

Covid-19 and the digital revolution

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Covid-19 and the digital revolution

Abstract

Since the 1980s, the digital revolution has been both a negative and positive force. Within a few weeks of the Covid-19 outbreak, lockdown accelerated the adoption of digital solutions at an unprecedented pace creating unforeseen opportunities for scaling up alternative approaches to social and economic life. But it also brought digital risks and threats that placed new demands on policymakers. This article assembles evidence from different areas of social science expertise about the impacts of Covid-19 in digitised societies and policy responses. The authors show how the pandemic supported changes in data collection techniques and dissemination practices for official statistics, and how seemingly insuperable obstacles to the implementation of e-health treatments were largely overcome. They demonstrate how the ethics of artificial intelligence became a primary concern for government legislation at national and international levels, and how the features enabling smart cities to act as drivers of productivity did not necessarily give them an advantage during the pandemic. At the micro-level, families are shown to have become ‘digital by default’, as children were exposed to online risks and opportunities. Globally, the spread of the pandemic provided a fertile ground for cybercrime, while digital disinformation and influencing risked becoming normalised and domesticated.

Keywords: Covid-19; official statistics; ethics of AI; e-mental health; smart cities; children online; social media policing

Introduction

Schwab (2015), the Founder and Executive Chairman of the World Economic Forum, argued that, building on the third ‘digital revolution’, the Fourth Industrial Revolution was distinguished from previous industrial revolutions by its ‘velocity, scope, and systems impact’. He anticipated that this

Fourth Industrial Revolution would develop exponentially rather than linearly and would ‘fundamentally alter the way we live, work, and relate to one another’. Five years later, Schwab & Malleret (2020) acknowledged that the world was facing a ‘defining moment’ as the pandemic precipitated the fusion of technologies, enabling digital technologies to extend their reach, almost uncontrolled, into every aspect of life.

In 2018, *Nature* devoted a supplement to ‘Digital revolution’, recognising that the digital world had become ‘crucial’ to the functioning of society but conceding that more needed to be done to realise its democratising potential (Hodson, 2018). Two years later in the same journal, Budd et al. (2020) portrayed digital technologies being harnessed to support public health responses to Covid-19 worldwide. For the same authors, while the emergency was depicted as a positive force driving the development and adoption of new digital technologies at scale and speed, their uninhibited implementation in some areas raised legal, ethical and privacy concerns, as well as intensifying risks for disadvantaged communities.

These concerns were not new. An OECD (2016) report had alerted researchers to variations in ‘what is legal’ and ‘what is ethical’ in the interests of data subjects from one national legislature to another. The European Commission had tracked the growth of internet usage across EU member states mindful of the need to ensure that digitisation would benefit the majority of the population by tackling global challenges, while avoiding risks to privacy and the worsening of digital exclusion (Eurostat, 2018).

By mid-2020, 58% of the world population were estimated to be internet users, compared to almost 90% in the European Union (Internet World Stats, 2020). Within the EU, the same study showed that usage ranged from nearly 98% in Denmark to less than 70% in Bulgaria. Studies within countries revealed that the pandemic had widened the digital divide. Pre-existing digital exclusion,

associated with socio-economic, gender, age and ethnic differences in access to online learning, teleworking and purchasing of goods and services, was compounded during lockdown (Allmann, 2020; Eurydice, 2020; Holmes & Burgess, 2020). The pandemic amplified the need for policymakers to address the fault lines that it had exposed in contemporary societies.

The social science contributors to this article provide evidence from their different areas of expertise about the positive and negative impacts of Covid-19 for digital society. They show how the pandemic accelerated the uptake of digital solutions, for example in data collection techniques; how it helped overcome what seemed hitherto insuperable obstacles to the implementation of e-health treatments; and how smart cities used or squandered their potential digital advantage. They consider the ethical, political and legal issues raised by the use of artificial intelligence, for example in surveillance, and the many risks associated with online opportunities, whether for children in social media, for the policing of cybercrime or for digital influencing and disinformation.

