Massachusetts Institute of Technology

Liminal Innovation in Practice:

Understanding the Reconfiguration of Digital Work in Crisis

Wanda J. Orlikowski
Sloan School of Management
Massachusetts Institute of Technology
100 Main Street
Cambridge, MA 02142
USA
wanda@mit.edu

Susan V. Scott
Information Systems and Innovation Group
Department of Management
The London School of Economics
Houghton Street
London WC2A 2AE
United Kingdom
s.v.scott@lse.ac.uk

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Abstract

As conditions of crisis disrupt established practices, existing ways of doing things are interrupted and called into question. The suspension of routine sociomaterial enactments produces openings for liminal innovation, a process entailing iterative experimentation and implementation that explores novel or alternative materializations of established work practices. We draw attention to three distinct tensions on the ground that arise in conditions of crisis — pragmatic, tactical, and existential — and show how these may be leveraged to produce liminal innovations in practice. While the process of liminal innovation can be challenging, it can also be generative, creating opportunities for the reconfiguration of digital work in conditions of crisis.

Introduction

Rapid and unprecedented use of digital technologies has been a hallmark of organizational responses to the Coronavirus disease (COVID-19) pandemic. Drawing on prior research concerned with digital work, we reflect upon developments thus far and offer conceptual insights to better understand emerging practices, organizational shifts, and broader processes of transformation. Engaging with implications of digital work sheds light on particularly salient processes of reconfiguration in conditions of crisis. We suggest that these insights help explain why and how different tensions lead to generative shifts in practice and offer possibilities for materializing new ways of doing things.

Much recent discussion has focused on the move to working digitally. The notion of "working digitally" suggests that there is a difference between work that involves digital technologies and work that does not. We argue that to understand the recent transformation of our work worlds, we need to move beyond this dichotomy because the "digital" does not usefully distinguish different kinds of work in contemporary organizing (Orlikowski and Scott 2016). Almost all work today entails the digital, being shaped directly and indirectly by myriads of technologies, both local and global, including email communication, mobile chat, online transactions, social media interactions, document production, computer-aided design, automated scheduling, precision agriculture, and robotic manufacturing. The digital shaping of work has never been more evident than during the current pandemic lockdowns as work-from-home online practices are being enacted the world over.

Central to our position on digital work is a practice approach. This entails the assumption that our world is an on-going production, emerging through recurrent action (Feldman and Orlikowski 2011). We have taken this further to argue for the criticality of sociomaterial practices in understanding how and why particular outcomes become more salient than others in constituting reality (Orlikowski and Scott 2014). Sociomateriality has served as an umbrella term for a broad range of research approaches, and the crucial and distinctive position taken in our work has been the inseparability of the social and material as manifesting in the sociomaterial

enactment of practices. By this we mean, following Barad (2007), that "a practice can have no meaning or existence without the specific materiality that produces it" (Scott and Orlikowski 2014, p. 875). In other words, practices are always and everywhere constituted through particular and ongoing materializations, and they perform differently depending on the specifics of those materializations, having consequences for what and how outcomes are produced. We argue here that understanding how digital work practices are differently materially enacted can provide valuable insights into ways of dealing with crisis, and to how and why the reconfiguration of digital work has become so vital in responding to the emerging pandemic.

Conditions of Crises

From an agential realist position, the world is continually enacted and emergent so we would tend not to frame phenomenon in binary 'before' and 'after' terms. However, when life is interrupted in unimaginable ways, we need to develop further analytical vocabulary to help us distinguish how crises are materially different in terms of their historicity and enactment. For the purposes of this discussion, we broadly differentiate between crises in terms of their conditions and how these generate action.

For example, some crises emerge slowly from a process of ongoing, gradual metamorphosis where the transformation is only noticeable over time, for example, climate change or cliff erosion. Most such transformations are long-lived and will likely continue without specific intervention and systemic change. Other crises manifest suddenly as dramatic and visible shocks that demand urgent attention and response, for example, a large earthquake or infrastructural breakdown. The duration of disruptions produced by such events vary, some are relatively short (e.g., terrorist attack, market crash) while others entail more prolonged conditions that suspend practices for a longer period of time (e.g., volcanic ash cloud, nuclear and radiation leaks).

