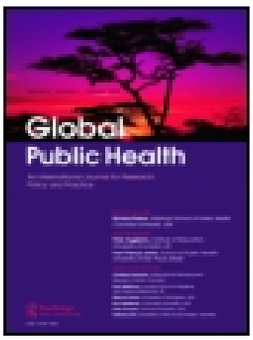

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The Smartphone Pandemic: How Big Tech and public health authorities partner in the digital response to Covid-19

Katerini Tagmatarchi Storeng and Antoine de Bengy Puyvallée

Centre for Development and the Environment, University of Oslo, Oslo, Norway

ABSTRACT

Digital technologies harnessed through smartphones have been deployed widely to support the response to Covid-19 internationally, often through partnerships between 'Big tech' and telecoms corporations and public health authorities. This paper provides an overview and critical analysis of the rapid rise of such new forms of public-private cooperation, focusing on their manifestation in the European region in the first phase of the pandemic. Drawing on a review of international media and documents, we discuss three main domains of public health action in which private technology companies and public health authorities have converged: contact-tracing, epidemic modelling and public health communication to manage the 'infodemic' of misinformation about the new coronavirus. Critics have raised concerns about how the digital response to Covid-19 may threaten privacy and enable greater state surveillance and control, and the possibility that semi-automated decision-making may exacerbate existing discrimination and inequalities. Our analysis extends such critiques by considering what the digital response to Covid-19 reveals about tech corporations' growing power to influence public health agendas. We discuss how they promote technical solutions to public health challenges that are politically seductive, but that have uncertain effectiveness and societal implications that warrant critical scrutiny.

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Introduction

Shortly after the World Health Organization (WHO) declared Covid-19 a pandemic, the *Washington Post* reported that, 'governments around the world are trying a new weapon against coronavirus: your smartphone' (Timberg et al., 2020). The current pandemic is not the first time that smartphones and the big data they gather have been recognised for their potential to contain disease outbreaks. In recent years, smartphone technologies have been experimented with in humanitarian settings (primarily in Asia and Africa) to address, with variable success, a wide range of infectious diseases, such as Ebola, dengue, malaria, cholera, and the HIV pandemic (Erikson, 2018). The Covid-19 crisis, however, has opened up a state of exception that, for the first time, has enabled the uptake of such humanitarian technologies in Europe and other high-income countries, and created the conditions for digital innovations like automated digital contact-tracing. The widespread use of digital technologies harnessed through billions of smartphones globally sets Covid-19 apart as the first 'smartphone pandemic.'

CONTACT Katerini Tagmatarchi Storeng katerini.storeng@sum.uio.no

The scale of the digital response has been astounding. By December 2020, at least 74 countries (see https://craiedl.ca/gpaw/) had launched apps to automate and assist established 'manual' contact-tracing, a core public health strategy for breaking chains of transmission by identifying and notifying close contacts of infected individuals, who can then present for testing and quarantine and isolation. Many countries have used smartphones to support other public health functions too, such as population surveillance, case identification, modelling and evaluation of interventions, and communication with the public. Smartphone apps are interconnected with a wider range of digital technologies used in the fight against Covid-19, including syndromic surveillance, machine learning and natural language processing, and digital diagnostic and genomics (Budd et al., 2020).

There has been much hype around these digital solutions. In August 2020, an article in *The Lancet* claimed that 'countries that have quickly deployed digital technologies […] have remained front-runners in managing disease burden' (Whitelaw et al., 2020). Contact-tracing apps, especially, have been widely lauded as effective. In Norway, where we live, Prime Minister Erna Solberg stated that 'if we are to get our everyday life and freedom back, as many people as possible will need to download the app' (Løkkevik et al., 2020). However, the data on the effectiveness of these technologies as public health interventions is still limited and weak. Critics denounce the hype surrounding new pandemic technologies as a form of 'technology theatre', in which 'governments and companies are focusing public attention on elaborate but ineffective tools to mask the absence of a solution to a complex problem' (McDonald, 2020). According to Stephen Roberts, the UK Government fêted its contact-tracing app as an 'indispensable asset in exiting lockdown' in the first phase of the pandemic to divert attention from their failures, which included 'a dismal track record of a lack of testing, shortages of PPE and medical equipment, and a demonstrable failure to adhere to scientific and medical evidence' (Roberts, 2020).

Such 'technology theatre' has focused public debate on technical issues (for example proximity tracking protocols and data storage solutions), and has led to much discussion about how the technology can be adapted to limit the possibility of abuse by the state. Media reports on how countries like China, Taiwan and Poland have used smartphone-enabled technology to enforce, rather than monitor, compliance with quarantine, have raised calls for better privacy regulations to safeguard against governments taking advantage of the state of emergency and to protect against 'function creep': the unforeseen use of the technology in the future beyond the scope first envisaged (see for instance: Goldenfein et al., 2020; Taylor et al., 2020).

