Unto the breach: What the COVID-19 pandemic exposes about digitalization

Samer Faraj [*], Wadih Renno, Anand Bhardwaj

McGill University, Canada

A B S T R A C T

Much recent scholarly investigation has been focused on the promise of digitalization and the new ways of working and organizing it makes possible. In this paper, we analyze how the COVID-19 pandemic has acted as a natural breaching experiment that has challenged taken-for-granted expectations about digitalization and revealed four important issues: uneven access to digital infrastructures, the persistence of the analog in digitalization, the brittleness of unchecked digitalization, and panoptical surveillance. The sudden shift to digital work has exposed taken-for-granted assumptions about the universality of digital access. The crisis has also revealed that many highly digitalized processes still rely on analog elements. The pandemic has also exposed that many algorithms used in digitalized inter-organizational processes are brittle due to over-reliance on historic patterns. Finally, the pandemic has breached fundamental expectations of privacy when organizational surveillance was extended into private and public spaces. Thus, the pandemic has laid bare fundamental challenges in digitalization and has exposed the limits of rose-tinted thinking about the relation between technology and organizing.

1. Introduction

Organizing is increasingly shaped by a deeper and more complex entwinement of digital and physical processes (Barrett, Davidson, Prabhu, & Vargo, 2015; Oborn, Barrett, Orlikowski, & Kim, 2019; Yoo, Boland Jr., Lyytinen, & Majchrzak, 2012; Zammuto, Griffith, Majchrzak, Dougherty, & Faraj, 2007). Building on the availability of digital resources, including data digitized from analog originals, and powered by learning algorithms, digitalization increasingly incorporates Artificial Intelligence (AI) as an important component to augment and automate different intra- and inter-organizational processes (Bailey & Barley, 2020; Faraj, Pachidi, & Sayegh, 2018; Kellogg, Valentine, & Christin, 2020; Shrestha, Ben-Menahem, & von Krogh, 2019). By incorporating AI, digitalization can improve the recognition of patterns in large and complex data sets, predict outcomes using powerful and sophisticated algorithms, identify optimization opportunities, adaptively effectuate work in the sense of performing organizational activities that used to be exclusively the domain of humans, and surveil different aspects of organizational life at an unprecedented level of detail.

The COVID-19 pandemic has caused organizational upheaval at a massive scale. Beyond having repercussions in the realm of public health and epidemiology, the social response to the pandemic has profoundly disrupted work and organizing. This extreme event has effectively subjected organizations to a real-life stress test that has exposed the patchwork construction upholding digitalization. On one hand, the organizational response to the COVID-19 pandemic has surfaced potential success stories, such as the move to telehealth,

* Corresponding author.
  E-mail addresses: samer.faraj@mcgill.ca (S. Faraj), wadih.renno@mail.mcgill.ca (W. Renno), anand.bhardwaj@mail.mcgill.ca (A. Bhardwaj).

the increase in flexible work arrangements, and the intensification of digitalization across many sectors (Chearavanont, 2020; Hollander & Carr, 2020). On the other hand, the pandemic has profoundly disrupted work and organizing, and has revealed how many organizations have struggled to adapt and could take years to recover (Dua, Mahajan, Oyer, & Ramaswamy, 2020). A nuanced perspective is therefore required to better understand the consequences of the pandemic for digitalization.

This article unpacks how the pandemic has laid bare fundamental challenges in digitalization and exposed the limits of rose-tinted thinking about the relation between technology and organizing. We analyze the COVID-19 pandemic as a natural breaching experiment that has disrupted organizational and societal processes. The breach occurs because the pandemic disrupts organizational and societal processes in unexpected and extreme ways. Traditionally, disruptions are oddities and unexpected occurrences that can be corrected to bring back daily activities (Steele, 2020). We deploy the term 'breach' to emphasize the exceptional nature, wide-ranging impact, and long duration of the pandemic. This disruption, and the remedial work associated with it, has challenged taken-for-granted expectations about digitalization. We offer that the breach foregrounds and amplifies four important but often backgrounded issues pertaining to digitalization: uneven access to digital infrastructure, the limits of digitalization, the brittleness of headlong digitalization, and panoptical surveillance. We conclude with thoughts on how future research can fruitfully engage with disruptions in digitalization.

