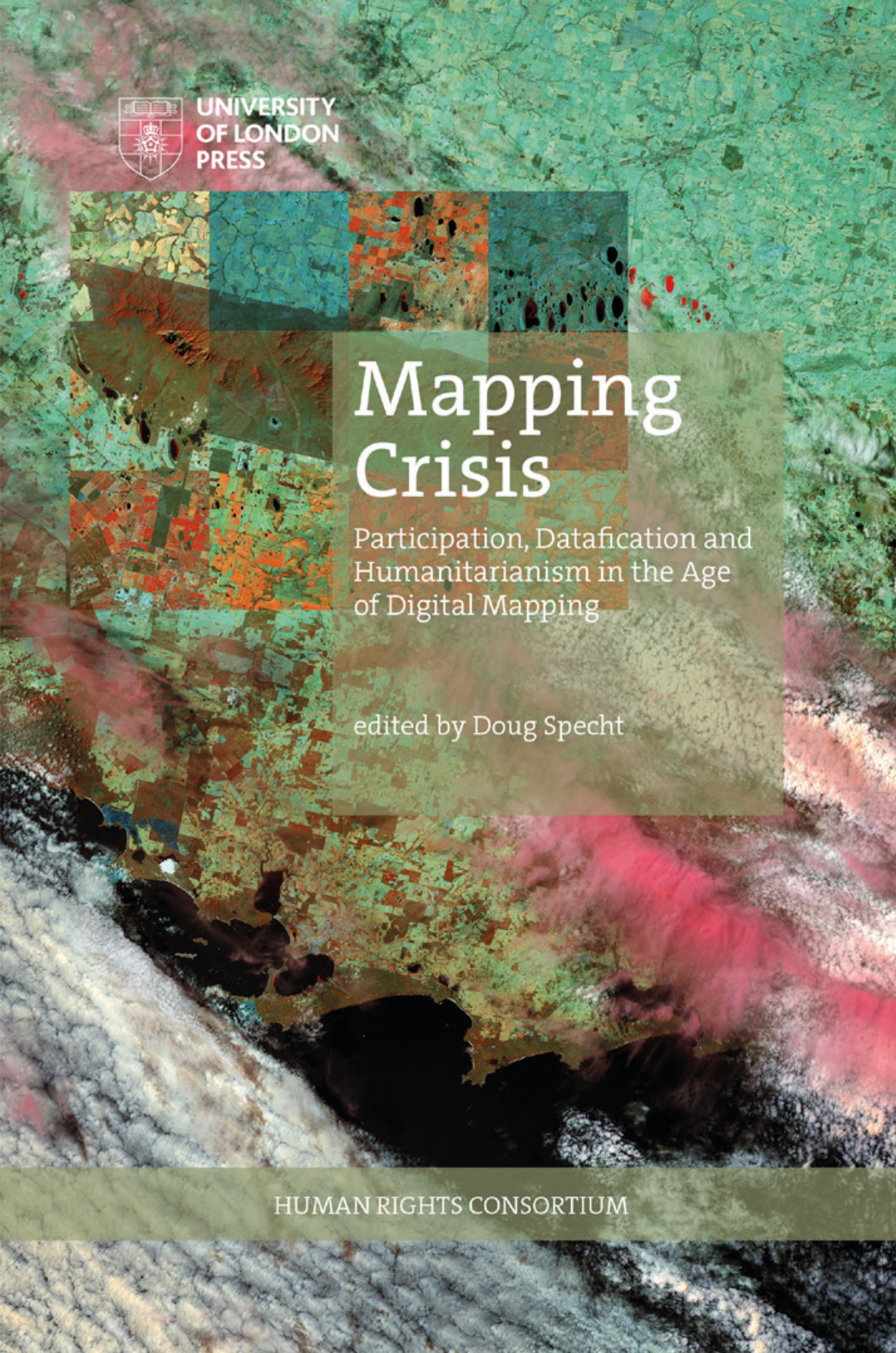
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edited by Doug Specht
HUMAN RIGHTS CONSORTIUM

Mapping Crisis

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HUMAN RIGHTS CONSORTIUM
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Contents

Illustrations

Figures

Tables

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Mapping Crisis: a reflection on the Covid-19 pandemic

This book is being published in the midst of the 2020 Covid-19 pandemic, an event that was beyond the imagination of most people at the time that the project started, but one that now grips the world and is one of the principal factors in how we presently organise our daily existence. It was suggested that we might add some information to the book about these changes and how they relate to the stories and research contained within. After much thought, it was felt that this preface was a more suitable space for such reflection. While there is no doubt at all that many of the chapters within this book could have easily been about the response to the Covid-19 outbreak, to insert this new narrative would have been to erode the experiences of those people who feature in these chapters. While the pandemic has rightly become a focus of much of the planet, it has already drawn our attention away from other inequalities and struggles around the world. This book though, despite being almost entirely finished before the pandemic was declared, has much to teach us about how we might respond to this global crisis. The pandemic, and our response to this crisis, has thrown up a great many questions in relation to how we use, collect, map and understand data, many of which are explored in these chapters.

Epidemiology and mapping have a long history, with early examples being Shapter's 1832 maps of cholera in Exeter, UK, and then the more famous maps of cholera deaths produced by John Snow in London. These maps and their authors were credited with bringing new understanding of waterborne disease and saving many lives. While now we often look back on these maps as being unquestionably useful and accurate, the results of the map production, rather than their process is what is what sticks in our minds. Yet, it is important to remember that at the time these maps were widely dismissed, and often misinterpreted as supporting the prevailing thoughts of the time that cholera was airborne. Indeed, Snow's maps become more famous than Shapter's not only because they were of London, but because of the evocative story of him striding in to Broad Street and tearing off the handle of the community water pump – an act required precisely because his data and mappings were not initially well received. As the world grapples with mapping and tracing the Covid-19 pandemic, the data and maps produced are also questioned by those who observe them. Data is being used to drive the daily movements of billions

of people in a way that we have never before seen, but the interpretations and collection of this data are wholly problematic – doctors and politicians looking at the same data draw wildly different conclusions about the course of action. People are being instructed to stay home, go to work, wear masks, or send their children to school based on the invisible hand of data. While I do not suggest we shouldn't be harnessing all the tools we can in the fight to save lives during this pandemic, it has also brought many issues of 'mapping crisis' to the fore. Issues of privacy, control, vicarious mapping, the datafication of people, incomplete data, dark data, prejudice in reading data, and inequality of access – even in the richest countries, those without a smartphone will be omitted from any digital tracing apps designed to protect people.

This book is not about epidemiology, it is about mapping many other moments of crisis, but the stories within foretell these issues. Throughout the book the authors explore and challenge the way in which people are mapped and turned into data when they are at their most vulnerable – in moments of crisis. These chapters explore the politics within data and ask why there is such uneven distribution. In asking these questions though, this book also offers solutions and hope. From active counter-mapping projects that show how to include voices and peoples often marginalised, to warnings of where things can so often go wrong, there are many lessons within these pages to guide us through using data to tackle the Covid-19 crisis.

Covid-19 has brought the world of data-driven crisis management to the doorstep of the whole world, but these are not new experiences. People around the world have already been reduced to data points, and had their lives dictated by algorithm, computation, and the biases built into these technologies. Many more are also pushing back with counter mapping and participatory practices that aim to force the inclusion of subjugated voices and knowledge. This book then is about those who have already been mapped or made maps in times of crisis, and through these pages lie many of the critical questions, and some of the answers, to mapping the Covid-19 pandemic.

Doug Specht

Abbreviations

AEDH	European Association for the Defence of Human Rights
AI	artificial intelligence
AIS	automated identification systems
AJPES	Agency of the Republic of Slovenia for Public Legal Records and Related Services
ARC	American Red Cross
BPRM	Bureau of Population, Refugees, and Migration
CBI	cash-based intervention
CCTV	closed-circuit television
CDSTs	citizen data scientist tools
CHAT	cultural-historical activity theory
CILD	Italian Coalition for Civil Liberties
CNVOS	Centre for Information Service, Co-Operation and Development of NGOs (Slovenia)
CPC	Commission for the Prevention of Corruption of the Republic of Slovenia
CRRF	Comprehensive Refugee Response Coordination
DHN	Digital Humanitarian Network
DJI	Dajiang Enterprises
DUI	driving under the influence
EOC	Uganda Ministry of Health Emergency Operations Committee
ESA	European Space Agency
EU	European Union
FSD	Fondation Suisse de déminage
G8	Group of Eight
GDP	gross domestic product
GIS	geographic information system
GMDAC	Global Migration Data Analysis Centre
GPS	global positioning system
GPSDD	Global Partnership for Sustainable Development Data
GPX	GPS Exchange Format
HDX	Humanitarian Data Exchange
HOT	Humanitarian OpenStreetMap Team

IAA	Institute for Applied Autonomy
ICMP	International Commission on Missing Persons
ICRC	International Committee of the Red Cross
ICT	information and communications technology
ICT4D	information and communications technology for development
IDPs	internally displaced persons
IOM	International Organization for Migration
IT	information technology
JOSM	Java OpenStreetMap Editor
MFERAC	Ministrstvo za finance enotno računovodstvo (Ministry of Finance Unified Accounting)
MP	Member of Parliament
MSF	Médecins sans frontières
NAM	Non-Aligned Movement
NASA	National Aeronautics and Space Administration
NATO	North Atlantic Treaty Organisation
NGO	non-governmental organisation
NULP	North Ugandan Land Platform
OCHA	United Nations Office for the Coordination of Humanitarian Affairs
ODbL	Open Database Licence
ODK	Open Data Kit
OECD	Organisation for Economic Co-Operation and Development
OFPRA	Office français de protection des réfugiés et apatrides
OGD	open government data
OPM	Office of the Prime Minister (Uganda)
OSM	OpenStreetMap
PMO	parliamentary monitoring organisation
POS	point of sale
PPA	Public Payments Administration
QGIS	quantum geographic information system
ROV	remotely operated vehicle
RPU	Register of Budget Users
SBTF	Standby Task Force
SDGs	sustainable development goals
SMGI	social media geographic information
SMS	Short Message Service
SPCS	State Plane Coordinate System
UAV	unmanned aerial vehicle
UBOS	Uganda's National Bureau of Statistics

UN	United Nations
UNDGC	United Nations Department of Global Communications
UNGGIM	United Nations Global Geospatial Information Management
UNHCR	United Nations High Commissioner for Refugees
UNICEF	United Nations International Children's Emergency Fund
USGS	United States Geological Survey
USSD	unstructured supplementary service data
UTM	Universal Transverse Mercator
UV	ultraviolet
VGI	volunteered geographic information
WaSH	water, sanitation and hygiene
WFP	World Food Programme
WTM	WatchTheMed
XML	Extensible Markup Language

Introduction: mapping in times of crisis

Doug Specht

We are in the middle of a revolution, or so the mantra goes, our world having been reinvented through digital technologies, changing mapping techniques and the aerospace industry. Data are at the heart of this revolution, one that, according to the United Nations (UN) Secretary General's report *A World That Counts*, is a revolution for equality (cited in Satterthwaite, 2015). The coupling of vast data sets with geographic information systems (GIS) has already and will continue to change the world through knowledge sharing and codification (Hendriks, 1999). Increased computer penetration and ever-increasing speeds of internet access are transforming the world into an e-society, allowing more people to provide data about their lived experience, potentially improving the health and well-being of all whom it embraces (Fife and Pereira, 2008). Tim Berners-Lee's vision of a connected world with easy knowledge sharing for the benefits of humankind seems within grasping distance (O'Hara, 2004) and geospatial technologies are playing an increasingly large role in the way in which we understand and also create the world around us (Specht, 2018). We are witnessing an ongoing globalisation of space and a reshaping of the local through the accumulation and deployment of such technologies, leading to a situation in which space is not only homogenised (and global), but also always fragmented (Kirsch, 1995). Nowhere is this more apparent than in the humanitarian sector, where the rise of digital humanitarianism has seen a huge shift in the processes of mapping, now viewed as a vital tool in moments of crisis. These changes have themselves created a crisis in the humanitarian sector, which must now wrestle more than ever with the dualities of datafication, 'Othering' and the participation of some of the most vulnerable people in the world.

Geotagged digital photos, aid requests posted on Twitter, aerial imagery, Facebook posts, Short Message Service (SMS) messages, drones and many other tools now form part of the digital landscape of the humanitarian sector. These new and rich data streams are often brought together through mapping practices that are in many ways able to offer unprecedented depictions of communities' needs within a crisis. Yet, it is also understood that the cartographic order of the world has forced many peoples into an imperial

logic under the no-win situation often referred to as 'map or be mapped' (Edney, 2019; Paglen, 2008). Maps and data are not only poor at describing the qualities of the relationships of everyday life, but are also born of power that has traditionally been used as an instrument of both colonialism and the contemporary geopolitical ordering of the world (Paglen, 2008; Specht and Feigenbaum, 2018). These issues are both alleviated and compounded by the growth in the amount of data being collected, not only harnessing global positioning systems (GPS), but also sound-level, light and accelerometer sensors, as well as a wealth of 'social' data collected through means such as social media. Aggregating data from these diverse and plentiful sensors enables new forms of monitoring societal change and have become a mainstay of humanitarian responses (Buckingham Shum et al., 2012). The kind of abstract scientific knowledge collected in this way may seem universal, but in the real world, it is always integrated with supplementary assumptions that render it culture bound and parochial. The mode of communication itself also conveys a set of tacit cultural and social assumptions or prescriptions (Wynne, 1992). These issues are accentuated through digitisation, in which information is converted to bits – malleable, electronically stored bits that can erode cultural objects, information cultures and politics. As we attempt to manage information, information itself mutates into new forms that often require new types of management (Jordan, 2015).