From a critical social scientific perspective, these technologies can also be understood as expressions of a new form of 'digital governmentality', in which statistics, previously employed by government to discipline *populations*, are now considerably expanded in scope, accuracy and breadth through the use of big data, and absorbed into predictive analytics as a new technology for the personalised management of *individual behaviour*. Remarkably, power and domination are not only exercised by the state in this emerging governmentality, but also by the global technology industry, which holds the power to incentivise, guide and constrain individuals' behaviour (Badouard et al. 2016; Barry 2020; Zuboff, 2018). Crucially, critics have shown that digital technologies are not neutral tools, but may exacerbate existing discrimination and inequalities, for instance along lines of race, gender, class and socio-economic inequality (Benjamin, 2019; Noble, 2018; see also Our Data Bodies project[1]).

Such intersectional analyses have recognised how Big Tech has become imbricated in the discriminatory practices of the 'digital welfare state' and its algorithmic, semi-automated decision making (Eubanks, 2018; UN, 2019). However, although technology companies have asserted their presence in previous public health action, whether through the roll-out of online marketplaces under the Obama Administration's Affordable Care Act in the US or in various Universal Health Coverage initiatives in low-income countries, only a few scholars have critically analysed the implications for public health and health equity (Al Dahdah, 2019; Erikson, 2020; Ferryman & Pitcan, 2018; Kenworthy, 2019). In mainstream public health discourse, the tech sector's involvement has largely been taken for granted as essential to the roll-out of 'digital health' – promoted globally as 'the

penicillin of our time' (Australian Government, 2018) and essential for achieving the Sustainable Development Goals. This is especially the case in discussions about low- and middle-income countries (LMICs) facing significant health systems challenges, where digital health is said to offer opportunities for leapfrogging (Neumark, 2020).

In this paper, we extend such critiques by drawing attention to how Covid-19 is enabling the incursion of the global technology sector into public health practice, by analysing some of the 'partnerships' between technology firms and public health authorities that have accelerated in scope and depth during the Covid-19 pandemic (Taylor et al., 2020). We describe three main domains of public health action in which technology companies and public health authorities have converged in the first phase of the pandemic: contact tracing, epidemic modelling and public health communication.

Our empirical examples focus on interactions between European public health authorities and the US Big Tech firms (Google, Apple, Facebook and their subsidiaries) and multinational telecommunication firms. European countries are among those that have invested heavily in technological solutions during Covid-19, and have invited tech executives into the heart of policy-making relating to the pandemic, such as the United Kingdom's SAGE committee and the European Union (EU) (Lewis & Pegg, 2020). Many European countries also cooperate on disease control measures and on data regulation under the auspices of the EU. Relative to other regions, Europe is known to have a strong focus on privacy and data protection. Our discussion has relevance beyond Europe, however, given that digital technologies have global reach. Most attention has been paid to Asian countries, but African countries too are experimenting with digital contact-tracing and have previously been the testing ground for many humanitarian digital technologies deployed during the pandemic (Arakpogun et al., 2020). They are potentially less able than Europe to ensure the digital response is implemented in the public interest, since technology companies are known to exploit their relatively weak regulatory systems to expand into new markets (Al Dahdah, 2019).

Analytically, we apply the lens of the political determinants of health to analyse 'how different power constellations, institutions, processes, interests, and ideological positions affect health within different political systems and cultures and at different levels of governance' (Kickbusch, 2015; Ottersen et al., 2014). The new partnerships established during Covid-19 differ from formalised public-private partnerships that have been scrutinised within the global public health literature (Buse & Harmer, 2004; Rushton & Williams, 2011), in that they are more ad hoc, informal and opaque forms of engagement with little, if any, public accountability (Andonova, 2017). We join Naomi Klein in questioning 'how Big Tech plans to profit from the pandemic' (Klein, 2020), and these companies' motivations for assisting public health responses (French et al., 2020; Roberts, 2020). We are particularly interested in what the digital response to Covid-19 reveals about an ongoing reconfiguration of the balance between state and corporate power, to the latter's advantage. Because different forms of power are important sources of influence on global health priorities and strategies (Shiffman, 2014), we are attentive to the way in which tech companies' influence in the public health response not only derives from and consolidates their market power, but also expands the power they derive from technological expertise and access to data. As Shiffman warns, such 'epistemic power' should not be taken for granted as legitimate (Shiffman, 2014). As we show below, the practical consequence of Big Tech's epistemic power can be to challenge the authority of public health agencies and to entrench a techno-optimism within the pandemic response that obscures the importance of both established but more low-tech public health interventions and broader political and social determinants of health.

Our aim is to contribute to critical scholarship on the rising influence of corporate power within global health governance. This literature has given prominence to the pharmaceutical industry as well as industrial sectors that produce direct harms to human health such as tobacco, alcohol and food, and extractive industries (Kenworthy et al., 2016), but has paid little attention to technology companies (Al Dahdah, 2019; Kenworthy, 2019 are important exceptions). Such analysis is necessary given technology companies' increasing interest in the health sector internationally, and their potential to erode public health services by offering them themselves. Ironically, at a

time of rising public scrutiny and legal action over the size, power and influence of Big Tech globally, their activities during the current pandemic have largely escaped scrutiny (Dwoskin, 2020).