Official statistics in the time of Covid-19

Before the coronavirus pandemic, digitisation of data collection for official statistics was presented as having a major potential impact on society. Governments were gradually making greater use of administrative data while exploring and trialling new data sources to enhance the big data evidence-to-policy process (Allin, 2019[2021]).

While societies were under lockdown and with no understanding of what the ‘new normal’ would be, official statistical systems were called upon to live up to their function of serving government and society. Despite the challenges of the pandemic, official statistics continued to be published and developed. As across the rest of government, contingency plans were implemented and used to

respond to new requirements for information about how people, households and businesses were being affected by the pandemic.

The UK's national statistician appeared alongside government ministers (occasionally making solo media appearances) in his role as a member of the group providing scientific and technical advice to support government decision-makers during emergencies. The Office for National Statistics (ONS, 2020a) addressed wider needs through a range of new material on its website. Some 150 new products were made available, including detailed reports, blogs and daily roundups. In the short term, face-to-face survey interviews were replaced by more telephone and online interviewing, and by turning to other data sources. This direction of travel had to be abruptly scaled up as it became the 'new normal' for data collection and dissemination.

The need to exploit new data sources in reporting on the pandemic also revealed a latent tension between official statistics, as formally defined, and other official figures. The numbers of deaths linked with Covid-19 came from two sources. Figures for the number of deaths of people who had tested positive for Covid-19, along with the number of new cases of Covid-19 over a 24-hour period, were collated and released the following day by the government departments responsible for health and social care. These data were presented as official figures, rather than as official statistics. They were stated to be incomplete, they were inconsistent between different parts of the country, and changes were made in their coverage during the course of the pandemic. Their value lay in their timeliness: they gave an account of what was happening day-by-day in the health and care system.

The official statistics produced by the ONS were full, weekly counts of all deaths involving Covid-19, that is all deaths where Covid-19 was mentioned on the death certificate. A doctor could certify the involvement of Covid-19 as a contributory factor, based on symptoms and clinical findings, even if this was not the main cause of death; a positive test result was not required (ONS, 2020b,

Sections 5 & 6). These statistics were widely recognised to be of high quality because they were drawn from a long-established system of death registration. They also supported analyses of patterns over time, especially in how deaths exceeded or fell short of the average for the time of year. They were published eleven days after the end of the week to which they related.

The two sets were generally seen as contributing to a single picture of what was happening, thus putting a premium on statistical outputs that drew on both sources, enabling them to be compared and contrasted (ONS, 2020b, Section 3). Producing a global picture of Covid-19 deaths was even more challenging. The international comparability of Covid-19 data emerged as a contentious issue, both in terms of the compatibility of definitions and sources, and in interpreting the statistics in relation to different health and social care systems, and government responses to the pandemic.

This observation also chimes with increasing scrutiny of the approach whereby official statistics are usually considered to be only those derived from data generated within the official statistics system or imported into it. In practice, the boundary around official statistics has been tweaked to include statistics produced by other organisations that commit to the Code of Practice for Statistics on a voluntary basis (Allin, 2019[2021]). The intention is to enable users to assess whether to trust figures as they come across them, rather than having to turn to a limited number of official outlets to find the figures. MacFeely & Nastava (2019, p. 311) proposed that ‘official statistics switch from a purely production or manufacturing based model to a mixed business model: one combining the manufacture of official statistics with the franchising of production under license’. They made the proposal in the context of the search for data to help track progress towards the UN’s 2030 sustainable development goals. But it suggests a more widely applicable model of licensing or accreditation based on compliance with codes of practice that support the fundamental principles for official statistics.

Could part of the ‘new normal’ accelerated by Covid-19 for official statistics mean that they serve as the bedrock but not the full extent of public statistics? Should we be moving to include producers currently outside the formal official statistics system, if all these statistics can be curated together and underpinned with reference to common standards for quality and trustworthiness?