This book concerns itself with one particular type of management, that is data management and codification undertaken through the use of GIS and other mapping practices such as citizen sciences and aerial mapping with drones. PGIS, and its related practices, evolved from the bringing together of a number of fields including geography, cartography and database management (Haklay and Tobón, 2003). These kinds of systems have been around since the 1960s, and can even be traced back to the early days of computing in the 1950s when the military began to see the importance of connecting geography with the new power of computing (Haklay, 2010). Despite Esri,[1] one of the most powerful mapping companies, emerging in the 1970s, and software that would allow personal computers to develop GIS products appearing in the 1980s, the term GIS itself was not coined until 1992 (Haklay, 2010). The 1990s then saw a great deal of development in relation to GIS with companies such as Garmin (est. 1989) developing ever-more powerful GIS- and GPS-based systems. However, these remained out of reach of most people. The level of complexity and multidisciplinary knowledge required to operate them was too significant a barrier to entry. This also meant that the control over these maps, and the power they represent, has always rested with organisations connected to the military or

1 Formerly known by its full title, the Environmental Systems Research Institute.

state, for example Ordnance Survey in the United Kingdom (Ballatore, 2014; Evans, 2013). Yet, more recent changes in web-based geo systems and open-source GIS have reduced both the technical and financial entry points into digital map-making (Goodchild, 2009). These new resources initially included Google Earth and Google Maps, introduced in 2005 (Crampton, 2009), but now encompass a huge range of tools, including OpenStreetMap (OSM) (est. 2004), and allow maps to be built from the bottom up, by people and not governments, mapping alternative visions of society (Evans, 2013).

The bringing together of GIS and the Web 2.0 has created a new space, termed the 'Geoweb' (Atzmanstorfer et al., 2014). This has allowed many more individuals, organisations and companies to make their own maps, but more importantly, like the Web 2.0 itself, this has also allowed for crowdsourcing of information and collective map-building through what is often referred to as volunteered geographic information (VGI) (Walker and Rinner, 2013). Many humanitarian projects rely heavily on the volunteered information provided by the public in order to build their maps, and in an 'app economy'[2] more and more people are contributing to VGI, knowingly or unknowingly (Tene and Polonetsky, 2012, p. 267). VGI data is most often used to make 'mash-ups'[3] of maps where data is drawn from multiple sources, including base maps made available by the historical custodians of geographic information and other state-owned data sets (Atzmanstorfer et al., 2014; Ballatore, 2014; Brown et al., 2013; Crampton, 2009).

These changes to the way in which humanitarian work has been carried out has resulted in a very different landscape of response. While much of the work is carried out by traditional players, to only examine these would be a mistake. It must be also acknowledged that there is a multitude of 'minor' figures at all stages of codification and legitimisation who all play a part in the transformation of information and data within the humanitarian context (Lorimer, 2003). Digital humanitarianism has seen not only more non-governmental organisations (NGOs) and volunteer organisations enter the field, but also many more corporations and private, for-profit, businesses who are set on making humanitarianism their business model (Burns, 2019). This, coupled with what United Nations Global Pulse (UNGP) (2012) have termed a 'data deluge', has seen a significant change in who is employed in information management processes, as well as the collecting of ever-more data (Hunt and Specht, 2019).

2 'App economy' refers to the range of economic activity surrounding mobile applications. Mobile apps created new fortunes for entrepreneurs and changed the way business is done.

3 Mash-ups is a colloquial term used to describe maps created by combining multiple, perhaps classically incompatible maps or data sets to create a new map. Much like mash-up tapes (Miller, 2006).

Despite all these new actors in the humanitarian sector, the basic entry requirements for utilising GIS have not actually moved all that much (Elwood, 2006); fast internet, a computer or tablet are still required for producing the map tools themselves, even if a mobile phone is sufficient to provide the data. Indeed, the power and knowledge needed to process the vast amounts of data now available have become increasingly out of the reach of much of the world. This means that the control over the data produced is still in the hands of tech companies and larger humanitarian organisations (Haklay, 2013). Furthermore, what lies at the heart of a mapping project is the classification and codification of real-world objects into taxonomies and terminology, this again is done by those trained elites or corporations who make the software (Brown et al., 2013). It is then important to explore and examine these contradictions, which suggest, on the one hand, that people are better represented and aided in moments of crisis as more data is produced about and by them. And, on the other hand, that the codification of this data remains the task of a small number of people and organisations often from outside the situation itself.

Latour, in his work on the non-human, notes that as technology increasingly mediates society, the interconnections of humans and non-humans become increasingly complex (Latour, 1988; Kirsch, 1995). The idea that this is a simple transformation is, however, clearly a myth (Jordan, 2015). The appropriateness of these technologies to carry out this mediation is a complex issue, as they are designed by people with various degrees of understanding of sociology and technologies (Haklay, 2010) and are positioned within Western scientific patriarchal capitalism (Kirsch, 1995). When it comes to the world as experienced by humans, objects and their values can also be tied to complex sets of concepts and conventional rules governing their use, so there is an important sense in which we can, and indeed must, learn about some of the affordances that these new humanitarian technologies and interventions offer (Hutchby, 2001).

Affordances are functional and relational aspects that frame, while not determining, the possibilities for agentic action in relation to an object. In this way, technologies can be understood as artefacts that may be both shaped by and that shape the practices humans use in interaction with, around and through them (Hutchby, 2001). If the innovation, integration and stabilisation of a technology in society are processes moulded by the actions of scientists, workers, capitalists, commuters and mayors, and thus a wide range of social contingencies, then where does society end and technology begin? Theoretical analyses have constructed a divide that places humans on one side and their technologies on the other, thus representing an artificially folded society (Latour, 1988). Conversely, Latour offers a process-oriented definition of high

technology as a complex and dialectical association of humans and 'non-human actors'. In Hutchby's (2001) words, high technology is 'a shifting network of actions redistributing competencies and performances either to humans or non-humans to assemble in a more durable whole an association of humans and things and to resist the multiple interpretations of other actors that tend to dissolve away the set up' (p. 445). Technology, in this light, is a means of eliciting specific ends, but one that is always open to interpretation, resistance and change (Kirsch, 1995). In choosing our technology we become what we are, which in turn shapes our future choices (Feenberg, 1991).

It is then important to examine in detail these contradictions (Parker, 2006). To detach newer processes of humanitarian mapping from their background in GIS would be unwise (Weiner et al., 2002). The whole practice is somewhat of a movable feast, with both geospatial and data infrastructure technologies changing rapidly and with more people being connected to the resources that allow them to engage, many of these new practices are now somewhat removed from the critical discourses of the 1990s (Elwood, 2006). Approaching mapping as a spatial practice helps us to better understand them as a form of reframing societies rather than just remapping them (Bryan, 2011). In the same vein, these tools must not be examined as a tool that can be picked up and then put down again; rather these mappings become an intrinsic part of the fabric of everyday life, even after a crisis has passed (Johnson et al., 2005). It is certain that the role of citizens has shifted from being purely the object of maps to being increasingly involved in the creation of maps, but this has not turned maps into neutral objects separated from power, nor has it moved power to the citizen (Pánek, 2016). Regardless of the size of our data sets, any representation will necessarily exclude (Verplanke et al., 2016). Furthermore, the process of mapping has long been seen as instrumental in the forming of the Other, and with that the subjugation of the Other (Specht and Feigenbaum, 2018). Quite clearly an ever-more salient issue within the context of humanitarianism. It is essential too then that while collecting more data, it should be understood that this does not solve the deep psychological issue of feeling watched and tracked, which may well reduce the desire of people to participate in their own development and politics. Without additional safeguards and regulation around the way that data is used, collected, shared and then used for resource allocation, all these technological innovations become self-defeating in the face of the human desire for privacy (Dumbill, 2013).

The problem then is that codified expertise is really about speaking *for* others, and is not based upon a lived experience (Gaventa and Cornwall, 2008). The contradictions are deep and complex. There is a notion that scientific knowledge has much to contribute to the humanitarian sector; at the same time, local knowledge needs to be conveyed in a way that is understandable,

but that also respects its tacit nature, and this is a gap that is hard to bridge (Coletta and Raftopoulos, 2016; Compton, 1989; Sillitoe, 1998). These issues of legitimisation are compounded by the small number of actors and gate keepers through which knowledge passes. The knowledge that so greatly affects people's lives is held in the hands of a monopoly (Gaventa and Cornwall, 2008), a situation that often forgets, or ignores, the importance of knowledge in relation to who created it (Rose, 1997). So, while there has been a significant rise in the level of participation within the humanitarian sector (Tufte and Mefalopulos, 2009), the power of knowledge ultimately remains with the planners, the technicians and Western scientists. It has been accepted that more consultation needs to take place with beneficiaries (Sillitoe, 2000), but this has become a constant seeking of universalism of knowledge through the Western discourse, which often fails to account for the non-linear nature of alternative knowledges leading to deep ethnocentrism (Rose, 1997; Sillitoe, 1998). These issues are hard-baked into the notion of legitimisation (Forester, 1982). At every stage of information-seeking, searching with algorithms, interpretation and use, data are passing through stages of mediation, contextualisation and codification (Newsom and Cassara, 2011). If these mediated stages are based upon the historic prejudices and colonial power structures of old, then access to data in and of itself does not create equality, but instead drives a further divide between peoples (Catlett and Ghani, 2015). In order to overcome this issue, there needs to be a great deal of understanding and willingness to work through these problems. While there are many who might wish to do so, in the face of the juggernaut of what Burns (2019) terms 'philanthro-capitalism' within digital humanitarianism, finding community members and activists who can spare enough time and who are suitably motivated and knowledgeable is difficult at best, and their motivations can hardly be separated from their personal needs (Harlow, 2012; Mercea and Funk, 2016). Tools that bring people together are needed, but this is not a solution itself, and empowerment remains a complex issue (Perkins, 2007). People have a desire to be better informed generally (Carver, 2003), but no population is homogenous in the way data often present and the goals and aims of a community are often diverse (Bennett and Segerberg, 2012; Weiner et al., 2002), yet the new digital divide of algorithms and big data seeks homogenisation, which conversely leads to bigger divides between the haves and the have-nots and can also manifest as increased divides within a community.

The use of geographical information has changed dramatically since around 2010 and continues to do so; in particular users themselves are being encouraged to crowdsource data in moments of acute need. This though only serves to heighten questions over ease of data access. The digital divide then is not gone, and where it has been reduced, much like Hydra it has grown

more heads. Large humanitarian organisations risk a 'Tower of Babel' moment in the way they present the success of reducing the digital divide without acknowledging these emerging issues (McFarlane, 2006).

> One can wear a dozen powerful sensors, own a smart mattress and even do a close daily reading of one's poop, but [the world's] injustices would still be nowhere to be seen, for they are not the kind of stuff that can be measured with a sensor. The devil doesn't wear data. Social injustices are much harder to track than the everyday lives of the individuals whose lives they affect. (Morozov, 2014)

Data are meaningful because of how someone collects, interprets and forms arguments with it. Data are not neutral. This is why Lisa Gitelman calls raw data an oxymoron, a contradiction in terms that hides the reality of the work involved in creating it (cited in Neff, 2013).

This is a worrying prospect when it is considered that the humanitarian sector is increasingly engaged in a process of datafication in low- and middle-income countries, where the use of new communications and database technologies is generating digital data that are machine readable and computationally manipulable, particularly for big data analytics (Taylor and Broeders, 2015). Whether this data collection technology is driven by economic, military-strategic, scientific or apparently altruistic motives, it is subject to a variety of influences during its innovation, diffusion, regulation and codification (Bijker and Law, 1992; Latour, 1988). The forms and functions of a technology are transformed by its innovators, market strategists, government regulators and through social use (Kirsch, 1995). It is also worth noting again that many of the key components of the networked society – the digital computer, the Internet, GPS – all have military origins and have been developed within capitalist social relations of production and unequal gender relations, they therefore build upon and reinforce existing spatial and social divisions (Perrons, 2004; Potts, 2015). We live immersed in representation, be it digital or through the cartographic gaze, it is how we understand each other, and in turn how we understand ourselves (Webb, 2009). These new modes of information lead to a globalised notion of self and other and this newly established worldwide scale is leading in turn to new conflicts, crises, wars and even catastrophes (Lefebvre, 2009), to which the world's poorest are most susceptible.

This book, then, aims to bring together critical perspectives on the role that mapping people, knowledges and data now plays in humanitarian work, both in cartographic terms and through data visualisations. Since the rise of Google Earth in 2005, there has been an explosion in the use of mapping tools to quantify and assess the needs of the poor, including those affected by climate change and the wider neoliberal agenda. Yet, while there has been a huge upsurge in the data produced around these issues, the representation of people

remains questionable. Some have argued that representation has diminished in humanitarian crises as people are increasingly reduced to data points. In turn, this data becomes ever-more difficult to analyse without vast computing power, leading to dependency on the old colonial powers to refine the data of the poor, before selling it back to them. These issues are not entirely new, and questions around representation, participation and humanitarianism can be traced back beyond the inauguration speech of Truman – which divided the world into the 'developed' and 'under developed' – but the digital age throws these issues back to the fore, as machine learning, algorithms and big data centres take over the process of mapping the subjugated and subaltern in moments of crisis. This book questions whether, as we map crises, it is the map itself that is in crisis.

In Chapter 1, Tamara Bellone, Salvatore Engel-Di Mauro, Francesco Fiermonte, Emiliana Armano and Linda Quiquivix provide us with an introduction to critical cartography. Born from decolonial movements of the 20th century, critical cartography has helped scholars reflect on the relationship between power and knowledge within colonial contexts of spatial representation and surveillance. The chapter engages with concerns of non-Western cartography, technological innovation and representation of territory and notes that even as the field of critical cartography has grown, Western cartography continues to be a powerful instrument in colonialist policies, even within postcolonial contexts.