2. What the pandemic exposed about digitalization

Much of current analysis has been focused on the promise of digitalization and what new ways of working and organizing it makes possible. Researchers and pundits alike have focused on the promise of a digital future and offered analysis and ideas aimed at developing frameworks and strategies (e.g., Adner, Puranam, & Zhu, 2019; Brynjolfsson & McAfee, 2014; Yoo et al., 2012). Digitalization goes beyond digitizing information or computerizing previously analog processes. Today, digitalization increasingly incorporates AI algorithms to perceive the environment, learn from it, and take action in ways that mimic humans (Goodfellow, Bengio, & Courville, 2016; Russell & Norvig, 2003; Simon, 1995). We propose that digitalization can best be understood by examining digital work and digital processes. Specifically, the pandemic has brutally exposed fundamental weaknesses and limits in the way organizations engage with digitalization.

We approach the COVID-19 pandemic as a large-scale 'natural' breaching experiment that has upheaved many of "the background expectancies of everyday life" (Garfinkel, 1967, p. 54), such as going to work, socializing, or even leaving one's home. This natural breaching experiment differs from Garfinkel's experiments and from research seeking to understand naturally occurring breaches in organizational settings (e.g., Feldman, 1995; Heaphy, 2013; Steele, 2020) in that the breach is not the result of a provoked norm violation during an interaction between human actors but rather the result of a natural phenomenon that radically reframes – simultaneously and across geographies – taken-for-granted ways of working and processes and, as a result, exposes societal fault lines and hitherto hidden issues. We suggest that the arrival of the virus, its scientific novelty, and the seemingly haphazard public health response to the resulting pandemic, have generated a real-world disruption in organizational processes and challenged fundamental assumptions about organizing. Because the Garfinkel breach challenges taken-for-granted understandings of daily reality, we deploy it at an organizational and interorganizational level to describe a sudden occurrence that exposes simultaneously and across geographies the shared assumptions about how the world works. Below we describe four important issues that have been exposed by the pandemic.

2.1. Uneven access to digital infrastructures

The COVID-19 pandemic lockdown has had the effect of forcing an abrupt shift from face-to-face and analog interactions towards the digital realm. This move has been relatively seamless in some cases, as with increased food delivery by restaurants and grocers, ordering goods from e-commerce retailers, or shifting from movie theaters to digital streaming services. In other cases, this change has been decidedly abrupt. In healthcare, the move towards telehealth has been especially jarring due to the primacy of the face-to-face examination in the doctor-patient relation. Nevertheless, despite these issues, the move is being celebrated as a silver lining of the COVID-19 breach (e.g., Bestsennyy, Gilbert, Harris, & Rost, 2020; Hollander & Carr, 2020).

Shifts to digitalization, such as in telehealth, while presenting many positive aspects, expose a persistent digital divide that leaves socially and technologically marginalized populations – rural, immigrant, uninsured, low-income, digitally illiterate, and older populations – with even more limited access to essential services. For example, in the US, a recent survey has shown that broadband subscription rates vary significantly by ethnicity with a 8.4% gap existing between black and white populations (Tomer & Fishbane, 2020). As organizations move services to the digital realm and dedicate more internal resources to these channels, they may find the traditional channels difficult to sustain. As a result, populations without easy access to digital infrastructure run the risk of losing access to necessary services.

A number of examples can help explicate the challenge offered by lack of digital access. For example, clinics in the US found that the move to telehealth during the lockdown created access hurdles for vulnerable patients with no access to the internet (Ramsetty & Adams, 2020). Government efforts to distribute COVID-related financial aid left behind a whole class of potential recipients whose lack of internet connectivity prevented them from requesting aid (Walden, 2020). These types of issues are exacerbated for rural populations, where inadequate access to digital infrastructure access is a systemic problem (Lane & Pittman, 2020). Finally, many organizations – whether in the private, public, or plural sectors – may lack the expertise or ability to shift their services to the digital realm.