Artificial intelligence and research ethics in the Covid-19 context

Social scientists have long been aware of the problem of balancing the efficient management of information and intellectual freedom – the fundamental dilemma of moral agency in cyberspace – which has given rise to the need for regulatory policies governing artificial intelligence (AI) (Iphofen, 2017). UNESCO (2020) was not alone in attempting to set global standards for the ethics of AI, supporting the argument that more policymakers should urgently consider regulations addressing advances made in AI and robotics, as well as issues of ownership, management and control (Iphofen & Kritikos, 2019[2021]). The Covid-19 epidemic made these concerns more pressing, as AI came to be seen as part of the solution to lockdown (Kritikos, 2020a).

A health monitoring start-up, using natural-language processing and machine learning, correctly predicted the spread of Covid-19 before anybody else (Niiler, 2020). AI was used extensively and in various forms in the context of Covid-19 (Council of Europe, 2020). AI applications were introduced to track the pandemic in real time, to predict accurately where the virus might appear next, and to facilitate the development of an effective vaccine. AI helped to detect whether people had novel coronavirus from visual signs of Covid-19 on images on lung CT scans, to monitor in real time changes in body temperature through the use of wearable sensors, and to provide an open-source data platform to track the spread of the disease. AI was capable of processing vast amounts of unstructured text data to predict the number of potential new cases by area, and to forecast which

types of populations would be most at risk, while also assessing, evaluating and optimising strategies for controlling the spread of the epidemic (Kritikos, 2020c).

AI technologies were harnessed to produce new molecules that could serve as potential medications, or even accelerate the time taken to predict the virus's RNA secondary structure. The capacity of AI to search large databases quickly, scan approved drug databases (for other illnesses) and process vast amounts of medical data helped to accelerate the development of a drug that could fight Covid-19 (Mohanty, Harun AI Rashid, Mridul, Mohanty, & Swayamsiddha, 2020; Wakefield, 2020).

Other AI applications were used to deliver medical supplies by drone and disinfect patient rooms. They contributed to draconian enforcement of restraining measures for the confinement of the outbreak for unspecified durations: for example the use of facial recognition to track people not wearing masks in public; AI based fever detection systems; and the processing of data collected on digital platforms and mobile networks to track a person's recent movements. Certain AI applications could also detect fake news about the disease by applying machine-learning techniques for mining social media information and tracking down words that are sensational or alarming (Kritikos, 2020b).

AI not only created opportunities but also risks. It raised questions about the criteria used for the selection of relevant datasets and possible algorithmic bias. Not all public health systems have the capacity to collect the data needed to train algorithms that would be reflective of the needs of local populations, take local practice patterns into account, and ensure equity and fairness.

Arguably, the massive use of AI tracking and surveillance tools in the context of the Covid-19 outbreak, combined with the fragmentation in the ethical governance of AI, might have paved the

way for a wider and more permanent use of surveillance technologies, leading to a situation known as ‘mission creep’, with state authorities extending the use of these technologies for surveillance purposes other than public health long after the end of the pandemic (Kritikos, 2020c). To prevent AI from contributing to the establishment of new forms of automated social control after the epidemic subsided, governments were called upon to address these ethical issues in ongoing legislative initiatives on AI such as those assumed by the European Commission (2020b) and the OECD.AI Policy Observatory (2019).

The impact of Covid-19 pandemic on e-mental health policy in Estonia

In many areas of healthcare, Estonia is considered to be one of the most digitally advanced countries in the EU and is recognised internationally for its innovations in e-health (OECD/European Observatory on Health Systems and Policies, 2017, pp. 14–15). Before the pandemic, Estonian health professionals and the public at large had been reluctant to embrace innovations in e-mental health (Sogomonjan, 2020[2021]). The Covid-19 pandemic had negative effects for both individuals and societies, especially for people with common mental health disorders. An unanticipated consequence of the Covid-19 pandemic was that governments everywhere had to rethink the role of digital technology in healthcare (Green, 2020). This section considers how Covid-19 changed attitudes and practices in e-mental health in Estonian society.