In Chapter 2, Gregory Asmolov builds upon these ideas and introduces us to the counter concepts of participatory mapping and volunteered geographic information (Goodchild, 2009), as well as a proliferation of crowdsourcing practices and new online mapping tools. The chapter offers a critical examination of digital mapping and its role in crisis mapping, as well as in solutions to social problems that draw on the notion of activity systems (Engeström, 1987). Asmolov also provides us with an analysis of a number of empirical cases of online mapping from the field of emergency response and social development to illustrate how we must distinguish between two major forms of activity that have been associated with online mapping: 'mapping as activity' versus 'mapping-enabled activity'. The analytical framework also highlights how the location of digital maps in the context of activity systems is associated with a set of actors that has been included in/excluded from the system.

Maria Rosaria Prisco also explores the diffusion of Web 2.0 and geospatial technologies in Chapter 3. Building on Harvey's three-dimensional conceptualisation of space (absolute–relative–relational) with the spatial trialectic (experienced–conceptualised–lived space) proposed by Lefebvre (1974), the chapter explores the possibilities and the real strength of the bottom-up production of local data (VGI, collaborative mapping, citizen science, etc.) in counteracting the technoscientific epistemology provided by the growing and pervasive datafication in the representation of the reality.

The case of representation of space is then examined through some of the most well-known systems of indicators like the sustainable development goals (SDGs) (especially in relation to urban poverty and environmental justice in the Italian context) in order to provide ideas and thoughts on the way forward.

Faine Greenwood takes these notions further in Chapter 4, examining data colonialism, surveillance capitalism and an increasingly prevalent new technology in the humanitarian sector, drones. Building on theories of the politics of verticality and surveillance, this chapter explores how inexpensive civilian drones can simultaneously enforce and subvert asymmetric power structures, by providing both historically underrepresented and historically powerless groups with access to high-quality aerial imagery. At the same time, vulnerable populations can be harmed by humanitarian drone users who participate in the system of data colonialism by extracting and sharing their spatial data without seeking their consent or collaboration. While many aid workers hold strong opinions about the potential harms or benefits that humanitarian drone use presents to affected populations, this chapter is one of the first to fully explore these contradictions. The chapter also puts forward a preliminary model of humanitarian unmanned aerial vehicle (UAV) use that is conscious of the dangers of data colonialism and calls for more collaborate research work on the impact and benefits of drone data collection in aid work.

In Chapter 5, Giovanna Astolfo, Ricardo Marten Caceres, Garyfalia Palaiologou, Camillo Boano and Ed Manley explore the use of data analytics and statistics since the start of the 2015 Europe refugee crisis. The chapter sheds light on the methodological and ethical challenges posited by the collection, analysis and representation of data on migration and refugees. The chapter asks who is benefiting from such data-driven politics and to what extent it is harming individuals, organisations and society at large. The chapter builds upon the findings of a two-year data project called Refugee Spaces and argues that data analytics and statistics are often used as a 'discursive practice' to construct and uncritically reproduce narratives of crisis and threat and as a 'governmental technology' to invest political agendas on migration by ideals of evidence, rationality, progress and nationhood grounded in disputable truths.

Monika Halkort builds on this work in Chapter 6, exploring how the rising death toll of irregular migrants in the Mediterranean has conjured up a dense matrix of geospatial intelligence aimed at reducing the number of destitute bodies crossing the sea. Measured by the mere amount of data generated through the combined force of real-time tracking devices, image satellites and big data mining, she argues that Europe's alleged refugee 'problem' is one of the best documented and well-mapped 'crises' in recent history. Against this backdrop the chapter asks why information about the dead and missing is widely absent or scarce. Mapping the critical blind spots in the data repositories

of state and humanitarian actors against the technoscientific and juridico-political protocols underpinning big data regimes, this chapter interrogates the key factors contributing to the substantive gaps that assign dead and missing migrants the liminal status of 'known unknowns'.

While there are many factors that drive migration, changing climate is expected to become an increasingly salient factor. In Chapter 7, Bogna M. Konior explores mapping crisis in the Anthropocene, a socio-geological era in which the uneven allocation of environmental risk follows global industrial development and denotes its own civilisational origin: capitalism and the global slave trade, the Great Acceleration, the fossil fuel economy and nuclear war. The chapter asks if climate capital and its uneven distribution can be mapped. The incomprehensibility of climate narratives forces a shift from analogue to digital and then computational media, where the processing of large data sets corresponds to the collective structures of feeling as defined cultural forms, a move central to all climate capital mapping: the blurring of realism and fiction and the paradoxical relation between the local and the commons. As a survey of these emerging digital climate fictions, this chapter examines post-global climate mapping in virtual reality projects such as the Stanford Ocean Acidification Experience and Melting Ice as well as digital cartography projects such as Italian Limes and the Welcome to the Anthropocene map by the Stockholm Resilience Center.

In Chapter 8, Aleš Završnik and Pika Šarf provide us with the first of two chapters on fighting back. This chapter explores the potential of 'sous-veillance' for individual autonomy and dignity, fairness and due process, community cooperation, empowerment and social equality. Examining numerous examples, such as the Satellite Sentinel Project, which tracks troop movements and warns civilians of attacks in Sudan; Virtual Community Watch, a service that crowdsources surveillance of the Texas–Mexican border; and citizen 'cop-watching' programmes, which film and counter-film police with wearable cameras at protests, the authors argue that we are witnessing a new wave of computerised technologically enhanced counter-surveillance or 'sous-veillance'. The chapter focuses on three aspects: 'datafication' (the use and reuse of data), 'resistance' (from passive avoidance to active subversion) and the 'empowerment' of the user, applying these categories to three specific 'sous-veillance' visualisation tools: (1) Erar, an online business transaction application created by the Commission for the Prevention of Corruption of the Republic of Slovenia, which provides citizens with data on the business transactions of public sector bodies and government spending (awarded the '2013 United Nations Public Service Award'); (2) the Slovenian platform named 'Kdo vpliva?' (literally 'Who Influences?'), which shines a light on the connections between lobbyists, companies, politicians and state institutions through visualisations of three different kinds of networks: lobbying contacts,

the network of transactions between the companies represented by the lobbyists and the public sector; and (3) traffic-ticket monitoring with Redaar, a smartphone application that helps users identify where and when traffic tickets were issued.

In the final chapter, Rupert Allan draws upon his experiences working as country manager for the Humanitarian OpenStreetMap Team (HOT) in Uganda, overseeing interventions such as CrowdSourcing Non-Camp Refugee Data (USSD (unstructured supplementary service data) BPRM (Bureau of Population, Refugees, and Migration)), the Uganda Open-Mapping Project (World Bank/OpenDRI), Data for Resilience in Refugee Settings (GPSDD (Global Partnership for Sustainable Development Data)) and Drone Data for Refugee Context National Risk Atlas Methodology (Embassy of Japan). Rupert also represented HOT/Missing Maps on the Uganda Ministry of Health Emergency Operations Committee (EOC) in developing the Ebola Data Resilience Strategy for preparedness and outbreak following cross-border events in the Democratic Republic of Congo. This chapter brings together many of the issues discussed throughout this book and works to explore ways through each, both via the experiences of working in Uganda as well as examining their theoretical underpinnings, leading to the conclusion that we are all part of a united statelessness.

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1. Mapping as tacit representations of the colonial gaze

Tamara Bellone, Salvatore Engel-Di Mauro, Francesco Fiermonte, Emiliana Armano and Linda Quiquivix

It took Frantz Fanon just a few pages into his book *The Wretched of the Earth* ([1961] 2005) to expose the colonial order as one built and fuelled by violent compartmentalisation and exclusion, calling into question Europe's pretensions as the universal standard of culture and civilisation. Fanon's intervention hoped to awaken the consciousness of the colonised, causing them to rise up and reclaim both their lands and human dignity – a project that could radically transform the notion of humanity into one no longer premised on domination and the negation of the Other. Fanon's decision to craft the moral core of decolonisation theory as a commitment to valorise 'the wretched' stands as his enduring legacy. Similarly, Paulo Freire in *Pedagogy of the Oppressed* ([1970] 2005) analysed the oppressor–oppressed binary to propose a path that, through 'conscientisation' or consciousness raising, could lead the oppressed to emancipation. Both Fanon the psychiatrist and Freire the educator captured the core of the modern world's alienation process; they argued that the mechanism of domination remains feasible as long as the oppressed continue identifying themselves with their oppressor, therefore making emancipation also a possibility when the oppressed come to identify otherwise (Goussot, 2012).

That the world in which we live has been produced and can thus be produced differently was a prominent focus of 20th-century continental philosophers and theoreticians who lived through colonialism's 'boomerang effect' on Europe as exercised by fascist Germany (Césaire, [1955] 2001). These thinkers included the Frankfurt School as well as Michel Foucault and Jacques Derrida, whose writings geographers have come to adopt in recent decades to expose the work that conceptions of space do to produce and reproduce the modern world. Within statecraft, for example, Foucault's writings have helped show how maps do work similar to that done by institutions such as mental hospitals and prisons: the map contributes to controlling territory as the state controls its inhabitants through those institutions, tools that transform inhabitants into subjects for the state's reproduction (Foucault, 1977). As another example, Derrida's suggestion that the literal is 'intensely metaphorical' has similarly

been adapted to suggest the science of the map itself also serves as metaphor (cited in Harley, 1989).

Drawing from such insights, geographers today argue that rather than simply revealing knowledge about the world, maps help *create* the world, leading scholars within the discipline to abandon any notion of space as a container or stage within which the world proceeds, and instead to now favour notions of space as undergoing continual construction (Massey, 2005; Thrift, 2003). Scholars engaging with critical cartography in particular have become cautious of the work that modern maps do in situating the viewer above and outside space, for such a view has been key in fostering a false sense of separateness between the viewer and what is viewed, promoting the notion of space as an object and engendering a geographical imagination where nature and its local inhabitants have become merely resources for settlement, domination and exploitation (Gregory, 1994).

To thus rewrite the relationship between periphery and centre from an anti-colonial perspective entails the deconstruction of the colonialist and imperialist ideology that has long dominated the system of Western knowledge and that remains today, in the age of globalisation, assuming more pervasive and occult forms (Ardito, 2007). Therefore, attempts at emancipation must aim to debunk any idea that the given situation is natural and what must be shown instead is that what is presented to us as necessary is, in fact, absolutely not inevitable (Fisher, 2009).

This chapter assesses the effectiveness of critical cartography in raising a broader anti-colonial consciousness since the field began, not only critiquing maps, but calling for movements to 'counter-map'. We begin by providing a brief overview of the cultural context that gave rise to Western cartography in order to denaturalise it, and we then expand on how critical theory helped develop theoretical frameworks for scholarship on critical cartography following the decolonial movements of the 20th century. We then illustrate how, in spite of the growth of critical cartography and the call to counter-map in the face of settlement, domination and exploitation, neocolonialism continues to advance the use of maps for its purposes in new, inventive forms. We conclude by suggesting that the dramatic rise in the gathering, storing, processing and delivering of geographic information today continues to influence neocolonial cartographic practices and suggest throughout that attention to competing worldviews is central if a critical cartography is to be effective in dismantling colonial impositions of time and space.

The rise of Western cartography in cultural context

European colonialism has famously imposed a notion of a universal human civilisation that negates or absorbs difference, aiming towards a universal sameness among those it considers civilised. Nikolai Trubeckoj (1982) traces this spirit to Roman-Germanic culture, a cultural context where a notion of cartography was born proclaiming itself as a universal conception of space. A characteristic trait of Roman civilisation, for example, was the pursuit of

Figure 1.1. Ebstorf map (c.13th century).

well-being in daily life, which it considered to be a central aspect of humanity. This was a pursuit maintained through the military administration of territory, as illustrated by its Tabula Peutingeriana, a third-century ancient Roman map that carefully listed and described the empire's military access roads.

The 13th-century Germanic Ebstorf world map (Figure 1.1) integrated biblical and classical elements and illustrated the world as a circular construction. Lands outside Europe and beyond North Africa and the eastern Mediterranean were understood as terra incognita, and like other medieval maps at the time, it followed the T-O construction with Jerusalem at its centre. The O depicted the outer ring of the ocean and the T the dividing lines of three continents as related to the biblical story of Noah's three sons: Shem who mapped on to Asia, the birthplace of Christianity; Japheth who mapped on to Europe, the realm of Christianity's expansion and domination; and Ham, the so-called 'cursed' son, who mapped on to Africa, Europe's most devalorised location.

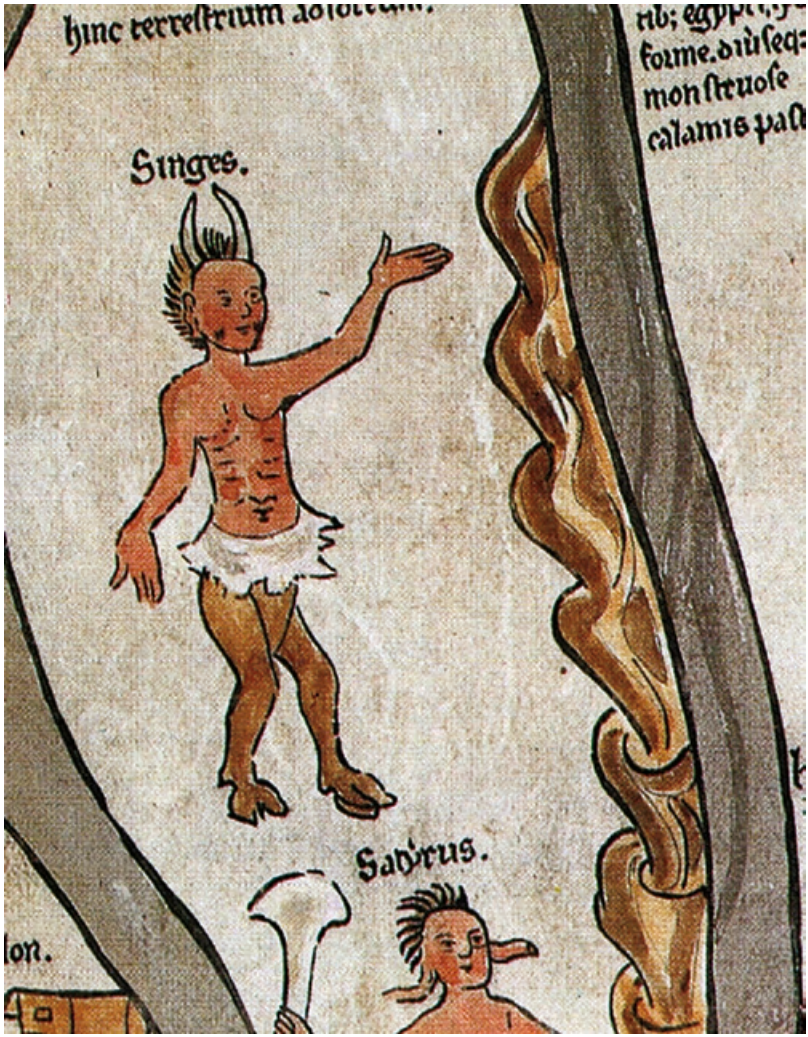

Figure 1.2. Detail of the upper-right edge of the Ebstorf map.