This lack of access to digital services may make certain populations invisible in the digital realm. Through digitalization, organizations are increasingly reliant on these digital traces to perceive the environment, learn from it, and take action. Systematic biases

may be introduced into the digitalization algorithms if unknown but important populations are unable to meaningfully interact with organizational systems. Further, hampered access and reduced interactions lead to a decrease in the representativeness of the underlying data, which then challenges the reliability of linked organizational processes. For example, in Northern Canada, the pandemic-related closure of schools and the accompanying shift to remote learning was difficult to achieve given the lack of digital connectivity. As a result, thousands of students fell behind and in effect disappeared from the educational system (Flanagan, 2020).

Thus, the COVID-19 pandemic has exposed the maldistribution of digital access across populations. This has breached expectations that the vast majority of people (at least in developed countries) have digital access and has created access and service challenges for poor, elderly, and rural populations at a time when non-digital channels are severely restricted. At a time when the digital has suddenly and necessarily become dominant, the inability of many to adequately participate renders already marginalized populations even more invisible.

2.2. The persistence of the analog in digitalization

The pandemic has also exposed the incomplete and limited nature of digitalization. These limits were made visible when individuals or organizations were forced to rapidly and completely digitalize their work processes in response to the pandemic. For example, many universities, colleges, and schools switched, virtually overnight, to distance-learning. Zoom, a cloud video communication platform, saw its user base rocket from 10 million users in December 2019 to 200 million by late March 2020 (Yuan, 2020). As many students and professors found out, these online courses faced many difficulties due to suddenly inadequate home bandwidth, coordination issues across time zones, firewalls (including national ones), lack of access to private workspaces, and a lack of experience in teaching and learning online.

Many organizations that were considered technological pioneers also faced challenges to shift to a digitalized way of working. For example, in a recently commissioned tertiary care hospital in Canada, specialists who routinely wield cutting edge medical technology found themselves stymied by the challenge of telehealth. The desktop computers in these specialists' offices lacked the video cameras needed to support the visual examination of patients. This infrastructural choice was driven by a pre-COVID vision that focused on protecting patient-doctor interactions from digital snooping. During the COVID-19 pandemic, these consultations had to take place by phone, with the added irony of many doctors still insisting on writing up their teleconsultation notes by hand (Faraj, personal communications). Even when this move to the digital goes as planned technologically, the implications on work practices are often overlooked. Continuing the example of telehealth, effective consultations require analog preparation on the part of patients in the form of measuring vital signs, preparing a list of medications, and locating themselves in a private space. Finally, the urgency to rapidly embrace telehealth ironically introduced compatibility issues as medical centers, acting independently, chose different technological solutions. Unsurprisingly, issues of interoperability emerge when patients are transferred across institutions.

The sudden shift to digital also exposed the limitations of digitalization and highlighted how some digital processes remain deeply entangled with physical processes and are difficult, if not impossible, to digitalize. In many situations, a critical component of digital processes is a physical object that is needed for authentication or for transaction. Examples of these are: passports, health insurance cards, credit cards, and subway cards. While some institutions have pivoted to reduce the dependence on analog objects (e.g., going for digital identification), the move to fully digitalized processes remains a challenge. A similar issue exists in the doctor-patient encounter. While it is now believed that family doctors can provide "care by phone" or "care by Zoom" for 95% of their cases, a small percentage of encounters need to involve the patient body for deeper examination, drawing blood, imaging, and other interventions. Telemedicine also presupposes the existence of electronic health records easily accessible to doctors, and the ability to electronically send prescriptions, charge for procedures, request labs, etc. In many cases, analog intermediation limits the extent to which digitalization is possible. A second component is the continued reliance on analog processes in organizations. By regulation, or to better serve specific populations, many organizations continue to offer analog channels in addition to more digital ones. For example, in Canada, certain classes of visa applications (e.g., family sponsorship) are still paper-based despite efforts to digitalize the processes. As the pandemic restricted immigration officers' access to offices and deprived them from retrieving physical documents, processing times increased and families protested those delays (Ing, 2020).