The first Covid-19 case was identified on 27 February 2020. The Government of Estonia officially declared a state of emergency on 12 March. Restrictions were implemented on the movements of foreigners arriving in the country and on internal travel. All public gatherings were banned, playgrounds and sports areas were closed, and most planned appointments in healthcare institutions were cancelled. Although the spread of the virus was largely contained, the strict preventative

measures imposed during lockdown resulted in an increase in unemployment and domestic violence (Republic of Estonia Social Insurance Board, 2020). The pandemic exacerbated underlying health conditions among vulnerable people by increasing the risk of depression and anxiety for those forced to self-isolate from friends and family (Santini et al., 2020).

Already in early 2020, the Estonian Health Insurance Fund (2020a) had been planning to make available remote appointments with healthcare specialists. Covid-19 precipitated the need for telemedicine to prevent the spread of the virus and mitigate other impacts on society. The state intervened to enable mental healthcare services to be delivered online to reduce pressure on the overburdened healthcare system. During the emergency, 76% of all remote appointments were made in the field of psychiatry (Estonian Health Insurance Fund, 2020b). Psychological first aid was also made available through the national crisis hotline (1247 and 116 111), and on websites (www.palunabi.ee, www.peaasi.ee and www.lasteabi.ee), where questions from the public could be answered by specialists.

Arguably, ‘the Covid-19 crisis and global pandemic served as a defining moment for digital mental health’ (Torous, Myrick, Rauseo-Ricupero, & Firth, 2020). Previously, the introduction of telemedicine mental health services in Estonia had been hampered by legal debates regarding personal health data privacy, limited financial resources and policy priorities (Sogomonjan, 2020[2021]). General data protection regulation and national law on personal data protection allowed access to special categories of personal data in the case of public health emergencies, making it possible to overcome some of the legal barriers preventing greater take-up of digital mental health solutions during the pandemic. Scheduled outpatient appointments were replaced by virtual appointments, and online counselling and therapies were more readily accepted.

By accelerating the uptake of digital healthcare services and investment in personal health data tracing capacity, Covid-19 undoubtedly brought opportunities to extend access to e-mental health therapies, thereby facilitating teleworking for health professionals and helping to prevent overburdening and collapse of the healthcare system (Järviste, 2020). But the pandemic also created challenges and risks for mental healthcare. Fear of contracting the disease and social isolation caused additional anxiety and stress among people with underlying mental health conditions. Vulnerable patients, particularly older people living alone or in abusive relationships, with poor digital literacy skills or no access to basic technology were unlikely to use online services, exacerbating health inequalities and requiring action by policymakers.

Online risks and opportunities for families living under Covid-19

Research on children's experiences in a digital society has grown apace around the world, responding to the multiple challenges to their well-being posed by socio-technological transformation (Livingstone & Stoilova, 2019[2021]). Before lockdown, children went to school and saw their friends outside the home. While parents worried about their screen time, the digital future was the stuff of science fiction (Livingstone, 2018; Stoilova, Nandagiri, & Livingstone, 2019).

Under Covid-19, schooling suddenly went online, and life became digital by default. Technology became the way that children habitually interacted with the world: playing, seeing family, doing schoolwork, connecting with friends. Much of the infrastructure of childhood – education, social services, entertainment, civic and cultural institutions – moved online, including child activism (Cuevas-Parra & Stephano, 2020). More online risks were created for children's safety, as bullies,

scammers, groomers, fake news manufacturers and manipulators scaled up their activities online (End Violence Against Children, 2020).

When parents compared their own childhoods to those of their children, digital technologies often seemed to crystallise the difference. Pre-Covid-19, parents had time to think through steps they could take to balance family conflicts and shared togetherness (Livingstone & Blum-Ross, 2020). Under Covid-19, their previous coping strategies were no longer available to them. Disconcerting media headlines about screen time, gaming addiction, online sexual abuse and other cybercrimes demanded that parents address the very real challenges posed by Covid-19 in managing the technology (Staufenberg, 2020).