These medieval worldviews were clearly related to the views of Augustine's City of God, which suggested that the will of God placed Christians at the centre of the known world and relegated non-Christian peoples to the outer spaces, even along the boundary of non-human beings, or 'monsters', whose brilliant and decorative effects were often relegated to the margins of maps (Figure 1.2).

Meanwhile, for the civilisations of Abya Yala (the Americas), which Christendom had yet no place for, understandings of the world developed

quite differently. In Abya Yala, space and time were often intimately linked, rendering the map and almanac calendar one and the same (Milbrath, 1999). Time was cyclical; its study was mainly intended to predict future events, and scaled on enormous durations based on repetitive cycles. For example, Maya calendars and almanacs like the Dresden Codex (Figure 1.3) were shaped by astronomical observations and refined mathematical calculations. Maya maps might thus be seen as a cross between history, cosmology and descriptions of territory: when they marked their borders, they added information on how they had conquered those areas.

Medieval Western maps were often illustrations designed to clarify concepts of space and time based on the pre-Ptolemaic model. Their value lay not so much in their practical use but in how they depicted concepts that corresponded to sacred texts. These were illustrations of history, philosophy or encyclopedic references, not points that referenced the earth's surface. Columbus himself followed a medieval spirituality in many ways; he had intended to meet the Great Khan of China, about whom Marco Polo spoke at the time, in order to convert the Khan to Christianity. He also understood that the great purpose of all his voyages was to eventually undertake a new crusade to liberate the 'Holy Land' (Watts, 1985).

At the same time, Columbus was influenced by Toscanelli's calculations of the distance between Europe and Asia from the west, suggesting it might be relatively shorter if travelled at higher latitudes. Toscanelli had spoken with the king of Portugal and written to Columbus, and he was a friend of Nicholas of Cusa, the mathematician and astronomer who referred to experience, nature and the human condition rather than to tradition and the authority of the sacred texts. Thus, for Columbus, the earth was a terrestrial globe – that is to say, the totality of ocean and land, rather than a medieval flat disc.

Columbus believed in the significance and aptness of his names: Cristobal (bearer of Christ, from the Greek) and Colon (coloniser). He himself changed the names of the places 'discovered': Guanahani became San Salvador (God), and then in order of importance: Santa Maria de la Concepción, Ferdinandina, Isabela and Juana (the Virgin Mary, the sovereigns of Spain and the Infanta, respectively). He later renamed a vast number of places, as Tzvetan Todorov (1999) notes, which fell in line with Europe's problem with the Other.

In the mid 16th century, following Columbus's 'discovery' of Abya Yala, geographers and cosmographers in Europe would come to shape cultural worldviews that used science to legitimise conquest. Those in the Netherlands would become an important group in this history. Their practices came to focus on depicting the earth's surface by adopting the Cartesian reference system, Euclidean geometry and Galilean physics. Among the group was Gerardus Mercator, a mathematician and cosmographer who had studied at the Catholic University of Leuven where the Christian humanist and

Figure 1.3. The Dresden Codex, the oldest surviving Mayan manuscript (c.13th or 14th century).

Renaissance scholar Erasmus had been a student. Mercator became known for his treatise on triangulation and would later become known as the father of a cartography that came to treat the globe as a scientific instrument and the world as a physical surface to be scientifically measured (Figure 1.4). Also among the group was Willem Blaeu, a pupil of the astronomer Tycho Brahe, who drew high-quality maps of various states, created important atlases and, notably, became cartographer to the Dutch East India Company.

In the following century, Newton would come to assume that space was absolute in nature – a type of container of objects and facts – whose dimensions

Figure 1.4. The Geographer *by Johannes Vermeer (c.1668–9).*

he also based on Euclidean geometry. He founded his mechanics on the idea that space was distinct from bodies and that time would pass uniformly. Newton's universe was an infinite space in which bodies move in a straight line unless deviated by another body exerting a force. Meanwhile, his contemporary Leibniz would anticipate Einstein, arguing against the Newtonian absolute conceptions of time and space in favour of relational ones.

Kant came to legitimise Euclidean geometry and Newtonian physics along the way, arguing that space and time were inner conditions of the human, allowing for perceptions that would subsequently be ordered by logical categories, thus rejecting religious assumptions that had previously been sacred. Kant, a professor of physical geography, argued that space and time were not objective realities but subjective constraints allowing for the sensory-cognitive capacity of the human mind to represent objects (e.g. a priori forms of sensory intuition). Appearances were phenomena; things in themselves were noumena; space and time were a priori forms of intuition, both transcendental and universal. Kant's conception of the universal was quite specific: the capacity to exercise the human mind in this way belonged to those beings his society determined to be endowed with reason, thus excluding those deemed incapable of assimilating into this imposed-upon ideal.

In the same century, the Cassini family would map France using geodetic triangulation for the first time, then a technical innovation. Mapping by using a measurement apparatus with precision fell in line with the spirit of the Enlightenment, the *esprit de géometrie*, without adding ornaments or frills, setting a standard for cartography thereafter (Figure 1.5).

Mercator's projection of the world, which, in privileging distance over area, emphasised the size of the global North and de-emphasised the size of the global South, was to become hegemonic. Lambert's cylindrical equal-area projection (1772) became the first to privilege area over distance and was followed by others, including James Gall's projection (1855), which critiqued Mercator's map for privileging the needs of navigators while sacrificing form, polar distance and proportionate area. Arno Peters would later build on Gall with the Gall–Peters projection (1973), presenting a highly unconventional representation of the earth's surface and aiming to eliminate the 'normal' Eurocentric image of the world found in common atlases.

These alternative views of the world were controversial and even referred to as 'ugly', for Mercator's representation had become so familiar to Westerners that his map was often taken simply to represent what was true and natural, even though what was 'natural' turned out to be merely 'conventional', the result of tradition and ethnocentrism.

Just as the conditions of possibility for a (Eurocentric) Mercator projection are important to consider, so too are those related to the Gall–Peters projection. The

Figure 1.5. Cassini map of Paris (1750–1818).

Gall–Peters projection was born in the era of decolonisation, a time of hope for a more equitable and, above all, more peaceful world. The Bandung Conference of 1955 had marked the beginning of the efforts of non-North Atlantic Treaty Organisation (NATO) and non-Soviet countries during the Cold War to seek their own paths of development. Shortly thereafter in 1961, the Non-Aligned Movement (NAM) was born in Belgrade, one of whose fundamental principles was pacifism in relations between states, with India's Nehru, Egypt's Nasser and Yugoslavia's Tito as its major advocates. Later in 1989, Arno Peters would

publish the only atlas at the time to represent all areas on about the same scale, a historical context that also saw the release of the Brandt Report's map of the unequal relationship between the global North and global South (Figure 1.6).

New map families such as anamorphic maps would also come to relative prominence (Gastner and Newman, 2004; Tobler, 2004), in which cartographical techniques were able to conserve the relative proximity of areas even as the parameter under study involved an increase or decrease in spatial area. For example, cartograms allowed viewers to quickly grasp great differences for a wide range of practices in different societies and countries, irrespective of area and distance. In one specific case, for example, which maps daily income over 200 USD, the Netherlands appears much larger than its relative spatial area than India or Mexico (Figure 1.7).

Geography's shift?

Decolonial movements and the counter-maps they inspired were key in the rise of critical cartography within geography by the 1990s,[1] which continues to the present day. As a subfield, critical cartography has helped theoretically situate maps as discourses of 'power/knowledge' (Foucault, 1980), thus displacing them as neutral scientific documents. Key works within the literature suggest that the traditional manner in which we understand the map and the way it fashions knowing and seeing have often been negative and disenabling (Harley, 1989; Wood, 1992).

The scholarship often draws upon Donna Haraway's (1988) notion of situated knowledges to throw into question the possibility of an all-knowing subject. Haraway's work exposes the problematic notion of an ostensibly disembodied scientist in his or her (but often his) claims to objectivity and universal knowledge, a phenomenon that her work referred to as a god-trick, or 'view from nowhere' that ignores our human limitations, convinces us objectivity is possible and obscures from us questions concerning who has the authority to look and from where. Rather than suggesting that claiming knowledge of anything is no longer possible, Haraway asks that we acknowledge

1 While critical cartography arose to prominence in the 1990s as a subfield, it must be understood in the historical context of the development of the cartographic discipline more generally along with its link to anticolonial movements, with anarchist geographers Élisée Reclus and Pëtr Kropotkin as precursors of this alternative geography.

In his youth, Reclus had worked in Nueva Grenada (present-day Colombia) and was likely influenced by memories of the 'reductions' the Spanish created in the Andes (*reducciones de indios*) that forcibly relocated indigenous peoples into settlements in order to Christianise, tax and govern them more effectively. Kropotkin's role in compiling Reclus's monumental *La Nouvelle Géographie universelle*, *la terre et les hommes* (1875–94) marked the official birth of contemporary geography for many, which was deeply interconnected with new political philosophy and dedicated to universal solidarity.

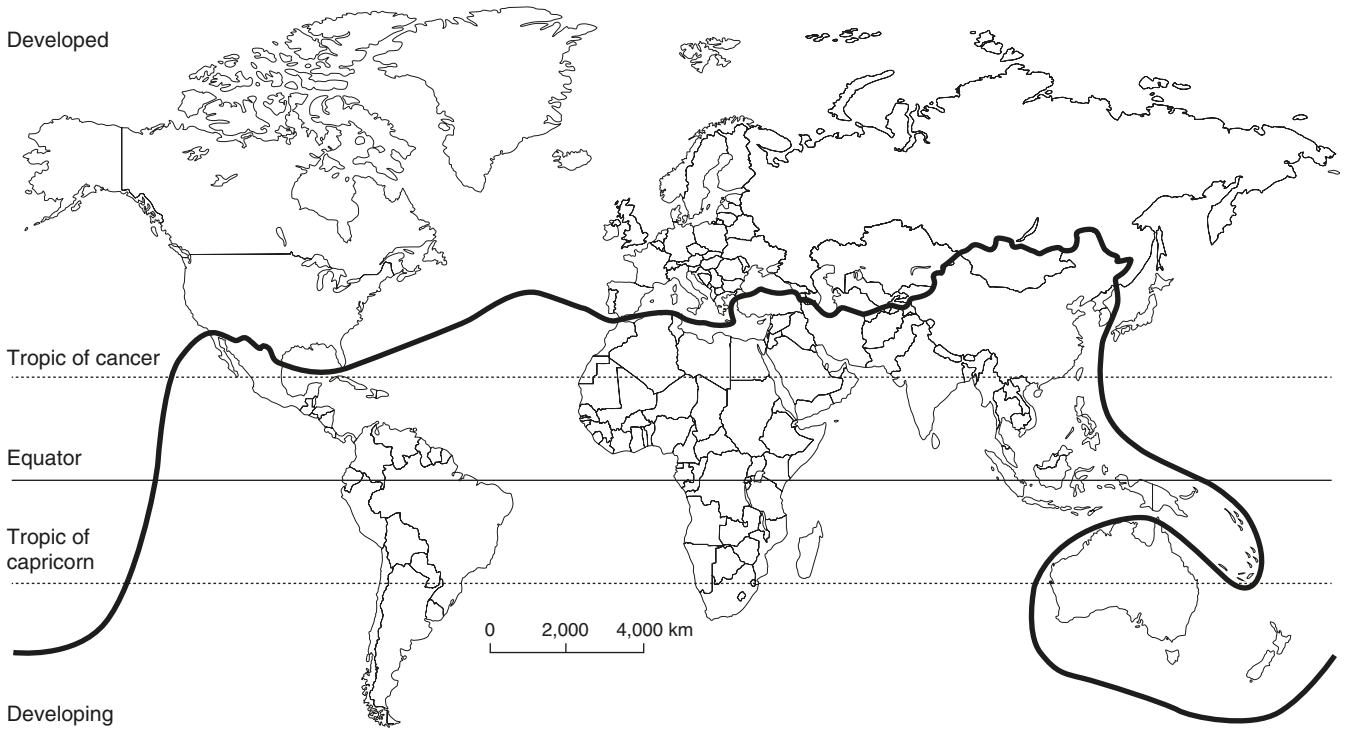

Figure 1.6. The Brandt Line, dividing the world into the 'developed' global North and the 'developing' global South.

Figure 1.7. Thematic map of families with daily income of over 200 USD.

that all knowledge claims are embodied and that we recognise that each of our positions as observers reflects our positions in society. With these, the best we can hope for is a situated knowledge where one can claim only partial knowledge of what there is to know. Thus, for the question of map-making, the cartographer's partial knowledge is relevant and interesting, but only as part of a bigger picture.