Thus, the COVID-19 pandemic has exposed that many processes are incompletely digitalized or need to connect with and account for analog realities. This has breached expectations that work processes can become completely digitalized or whether it is possible to do so. Furthermore, factors such as insufficient infrastructure, training lacuna, stubborn analog practices, or interoperability issues hinder the digitalization of work processes. As a result, stubborn issues might limit the ability of organizations to fully digitalize their work.

2.3. The brittleness of unchecked digitalization

In knifemaking, the use of high carbon steel allows for a harder edge that can be exquisitely sharpened. However, this hardness comes at the cost of inflexibility and brittleness. To address this limitation, expert bladesmiths combine high- and low-carbon steel to create knives that have hard edges yet flexible spines. Akin to a high-carbon knife striking a hard object, headlong digitalization has been exposed to be brittle upon encountering the COVID-19 pandemic. A source of brittleness can be traced to the increased incorporation of AI algorithms in digitalized processes.

Under normal and stable conditions, incorporating AI is a step forward because such algorithms are extremely accurate at prediction and classification. However, as the pandemic disruption has shown, these algorithms are vulnerable to extreme and ahistorical events. For example, consumer behavior changed in unexpected ways during the pandemic. Inventory management systems that

predict production rates and consumer demand were not able to account for the sudden shift in consumption that resulted from the pandemic-related lockdown, leading to shortages and coordination problems along entire supply chains (Heaven, 2020). Unexpected surges in previously unremarkable products (e.g., toilet paper, protective masks, disinfecting wipes, hand sanitizer, etc.) wreaked havoc on previously well-behaved AI-tuned supply chains.

Under normal circumstances, digitalization can rely on AI algorithms that are capable of self-correcting and adjusting to ordinary changes in patterns. However, the rapidity, scope and scale of the pandemic breach brought to the fore the importance of both human expertise, and the continued necessity for human intervention in highly digitalized processes. Human expertise was required to identify the reasons and implications of sudden shifts in consumer demand patterns, such as the unexpected run on toilet paper. Technical expertise was also required to identify the impact of the lockdown in terms of supply chain disruptions, transport bottlenecks, and coordination challenges (OECD, 2020). Finally, programming expertise was required to adjust the algorithms themselves. Even in ubiquitous applications, such as Google Maps, which relied on historical data to predict street traffic, human intervention was required to prioritize post-COVID traffic patterns over the suddenly unrepresentative historic patterns (Lau, 2020). Thus, the COVID-19 pandemic has breached expectations about the ability of AI algorithms to self-correct and continuously learn. The restricted ability to self-adjust under disrupted conditions has brought back the critical need for human expertise and judgement.

The breach also exposes fundamental differences in how humans and AI algorithms come to conclusions about the state of the world. Simply put, these systems are powerful engines of computation, but are fundamentally naive with respect to the world they purport to represent. Many such algorithms process extremely large data, and their inner workings are often blackboxed to human expertise. Thus, while algorithms may "work" in the sense of producing remarkable prediction or recognition, how they work is exceedingly difficult for humans to decipher. As a result, these algorithms may function based on what, for humans, turn out to be inappropriate or spurious criteria. For example, an early version of a self-driving car algorithm turned out to be relying on the presence of sidewalk grass to identify the boundary of the road, initially resulting in unexpected and dangerous swerving when the grass ended (Castelvecchi, 2016). In dermatology, AI-enabled diagnostic systems trained on medical images of moles came to associate the presence of rulers with cancer. This was simply because in the training data, images of cancerous moles were more likely than non-cancerous ones to include the presence of a ruler for measurement purposes (Narla, Kuprel, Sarin, Novoa, & Ko, 2018).

Thus, the COVID-19 pandemic has exposed that many processes remain vulnerable to weaknesses inherent to unchecked digitalization. While digitalization may radically increase the speed and automaticity of organizing, the tight coupling of systems with each other creates the possibility of propagating and amplifying errors. In line with Perrow's (1999) notion of normal accidents, the source of brittleness and problems cannot be reduced to technological errors but emerges from the complex interaction between systems and social factors. As the pandemic has shown, systems that are prone to blackboxing are the ones to be exposed as less resilient under stress. Thus, increased digitalization that develops with reduced human involvement may be more brittle and thus less desirable.