Methods

Our analysis draws on an ethnographic review of international media and policy documents published between February and October 2020 on the use of digital technologies in the pandemic response in European countries. We have analysed dozens of news stories, commentaries and op-eds in major media outlets with global reach like *The New York Times*, *The Guardian, The Financial Times, The BBC* and *Le Monde*, blog posts, webinars and podcasts from technology-focused think tanks and research institutes (including *The Centre for Strategic and International Studies, Chatham House, the Centre for International Governance Innovation, the MIT Technology Review; the Ada Lovelace Institute*), and the webpages of technology companies, public health authorities and international organisations. We have consulted materials written in English, French, German and Norwegian. We led a systematic analysis of Norwegian media's reporting of the use of digital technologies (over 181 news stories drawn from the Atekst database of Norwegian media sources), conducted as part of our boarder research into Norway's use of digital technologies in the pandemic response. We also attended relevant webinars organised by the Norwegian Institute of Public Health, the Norwegian Academy of Science and Letters, the University of Oslo, technology companies (Simula) and technology-centred associations (Tekna), and conducted in-depth interviews with seven individuals involved in developing the national contact-tracing app. Finally, although few academic articles have yet to analyse new pandemic technology, we also reviewed English-language academic literature published since the start of the pandemic, notably articles that summarise evidence on the public health effectiveness of digital technologies (see for instance: Budd et al., 2020; Whitelaw et al., 2020).

Below, we describe three domains in which technology companies and public health authorities converge in the use of pandemic smartphone technologies: contact-tracing; tracking and modelling the pandemic; and challenging the 'infodemic' of misinformation. While not exhaustive, these empirical cases illustrate how the smartphone has become an unregulated site for public-private cooperation in response to the Covid-19 crisis.

Big Tech and contact-tracing

The Covid-19 pandemic has demonstrated, for the first time, how technology companies and public health authorities converge in the use of smartphones for digital contract-tracing. Unlike the examples of pandemic modelling and the fight against misinformation that we discuss later, digital contact-tracing has not relied on established technologies or pre-existing public-private cooperation: it is the result of an experimental ad hoc solution.

Digital contract-tracing was first introduced and justified by academics and policy-makers in terms that were difficult to challenge. It was cast as an essential public health technology to control the epidemic and lift the most invasive social countermeasures (travel restrictions, school closures), until another technological solution, a vaccine, came along. Digital contact-tracing was foregrounded by claims that such technology had been important in epidemic containment in Asia both during the current pandemic and in previous ones (Whitelaw et al., 2020), combined with mathematical modelling suggesting that it could be a highly effective means of pandemic control. The Oxford researchers behind this modelling believed that 'controlling the epidemic by manual contact-tracing is infeasible', but that 'the use of a contact-tracing app […] would be sufficient to stop the epidemic if used by enough people, in particular when combined with other measures such as physical distancing' (Ferretti et al., 2020, p. 1). They concluded that the algorithmic approach proposed 'can have very large impacts and achieve sustained epidemic suppression, even with partial uptake' (Ferretti et al., 2020, p. 5).

Critics countered that apps are not a panacea. Success stories from Asia conveniently ignored the fact that digital solutions were part of coherent strategies that built upon solid and well-functioning public health and preparedness systems. 'Exit through the app store', an April 2020 report by a British think tank, warned that 'resources must not be diverted from manual contact-tracing or diagnostic testing to technology development' and urged authorities to delay the deployment of an app until capacity for testing and manual contract-tracing was increased. The report cautioned that 'testing and manual contact-tracing capacity must be sufficient to cover those segments of the population who are digitally excluded because of their age, disability, vulnerability, device ownership or digital literacy' (Ada Lovelace Institute, 2020, p. 11). Given past experiences with the abuse of algorithms in policing (Eubanks, 2018; Taylor et al., 2020), there were reasons to expect that even those with mobile phones who had already experienced the punitive surveillance tactics of digital tech may opt out from such systems or be more likely to view contact-tracing as a privacy invasion and avoid testing, because it is associated with technology that has caused past harms.

Despite early warnings, the international hype around this new public health technology led many European countries to launch digital contact-tracing projects during the spring of 2020, well before conditions for equitable access to testing and manual contact-tracing capacity were put into place. The European Commission also supported this, arguing for a collective European approach to ensure that the projects would work across borders and enable a quick reopening of the European internal market (EU, 2020). A common EU contact-tracing solution, however, appeared at first to be wishful thinking. Governments prioritised different technologies for tracking phones (Bluetooth versus GPS) and storing data (centralised in a unique national data base versus decentralised on users' phones) and chose different actors to develop the apps (public research institutes versus private companies versus public-private cooperation). Norway, for instance, first tasked a state-owned research institute with the development of an app using both Bluetooth and GPS tracking and a centralised database (Sandvik, 2020), while France commissioned a consortium of French public and private entities to develop an app with Bluetooth tracking technology and a central database (French Government, 2020). England also opted for a Bluetooth-centralised storage app and procured services from private company VMWare Pivotal Labs (Sabbagh & Hern, 2020). Germany, meanwhile, selected two private companies, Deutsche Telecom and SAP that used decentralised data storage and Bluetooth tracking.