The focus in public discourse on digital technology risks under Covid-19 obscured the influence of other important changes on family life: transformations in family structure, job security, welfare provision, migration and identity politics, among others (Chambers, 2012). Arguably, it was these changes that played a dominant role in shaping parental expectations and fuelling their anxieties during the pandemic, since they imbued everyday technological decisions and conflicts with emotional intensity. More than screen time or social media habits, they accounted for most of the problems that children and young people were experiencing (Livingstone, 2018).

Families were unequally positioned when faced with the technological challenges of being locked down. Some families struggled to find reliable health information or effective ways of working online, or to stay in touch with distant relatives, while others enjoyed the greater time for hobbies or for spending as a family, both online and offline. These inequalities were most evident in the public policy row over the unfair consequences of moving from school attendance to online learning, given that many households lacked adequate technology and connectivity to support home-

schooling (Eurydice, 2020). Children with special educational or other needs could not be reached online by the systems of care that previously supported them offline.

The new normal of a digital-by-default society did not only involve a changed lived experience; it was also government policy. In the planned shift away from (expensive) in-person state provision, Covid-19 occasioned a step-change in increased reliance on the national digital infrastructure. The result went further than digital inequalities to include a seeming mandate for increased datafication, commodification and digital surveillance of family life by both state and commerce (Lupton & Williamson, 2017).

Open questions for post-Covid-19 research are whether the well-meaning efforts of families to find ways for children to play, see family, do schoolwork and interact with friends online under lockdown will have hastened a digital future in which people's lives are tracked and monetised in ways that few fully understand (Stoilova, Nandagiri, & Livingstone, 2019). Or will families have become more resistant to all things digital, more aware of the value of alternative ways of living, more determined to find their own balance and have their voices heard?

Smart cities and Covid-19

Smart cities aim to apply digital technologies to advance well-being of their citizens. A wide spectrum exists: at one end are cities using digital technologies and information very effectively to improve public services; at the other are cities that are merely 'smart washing' and adopting superficial technological solutions that chase the symptoms rather than causes of complex urban issues (Anand, 2020[2021]). Since cities depend on social connections, the agglomeration effects that drive the productivity advantage of cities became the main source of risk during the Covid-19

pandemic. As the pandemic swept through the world, cities were at the forefront due to their global connections, social interactions and population density. Spatial distancing and other lockdown measures had a direct effect on cities as services, transport, hospitality and leisure industries took the biggest hit in the economic downturn (OECD, 2020b).

Did smart cities manage the pandemic in a smart way? As the ‘track and trace’ approach to containing the infection was being trialled, smart cities might have been expected to have an advantageous starting point. Preliminary analysis of the top and bottom 10 in the 102 cities in the IMD (2020) Smart City Index suggests that the number of cases and deaths in the cities concerned were influenced more by national level policies and actions than by city level actions. Many smart cities seemed to have been caught as much unprepared for the pandemic as other cities without a smart-city platform. Whatever data advantage smart cities were supposed to have, their status did not appear to have helped them in coping with the virus.

The limited evidence available (author’s analysis) confirmed the pre-Covid-19 findings that cities with robust governance and participation mechanisms were likely to be resilient and manage crises better than those using isomorphic mimicry to look like a smart city (OECD, 2020a). Real smartness lay in adaptability, agility and delivering public services in innovative ways. According to this definition, many cities that were not on lists such as that of the Smart Cities Index performed well. Analysis of the policy responses from cities that tended to manage the pandemic most effectively identified several factors that may have contributed to their relative success: they had open, transparent and accountable leadership, and a partnership environment in which public, private and civic organisations and social networks could all work to deliver different types of services to a range of stakeholders. The role of reliable information provided in a manner that reduced confusion, together with the level of public trust in institutions was also paramount (Devine, Gaskell, Jennings, & Stoker, 2020; Henderson et al., 2020).