2.4. Panoptical surveillance

The response to the COVID-19 pandemic has additionally breached expectations about privacy and the acceptable limits to surveillance. Increased surveillance of the home has accompanied the shift to working remotely. While surveillance of employees by management preceded the pandemic, concerns about declines in employee productivity while working remotely has accelerated employers' efforts to surveil employees and quantify their behavior in new ways (Blackman, 2020). Efforts are underway to develop corporate surveillance tools that more comprehensively analyze forms of communication (e.g., email, calls, video conference recordings) by mining them for body language, facial expressivity, physical properties of speech (e.g., intonation, inflection pitch) to develop a much more detailed analysis of employees, often under the guise of ensuring "employee safety" (Chamorro-Premuzic, 2020). These efforts have far-reaching implications for extending organizational control in unprecedented ways.

One of the ways surveillance is moving to the home is through the increased deployment of corporate 'tattleware' to watch over home workers. The term refers to a class of algorithms that monitors keyboard clicks, browsing history, and time spent using organizationally sanctioned productivity tools, even going so far as taking minute-by-minute screen shots of employee computers to analyze their activities or review them in the moment. These data are often processed by algorithms that classify activity as "productive" or "non-productive," alerting managers in cases when the latter occurs during work hours (Harwell, 2020b).These measures are complemented by imposed behavioral requirements, such as always-on cameras, multiple daily check-ins, and 'always on call' availability. One rapidly increasing trend is the emergence of 'people analytics', a term used to describe pervasive measurement of peoples' organizational actions. Even though people analytics is portrayed as allowing managers to make evidence-based, bias-free and objective decisions, they suffer from the ethical challenges of blackboxed algorithms, reductive and decontextualized quantification of behaviors, and the deployment of gamification and nudging to ensure productive behaviors (Gal, Jensen, & Stein, 2020). Maybe because the COVID-19 pandemic has so brusquely sent employees home and threatened their livelihood, this unprecedented encroachment of corporate surveillance has initially been tolerated by society. What can be expected is the further emergence of resistance to algorithmic oversight in the form of symbolic compliance, invisibility practices and other forms of "algoactivism" (e.g., Anteby & Chan, 2018; Kellogg et al., 2020; Pachidi, Berends, Faraj, & Huysman, 2021). Inklings of such resistance have started to surface among university students with pushback against the use of online cheating-detection software that penalizes students for excessive head and eye movement or the presence of others in the background (Harwell, 2020a).

Finally, another issue that has been foregrounded by the pandemic is the large-scale warrantless surveillance of people in public spaces. For example, the development of COVID-19 disease-tracing applications that analyze geo-tagged location and interaction history has further eroded the barrier between public and private actions. Once installed, such applications can allow governmental agencies or corporations to routinely surveil individuals. Already, governments have started using smartphone location data to assess

how citizens are complying with lockdowns and for enforcing quarantine requirements. As these apps collect precise location, social interactions, and personal details stored on devices, they carry substantial privacy and security risks. By design or unintentionally, these applications can put "hundreds of millions of people at risk for stalking, scams, identity theft, or oppressive government tracking — and could undermine trust in public health efforts" (Singer, 2020). The pandemic has also coincided with social activism in the form of the Black Lives Matters movement and other movements that are critical of law enforcement practices. These movements have highlighted the use of pervasive surveillance in the form of facial recognition algorithms and massive curated image datasets that capture faces without consent. Unsurprisingly, reports have emerged about law enforcement agencies using facial-recognition algorithms on social media images to identify protesters and target them with retaliation (Rihl, 2020). Because of the ethical and legal risk associated with developing capabilities that allow for this form of constant and invasive surveillance, several established companies have stepped away from providing such tools, as evidenced in IBM leaving the mass surveillance market in June 2020. In a letter to congress explaining the decision, IBM's CEO explicitly criticized the abuses of facial recognition algorithms and boldly stated: "IBM firmly opposes and will not condone uses of any technology, including facial recognition technology offered by other vendors, for mass surveillance, racial profiling, [and] violations of basic human rights and freedoms" (Krishna, 2020).