We can also distinguish between crises in terms of their outcomes. Some lead to deliberative change as vulnerabilities and risks revealed by the disruptive conditions produce pressure for new regulations and policies alongside adaptation of existing practices (e.g., security check-ins at

airports, capital requirements, redesigned facilities). In these crises, the world is still broadly recognizable afterwards (e.g., planes fly, trading resumes, land is remediated, buildings are reconstructed). But there are crises that require us to leave behind prior practices (loss of national sovereignty, irreversible injury, extinction of species) and are life-changing.

The crisis conditions in which we find ourselves with the COVID-19 pandemic are producing a distinctive combination of the above characteristics and others that are still emerging. Most of us experienced 'lockdown' as a sudden shock bringing significant disruptions to everyday life that disrupted routine practices for an extended period of time. Importantly, though, as the crisis persists, conditions continue to change through ongoing transformations: knowledge about disease transmission, infection, detection, and treatment emerged gradually and continues to evolve; multiple practices on the ground shifted and continue to adjust in response to new measures; and the SARS-CoV-2 coronavirus continues to mutate, spawning variants that are spreading at differential rates over space and time. With the exception of world wars, there have been few crises that have necessitated such widespread and wholesale shifts in how work is organized and performed.

Organizational learning has been a recurrent theme in IS and organization research (Argyris 1976, 2002; Senge 1990) with prior work noting how sudden crisis prompts us to suspend our taken-for-granted assumptions (Weick 1988, 2004). Although learning may be an outcome, our focus here is on how the conditions of crisis characterizing the pandemic have manifested as tensions on the ground, which have generated specific and innovative responses in how work is organized and performed. We recognize that this crisis is novel and digital work encompasses a vast spectrum, and rather than build a general model of digital work in times of crisis, we call out common themes and issues to serve as a basis for theorizing generative shifts in practice arising from multiple experiences of the COVID-19 pandemic.

Liminal Innovation

When spiraling uncertainty disrupts and suspends established practices, existing ways of doing things are called into question. This creates an opening — a liminal time and space — interrupting usual practices and obligations in a way that fosters the possibility for creativity (Czarniawska and Mazza 2003). For Turner (1967), liminality is characterized by the blurring and merging of boundaries, positions, distinctions, categories, and concepts, which produce an unsettled, open, and ambiguous condition from which "novel configurations of ideas and relations may arise" (p. 97).

Within organization studies and information systems, the notion of liminality has been drawn on to explore how various actors — for example, external consultants (Czarniawska and Mazza 2003), temporary workers (Garsten 1999), internal change agents (Howard-Grenville et al. 2011), knowledge community coordinators (Swan et al. 2016), and institutional entrepreneurs (Henfridsson et al. 2014) — contend with, capitalize on, or create periods of ambiguity to facilitate change in roles, projects, trajectories, and work cultures. Other scholars have examined how liminal spaces may be constructed to engender places of personal or collective reflection and action, for example, within routine commutes, temporary organizations, underused or remote workplaces, and IS projects (Lucas 2014; Shortt 2015; Vesala and Tuomivaara 2018; Wagner et al. 2012; Wilhoit 2017). Common across these studies is the temporary dissolution of established expectations, norms, and processes, which offers new possibilities for organizing as participants experiment with alternative ways of structuring their activities or invent new ones.

Our interest in the generative potential of liminality focuses on practices. While times and spaces are salient, they are not primary in our consideration of how the liminality of crisis produces conditions of possibility for transformative change to be enacted in practice. Our emphasis on liminal practices builds on the ideas of Mertens (2018), who developed the notion of *liminal innovation* as a set of practices that entail "a seemingly never-ending transitional phase where one innovation serves as a building block, or a kick starter, for another one" (p. 290). That is, liminal innovations flow repeatedly "between experimentation and implementation" (p. 280),

being enacted in ongoing practices where "partial implementation is a condition for experimentation" (p. 288). In this view, liminal innovation practices are open-ended, fluid, and flexible, ensuring that "innovations remain malleable, even after implementation" (p. 286).

Prior information systems literature provides us with some evidence of digital work practices transitioning from experimental to in-use during times of crisis. For example, in the 1990s, electronic trading was an experimental twilight practice, only used out-of-hours in the futures and options markets. The dominant core trading practices took place on tightly packed, in-person, open outcry trading floors located in the financial centers of Chicago, London, and Frankfurt. In 1998, a strategic crisis emerged as rival financial services companies made a competitive bid to secure a majority share of German bund trading, moving it from its long-standing market center in London and relocating it to Frankfurt. Previously ignored and dismissed as marginal, electronic trading played a central role in this strategic move, and in-person trading gradually gave way to new digital work practices throughout the futures and options markets (Scott and Barrett 2005).