The unlikely joint intervention in April 2020 of Google and Apple – who had never previously cooperated on a project – radically changed the situation. The two technology giants developed a solution using Bluetooth and decentralised data storage, which they claimed solved technical and interoperability difficulties, uniting in the name of a 'shared sense of responsibility to help governments and our global community fight this pandemic through contact-tracing' (Google, 2020a). Bluetooth had not been conceived for tracking purposes, and Apple had integrated safeguards in its operating system to limit Bluetooth tracking. This meant, in practice, that Bluetooth tracking could only work on Apple phones that were turned on and had the contact-tracing app open. The new Google-Apple exposure notification system (GAEN) solved these technical issues and was framed as optimal to protect privacy and avoid misuse of personal data for state surveillance and control, not least since public authorities are obliged to accept Google and Apple's extensive terms of services to use the GAEN system, which limit access to personal information (Google, 2020b). An exposure notification is activated once public authorities provide a code to an individual testing positive, with this individual expected to enter the code into a government-issued contact-tracing app using the GAEN. Users whose phones have been in contact with the positive individual's phone are then automatically notified with standard information about the procedure – without letting authorities know the identity of these case-contacts. Recently, Google and Apple went a step further by announcing that their system could work independently from public authorities' apps.

Privacy advocates, cryptographs and technologists quickly and vocally promoted Bluetooth and decentralised data storage, which was ruled by the European Data Protection Board as respecting

European privacy protection regulations (EU, 2020). The GAEN system, based on this decentralised/Bluetooth technology, offers powerful assurances of privacy that tap into the public's concerns and made it untenable for governments to continue with their initial, heavily criticised solutions that relied on GPS and/or centralised data storage. Both Norway and UK abandoned their first pilot apps to use the GAEN technology, though in doing so, downscaled claims about the centrality of digital contact-tracing to their pandemic response: for example, UK authorities now emphasise that any app needs to 'complement' rather than replace 'a comprehensive human contact-tracing service underpinned with a huge, nationwide testing capacity which is now available through the NHS Test and Trace service' (UK Government, Department of Health and Social Care, 2020). Oxford-based modellers behind the influential study supporting digital contact-tracing also moderated their initial optimism, concluding in December 2020 that digital contact-tracing 'isn't a silver bullet, but it's not just a gimmick' because 'small effects can accumulate over time' (Lewis, 2020, p. 387).

Although Apple and Google's stated motivation for developing its joint exposure notification system is to help public health authorities contact-trace, digital contact-tracing departs in fundamental ways from established 'manual' contact-tracing, even if human contact tracers also use technology to store data and may ask individuals to consult their smartphones to recall their movements and close contacts. GAEN's selling point is that it conceals contact cases' identities. However, contact-tracing relies precisely on authorities' ability to identify contact-cases and follow them up to ensure that they understand procedures for testing, quarantine and isolation, to offer empathy and reassurance, as well as to contextualise the risks within the context and geographical area in which the individual lives, given that human contract tracers know their populations in ways that the app does not. This anonymity makes follow-up of notified cases impossible. This is a significant limitation of GAEN given reports that people's ability to comply with quarantine recommendations is in any case low (Steens et al., 2020) and is exacerbated by the structural inequalities responsible for the disproportionate impact of Covid-19 on historically marginalised communities (Tai et al., 2020) Although intended to complement rather than replace contact-tracing, the GAEN system partly automates the contact-tracing exercise. It partly shifts the responsibility for contact-tracing from authorities to Google and Apple (whose algorithm, automatically notifies users), and also confers significant responsibility onto individual smartphone users, who must decide whether to obtain and enter the notification code when tested positive, and whether to get tested or quarantine when notified of a possible exposure.

Widespread claims that GAEN 'works' are difficult to scrutinise because only limited data is publicly available and because focus so far has been on app uptake and speed of notification, rather than the detection accuracy and the effectiveness of digital contact tracing as part of a broader public health strategy (Ivers & Weitzner, 2020). Germany is often cited as a success case for GAEN, but the main indicator has been the number of downloads, rather than actual use, of the app (23.5 million downloads by December 2020) (Lauck, 2020). However, according to German health authorities, only half of the people who tested positive used the app to notify their contacts. We do not know how many individuals out of the 100,000 who received a notification from the app followed recommended advice on testing, quarantine and isolation, nor whether the app notified them of an exposure that was not otherwise picked up by human contact tracers or their close contacts. In late September 2020, German laboratories estimated that only 3–6% of the tests nationwide were undertaken due to a notification from the app, but no information is available regarding whether these tests were justified, nor on the costs of these tests and self-imposed quarantines to the public health system and wider economy (Oltermann, 2020).We do not know whether contact tracing apps create a false sense of security among users, potentially resulting in more risky behaviour.