Thus, the COVID-19 pandemic has exposed a wide breach in expectations about privacy and the acceptable limits to surveillance. The need to work from home has triggered the deployment of corporate surveillance and algorithmic oversight tools. The pandemic has also been used as justification for warrantless surveillance of public spaces and for the collection of potentially sensitive personal information via contact-tracing applications. As a result, tolerance for reduced privacy and normalization of panoptical surveillance may become a lasting legacy of this pandemic.

3. Discussion and conclusion

This paper has addressed how the COVID-19 pandemic has acted as a breaching experiment and has exposed several important caveats and stubborn issues related to digitalization. Specifically, the pandemic breach has exposed taken-for-granted assumptions about widespread access to digital infrastructure, the extent to which organizational processes are actually digitalized, the resilience of digitalized processes to unexpected events, and the societal norms about what constitutes surveillance and the boundary between work and private spaces. Beyond digitalized work and organizational processes, the COVID-19 pandemic has also exposed the increased reliance on quantification of human behavior, allowing for an unprecedented extension of workplace surveillance into the home, paralleled with increased surveillance in the public sphere. The breach has resulted in increased social awareness of Orwellian surveillance at home, management by algorithm, and continuous facial recognition in the public sphere. Whether done by governmental entities in the name of security or by corporations in search of monetizing social interactions, the overall impact has been to reveal unpleasant aspects of digitalization that counteract an overly optimistic narrative of progress.

Our deployment of the concept of breaching experiments, in the context of unexpected but systemic disruption offers occasions where researchers are able to address typically hidden or previously ignored organizing issues. Just like economists have deployed the concept of natural experiments to quantitatively identify and measure causal mechanisms, qualitative researchers can gain from the analysis of breaches to evaluate hard-to-expose and theorize typically hidden social mechanisms. The study of breaches can be fruitful because regular maintenance work fails and organizations are forced to engage in repair work (see Garfinkel, 1967; Steele, 2020). Thus, as in the case of researchers focused on organizing in extreme and fast response settings, the breach offers a point of entry for the exploration of taken-for-granted elements of organizing, or to consider issues that were hidden or blackboxed. Thus, we consider that fruitful theorizing and an enhanced theoretical vocabulary could emerge from such studies.

Scholars of digitalization can benefit greatly from stepping into the breach opened by the COVID-19 pandemic for they have often extolled the bright possibilities associated with the digitalized future. Our paper suggests that fruitful avenues of research can be found by focusing on understanding the evolving challenge of a significant part of the population having limited access to digital resources and infrastructure. Digitalization researchers may also benefit from recognizing the persistence of the analog in digitalization. As is apparent in the analysis above and in the stories emerging from the pandemic, much of human and organizational life requires a critical analog dimension that cannot simply be moved to the digital realm. Researchers could build on the current breach to clarify what aspects of life are more easily or more completely moved to the digital realm. The breach has also reminded us that digitalization is made brittle because it is based on algorithms that are blackboxed by default and marginalize human intervention. Researchers could thus seek to better understand how sociomaterial configurations of organizing are constructed and deployed. Finally, issues related to widespread and panoptical surveillance in both public and private spaces need urgent research attention. Already, new forms of behaviors, contestation, organizing, and even resistance are emerging and would benefit from researchers' attention.

The pandemic breach has actionable implications for practitioners and policymakers. A fundamental issue revolves around providing access to populations and organizations that are excluded from digitalization. Access to digital infrastructure, especially for rural areas, has long been an espoused value of many governments. The pandemic has shown that, from a public health perspective, people without adequate access to digital services end up being more exposed to infection because they have to resort to services and interactions in the analog world. Thus, for policymakers, the questions may increasingly be about whether access to digital infrastructure is a right rather than a privilege. Additional policy issues relate to the resilience and safety of increasingly interconnected supply chains within and across political jurisdictions. In turn, practitioners need to address the consequences of the headlong rush towards unchecked digitalization. As the pandemic has revealed, not all organizational processes and channels should or need to be digitalized. During crises, like the current one, the importance of building flexibility and resilience in processes, understanding when and how to shift between the analog and the digital, and having the ability to rapidly deploy human expertise to intervene in blackboxed systems, has been made abundantly clear.