Insights such as these also allow for an understanding that the oppressor and oppressed will inevitably have distinct views of the world, leading us to better understand how scientific Truth (capitalised here to mark its imposition as universal) is intricately linked to power and the social, economic and cultural locus of the observer. In exposing this interplay, Edward Said (1978) showed how Europe produced and continues to produce 'the Orient' – its colonial gaze always seeking to 'know' the world in order to have power over it. It is a reason that sees, dominates and instrumentalises humans and space, developing the social sciences not simply to know or even to create the world, but to dominate it. This gaze perpetuates colonial institutions and practices even after formal colonialism has been dismantled, continuing to frame how the West knows, represents and ultimately *produces* the colonised themselves.

Much like Haraway would later argue, for Said no production of knowledge in the human sciences can ever ignore or disclaim scientists' involvement as human subjects in their own circumstances. And it is for this reason why, for Fanon ([1961] 2005), it would be the wretched of the earth who *could* play the revolutionary role – their position in society as wretched would have the least to lose and most to gain in the creation of the world anew.

From such impactful interventions, within the discipline of geography there thus exists a 'cartographic anxiety' (Gregory, 1994) about the map's complicity in imperial/colonial power and the chronic persistence of this relation in present assumptions about cartography. This is the case even when choosing map projections, as the Mercator/Gall–Peters controversy attests. These histories of the map's use and of its production itself highlight the complexity of cartography as a language of communication with functions that far exceed their role as mere bearers of spatial information that are commonly attributed to them. Maps are thus never replicas of reality; they interpret and can even create a reality laced with the assumptions and logic that guide the construction process itself. Indeed, the terrestrial ellipsoid cannot be developed on the plane, because the two surfaces have different total curvatures: the choice of the type of deformations (angular, areal, linear) always suggests, but not always consciously, a point of view. Ultimately, this choice reflects the prevailing cultural climate: the Mercator map of the world was itself produced following the invention of perspective by Renaissance painters.

Critiques of modern maps as weapons of the coloniser eventually led some scholars to suggest that 'more indigenous territory has been claimed

by maps than by guns … [thus] more indigenous territory can be reclaimed and defended by maps than by guns' (Nietschmann, 1994), which led some indigenous movements to 'counter-map'. It was in the early 1990s when Edward Said and Nancy Peluso, writing about different contexts, introduced the term to describe grassroots map-making by indigenous peoples in Palestine (Said, 1993) and Indonesia (Peluso, 1995). It became immediately evident that counter-maps could be effective in disrupting truth claims and are interesting in themselves for their ability to engender notions that non-state actors could make competing and equally powerful maps (Wood, 1992). Nevertheless, counter-mappers did not always recognise that, without a strategy guiding the map's use, even indigenous counter-mapping could come to impose a new hegemonic reality that followed colonial logics, reproducing the colonial world itself (Wainwright, 2008).

The question for the counter-mapper that has often been overlooked, is if non-Western conceptions of space and time are being replaced when seeking cartographic recognition from the Western gaze. The points, lines and polygons that exist on maps are practically all human artefacts, falling into two categories: engineering works (roads, bridges, dykes, runways, railway lines, surveying landmarks) and administrative and property boundaries. As Couclelis (1992, p. 67) writes: 'Throughout the history of Western culture, these two categories of Euclidean features have been essential to the regulation, domination and control of the geographic world: the natural world, in the case of engineering works; the social world, in the case of boundaries'.

So while the map is not the territory, the map runs the risk of asserting that it is the only possible representation of the territory (Dematteis, 1985). We must recognise that maps – whether colonial or anti-colonial – are related to the cultures to which they belong and to whom they make sense, and in the first instance, to those cultures' metaphysical conceptions of space and time. There is no escape from the cartographic paradox: to provide a functional image, maps must lie (Monmonier, 1996) by favouring some elements over others, necessarily making invisible other possible stories, other possible ways of being, even extinguishing them. As Yves Lacoste states in the title of his (1976) book, *La géographie, ça sert, d'abord, à faire la guerre*, geography exists, first of all, to make war.

Maps and the persistence of colonised worlds: some examples

Cartography as a whole retains, for the most part, an overwhelmingly Eurocentric understanding of the world (Blaut, 1999; Castree, 2003; Sheppard et al., 2013). In mapping regions and continents, the main point of view represented continues to be that of colonial powers; they continue

to hold control over countries they once formally ruled over directly, with present-day political boundaries testifying to this continued order. In settler-colonial contexts, conventional mapping conforms to propensities for excising racially minoritised and colonised peoples *within* these boundaries. In both cases, whether colonial or settler-colonial, the shared logic that predominates is the desire to control, objectify, manipulate and exploit colonised people's environments. Also present is a generalised culture–nature or human–non-human dichotomisation that paves the way for separating people from their environments and relating to land in terms of its exploitable potential.

The mapping of Africa is a salient example. Africa is typically split into two parts, one north and one south of the Sahara. This is a colonial perspective that refuses to see continuities, papering over cultural unities among African peoples. It is as if centuries of knowledge sharing and trade across the Sahara never existed, simply because European colonial authorities either did not acknowledge them as historically important, or when they did acknowledge them, it was to prevent them from posing a threat to colonial rule. The current French military interventions in Mali, Libya and Chad serve as examples: the Tuareg must be forcibly assimilated into a Sahel-centred state (Mali), whose borders were carved out by French colonialism and traversing sections of the Sahara; crossings and flows from Libya to Chad must be suppressed to ensure the French-supported Déby dictatorship remains intact, along with resource control for French capital.

Maps that insist on drawing boundaries across deserts and savannahs reinforce the persistence of a colonial world order that remains imposed on many African peoples. It reduces space to what colonial powers deem to be acceptable, representing ecosystems as if they could be neatly divided by administrative fiat. A different map could show instead existing continuities (both social and ecological) and political contestation by displaying national state boundaries as interrupted lines and showing areas where alternative and/or rival political arrangements exist, such as the Tuareg struggle to establish Azawad or the Saharawi struggle for independence from the US- and French-supported Moroccan monarchy. To map out these existing alternatives and contestations would be a cartographical act that does not take colonial and derived national state impositions for granted and that speaks to the tenuous nature of boundaries, which are contingent on the relative successes of military interventions by colonial powers and the related dictatorial capacities of local regimes.

The construct of a sub-Saharan Africa is overwhelmingly common in cartography and has repercussions for understanding ecosystems and how African life-ways have co-evolved with them. To show the falsity of this construct and also the artificiality of separating African peoples, it is possible to create maps eliding the divide by showing contiguities of cultural traits (such as

the distribution of languages and religions) and of physical environments (the regional boundary, after all, rarely coincides with ecosystem differences). As a contrast to received mapping imaginaries, such an alternative map can provoke an exploration of the ideological underpinnings, involving colonial strategies of control by way of division, as Edward Said (1978) pointed out some time ago, and long-standing Eurocentric imperialistic obsessions with the spread or presence of Islam and/or Arabs.

The settler-colonial nature of North America can be exposed in similar ways. The relationship of ideological constructs with cartographical representation is evident in United States Geological Survey (USGS) topographical maps. In this case, omissions, obscuration and ethnocentric categories help reproduce colonial and racist worldviews. Because they are regarded as neutral and objective (authoritative) spatial representations of reality and because they continue to be used widely, even in urban and regional planning, USGS maps constitute an important process in the reinforcement of colonial processes.

There is much more than mere change over distance being represented in such cartographical products of the US state. There are factories, mines, boat landings, residential areas, channelised streams, dams, reservoirs and cemeteries (usually those of white people), among other features. Ecological processes are usually confined to marshes, surface waters, peaks, depressions and vegetation reaching heights above two metres, among other representations that focus on the layout of the terrain, rather than the distribution of organisms or interactions among them. The mapped features are divided between cultural and 'natural' features, with the latter portrayed in much fewer and more general categories and as subservient to the former. For example, marshland or forest is more generic than the differentiation shown among a society's land uses (representing a population within a single species, to put it ecologically). There are no beaver dams or distinctions between types of grasslands or forests. The emphasis is squarely on the 'cultural', even though the cartographers claim the map to display mainly topography. More than this, the cultural is really reflective of just one kind of society, the settler-colonial capitalist society. Nature is separated from society and reduced to what is useful to a particular social formation.

Every now and then, there are attempts, for example, to signal the importance of the historical presence of African diaspora communities, but typically this is by way of cemeteries or slave plantations, as if African people never taught whites anything, never imparted cropping system knowledge, never contributed to the actual shaping of a landscape through such activities as farming, agricultural innovations and much else (Carney, 2001). Native Americans also exist, but only by way of reservations. The USGS maps erase from view their historical reshaping of the landscape, such as large monumental architecture (incorrectly called 'earth mounds') and the persisting grassland-forest ecotones, the extent

of their original territories, their current struggles to regain land stolen from them, and the location of their ancient settlements. Such ideological terms and silences buttress a view of the world that justifies the annihilation of other peoples and, with it, other ways and possibilities of relating to land, environment and place. Such a process of settler-colonial indoctrination can be exposed by alternative representations showing the extent of conquered territories (including those illegally grabbed according to US federal laws), much beyond current reservation regimes and the presence of cultural markers in the landscape left by all peoples, not just Europeans.

In fact, what is seldom recognised is that USGS maps are landscape representations in part for military purposes and in part for partitioning conquered land for commerce and state use. Terrain maps have historically served military ends, and USGS maps do not depart from this tradition. Aside from longitude–latitude, Universal Transverse Mercator (UTM) coordinates, which are used primarily by the military, feature among the three coordinate systems. They are sometimes given prominence by the display of grid lines devoted to that coordinate system only. Critical industrial infrastructure is highlighted, such as power plants and lines, pipelines, port facilities and major factories, implying defensive as well as offensive military priorities. Green areas are used to symbolise vegetation but only if it is higher than two metres. As the USGS maps explain, the purpose is to identify troop movement or troop-concealing forest canopies. Actual US military installations are largely made absent or devoid of the same level of detail as other landscape features. Such omission is unsurprising, but what is taken for granted is a world of highly armed and belligerent institutions that have little care for the security of the vast majority of people.

More than this, USGS maps project a settler-colonial mindset through the use of the State Plane Coordinate System (SPCS) in addition to the focus (described above) on industrial infrastructure, the underpinnings of commerce. The SPCS was introduced in the 1930s to improve records of original land surveys by standardising measurements to a single datum (North American Datum of 1927), using Cartesian coordinates to divide each state into zones and using English imperial units (Stem, 1990). This facilitates and raises the accuracy of local and regional land surveying, while obscuring ecological and social differences and historical markers. Every surface is rendered into an empty, abstract polygon. Such divisions of land are crucial to delineating property boundaries. After all, if land is to be fungible – that is, exchangeable in the market – it must be eviscerated of meaning and ecological dynamism. In other words, in the case of the United States, conquered land (the loot) is thereby divided up according to capitalist logic of distribution to those with capital. It should be clear that such a topographical map is virtually useless to ecologists, botanists, organic farmers (who may, for instance, want to know much more about local ecosystems), pastoralists, gatherers or hunters,

to name a few other possible alternative imaginaries and actual uses. More importantly, such mapping directly pre-empts any notion of Native American self-determination and sovereignty. It is thus that USGS maps are specifically settler-colonial representations of the earth's surface.

Conclusion

The rules of Western cartography serve not simply to represent space but to impose one way of relating to, seeing and imagining the world – a worldview it claims to be superior. This is the case even though the creation of Western cartography itself was dependent on non-Western knowledges. As is well known, while the first colonisers renamed the lands they wished to conquer before even setting foot on them, in order to map those lands they needed the support of the indigenous peoples living there (Turnbull, 1998). Today, geomatic instruments such as drones equipped with topographic tools map from above in order to assist in further wars of dispossession and here again their use is never neutral. The technologies may evolve but the assumptions that inform Western cartography remain, contaminating if not colonising the very ways of being and doing that were previously non-Western.

As the move from paper to digital formats opens new perspectives, the dilemmas related to representation and map use have persisted, without solving or only partly solving previous conflicts. As smart devices become more map driven, users are folded into banal aspects of 'Where am I?' and 'Where would I like to go?' While it is possible to associate a global positioning system (GPS) image with a photo, to search for addresses and to follow directions from one place to the other, what users often find themselves doing is instead 'surfing' a reality that becomes more and more virtual. In this way, contemporary mapping emphasises the individual over national or collectivist projects. And in the meantime, the power the individual holds is itself deluded as social media companies capitalise on their map-driven aspects by extracting location data and by tracking users. Here we see a very different use for maps: a technology that previously sought to conquer territory now seeks to conquer everyday life.

A fundamental notion of critical cartography – that maps are expressions of power and desire – led scholars to take seriously the idea that maps can be used to show utopian worlds, create alternative social planes and aid groups in battles against domination. Nevertheless, late capitalism continues to succeed in subsuming and neutralising alternative points of view and protest – its response to ecological catastrophe via a 'green capitalism' is a prescient example (Leonardi, 2017). For counter-cartography, map-driven smart devices that allow one to act alone risk isolating users, further removing them from the community and rendering them dependent on a pervasive technology that seeks to take control of everyday life.

As the global liberal order continues replicating the colonial logic of asserting itself as the best of all possible worlds, it is important to keep in mind that critical cartography is concerned with the social relevance, politics and ethics of mapping (Firth, 2015). The order being imposed today follows a market-liberal utopia that claims the world will be perfect once market logic and human rights are applied, yet that results in ecological catastrophe, new forms of apartheid as are apparent in Palestine and in slums worldwide, and incentives to privatise intellectual creativity along with water, minerals, wood and human DNA. Thus, if we are to do a critical cartography under an ethics and politics of anti-colonial liberation, then we must keep in mind that the work of critique is to analyse what appears obvious, natural and inevitable in order to create the world anew. Critiquing cartography towards this end means not simply examining how maps helped colonise the world, but how maps continue to create the world in step with the colonial logics and worldviews that began being imposed globally over five hundred years ago.