More recently, Henfridsson and Bygstad (2013) describe how experimenting with mobile channels and social media provided Norwegian Air with an unexpectedly effective way of coordinating during the volcanic ash cloud crisis that followed Eyjafjallajek's eruption in Iceland during 2010. As they note (p. 917):

> Facebook was not only used for information purposes, but also to negotiate customer rerouting and new tickets. The team leader commented afterward, 'Frankly, we do not know where this Facebook thing will take us, but we certainly realized that our customers preferred this communication channel in this urgent situation.'

Both these examples draw attention to how the boundary between experimental and established practices was remade during periods of crisis, creating liminal conditions in which reconfigurations could be generated. Drawing on a sociomaterial perspective, we see liminal innovation practices as materially enacted, and in our digitalized world such materializations are increasingly digital. The COVID-19 pandemic powerfully highlights how the suspension of established practices to a great extent has involved a disruption in the sociomaterial enactment

of how we habitually live and work. As we have had to lock down, self-isolate, quarantine, and socially distance, our customary habits of physically moving and gathering in person at workplaces, on commutes, and in schools, churches, gyms, courtrooms, restaurants, and shops have been interrupted and replaced (where feasible) with a variety of online encounters, meetings, sessions, events, transactions, etc. The sociomaterial enactments of our practices have shifted substantially.

For many organizations, shifts in the materialization of everyday practices have been challenging, but they have also been generative, creating opportunities to engage in liminal innovation — performing multiple and iterative experiments and implementations to explore alternative ways of doing things. This process of liminal innovation reconfigures practices on the ground by leveraging the tensions that arise from disruptions in established ways of working.

Tensions in Practice

As existing ways of doing things are disrupted in conditions of crisis, tensions emerge from the suspension of routine sociomaterial enactments. These tensions highlight how and why established practices have become strained, interrupted, or discontinued. Attending to conditions and tensions in practice is valuable as these point to both the challenges associated with the disruption of existing practices, but also the opportunities for revised, novel, or alternative practices to be explored and experimented with, thus potentially reconfiguring work practices and outcomes. We draw attention here to three distinct tensions that can generate changes in practice — pragmatic, tactical, and existential (Scott and Orlikowski 2020). We note that these three tensions arise in all kinds of practices, and can produce change in various particular situations. Our interest here is in conditions of crisis and how the three different tensions may be specifically leveraged to generate liminal innovations that redraw boundaries of existing ways of working and reconfigure how digital work materializes (see Table 1).

Pragmatic tensions comprise practical difficulties that put existing ways of doing things under strain during the crisis. This particular tension is generated by an urgent need for

established practices to materialize differently so as to overcome specific difficulties. For example, the current pandemic conditions require all health care workers to wear masks and visors when interacting in-person with patients. This has created considerable communication difficulties for some COVID-19 patients who struggle to understand verbal prompts and gestures made by masked health care workers. Having observed how challenging established practices were proving for patients, a medical doctor in the UK founded Cardmedic,[1] an app which enables vital information and questions to be shared with patients via digital flashcards displayed on a phone, tablet, or computer. Available in 10 different languages as well as a read-aloud option for blind patients, the communication app has spread rapidly and is now in use in hospitals across the world.

This case illustrates the adaptation of established practices through dynamic interplay between experimentation and implementation, leading to new activities with alternative materializations during the pandemic crisis. Patient communication practices — typically materialized through face-to-face interaction — were made difficult by the requirement that health care providers wear PPE (personal protective equipment). The pragmatic tension produced by the breakdown in interactions with ill patients spawned the iterative innovation process that experimented with and then implemented the practice of communicating via digital flashcards. The resulting modified communication practice is now materially enacted in multiple hospitals through the use of a software product downloaded for free onto digital devices. And this particular innovation continues to evolve even as it is in active and widespread use; current efforts are extending the service to 30 different languages, and expanding the flashcard app to include videos in various sign languages.