On the negative side, where trust in public authorities was weak, militias, gangs and neighbourhood associations used lockdown to legitimise their control. Despite guidance from the United Nations Office on Drugs and Crime (UNODC) (2020) to improve accountability of emergency relief measures, we can conjecture that lockdown also increased corruption and diversion of funds and relief equipment, manipulation of information for advantage and worsening of existing inequalities. In preparation for future pandemics, smart cities could learn from those that were most successful in containing the virus; they could protect their economies by adapting the inclusive policies introduced elsewhere, as well as their data quality and transparency tools, to enable them to play an important role in 'building back better'.

Viral misinformation: Covid-19 and social media

Not only did the rise of social media in the early twenty-first century revolutionise public communication, but it also transformed the potential reach of criminal behaviour, raising concerns about its use to spread hate crime, extremism and disinformation, as well as abusive, threatening and offensive content. Before the pandemic struck, police forces globally were under pressure to do more to regulate and control social media (Williams, Butler, Jurek-Loughrey, & Sezer, 2019[2021]).

To navigate the fear and uncertainty of the Covid-19 pandemic, people turned increasingly to social media to gather information and to engage in social learning. While this reaction could be empowering as a means of risk assessment and mitigation in the light of, at times, conflicting, ambiguous, and partial information, it also left people vulnerable to those adept at exploiting and capitalising on the fears, uncertainties and anxieties caused by the pandemic. Unsurprisingly, a

dramatic increase was reported in cybercrime: socially engineered phishing and ransomware campaigns, malware distribution, fraud, hate speech, the online sexual exploitation of children, and the distribution of illicit and illegal commodities (Europol, 2020).

The pandemic also proved to be an efficient vehicle for misinformation, disinformation, and rumour which, among other things, hampered public health responses and effective crisis communication by sowing confusion and distrust in official and medical guidance (Allington, Duffy, Wessely, Dhavan, & Rubin, 2020). As a result, the Director-General of the World Health Organisation (WHO) stated that the world was fighting not only the Covid-19 pandemic but an ‘infodemic’, that is an overabundance of information that obfuscates reliable guidance (European Commission, 2020a). Social media amplified the potential reach and impact of this phenomenon: approximately one third of social media users surveyed across six countries were found to encounter false or misleading information about the coronavirus (Nielsen, Fletcher, Newman, Scott Brennen, & Howard., 2020).

Traditional investigative and prosecution procedures remain outdated and ill-suited for policing this type of criminality. However, signs were found that transnational organisations, national governments, and platforms increasingly worked together to police social media communications during the pandemic. They adopted a more holistic approach by taking concerted steps to counter, remove and deprioritise misinformation. In the UK, the government created a centralised Rapid Response Unit to coordinate responses to false information related to Covid-19. Their actions included ensuring platforms removed content, provided direct rebuttals to false narratives and promoted accurate medical information (Cabinet Office, 2020). The Rapid Response Unit also engaged directly with social media platforms, academics, technologists, and other experts to ensure that the extent, scope and impact of misinformation during the pandemic was fully understood and responded to.

This approach moved away from traditional investigation and prosecution procedures. The greater involvement of social media companies and experts reflected the evolution of thinking on the topic as outlined in the Online Harms White Paper (UK Government, 2020), specifically in the acknowledgment by government that they were unable to mitigate the harms of online communications offenses alone. This new approach was welcomed, since it potentially ensured the greater use of evidence to inform policy and practice, especially in the light of the three major challenges of policing online harm: scale, the global nature of social media and the principle of proportionality in light of communications, such as misinformation, that may be harmful but not necessarily illegal.

Significant challenges remained. The pandemic highlighted the fundamental problem with the information ecosystem, namely the erosion of factual authority associated with ease of access to polarising information. To counter this situation, cooperation was essential to ensure the reframing of how information is accessed, labelled, prioritised and shared, especially in times when falsehoods can literally be fatal.

Covid-19 and the domestication and normalisation of digital disinformation

The archetype for studying digital disinformation has become the US Presidential election in 2016. The discovery that operators working for the St Petersburg based Internet Research Agency, engaged across social media platforms such as Twitter, Facebook and Instagram, to amplify distrust and discord in the lead-up to the 2016 vote, became an inflection point in how the dynamics and pathologies of the contemporary media ecosystem are understood. All the principal academic studies of disinformation published since 2016 pivoted around this episode. Some concluded that

the Russian interventions probably did have a material effect on the outcome (Jamieson, 2018).

