops, formal interviews and site visits to obtain firsthand experiences of 14 Mittelstand companies. We also used secondary sources such as press releases and company websites to gather data. Subsequently, we focused on three companies as primary informants and conducted two rounds of formal interviews with key personnel in 2020 and 2022 to assess their progress with digital transformation during the COVID-19 pandemic.

We analyzed the data using a mix of theory-based and open coding. First, we identified building blocks, logics and practices in line with the theoretical understanding of digital transformation.²⁷ We not only identified examples of where digital transformation logics had been applied but also how they had been adapted and used by German Mittelstand companies. Second, we used open coding to identify other peculiarities of crisis-driven digital transformation and additional challenges related to it. Third, we applied axial coding to condense our findings into the four crisis-induced digital transformation logics and the resulting changes in the steps of the digital transformation process described in this article. Finally, we revisited the scientific literature to ground our insights deeper in scientific discussions and extend the applicability of our findings.

²⁷ Vial, G. op. cit., February 2019.

About the Authors

Ralf Plattfaut

Ralf Plattfaut (ralf.plattfaut@icb.uni-due.de) is a professor of information systems and transformation management at the University of Duisburg-Essen, Germany. He conducts research on digital transformations, business process management and process automation. He leads the university's Process Innovation & Automation laboratory and supports companies on their digital transformation journeys. Ralf worked at a major strategy consultancy for several years before he rejoined academia. He received his Ph.D. from the University of Muenster, Germany.

Vincent Borghoff

Vincent Borghoff (vincent.borghoff@fh-swf.de) is a research associate at the South Westphalia University of Applied Sciences, Germany. His research interests include the digital transformation of organizations, the automation of business processes with lightweight IT and the governance of lightweight IT solutions.