There are also legitimate fears that digital contract-tracing apps carry high opportunity costs (Erikson, 2020), since they require substantial initial investments and may have high operating costs. Germany spent €20 million on developing the app building on the GAEN system, budgeting

€3 million per month for operating costs (Deutche Welle, 2020). The UK reportedly spent £35 million to develop two digital contact-tracing apps, including £11 million for a pilot app that was later abandoned (Downey, 2020). By December 2020, the French app is estimated to have cost €6.5 million, but has only sent 296 alerts to its users. Parliamentarians have described the latter as 'useless, from a sanitary point of view' (Bayard, 2020). Digital contact-tracing is also likely to increase inequality in access for those who do not own a smartphone or are unable or unwilling to use the system for other reasons, such as previous negative experience of algorithmic-enabled discrimination or policing. Such challenges, however, appear to do little to limit faith that technical difficulties will eventually be overcome and that digital contact-tracing is worth pursuing.

Big data for social good and pandemic modelling

A second area of cooperation between technology companies and public health authorities during the Covid-19 pandemic is around mathematical modelling based on aggregated and anonymised location data from smartphones. Data derived from mobile phones' connection to the telecommunication companies' network and Big Tech companies' mining of GPS data through smartphone apps like Facebook, WhatsApp and Google Maps, is inputted into mathematical models to both predict the spread of the outbreak and to evaluate the effects of social countermeasures, such as travel restrictions, on population movement (Kucharski, 2020).

Within the EU, public-private cooperation in the use of geolocation data from smartphones in pandemic modelling was initiated in March 2020, with an EU Commission-organised consultation on access to mobile big data sets with European telecom companies and GSMA, the international business association of mobile telecommunication operators. All telecom companies reportedly agreed to cooperate in providing location data to the EU Joint Research Centre (Untersinger, 2020), which published three reports drawing on these data. The EU later endorsed the use of aggregated and anonymised location data in its recommendation 2020/518 for a 'common Union toolbox for the use of technology and data' to fight the pandemic (EU, 2020).

Unlike digital contact-tracing, which has developed directly in response to Covid-19, the public-private cooperation on pandemic modelling has older roots. For example, it builds on GSMA's Corporate Social Responsibility (CSR) programme 'Big Data for Social Good', which has been fronting the use of mobile big data to respond to societal challenges, particularly epidemics and humanitarian crises, since 2017. Even before that, computational epidemiologists were negotiating directly with telecom companies for pro bono access to their location data. In 2010 Flowminder, a non-profit organisation, obtained data from the Haitian telecom operator Digicel and published a widely-cited study mapping the spread of the cholera epidemic that followed the devastating earthquake (Bengtsson et al., 2011). Dozens of projects followed this landmark study and attracted considerable media attention to the field. Studies drew mainly on data from LMICs provided by over 20 telecom companies (see also: Erikson, 2018; Maxmen, 2019). The Norwegian telecom company Telenor, for instance, shared sets of mobility data from its subsidiary company in Pakistan to map the spread of dengue epidemics (Wesolowski et al., 2015) and to track population movements in Bangladesh following an extreme weather event (Lu et al., 2016), and is currently analysing data from Myanmar, Thailand and Bangladesh to map the spread of malaria.

It was not until the first outbreak of Covid-19 in Norway, however, that Telenor was willing to share mobility data from *Norwegian* users. Since at least 2016, they had been refusing researchers' demands for such data, due to fears of negative public reactions related to privacy concerns (Elnan, 2020). And yet, within days of the first coronavirus case being detected in Norway, the 'humanitarian' models developed on the basis of South East Asian users' location data were used to analyse Norwegian location data through a public-private cooperation between Telenor, the University of Oslo and the National Institute of Public Health (Skille & Tennoy, 2020). The models have

since directly informed the Norwegian government's decision-making on school closures, physical distancing advice and preparedness scenario planning.

GPS localisation data from smartphones extracted by apps such as Facebook or Google Maps also provide a valuable source of data that can be harnessed in pandemic modelling. Facebook has provided such data to enable researchers to model the disease spread of Covid-19 and to evaluate the effect of social countermeasures (such as travel restrictions and school closure) on population movement in Italy (Beria & Lunkar, 2020), France (Benkimoun et al., 2020) and other countries. One UK study (Jeffrey et al., 2020) integrated de-identified location data from Facebook and telecom company O2 to increase reliability. These data form part of the pool of evidence reviewed by scientific committees advising governments.

As with the telecommunications industry, Facebook's efforts build on, and are carried out under the rubric of, CSR and humanitarian programmes – in the above case, Facebook's 'Data for Good' initiative. Launched in 2017 to develop disaster maps to help humanitarian organisations identify where to focus aid efforts during disasters, the programme was rapidly scaled up to include over 30 partner organisations, including several UN agencies, non-governmental organisations and academic institutions – increasingly becoming an essential tool to inform disaster response (Cheney, 2018). Since May 2019, 'Data for Good' has been working towards the development of disease prevention maps by making available to researchers different types of de-identified big data, such as high-resolution population density maps, movement maps, and network coverage maps (Facebook, 2019).

Big Tech's cooperation with authorities through such CSR programmes confer positive media attention and provides reputational gains, by casting the companies as 'giving back' to communities. Demonstrating how big data can further the public interest through disease control initiatives provides a valuable antidote for companies who are facing growing scrutiny for the way in which they extract, commodify and monetise data from user interactions, interests and locations to modify behaviour (Zuboff, 2018). That the data is offered pro bono during a public health crisis does not preclude their eventual monetisation, however, and, according to our interlocutors, both Big Tech companies and telecom companies are devising mechanisms for future commercialisation of their surplus data.