Others though have urged caution, arguing the current methodological state-of-the-art in terms of measuring influence and impact, especially where it pertains to complex messaging, is relatively immature (Benkler, Farris, & Roberts, 2018).

The study of digital disinformation during the pandemic and policy responses developed to it suggested that our conceptual and empirical paradigm was over-dependent on the known features of the 2016 US case (Innes, Dobrova & Innes, 2019[2021]). This over-reliance became clear when we examined the role of misinformation and disinformation in manipulating public perceptions of Covid-19. One of our drivers for analysing disinformation and digital influencing after terrorism was to foreground how particular techniques for constructing and communicating distorting and disinforming messages could be detected in situations and settings other than democratic events.

Considerable public and political concern was expressed about multiple attempts to manipulate public perceptions of the causes and consequences of Covid-19, as well as the adequacy of policy responses to it. Areas raising concern included: conspiracy theories linking 5G mobile phone technologies; claims that coronavirus emerged from Chinese and American bio-weapon programmes (Kaszeta, 2020); and assertions that some drugs and substances provided effective treatments in the absence of supporting evidence (Freeman, Waite, Rosebrock, & Petit, 2020).

The global health pandemic confirmed and accelerated an extant trend in the causal dynamics of disinformation, and its normalisation and domestication. ‘Normalisation’ highlighted how misleading information became an almost expected and routine feature of the ways in which a profoundly polluted media ecosystem responds to public crises. Inspired in part by Vaughan’s (1988) conceptualisation of the ‘normalisation of deviance’, in her seminal analysis of the Challenger space shuttle disaster, the key dynamic is how what was previously seen as aberrant and

deviant was progressively accepted and tolerated. This is an apposite description of what was observed to be happening in terms of attitudes to misinformation and disinformation about Covid-19, where such reporting became so commonplace and prevalent that it was almost unremarkable. ‘Domestication’ conveys how, rather than emanating from the deliberate actions of foreign governments, disinforming and misinforming content was increasingly authored and amplified by domestic citizens for a variety of motives.

Equally however, this trajectory of development had a looping effect on the tactics and techniques utilised in (dis)information operations run by hostile states. Multiple allegations and claims swirled around that Russia, China and Iran, amongst others, were propagating a series of rumours and conspiracies about the causes and consequences of coronavirus. Significantly though, in many such instances they were just amplifying content originating within more domestic sources, rather than authoring such material themselves. If so, this represents an important new dynamic in the flow of misinforming and disinforming digital communications, and how public perceptions and political agendas associated with high-profile social problems were at risk of being manipulated. Such complexities present new challenges for constructing effective policy responses, given how governments deliberately tended to firewall agencies and departments focussed upon domestic issues and citizens from those engaged with foreign relations and external threats. In terms of how (dis)information flows and travels, it is not bound by any such considerations and conventions.

Conclusions

The examples provided in this article illustrate how the pandemic accelerated the adoption of digital technologies in some areas where uptake had been stalled or was only slowly progressing, such as data collection techniques, e-health online appointments and therapies, online working, learning, and social interconnectedness. New challenges were created, requiring the scaling up of production,

fast-tracking of digital supplies, construction of online platforms and video-conferencing products. These transformations did not come without a cost: the pandemic exacerbated existing challenges, demanding government interventions to prevent harm and social exclusion associated with teleworking and social networking on an unprecedented scale.

Even before the pandemic, social scientists recognised that technological development and economic growth did not necessarily result in social progress (Hantrais & Thomas Lenihan, [2021]). Their analyses and the questions they raise in this article reveal how the innovative digital solutions embraced during the pandemic to stop the spread of the virus and avoid economic meltdown may also have been used to justify restrictions on personal freedom and forms of surveillance that risk being difficult to reverse.

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