Tactical tensions arise when existing practices are interrupted and cannot continue as they are no longer feasible during the crisis. This tension creates the conditions of possibility for experimenting with new activities, products, and services that take advantage of the

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[1] https://www.bbc.com/news/uk-england-sussex-52442313

sociomaterial enactments that continue to be feasible and available, thus repurposing existing capacity in new ways. For example, StringKing,[2] a sporting goods manufacturer of lacrosse sticks and apparel in Los Angeles, found itself without a market when the Spring lacrosse season was canceled in March due to the COVID-19 pandemic. Facing a complete shutdown in operations, losses in revenue, and the likelihood of having to lay off workers, the company experimented with different production practices that would utilize its existing manufacturing capacity. This led them to shift from making sporting goods to making PPE— masks and gowns — for hospitals, essential workers, and the general public. Over the few months since shifting their manufacturing lines, StringKing has made millions of masks and gowns, and to keep up with demand, the company has employed hundreds of additional workers.

In another example, the COVID-19 pandemic forced Nike to shut 5,000 of its stores across China.[3] Attempting to retain its brand reputation and market presence in the region without the ability to interact with customers in person at stores, the company redesigned and expanded its online operations by experimenting with a virtual channel to deliver at-home workouts via personal training apps. Since making this shift in how Nike's customer engagement practices are materially enacted, the company has seen online sales in China rise by 35% compared to the same period last year. Nike continues to experiment with materializing different kinds of at-home workouts and personalized coaching options online, and has recently extended these virtual offerings to consumers in other countries around the world, adapting them as appropriate for implementation in different markets.

The reconfiguring of practices evident in these two examples highlights the creative leveraging of available sociomaterial enactments to innovate different activities, services, or products. StringKing's case demonstrates how the company's existing manufacturing equipment could no longer be used to produce the company's established products — lacrosse sporting goods. This produced tension about likely losses in company revenue and employee jobs (and

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[2] https://www.bowdoin.edu/news/2020/05/stand-and-deliver.html
[3] https://qz.com/1825248/what-nike-learned-in-china-during-the-coronavirus-outbreak/

livelihoods). In exploring ways to keep their workers gainfully employed, the company

creatively experimented by repurposing their manufacturing capacity to make a product that was

in much demand. Manufacturing PPE as opposed to lacrosse goods has not only generated

considerable revenue for the company but has allowed existing workers to retain their jobs and

created further employment opportunities for others during economically challenging times. In

the case of Nike, the shuttering of stores meant losing their personal connection with customers,

creating a critical tension with the brand's core stakeholders. This led to experiments with

different interaction possibilities, producing the idea of online engagement via personalized

digital work-outs. Through its implementation, this approach has enabled different sociomaterial

enactments of how, how often, and which customers interact with the company. No longer

limited to those customers who walk into stores at specific times and places, the virtual channel

is available to consumers across all of China at any time, allowing them to enhance their fitness

while connecting with the company. This has promoted brand awareness and loyalty, while also

increasing online sales.

Existential tensions arise when conditions have changed so much that existing ways of doing

things no longer make sense in the disrupted conditions of the crisis, leading to established

practices being discontinued. As existential tensions cannot be addressed through pragmatic

adaptations or tactically repurposing existing capacity for different activities, they severely limit

the possibility of reconfiguring practices through liminal innovation. This is particularly

problematic as it undermines the value and purpose of established practices to operate in the

disrupted world. As experimentation with alternative practices continues and novel ways of

doing things are found, established practices are displaced, jeopardizing their viability both

during and after the crisis.

A prominent example of how existential tension is produced is the disruption in global

supply chains as a result of the COVID-19 pandemic. Companies with long-established

strategies of lean inventory and just-in-time deliveries for components and products are now

starkly confronted by their overreliance on an organizational logic that focus exclusively on

optimizing efficiency at the expense of resilience. As a number of analysts have observed, the "just in time" model is broken and needs to be transformed into a "just in case" model.[4] This amounts to the displacement of the "just in time" strategy for one premised on alternative assumptions and very different sociomaterial enactments of supply chains. To realize this will require considerable redesign and substantial reconfiguring of supply chain practices including various combinations of reshoring manufacturing, shifting production to a larger number of countries, increasing automation, and domestic stockpiling of critical inventory. Some companies are already beginning to experiment with dynamic ways of implementing these kinds of changes, but the investments that are involved are significant and take time.

Whether and how many companies can radically innovate their supply chain models in the current crisis remains to be seen. The crisis condition produced by the pandemic can serve as a liminal opening/opportunity for generative reconfiguring, but leveraging the existential tensions that have arisen requires the enactment of significant material shifts in supply chains in order to accomplish transformative changes on the ground.