Furthermore, whereas these CSR programmes have mostly focused on humanitarian emergencies in LMICs, the Covid-19 crisis is normalising and legitimising the use of the data in the European context, known to be the strictest globally when it comes to privacy standards. Yet the EU Data Protection Board ruled that the standard used to aggregate and anonymise the data used in Covid-19 modelling complied with European data protection legislation (EDPB, 2020), providing a legal approval stamp to what was until that point a self-regulated and non-binding practice (GSMA, 2020). This may provide a strong impetus to harmonise the practice globally (Kishore et al., 2020), a much needed exercise to attenuate controversy about the appropriate standards being applied to ensure privacy and ensure that these data are not used for other purposes (such as policing) or to discriminate against minority groups (McDonald, 2016; Taylor & Schroeder, 2015).

The pace of adoption of mobile big data into humanitarian work, and into public health during the current pandemic, is stunning. While there are reasons to celebrate the progress enabled by using such data, we must raise concerns regarding decision-makers' increasing dependency and overreliance on what are, after all, private data. This may later become problematic if data owned by the private sector becomes unavailable, or if companies owning the data decide to commercialise them instead of giving them pro bono through CSR programmes. It may also provide leverage to Big Tech at a time when governments are increasingly pressurised to regulate the sector.

Big Tech and the 'infodemic'

Our final example of collaboration between technology companies and public health authorities during the pandemic pertains to the management of misinformation about the new coronavirus,

which circulates rapidly through Facebook, Twitter, WhatsApp and other social media platforms accessed via smartphones and other personal computer devices. Such cooperation has taken place directly between national public health authorities and social media companies, and has been particularly significant between the tech sector and the *international* public health authority, the WHO, reflecting digital information's global reach.

As early as February 2, 2020, the WHO claimed that a 'massive infodemic' (an epidemic of misinformation) was spreading faster than the virus itself, and lamented that 'an over-abundance of information – some accurate and some not – […] makes it hard for people to find trustworthy sources and reliable guidance when they need it' (WHO, 2020a). The WHO recognised that managing this 'infodemic' would require cooperation with the Big Tech companies that own the social media platforms and algorithms responsible for its spread. As an op-ed in *The New York Times* put it, 'Without the support of social platforms, our efforts to stamp out viral misinformation feel futile' (Yasmin & Spencer, 2020). In the first days of the pandemic, the WHO therefore turned to Silicon Valley for help (Richtel, 2020).

Facebook has since worked closely with the WHO, building on existing efforts to limit the viral spread of anti-vaccination misinformation (WHO, 2019). On behalf of the WHO, it organised a roundtable with representatives from 20 Silicon Valley tech companies in February 2020, including Google, Pinterest and Twitter. Those present committed to enhance the visibility of accurate information on Covid-19, both by providing the WHO and national public health authorities with free advertisement credits to promote their public health messages, and by editing their algorithms to ensure that references to the WHO and national public health authorities' websites would appear first on every Covid-19-related search with 'a Covid-19 alert' indication. They also invited users to report 'harmful content' and pledged to remove false information from their platforms (GlobalData Healthcare, 2020).

Mark Zuckerberg, Facebook's CEO, suggested that the WHO could use the Facebook-owned WhatsApp platform to develop an automated messaging service (chatbot) providing reliable information directly to users across the world (Cheney, 2020). Launched in late March, the WHO-WhatsApp service claimed 'the potential to reach 2 billion people' (WHO, 2020b) via their smartphones, providing information about Covid-19 in 11 languages. WhatsApp also offered its services to national public authorities, reaching out 'to dozens of governments to assist their efforts to provide accurate information to the general public' (WhatsApp, 2020).

This glossy initiative attracted worldwide attention, casting positive light both on the WHO (in a period of political turbulence, with criticisms of the organisation's handling of the pandemic), and Facebook, which was, with the other Big Tech companies, facing anti-trust accusations in the US. Despite a history of contentious collaboration between WHO and private-sector actors, especially with Big Pharma, the WHO's Director General Dr. Tedros declared that 'we are proud to have partners like Facebook … that are supporting us in reaching billions of people with important health information' (WhatsApp, 2020).

Critics, however, have questioned both the sincerity of Facebook's commitment to counter misinformation, and whether it is appropriate for private corporations to be the arbiter over what constitutes accurate information, given that platforms like Facebook have routinely moderated information related to their business or political interests. A report published six months into the pandemic coined Facebook's algorithms 'a major threat to public health' and found that the ten most influential websites spreading misinformation had four times as many estimated views as the ten leading health institutions (Avaaz, 2020). Another report found that out of 569 notifications of Covid-19-related harmful content on Facebook, only 2.5% were removed and 3.3% labelled as false. The same study found that Instagram (also Facebook-owned) enabled the top ten anti-vaccination accounts to grow by 557,000 followers in only one month and described similar trends on other social media platforms (CCDH, 2020). The spread of misinformation led the British Parliament to launch an inquiry into social media companies' response to the pandemic. Its report, in July 2020, concluded that their current business model 'not only creates disincentives for tech

companies to tackle misinformation, it also allows others to monetise misinformation too' (UK Parliament, 2020).