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2. The failures of participatory mapping: a mediational perspective

Gregory Asmolov

Since around 2010, we have seen the field of digital mapping flourish. The mapping boom is taking place in three major dimensions: the creation of maps that address a variety of fields and issues, the development of new mapping platforms that simplify participation in mapping and the emergence of mapping and geographic information system (GIS) volunteer communities. The rapid distribution of mapping solutions across a variety of fields, as well as the significant increase in the simplicity and accessibility of map creation, have turned maps into an omnipresent medium and form of communication. A variety of research projects have investigated the various contributions of mapping (see Baruh, 2015; Bott and Young, 2012; Haklay, 2013a; Hunt and Specht, 2019; Liu and Palen, 2010; Young, 2014). Most, however, have considered the functions of these tools in a particular context. Some scholars have also highlighted how participatory mapping challenges institutional actors by offering the crowd new tools for increasing transparency around various social and political problems, in addition to a mechanism for holding the actors responsible for these problems accountable.

The celebration of participatory mapping often underlines the successful case studies and the empowering role of the maps. Due to the simplification in the creation of maps and a number of influential case studies, the idea of 'let's create a map' has become in many cases a universal solution for a variety of issues. However, the creation of an online map cannot ensure the desired outcome. The purpose of this chapter is to go beyond the instrumental focus on participatory mapping, as well as the discussion about how digital maps contribute to the empowerment of users. In order to address these challenges, we propose a focus on the triangle of relations between the tools and purposes of mapping and the communities engaged in it, by examining maps in a context of activity systems (Engeström, 1987).

The first section of the chapter describes the rise of participatory mapping, followed by a review of the literature that addresses its social and political role. Next, we discuss how digital maps can be conceptualised in the context of cultural-historical activity theory (CHAT) and offer a conceptual framework

for the analysis of maps in the context of activity systems. On the basis of this conceptual framework, we go on to consider case studies from the fields of crisis mapping and urban mapping. The analysis section explores the relations between various communities related to digital mapping and identifies gaps in the structure of activity systems around mapping. The analysis discusses the consequences of the simplification of participation in mapping, with more internet users taking part in the process, but not necessarily in the solution of the issues mapped. It highlights that the symbolic representative value of the map in many cases does not necessarily lead to action, despite the claims that maps will increase transparency and accountability. The conclusion asks if information and communications technologies (ICTs) contribute to shifting the balance towards mapping activity, while fewer resources deal with mapping-enabled activity.

The rise of participatory mapping

The emergence of Web 2.0 and the increasing dominance of user-generated content online can be seen in many platforms, genres and formats. Maps 2.0 (Crampton, 2009) is a space for the manifestation of user-generated content. Goodchild (2007, p. 212) describes 'the widespread engagement of large numbers of private citizens, often with little in the way of formal qualifications, in the creation of geographic information' as volunteered geographic information (VGI). VGI is also often linked to a notion of 'neogeography', which refers to 'people using and creating their own maps, on their own terms, by combining elements of an existing toolset' (Turner, 2006, p. 3). According to Goodchild (2009, p. 82), the key feature of neogeography is 'a blurring of the distinctions between producer, communicator and consumer of geographic information'. At the same time, this research highlights the potential cooperation between traditional geographers and neogeographers when 'diverse VGI contributed by citizens via a bottom-up process complements, and in some cases integrates well with, the spatial data infrastructure constructed by authoritative sources via a top-down process' (Elwood et al., 2012, p. 585).

An 'explosion of participation' in collaborative map-building is linked to the development of a variety of technologies that enable participatory mapping (Goodchild, 2007). These enablers can also be addressed as digital affordances of participatory mapping (Livingston, 2016). A first set of affordances is related to georeferencing as the ability to detect location by relying on global positioning system (GPS) technology and the integration of geolocation functions in various devices, platforms and apps. According to Hardy et al. (2012), georeferencing is enabled mainly by the geotagging of various types of data, including text messages and photos. Another set of affordances is related to the capacity of users to collect, produce and share digital data about their

surroundings by relying on networks of participatory sensors, which can also be addressed as participatory sensing (Goldman et al., 2009).

Participatory sensing, in turn, can also be addressed as a private case of a broad group of affordances related to crowdsourcing (Brabham, 2013). The production of digital maps can be approached as an outcome of the digitally mediated mobilisation of user resources (Asmolov, 2014), which includes the sensors, analytical skills, knowledge and social capital of users. Goodchild and Glennon (2010) highlight VGI's reliance on crowdsourcing and present a case where the crowd can potentially solve a problem more effectively than a group of experts, as well as how 'information obtained from a crowd of many observers is likely to be closer to the truth than information obtained from one observer' (p. 233).

Different types of affordances lead to the simplification and increased accessibility of tools for the creation of maps. These include tools that allow the collection of geographical data (e.g. OpenStreetMap – OSM), tools for the development of new maps (e.g. Mapbox) and crowdsourcing mapping applications that allow the collection of data on different topics and generate thematic map 'mash-ups' (e.g. Ushahidi or Crowdmap). In addition, tools that support mapping include mobile applications that enable participation in the process, SMS platforms that allow data collection relying on text messages, and a variety of tools for data sharing, data aggregation, data verification and the engagement of users in online activities.

The proliferation of participatory mapping technologies with a low entry threshold gives rise to different types of mapping projects. Some of these projects, such as OSM, have focused on the development of maps in order to collect new geographic data about specific areas. Others have introduced various types of thematic maps that offer a visualisation of different data sets relying on geolocation and geotags. The latter can be addressed as map-based web mash-ups that 'combine or mash up multiple sources of data, which are displayed in some geographic form' (Liu and Palen, 2010, p. 69). One could also differentiate between dynamic maps that are frequently updated and used as tools for the collection of data from various sources and static maps that are used for the visualisation of a particular data set.

Map-based mash-ups have been used in various fields, including citizen science projects and environmental monitoring (Connors et al., 2012), as well as mapping for the purpose of news coverage. Urban mapping that relies on user-generated information is often used as part of civic applications (Ermoshina, 2014) that offer citizens an opportunity to participate in finding solutions to problems in their neighbourhood. Participatory mapping is also used for public and environmental health surveillance (Kamel Boulos et al., 2011) and for the mapping of humanitarian emergencies and conflicts (Livingston, 2016).

Special attention has been dedicated to the role of participatory mapping in crisis situations. According to Liu and Palen (2010, p. 70), 'crisis map mash-ups are emerging as interesting artifacts in the practical work of reporting on, assisting in, and managing emergencies'. For Meier (2011, p. 1242), crisis mapping has four pillars: 'information collection, visualization, analysis and decision support'. The public can also assist in 'classifying and sorting the large amounts of information' (Simon et al., 2015, p. 614). In this way, mapping platforms help with making data sets actionable in a situation of information overload. Liu and Palen (2010, p. 89) also highlight the benefits of integrating professional and participatory geotechnologies in situations of crisis through relying on 'hybrid forms of informal, participatory systems with professional (or professionalized) systems'.

Ziemke (2012, p. 105) suggests that the mapping of a crisis covers a broad range of situations beyond conflicts and natural disasters:

> Slow-onset chronic conditions like poverty, homelessness, gender-based violence, foreclosures and forced eviction were being mapped alongside acute disasters, and disasters can be either natural or man-made … Maps can also be leveraged to help monitor elections by allowing citizens a space to report intimidation, violence, and fraud at the polling station. Maps also may act as a witness to crimes committed by the state, such as harassment, detention or torture.

There is also a broad range of views on the functions of participatory maps. For instance, Goodchild and Glennon (2010, p. 231) argue that 'geographic data and tools are essential in all aspects of emergency management: preparedness, response, recovery, and mitigation'. Digital maps can support 'situational awareness' (Mark and Semaan, 2008) and supplement traditional information sources (Bruns et al., 2012). Particular attention is dedicated to how crisis mapping supports 'crowdfeeding', which is the facilitation of peer-to-peer mutual aid in emergency situations (Ziemke, 2012). This is particularly notable in cases of limited statehood and failure by the emergency services to provide emergency response (Asmolov, 2013). Additional functions include testing hypotheses, detection of trends and early warning of events, as well as using maps as testimony to shed light on different forms of human rights violations or abuses by repressive regimes (Livingston, 2016; Ziemke, 2012). Participatory maps can also be used for data verification by relying on crowdsourcing practices.

However, mapping does not necessarily have a specific goal. Maps associated with open-data ideology are created on the basis of the assumption that data should be available and usable, while no one can predict in advance how a particular type of data can be used. For instance, the Wikimapia project seeks to respond to a call to 'describe the whole world'. The same goal is shared by OSM activists. Russian GIS expert Maxim Dubinin compares open data to the concept of a 'primordial soup':

> We work at the level of the nutrient broth. It's such a mess of elements, some fragments of molecules, some things that potentially can give birth to life. Life cannot appear without this soup. Speaking in a very simplistic way, lightning will strike this soup and life will be born. But without this soup, lightning can strike the clear water forever and nothing will happen. The beautiful part of creating maps as open data is that when we do it we have no idea how it will be used.[1]

Mapping without a specific purpose resembles a notion of 'generativity', as conceptualised by Zittrain (2008, p. 70), who defines it as 'a system's capacity to produce unanticipated change through unfiltered contributions from broad and varied audiences'. Generative mapping suggests that the mapping itself does not have a specific purpose, but that it contributes to developing an environment with better capabilities of attaining a variety of unanticipated goals. For instance, data collection on crisis situations in remote areas cannot be carried out without an updated geographic map of these areas.

While VGI can be considered as a case of crowdsourcing, where the resources of the crowd have been mobilised in order to develop maps, in many cases the crowd has also been transformed into a community of digital mappers. Since the catastrophic earthquake in Haiti in 2010, the crisis mapping movement has gained momentum and included a variety of initiatives (Starbird and Palen, 2013; Ziemke, 2012). The mapping communities share some neocartographic skills and manifest a growing cartographic literacy (Liu and Palen, 2010). The increasing range of opportunities for participation in mapping has led to the creation of a diversity of communities of mappers around ideas and values (e.g. open data), platforms (e.g. micromappers), topics (e.g. crisis mappers or citizen scientists), as well as around professional communities (e.g. the GIS community). In some cases, these communities transform into various forms of organisations that can be considered as intermediaries between institutional actors and the digital crowd. The social and political role of new digitally enabled actors, however, requires further discussion.

The social and political role of participatory mapping

A number of scholars have celebrated the advantages of participatory mapping. Goodchild (2007) presents VGI as a case of a 'dramatic innovation'. It is also considered to be a manifestation of a 'spatial century' (Gould, 1999) and 'an unprecedented shift in the content, characteristics, and modes of geographic information creation, sharing, dissemination, and use' (Elwood et al., 2012, p. 585). Goodchild and Glennon (2010, p. 238) have also highlighted how the crowdsourcing of geographic information allows faster collection and

1 From an interview conducted in Russian in September 2013. Translated by the author.

verification of information, while 'authoritative information is much slower to appear than VGI'.

Analysis of the role of participatory mapping goes beyond the instrumental value of mapping. It explores how liberalising access to maps and their development changes the power relations between different actors and democratises the medium of mapping (Gartner, 2009, p. 74). For instance, increasing access to satellite imagery has limited the capacity of authoritarian regimes to conceal violations of human rights (Livingston, 2016). There are arguments that celebrate participatory mapping as a practice that can significantly contribute to solving many social or political problems (Fairbanks, 2013) and as 'a tool for social transformation' (Roberts, 2012).

Mapping can also be approached as one of the manifestations of what Manuel Castells (2007) calls 'mass self-communication'. A reality where anyone can participate in geographic mapping, add layers of information to maps or create dedicated thematic maps, as well as using the process as a tool for social mobilisation and agenda setting, has contributed to increasing transparency and accountability. When emergency situations occur in authoritarian political environments, crisis mapping is considered a source of alternative framing (Entman, 1993) of the disaster, which can challenge the authorities' control of the construction and dissemination of information about the crisis.

At the same time, there are scholars who question whether participatory mapping can substantially contribute to empowerment and democratisation. Haklay (2013b) examines the exclusion from participation in the production of maps and suggests a 'hierarchy of hacking' that defines different degrees of capacity to participate in the mapping process. He argues that only bounded groups of experts can fully explore the potential of mapping (Haklay, 2013b, p. 63). These skills tend to be less available to those who are less well represented.

Critical research on Web 2.0 cartographies questions the way reality is represented through maps and approaches maps as symbolic constructions that reflect the power relation between various actors. According to Bittner et al. (2013, p. 946), critical cartography suggests 'explorations that question given social realities and sensitize for patterns of marginalization and exclusion', a consideration of 'the social contexts in which maps are produced and further, the way maps (re)produce social realities'. In addition, the new technologies of mapping allow new affordances for the construction of a reality that can favour traditional institutions (Asmolov, 2014).

Optimism about the democratic potential of participatory mapping can also be approached as a case of solutionism, as conceptualised by Morozov (2013, p. 6): 'Recasting all complex social situations either as neat problems with definite, computable solutions or as transparent and self-evident processes that can be easily optimized – if only the right algorithms are in place!' Some empirical research highlights the challenges related to participatory mapping.

For instance, a report titled *Mapping the Maps* has demonstrated how only a small percentage of the maps created on the basis of the Crowdmap platform were actively used (Bailard et al., 2012). About 93 per cent of the more than 12,000 Crowdmaps analysed in the research sample had fewer than ten reports, while 61 per cent were identical to the default Crowdmap setting.

In some cases, mapping initiatives fail to engage a local community due to technological challenges, social or gender norms, as well as the apathy and political risks that can affect reporting. Monitoring and evaluation of crisis mapping projects, for example in the case of the deployment of Ushahidi following the earthquake in Haiti in 2010 (Heinzelman and Waters, 2010), also raise some questions about the extent to which the platform contributed to the response on the ground (Morrow et al., 2011).