A broad societal issue relates to the panoptical surveillance that increasingly pervades public space and has now effectively penetrated the sanctity of people's homes. Though initially tolerated, the reach and depth of surveillance is increasingly being questioned. This undoubtedly should lead to a public debate on what is acceptable to protect individual rights. Already, such tensions between personal rights and public needs are visible in the debates around the deployment of disease-tracing apps on personal phones or of tattleware on home computers. Organizations can preempt or complement such debates by proactively engaging with these issues and by setting up specific guidelines that frame ethical and operational aspects of their expanded surveillance toolkit. In parallel, policy is likely needed to identify minimum levels of protection for individuals in their working and private environments, while identifying clear guidelines for the use of surveillance by public entities.

Digitalization has undoubtedly helped society to deal with the disruption due to COVID-19. Yet the impact of the pandemic has been to breach widespread assumptions and to expose cracks in a previously taken-for-granted digitalized future. This crisis offers scholars, practitioners, and policymakers an opportunity to revisit cherished assumptions, guiding frameworks, and rose-tinted thinking about the nexus of technology, organizing, and society. Adopting a breaching perspective offers a constructive way to go beyond a disruption-and-repair focus to surface fundamental limitations and issues around digitalization.

Author statement

All three authors contributed equally to this manuscript.

Acknowledgements

References

Adner, R., Puranam, P., & Zhu, F. (2019). What is different about digital strategy? From quantitative to qualitative change. *Strategy Science, 4*, 253–261.
Anteby, M., & Chan, C. K. (2018). A self-fulfilling cycle of coercive surveillance: Workers' invisibility practices and managerial justification. *Organization Science, 29*, 247–263.
Bailey, D. E., & Barley, S. R. (2020). Beyond design and use: How scholars should study intelligent technologies. *Information and Organization, 30*, 1–12.
Barrett, M., Davidson, E., Prabhu, J., & Vargo, S. L. (2015). Service innovation in the digital age: Key contributions and future directions. *MIS Quarterly, 39*, 135–154.
Bestsennyy, O., Gilbert, G., Harris, A., & Rost, J. (2020). *Telehealth: A quarter-trillion-dollar post-COVID-19 reality?* In Healthcare Systems & Services: McKinsey & Company.
Blackman, R. (2020). *How to Monitor Your Employees — While Respecting Their Privacy* (In Harvard Business Review).
Brynjolfsson, E., & McAfee, A. (2014). *The second machine age: Work, progress, and prosperity in a time of brilliant technologies: W*. W. Norton & Company.
Castelvecchi, D. (2016). Can we open the black box of AI? *Nature News, 538*, 20–23.
Chamorro-Premuzic, T. (2020). *Can surveillance AI make the workplace safe?* (In MIT Sloan Management Review).
Chearavanont, S. (2020). *How digitization and innovation can make the post-COVID world a better place.* In: World Economic Forum.
Dua, A., Mahajan, D., Oyer, L., & Ramaswamy, S. (2020). *US small-business recovery after the COVID-19 crisis.* McKinsey & Company: In Public & Social Sector.
Faraj, S., Pachidi, S., & Sayegh, K. (2018). Working and organizing in the age of the learning algorithm. *Information and Organization, 28*, 62–70.
Feldman, M. S. (1995). *Strategies for interpreting qualitative data.* Thousand Oaks: Sage Publications.
Flanagan, R. (2020). *Without broadband access, online learning not viable in rural, remote Canada* (In CTV News).
Gal, U., Jensen, T. B., & Stein, M.-K. (2020). Breaking the vicious cycle of algorithmic management: A virtue ethics approach to people analytics. *Information and Organization, 30*, 100301.
Garfinkel, H. (1967). *Studies in ethnomethodology* (p. 288). Englewood Cliffs, NJ: Prentice-Hall.