Similarly, the benefit of the WHO-WhatsApp chatbot has not been ascertained. Despite its anticipated reach of up to two billion people, two months after launch it boasted only 12.6 million users (WHO, 2020c). We have found no further information about its uptake since. Limitations included the difficulty of maintaining user engagement beyond the first day of use (WhatsApp refused to allow the chatbot to send users unsolicited notifications), and the challenge of ensuring up-to-date information in a fast-changing context (Cheney, 2020). There are also questions about its ability to moderate information across linguistic and cultural lines. Critics also point to Facebook's obvious interest in promoting such an initiative since it legitimises it as a safe source of information – a paradox, given the notorious spread of misinformation across its platforms – and encourages people to download and use WhatsApp to access the service (Johns, 2020).

Furthermore, digital tech competitors claim that the decision to use WhatsApp may confer unfair market advantages by incentivizing the WHO, other UN agencies and humanitarian organisations to use the platform in the future, even though other digital solutions may be more suitable. The founder of one mobile health company argued that the WHO giving their seal of approval to one piece of technology, without a clear process for considering others, 'has significant weight on how other groups and ministries of health decide what to use', and may have unforeseen consequences, which ultimately affect the health of populations (Cheney, 2020).

Conclusion

The Covid-19 pandemic has accelerated the involvement of the global technology and telecommunications industry in global public health, often through ad hoc partnerships with national and international public health authorities. In this paper, we have described how these new forms of interactions play out within European countries, focusing on three examples: digital contact-tracing, pandemic modelling and management of the coronavirus infodemic.

Although the digital response to Covid-19 builds on previous experimentation with similar technologies to manage public health crises, primarily in in humanitarian settings, the scale at which smartphone technologies and data are being mobilised in response to Covid-19 is unprecedented. New innovations such as automated contact tracing have been rolled out for the first time, despite their lack of documented effects. In many ways, it makes sense to speak of Covid-19 as a 'smartphone pandemic'. As we have shown, the state of exception that Covid-19 has created globally has precipitated new forms of interactions between private-sector tech corporations and public-sector authorities around public health goals, enabling the incursion of tech into new domains.

Helping and profiting – Tech companies' motivations and interests for participating in the Covid-19 response.

As we have shown, many of the initiatives in the digital response to Covid-19 originate in past corporate social responsibility initiatives, whereby companies 'give back' by sharing technological know-how and metadata with researchers and authorities, ostensibly to help public health efforts. The innovation within digital exposure notification and contact tracing that Apple and Google have cooperated on, is also framed within the language of corporate social responsibility – it was done out of a 'shared sense of responsibility to help governments and our global community fight this pandemic', the tech giants claim (Google, 2020a).

But there is more at stake here than corporate goodwill. Apple, Google and Facebook's participation in the pandemic response helps to strengthen their brand equity by creating a positive image that entices consumers to continue purchasing from them over competitors: a beneficial byproduct at a time when they are under intense public scrutiny and anti-trust lawsuits due to their monopolistic corporate strategies. Additionally, corporate social responsibility schemes can also be used to

establish new markets and do not preclude the marketisation of these pro-bono services, for instance, by introducing user fees after demonstrating the service's utility to the public. Facebook/WhatsApp's joint experimentation with the WHO around chatbot during the pandemic might, for instance, help the company establish itself as a leader in the emerging chatbot market (Johns, 2020). The World Economic Forum argues that 'the Covid-19 pandemic is an accelerator for chatbot technology, helping people around the world get more and more comfortable with leveraging this tool for healthcare. As we move beyond the pandemic, the adoption of chatbots in broader healthcare applications will continue to grow' (Sundareswaran & Firth-Butterfield 2020).

Cooperating and pushing back – European governments' ambivalent relationship with Big Tech

Short of policy solutions, European authorities appear to have eagerly taken up technology companies' offer to experiment with digital tools to fight the Covid-19 pandemic. Big Tech offers technology and data that public authorities do not possess on their own and are more or less dependent upon to set-up a response to the pandemic. In addition, 'outsourcing' the digital response to private tech companies can also conveniently help public authorities assuage privacy activists' concerns that public health interventions relying on localisation data or digital exposure notification breach established norms about state surveillance. In Norway, for instance, tech experts opposed to the National Public Health Institute's contact tracing app on grounds that it breached privacy by tracking citizen's movements through GPS and centrally storing data, have been much more willing to accept Apple-Google's Bluetooth-based solution, which does not hand over personal data to the government.

Critics are rightly worried about how technologies ushered in during a state of emergency may consolidate state power, whether through expanded and coercive state surveillance and control, or through a more mundane shift towards semi-automated forms of governance based on algorithms and big data (Taylor et al., 2020). Such 'algorithmic governance' has been increasingly important both in pandemic preparedness efforts (Roberts, 2019; Roberts & Elbe, 2017), and decision-making more generally (Amoore, 2013; Andrejevic, 2019; Eubanks, 2018), but is taking on new life during the pandemic. The UK government, for example, has been criticised for relying too heavily on modelling in its pandemic response, at the expense of other evidence sources, to the detriment of public health outcomes (Ford, 2020).