The celebration of participatory mapping often underlines the successful case studies and the empowering role of maps. Due to the simplification of the creation of maps and a number of influential case studies, the idea of 'let's create a map' has become in many cases a universal solution for a variety of issues. However, the creation of an online map cannot ensure the desired outcome. A more nuanced understanding of the social and political impact of participatory mapping requires a conceptual framework that considers digital mapping affordances in the context of situations that have been addressed by mapping.

Maps and activity: a conceptual framework

Addressing the debate about the role of participatory mapping requires a conceptual framework that allows us, on the one hand, to address the uniqueness of digital maps as participatory objects and, on the other hand, to explore the role of maps in the context of issues that have been addressed by mapping. While the affordances concept explains the technological factors that enable participatory mapping, it does not allow us to explore it in the context of specific situations. At the same time, theories that discuss the social and political impact of participatory mapping are mostly focused on explaining the successful cases where this could play a substantial role. Nonetheless, they do not explain the various scales of impact of participatory mapping and the cases of its failure. In this light, there is a need for a framework that will support a critical analysis of both the successes and failures of participatory mapping in addressing social and political challenges, as well as in addressing both technological and sociopolitical aspects of user participation in the development of digital maps.

In order to address these challenges, the following conceptual framework proposes a focus on the triangle of relations between the tools and purposes of mapping and the communities engaged in it. Traditionally, maps were

considered primarily as something that mediated the relationship between the user of the map and their environment. By offering a representation of an environment that assisted with navigation, maps helped the user to reach a specific destination. Most users, however, were excluded from production of the map. The emergence of 'prosumers' (Toffler, 1980) – those who both participate in the generation of maps and also use them – can be associated with the dual position of a map as an object of development and as a mediator of the relationship between users and their environment. This duality is addressed here through the lenses of CHAT and by relying on the notion of activity systems developed by Engeström (1987).

Activity theory grew out of cultural-historical psychology, as developed by Lev Vygotsky (1978). According to Vygotsky, the 'individual and the social were conceived of as mutually constitutive elements of a single, interacting system' (cited in Cole, 1985, p. 148). CHAT argues that the activity is a form of relationship between individuals (subjects) whose environment has two properties: it is mediated by tools and oriented towards goals (objects). According to Kaptelinin and Nardi (2006, p. 56), 'the structure of a tool itself, as well as learning how to use a tool, changes the structure of human interaction with the world'. In this sense, a map is a tool that mediates the relationship between subjects (users) and their environment. It supports navigation and allows a subject to achieve its object.

Vygotsky (1981), however, highlighted how the role of maps is more complicated than just the mediation of external activity. He argued that maps can be considered as psychological tools that mediate mental function. According to Vygotsky (1930), psychological tools 'are directed toward the mastery of [mental] processes – one's own or someone else's – just as technical devices are directed toward the mastery of processes of nature' and modify the 'structure of mental functions by determining the structure of the new instrumental act, just as the technical tool modifies the process of natural adaptation by determining the form of labour operations'. In other words, maps have a reverse function by comparison with material tools. While material tools are applied in order to change the object of activity, maps are internally oriented and change the subject. In this light, maps structure, guide and transform activity by offering new forms of relationships between a subject and his/her environment and supporting the attainment of specific goals.

Vygotsky distinguished between psychological tools as physical artefacts and as symbolic systems (Kaptelinin and Nardi, 2006), and showed that physical artefacts continue to fulfil their functions even after their subjects stop using them. This phenomenon was addressed as a process of internalisation, that is the transformation of the material psychological tools into internal cognitive functions. According to Kaptelinin and Nardi (2006, p. 43), 'internalization of mediated external processes results in mediated internal processes'. However,

despite the differences between material and psychological tools, the analysis of tools – whether material or psychological – was situated within a context of the mediation of activity. Kaptelinin and Nardi (2006, p. 42) conclude that 'the use of mediators, whether crushing a nutshell with a hammer or orienting oneself in an unfamiliar city using a map, changes the structure of activity'.

CHAT highlights how maps should be examined in the context of human activity as a form of mediated subject–object relation. Nevertheless, while the traditional analysis of maps in activity theory has addressed maps as psychological tools that transform users' relations with the environment, digital affordances that allow participatory forms of producing maps have created new challenges for their conceptualisation. On the one hand, maps continue to be a mediating tool located between subject and object, supporting orientation towards a goal. On the other hand, maps are an object of participatory production that is mediated through a variety of digital tools. Moreover, maps can be considered as an object of collective activity.

Vygotsky's followers were concerned with the role of tools in the mediation of activity as part of collective action. Relying on a notion of activity developed by Leontiev (1978), Engeström (1988, p. 30) conceptualised activity as a collective phenomenon and defined it as 'systems of collaborative human practice'. Engeström proposed that we analyse the role of tools as one of constituting and mediating activity systems. In addition to a relation between subject and object (purpose of activity), which is mediated through tools, the model includes three supplementary elements of activity: the rules within activity systems, the community of those who participate in an activity that has been mediated by an artefact and the division of labour within this community (around attaining the object of the activity system) (see Figure 2.1).

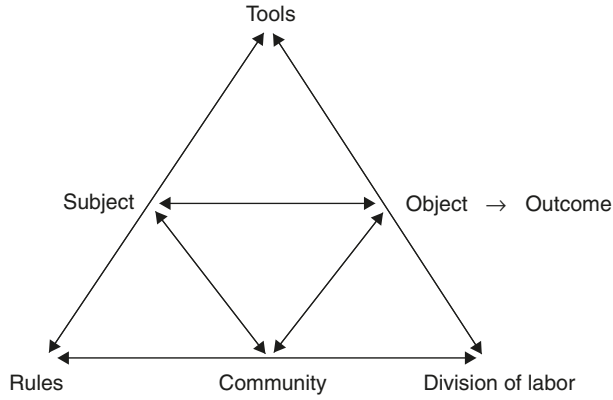

Figure 2.1. The model of a human activity system (Engeström, 1987).

From this perspective, a participatory online map has a dual position. On the one hand, a digital map is a tool that mediates the activity of a community of subjects in relation to a specific object. On the other hand, a digital map as an outcome of participatory development can be considered as an object of activity of a community of users that is mediated by relying on a variety of digital tools. In the first case the object of the systems is the creation of the map, while in the second case the map is used in order to reach a desired outcome.

The major question suggested by applying CHAT is: what is the place of the mapping within the activity system? In the case of 'mapping as activity', the purpose of the activity system is the creation of the map. In the case of 'map-mediated activity', there is an infinite range of potential forms of activity, while the common denominator of these activities is that they are supported by mapping. Activity theory offers a methodological framework for the analysis of digital maps in the context of activity systems. The purpose of analysis, however, is not only to establish the location of a map in the context of an activity system. The main advantage of applying CHAT to the analysis of participatory mapping is the opportunity to explore the interrelation between maps as an object of activity and maps as mediators of activity.

In some cases, the participatory development of maps can be integrated into a larger context of activity around a common object that requires mapping as a form of mediation. In this case, those who create maps and those who use maps belong to the same system. In other cases, the development of maps and the activity supported by mapping can be seen as segregated activity systems, or at least systems with a limited degree of integration. In this case, the question becomes: Do mapping as an activity and mapping-mediated activity belong to one integrated activity system or are they separate systems? And, if the communities of these systems are separate, how is their relationship structured?

To sum up, unlike the critical approach that investigates maps as a form of symbolic representation, a conceptual framework that relies on CHAT allows us to focus beyond the question of how reality is constituted, through a map as an outcome of a particular power relationship. The focus on the link between the participatory development of mapping and the activity that is mediated through maps allows us to consider critically the role of digital maps in the context of social and political processes. The following case studies allow us to apply this framework to an analysis of crisis mapping and urban mapping.

Case studies

Crisis mapping

According to Starbird (2012, p. 47), 'crisis maps are maps of impacted areas that users collectively create and edit'. She explains that 'volunteers for crisis mapping projects can come from a local community in response to a specific

event, or from a growing pool of individuals who identify as "crisis mappers" and repeatedly participate across events, most often from outside the affected area'. In this sense, crisis mapping initiatives can represent a spontaneous self-organisation of people around a specific crisis, relying on members of a crowd or on projects facilitated by an established community of crisis mappers. In order to address both cases, this section considers a number of cases from Russia, as well as other cases that have been supported by members of the global crisis mapping community.

In 2010 a densely populated area of western Russia experienced a significant wave of wildfires. The disaster caused dozens of casualties. Russian internet users tried to self-organise to respond to the emergency. The crisis-related online activism was motivated particularly by the lack of an appropriate response from traditional institutions responsible for disaster management (Asmolov, 2013). A group of online volunteers created an Ushahidi deployment and named it Help Map. The purpose of the mapping was not only the collection of information about fires, but also the facilitation of aid links between those who needed help and those who were interested in helping.

While state-controlled traditional media broadcasted that the situation was under the full control of the emergency services, Help Map offered an alternative picture, presenting a truer scale of the disaster by relying on reports from citizens. Moreover, it also offered a mapping of resources available to support an emergency response. The major purpose of the mapping was the collection of data about needs and available resources (including transport, firefighting equipment, clothing, evacuation destinations and volunteers willing to participate in firefighting). The emergency services ignored the map and avoided contact with volunteers. However, the map was used by volunteers on the ground and by charity non-governmental organisations (NGOs) that took part in the emergency response.

The purpose of moderators, who created an offline coordination centre, was not only to aggregate data from different sources and verify the data submitted by users, but also to make sure that requests for help were linked to offers of help and to ensure that the information mapped did not remain without a response. If internet users were not able to address a particular need, the moderators tried to find a relevant NGO or charity organisation to help. In other words, the mappers' activity was not limited to mapping, but also involved doing their best to ensure that the required activity happened in the offline dimension. In this sense, the map was not only a tool for data collection, but also a tool for the allocation of citizen-based resources for the purpose of emergency response. In the case of Help Map, there was no strong distinction between those who created the map and contributed to the mapping and those who used it to respond to the disaster. The mapping itself and the activity enabled by it relied on the same community of internet users.

A few months later, in the winter of 2010–11, Russia was hit by an unprecedented cold front. Many cities were left without heating and thousands of people were struggling to receive basic supplies due to the extreme weather conditions. This crisis was addressed by another deployment of Ushahidi called Holoda.info (*holoda* means 'cold' in Russian). The structure of the map was similar to that of Help Map. However, this time no offline coordination centre was established. In addition, unlike in the case of the wildfires, this crisis was not met with large-scale citizen mobilisation. Eventually, the map collected many reports about problems in different regions experiencing extreme weather. Nonetheless, the map stopped functioning a few days after deployment since it received very few reports about available resources and was not connected to specific organisations offering a response. While Holoda.info contributed to increasing transparency around the scale of the crisis, its role in the facilitation of response was minimal.

In another case of disaster response in Russia, a different type of relationship between the community of mappers and the community of responders was evident. In July 2012 floods destroyed a significant part of the city of Krymsk in southern Russia. As in the case of the wildfires in 2010, the response from the authorities was slow and insufficient. Many volunteers self-organised online and went to the area of the disaster. However, one of the problems they faced on the ground was a lack of updated maps of the disaster area. Lack of a geographic map made the coordination of a response more difficult. To address this gap, a group of OSM volunteers self-organised in Russian OSM forums and created an updated map of the area of the floods. Consequently, volunteers were able to have updated maps that enabled them to facilitate a better response to the emergency. In this case, there was a clear differentiation between the community of mappers and those who used the maps. Moreover, the map created online as a result of the mapping activity was transformed into a physical printed artefact that was used by volunteers. Despite the fact that the mappers and those who used the maps were from different communities, this case presents a good example of integration between a mapping activity and an activity enabled by mapping within unified activity systems and with the object of responding to the disaster. Later, the OSM map was also used as the basis for online thematic maps in order to create a crowdsourcing deployment similar to Help Map in the case of the wildfires.

The global crisis mapping movement offers a different case of relations between those that participate in mapping and those that use the map to address a crisis. The case of the response to Typhoon Yolanda, which struck South East Asia in November 2013, allows us to consider the complexity of the relationship between the different actors that participate in mapping and the responders. The request 'to carry out a rapid needs and damage assessment

by tagging reports posted to social media' (Meier, 2013a) was submitted by the United Nations Office for the Coordination of Humanitarian Affairs (OCHA) to the Digital Humanitarian Network (DHN), which represented an online coalition of organisations of networked volunteers.

The activation included not only the members of online crisis mapping communities, but also an appeal to members of a broad crowd that could participate by using the Micromapping tool (Hildebrandt, 2013). This tool simplified the participation of online users in the analysis and categorisation of visual and textual information about the disaster. MicroMappers[2] is based on the idea of crowdsourcing and microtasking (such as in the case of Amazon Turk), where the simplification of participation is based on tasks that do not require prior knowledge, allowing the range of potential participants to be expanded and making the achievement of the desired outcome easier and faster.

The project was managed by Patrick Meier (who at the time worked at the Qatar Computing Research Institute) and his colleagues from the volunteer disaster-response community Standby Task Force (SBTF). Relying on a number of tools that aggregate disaster-related messages and images, the platform created a data set of hundreds of thousands of tweets and images related to the consequences of the typhoon. Aggregation tools allowed an ongoing process of 'feeding the clickers' with new data for categorisation and geolocation (Meier, 2013b). The analysis relied on a number of mechanisms that allowed the tagging of tweets and images by 'clickers'.