Conclusion

We believe the ideas of liminal innovation offer valuable conceptual insights that can help us understand emerging practices and transformations in conditions of crisis. Becoming attuned to different tensions can help identify openings for reconfiguring, while working through iterative experimentations and implementations in practice can help engage different sociomaterial enactments. This liminal innovation process fosters an awareness of ongoing boundary remaking as the challenges of particular pragmatic, tactical, or existential tensions engender opportunities for including novel, alternative, or revised practices and materializations. Vital to such reconfigurations on the ground is the willingness to engage in open-ended sensemaking and the

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[4] https://www.ft.com/content/606d1460-83c6-11ea-b555-37a289098206

flexibility to enact different practices in order to be responsive to emerging tensions and receptive to boundary remaking.

It is neither the playfulness characterizing innovation in better economics times nor the hard rationalization of processes in downturns that serve as the engine of generativity in liminal innovation but rather the tensions produced through sociomaterial practices. We suggest that pandemic organizing efforts are not about binary cycles of exploring or exploiting, but about leveraging potential openings for different materializations and working productively with these to serve present priorities. Or indeed, connecting with sociomaterial practices that made a degree of difference in the past and threading them through the present. Of course, openings are not singular but multiple, and what is required is attending to those that are particularly salient for reconfiguring ways of work. We propose that these can be identified through the pragmatic, tactical, and existential tensions manifesting in the discontinuities of key sociomaterial practices that have been strained, interrupted, or discontinued in crisis conditions.

We note that there are few (if any) prescriptive theories that can guide practitioners during such unprecedented times. Our counsel is to reframe mindsets and reposition actions, shifting away from 'disaster mode' and towards processes of ongoing learning that center on liminal innovations. Such a learning orientation (Arygris 2002) enables letting go of no-longer-relevant prior assumptions and routines (Weick 1988, 2004), focusing attention on making different sense of the challenges, and allowing new possibilities for action to emerge that can be leveraged for effective change. In our view, theorizing is important even in the midst of intense uncertainty and practitioners are better off exploring and wayfinding rather than fixing on a single crisis itinerary. We find that Pratt et al.'s advice to researchers applies as well to practitioners (2020, p. 5):

> In a changing, complex world, where every circumstance is different, safety lies in doubting previous experience and having available wide repertoires of tentative theories and concepts with which to address always-novel conditions.

As we have highlighted, the outcomes of liminal innovation in digital work are proving 'pivotal' in the sense that they are of crucial importance in relation to certain consequential efforts undertaken during these pandemic times. However, we argue that, in general, the notion

of 'pivot' gives a misplaced sense of the sociomaterial practices involved in bringing digital work into meaningful existence. Rather than emphasizing a central point or pin from which innovation spins outward, we draw attention to ongoing boundary-making in liminal conditions of iterative experimentation and implementation. Instead of marking out liminal innovation as a discrete phase, we frame it as the continuous process of leveraging tensions and creating opportunities to become generative in times of crisis.

We believe that further studies of liminal innovation can open up interesting avenues for future research. For example, categories of liminal work could be explored and specific manifestations in different industries considered in more detail. Further research could examine and document the performative outcomes generated by liminal innovation, yielding in-depth understanding of how industry trajectories are shaped going forward. Additional studies could explore whether other tensions may arise in conditions of crisis, beyond the three tensions we have identified here. Such different tensions may become evident in particular times, places, and circumstances, and it would be useful to distinguish these, and relate them to particular ways of engaging established practices. Future work might also examine more deeply the liminal process of iterative experimentation and implementation, articulating how and when novel, alternative, or revised materializations generate opportunities for creative change in crisis, and in what ways these can be enabled and supported over time. And finally, as we consider the multiple reconfigurations of digital work being enacted in the current crisis, a critical question we are left with is whether the distinctive processes of transformation will be an isolated and transitory set of sociomaterial practices or epoch defining?

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Table 1: Different Types of Tensions Generating Pressure for Change

Types of Tensions	Conditions producing Tensions	Changes
Pragmatic	Existing ways of doing things are strained as established practices encounter practical difficulties in practice	Adaptations modify established practices to address the difficulties arising in practice
Tactical	Existing ways of doing things are interrupted as established practices become infeasible in practice	Experiments repurpose the capacity of established practices for new products and services that are feasible in practice
Existential	Existing ways of doing things are discontinued as established practices no longer make sense in practice	Alternative practices displace established practices, offering novel and different ways of doing things