On the other hand, European public authorities' increasing reliance on private tech companies in the pandemic response raises questions about their power relative to the tech giants. The involvement of multinational Big Tech companies headquartered in the United States in the pandemic response feeds into growing worries over Europe's 'digital sovereignty', and fears that the citizens, businesses and Member States of the EU 'are gradually losing control over their data, their capacity for innovation, and over their ability to shape and enforce legislation in the digital environment' (EPRS, 2020). It is for instance striking that public health agencies wishing to adopt Google and Apple's exposure notification technology as part of digital contact tracing efforts appear to have little if any choice but to accept the terms and conditions the companies impose.

Only a few European countries have publicly contested Apple and Google's involvement in digital contact tracing within the context of Big Tech companies threatening countries' capacity to regulate and retain control over their own digital infrastructures and data (Floridi, 2020). In June 2020, French parliamentarians tabled a bill to protect the country's 'digital sovereignty', warning that US Big Tech companies operating in the health field was equivalent to making personal health data publicly available forever and allowing Big Tech and Wall Street to profit from them. They asked instead to trust the state, which is already entrusted with its citizens' personal data (Le Monde, 2020). The bill did not pass, but France remains one of the few countries that has rejected the Google-Apple notification system and continues to use a centralised data storage app for contact tracing. Latvia has also accused technology companies of 'dictating' European democracies' response to Covid-19. 'In Latvia, we wanted to harness smartphone technology for

contact-tracing. We ran into a Silicon Valley-built brick wall', Ieva Ilves, adviser to the Latvian president on information and digital policy, wrote in *The Guardian* in June 2020 (Ilves, 2020). Pointing out that the GAEN system will not allow the national app to establish connections between contacts and carriers, she poses a fundamental question: 'how much can the decisions of sovereign democratic countries be overruled by technology companies?' As she concludes, 'The Covid-19 pandemic has brought this question to the fore for the first time. It will not be the last'. This debate intervenes in a context of increasing support for better policy and regulation of the digital sector in Europe – illustrated with the recent 'Digital Market Act 'legislative proposal from the European Commission – as well as the desire to enhance Europe's strategic autonomy in the digital space.

The digital response – implications for public health and society

On a basic level, the 'techno-theatre' surrounding the digital response to Covid-19 feeds into a techno-optimism that has become entrenched within global public health for the past two decades (Birn, 2005). Unquestioned claims of efficacy of digital tools abound, and feed into a public perception that digital technologies are inevitably better than the 'traditional' or 'manual' alternatives. The concerns around digital surveillance and privacy have, in many instances, distracted from broader discussions not only about the relative interests and influence of public and private actors, but also, at a more basic level, about whether these technologies actually work in the first place.

The few academic reviews that have been published suggest that countries that rapidly adopted digital means to facilitate planning, surveillance, testing, contact tracing and quarantine 'have remained front-runners in managing the pandemic' (Whitelaw et al., 2020, e439). But this observation does not prove causality. Despite the stringent scientific criteria applied to testing vaccines and other 'biomedical countermeasures' to the pandemic, the reality is that most digital technologies are unproven public health interventions (Anglemyer et al., 2020). The claims as to their effectiveness within real-life public health systems have not been peer-reviewed. The evidence upon which over 70 countries have developed and applied this technology derives largely from theoretical mathematical modelling and unsystematic observations across diverse country contexts. We do not actually know if and how contact tracing-apps, for example, perform relative to established 'manual' contact tracing systems (though there is growing evidence that they cannot replace them), or how digital technologies work in distinct health systems or social and political contexts. It is striking that despite recognising that 'it is impossible to measure and validate the solution's [the contact-tracing app] efficacy' (NIPH, 2020), public health authorities like the Norwegian Public Health Institute encourage citizens to download the app in order to reclaim daily life.

Our discussion of the 'Smartphone Pandemic' suggests the need for joint international strategies that regulate and evaluate the use of digital technologies to strengthen pandemic management and future preparedness – as well as to improve global public health more broadly. We need careful, independent assessments that go beyond descriptive statistics of downloads and notifications sent to interrogate, through in-depth research, how the technologies and data are actually used within real life settings, and with what benefits and limitations for public health practice. Given the established concerns about how digital technologies can 'automate inequality' (Eubanks, 2018), we also need intersectional analyses to establish how the new pandemic tech may exacerbate existing forms of discrimination and vulnerability. Finally, evaluations of the effects of the technological solutions we have discussed here should not be limited to assessments of public health impacts. We also need a broader public and academic assessment of how technologies ushered in during the Covid-19 crisis may be reconfiguring the power balance between the public and private interests in ways that will far outlive the pandemic.

Note

1. https://www.odbproject.org/.

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ORCID


Katerini Tagmatarchi Storeng http://orcid.org/0000-0003-0032-7006

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