Goodfellow, I., Bengio, Y., & Courville, A. (2016). *Deep learning: MIT Press.*
Harwell, D. (2020a). *Cheating-detection companies made millions during the pandemic. Now students are fighting back* (In The Washington Post).
Harwell, D. (2020b). *Managers turn to surveillance software, always-on webcams to ensure employees are (really) working from home* (In The Washington Post).
Heaphy, E. D. (2013). Repairing breaches with rules: Maintaining institutions in the face of everyday disruptions. *Organization Science, 24*, 1291–1315.
Heaven, W. D. (2020). *Our weird behavior during the pandemic is messing with AI models* (In MIT Technology Review).
Hollander, J. E., & Carr, B. G. (2020). Virtually perfect? Telemedicine for COVID-19. *New England Journal of Medicine, 382*, 1679–1681.
Ing, V. (2020). *Delays expected for paper-based family sponsorship applications.* Vancouver, BC: Sas & Ing, Barristers & Solicitors, immigration law centre.
Kellogg, K. C., Valentine, M. A., & Christin, A. (2020). Algorithms at work: The new contested terrain of control. *Academy of Management Annals, 14*, 366–410.
Krishna, A. (2020). *IBM CEO's letter to congress on racial justice reform.* In *IBM, diversity and inclusion (Vol. 2020).* NY: Armond.
Lane, J., & Pittman, S. (2020). *Towards a rural digital economic strategy. In.* Calgary, Alberta: Canada West Foundation.
Lau, J. (2020). *Google maps 101: How AI helps predict traffic and determine routes.* In Google Official Blog: Maps.
Narla, A., Kuprel, B., Sarin, K., Novoa, R., & Ko, J. (2018). Automated classification of skin lesions: From pixels to practice. *Journal of Investigative Dermatology, 138*, 2108–2110.
Oborn, E., Barrett, M., Orlikowski, W., & Kim, A. (2019). Trajectory dynamics in innovation: Developing and transforming a Mobile money service across time and place. *Organization Science, 30*, 1097–1123.
OECD. (2020). *Food supply chains and COVID-19: Impacts and policy lessons.* In Policy Responses: OECD.
Pachidi, S., Berends, H., Faraj, S., & Huysman, M. (2021). Make way for the algorithms: symbolic actions and change in a regime of knowing. *Organization Science, 32* (1), 18–41.
Perrow, C. (1999). *Normal accidents: Living with high-risk technologies.* Princeton, N.J: Princeton University Press.
Ramsetty, A., & Adams, C. (2020). Impact of the digital divide in the age of COVID-19. *Journal of the American Medical Informatics Association, 27*, 1147–1148.
Rihl, J. (2020). 'If your mom can go in and see it, so can the cops': How law enforcement is using social media to identify protesters in Pittsburgh. In *In PublicSource (Vol. 2020).* PA: Pittsburgh.
Russell, S., & Norvig, P. (2003). *Artificial intelligence: a modern approach* (2nd ed.). Englewood Cliffs, NJ: Prentice Hall.
Shrestha, Y. R., Ben-Menahem, S. M., & von Krogh, G. (2019). Organizational decision-making structures in the age of artificial intelligence. *California Management Review, 61*, 66–83.
Simon, H. A. (1995). Artificial intelligence: an empirical science. *Artificial Intelligence, 77*, 95–127.

Singer, N. (2020). *Virus-tracing apps are rife with problems*. New York: Governments Are Rushing to Fix Them. In The New York Times.

Steele, C. W. J. (2020). When things get odd: Exploring the interactional choreography of taken-for-grantedness. *Academy of Management Review*. https://doi.org/10.5465/amr.2017.0392. in press.

Tomer, A., & Fishbane, L. (2020). *Bridging the digital divide through digital equity offices. In metropolitan policy program*. Washington, DC: The Brookings Institution.

Walden, S. (2020). *Covid-19 highlights digital divide and its impact on banking* (In Forbes).

Yoo, Y., Boland, R. J., Jr., Lyytinen, K., & Majchrzak, A. (2012). Organizing for innovation in the digitized world. *Organization Science, 23*, 1398–1408.

Yuan, E. S. (2020). *A message to our users* (In Zoom Blog).

Zammuto, R. F., Griffith, T. L., Majchrzak, A., Dougherty, D. J., & Faraj, S. (2007). Information technology and the changing fabric of organization. *Organization Science, 18*, 749–762.