In this case, the microtasking platform and the map were two different tools. The mapping activity was mediated through the microtasking platform, while the visualised outcome was represented through a map. The map was created following a request from its potential users:

> In the case of Typhoon Yolanda, we also had a formal partner, the UN Office for the Coordination of Humanitarian Affairs (OCHA), that officially requested digital humanitarian support. In other words, our efforts are directly in response to clearly articulated information needs. In contrast, the response to Haiti was 'supply based' in that we simply pushed out all information that we figured might be of use to humanitarian responders. (Meier, 2013a)

This case presents a strong division between the community of mappers and those who used the map. It allows us to identify three type of actors that are related to the mapping. The first group was an unbounded crowd that took part in mapping by relying on mediation with dedicated tools that simplified participation. The second was a bounded group of online volunteers with a certain degree of expertise that managed the crowd and made sure that the map met the expectations of responders. The third group was humanitarian agencies

2 See http://micromappers.com.

that used the maps to increase situational awareness, support the allocation of resources and assist responders on the ground.

In this case, intermediaries like SBTF and DHN made sure that the outcome of participatory mapping was integrated with activities that could benefit from the maps. That linkage was also supported by the fact that the mapping activity was activated by responders. In other words, in the community around the map of Yolanda there was an integration of mapping as an activity and the activity enabled by the mapping. That said, while initially emergency organisations outsourced the mapping to the crowd, in more recent years we can see how international organisations develop internal technological and professional capabilities to analyse big data in crisis situations and therefore have less need for the engagement of external actors.

Urban mapping and civic applications

The mapping of the urban environment for a variety of purposes has become a popular branch of participatory mapping. One of the best-known examples is SeeClickFix, a web tool for the reporting of non-emergency issues in a neighbourhood to local authorities launched in the United States in 2008. The name SeeClickFix highlights the connection between the act of data collection, the act of mapping and the act of resolving an issue that has been mapped. Another tool, CitySourced, 'provides new spatial media tools for civic engagement' and is 'seeking citizen involvement in municipal problem-solving by allowing people to submit reports about different problems (e.g. potholes or garbage) to an interactive online map' (Elwood and Leszczynski, 2013, p. 8). This map offers local government an opportunity to follow a problem and report back on the resolution of the issue.

Urban mapping projects that seek to resolve local issues, however, have also been launched in countries where the local authorities often seek to avoid responsibility and ignore citizen reports. In this light, some urban mapping initiatives are considered as 'civic applications' and provide a means of cyber-empowerment that assists city residents in forcing local authorities to address problems. According to Ermoshina (2014, p. 5), 'civic applications make use of existing legal mechanisms and standards to legitimize and strengthen an individual complaint'. She describes the mechanism of civic application: 'Every problem declared via a civic application has two destinations. The first one is an invisible one – higher administrative units (Inspectorate, City Hall, etc.). The second destination is a public one – the application's server – where the problem becomes visible to other users' (Ermoshina, 2014, p. 6).

One of the most popular Russian participatory mapping civic apps is Rosyama, launched by Russian oppositional activist Alexey Navalny to address the condition of Russian roads. Once a message with the geolocation and image

of a pothole is submitted, this automatically generates a complaint that is sent to the local authorities responsible for the issue, who are then legally obliged to take care of it. In another case, a platform from St Petersburg, Zalivaet.spb (Flooded.spb), offered a map of leaking roofs following spring melting snow in 2010 in order to force the local housing service to address the problem. Eventually, senior officials had to pay attention to the map and invited the founder of the project to collaborate in resolving the problem. Another online urban mapping platform, RosZHKH, was a Russian alternative to SeeClickFix that allowed people to submit reports about local problems such as illegal parking and linked these reports to a tool that generated official complaints to local authorities.

In all the above cases, the participatory mapping not only increased transparency around specific problems, but also allowed people to hold the authorities accountable by offering a specific repertoire of activities to address the problem. The maps can be seen here as 'problem-solving instruments' that offer a link between the mapping of the problem and the activity enabled by it. That said, in many cases the mapping projects were not able either to force the authorities to respond or to develop a collaboration mode with local authorities that allowed them to offer a link between participatory mapping and activity in response to the issue raised by the map.

The following case enables us to examine the relationship between mappers and the users of the map in a project called Open Maps of the Perm Region, launched by an ombudsman of the Perm region in Russia with assistance from the World Bank in 2011. The general purpose of the project was defined as supporting local self-governance and civic society, including citizen activism in the region (Margolina, 2012). The maps addressed mostly small cities with some significant social challenges. For instance, in Kizel a Crowdmap deployment called 'Recreating Our City: Kizel – Past, Present and Future' was created.[3] The city had been experiencing significant problems since its main industries were closed. The idea was to map three different geographic layers in the dimension of time. The 'past' layer would map how the city had looked in the past (a nostalgic manifestation of memories). The 'present' layer would focus on the current problems of the town. The 'future' layer would present a map-mediated vision of how the city should look.

However, while planning these projects the initiators discovered that the basic layer of updated geographic data was missing for some areas. Consequently, the project suggested first mapping the towns themselves (literally 'putting them on the map') in order to allow for work with

3 See http://history.kizeladm.ru.

issue-related layers later. Civic activism was refocused from solving local problems to engaging people in geographical mapping, relying on OSM and based on the website osm.perm.ru. Eventually, the project was successful in adding a great deal of geographical information about remote areas of the Perm region to OSM. The regional Crowdmap deployment in Kizel, however, remained almost empty and inactive a couple of years later. The project was successful in creating a community of VGI mappers, but failed to create a community of users of those maps.

In some cases, the authorities have tried to take control of mapping tools by offering their own urban mapping platforms. In this way, the moderators could filter reports submitted by citizens, as well as making sure that the action supported by the maps had no disruptive effect. For instance, in some cases, reports about streets that were blocked by snow were addressed by removing the snow from photos using Photoshop and posting the edited photo as proof that action had been taken. In other cases, platforms offered a limited repertoire of citizen participation. For instance, the Active Citizen platform, launched by the mayor of Moscow, was criticised for appearing to provide an opportunity to complain, but with no consequent action taken, and creating 'a semblance of openness and participation, while in practice neutralising citizens' activity and exerting control over them' (Asmolov, 2017, p. 463).

The idea that in order to solve the problem you first need to create a layer of geographical information about a particular area that is scarcely represented on the existing map is certainly not exclusive to Russia. One of the most notable projects in this field is the mapping of the slums of Kibera and Mathare in Nairobi. According to Fairbanks (2013), 'on Google Maps they figure as blank expanses, in keeping with their reputation as shadowy, marginal places'. Drawing Kibera on the map relied on the engagement of volunteers to collect data about the area and on the crowdsourcing of information about the location of key places (such as water taps, schools, pharmacies) based on information from local citizens, as well as adding official data. However, according to Kovacic and Lundine (2013, p. 123), while Map Kibera successfully created data and mapped the slums, the outcome of the mapping project was not 'accessible to or consumable by local organizations'.

A new model of mapping was implemented by a social enterprise, Spatial Collective, in the slums of Mathare: 'The goal was that Mathare residents, through mapping and social media tools, relate their stories to an audience outside of the slum and beyond the borders of the nation, but more importantly start the conversations within the community through constant small forums' (Kovacic and Lundine, 2013, p. 124).

The mapping relied on members of youth groups from the slums. One of the leading activists, Isaac Mutisya, explained the role of the map from the

perspective of the local mappers: 'We think of GPS maps as guides. They are the sometimes annoying, always calm, recorded voice in our car that steers us through unfamiliar places. But maps are also public records that can help slum dwellers negotiate with city authorities' (Warner, 2013).

One of the issues for problem mapping in Mathare was illegal dumping grounds. The purpose of mapping was defined as improving 'the existing waste management systems found in the community' (Spatial Collective, 2013). Mapping various segments of the life cycle of waste and locations related to illegal waste allowed local community members to take care of this problem. Other problems addressed by the map have focused on the facilitation of dialogue between local residents and the local authorities, for example on mapping the infrastructure of pipes in order to increase the number of public toilets and crime mapping that relies on community reporting.

The case of Mathare demonstrates how the same community has conducted the mapping and used the outcome of it to enable an activity that can contribute to the solution of problems like waste management. We can also see how a specific organisation, in this case the social entrepreneurship Spatial Collective, supports both the mapping process and how it is used to address the problems of the slums. The purpose of the maps is 'not only to present information (e.g. a water supply shortage), but also to produce concrete action (e.g. to facilitate the delivery of water to remedy the shortage)' (Kovacic and Lundine, 2013, pp. 126–7).

Analysis

This chapter argues that the role of participatory digital maps needs to be examined in the context of activity potentially related to these maps. The notion of an activity system allows us to identify the dual position of the maps as a mediator and/or as an object. Case studies from the fields of crisis mapping and urban mapping allow us to examine the locations of the maps in the context of activity, as well as the structure of relations between different communities of users related to the maps.

Figure 2.2 presents a case where the map can be considered as an object of activity. This activity is mediated via a variety of digital tools that afford a broad scope of participation in the development of maps. The participatory mapping activity includes the aggregation of data from a variety of sources, data analysis and data verification. In each case considered above we can see various forms of digitally mediated participatory practices that were directed towards the development of digital maps. Maps as objects can be seen both in the case of participatory development of geographic maps (e.g. OSM) and of participatory development of issue-focused maps such as crisis maps or urban maps.

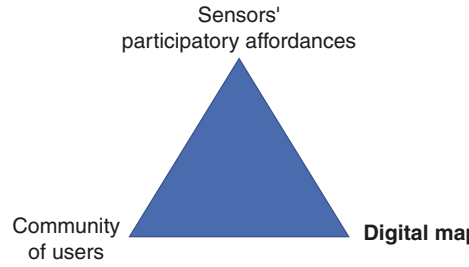

Figure 2.2. Participatory maps as objects of activity.

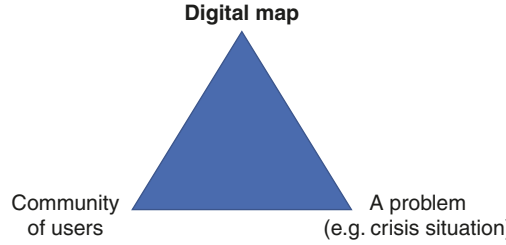

Figure 2.3. Participatory maps as mediators of activity.

Figure 2.3 presents a case where the map can be considered as a mediator of activity in relation to specific objects. This can be seen in the cases of crisis mapping, where digital maps were supported in order to enhance emergency response, and in the cases of urban mapping, where the maps were developed in order to address a variety of problems on the city level. The major question, however, is how mapping as an object of activity is related to the outcome of the mapping. Figure 2.4 allows us to focus on an analysis of the relationship between the community taking part in the production of the map and the community using the map, and to explore the mechanisms linking the map's two functions.

In the case of Help Map, the mapping activity and the mapping-enabled activity were integrated in the structure of a mapping platform, suggesting a link between needs and resources. Those who participated in the mapping were the same group of people who participated in the response to what had been mapped. Both activities relied on a community of volunteers who used the Internet, as well as a number of NGOs participating in the emergency response. It is safe to say that the mapping and mapping-enabled

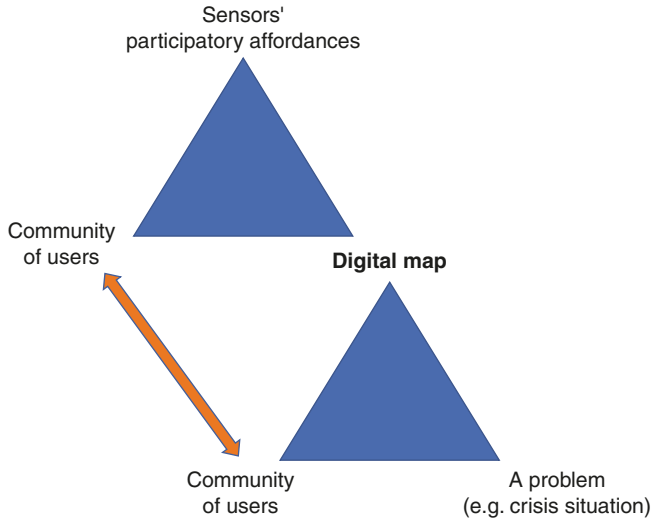

Figure 2.4. The dual role of participatory maps in the context of activity systems.

activities were highly integrated in the case of Help Map. The group of map moderators played the role of facilitators in order to ensure that the mapping was linked to the activity required in response. However, in the case of the map that dealt with the extreme weather in Russia, this link was missing and the map remained mostly an object of activity.

In the case of the response to Typhoon Yolanda, the community of users that created the map and those who used the map were substantially different. The map relied on the participatory activities of micromappers; however, the outcome of the mapping was developed for an international responding organisation, in this case OCHA. The link between mapping as an activity and the activity mediated by it was supported by SBTF, an established online community of crisis mappers. The two types of activity were also integrated due to the facilitation by the DHN and due to the fact that the activation of the mapping community took place following a request from those interested in the map to support the rescue operation on the ground.

The cases of urban mapping also allow us to examine different types of relations between mapping as an object of activity and the activity that has been mediated by the mapping. In the case of projects dealing with potholes, leaking roofs and neighbourhood problems, the maps forced institutional actors to address the issues thanks to algorithms that automatically generated

complaints. The moderators of the maps also made sure that the reports were transformed into official complaints and reached their destination. In the case of the Open Maps project in Perm, the emergence of a GIS mapping community was not followed by the emergence of an issue-mapping community or a community of people who could act on the basis of the mapping. The map in Kizel demonstrates how mapping can be disconnected from activity that is supposed to address the issues mapped.

The case of the mapping in Kibera and Mathare also demonstrates how it is linked to various types of activity by the local community. The same community of youth groups from the slums was engaged in mapping and in activity relying on it (such as the collection of rubbish). In some cases, the community around the map included not only internal actors (local residents), but also external actors, including the authorities and aid organisations. The high degree of integration between mapping and mapping-enabled activity was supported by the Spatial Collective NGO.

In some cases, however, the mapping activity is not necessarily designed to address a specific problem. The cases where it is driven by the goal of updating geographic maps (as in the case of OSM) can be considered as 'generative mapping', where the purpose is to support unexpected outcomes and a variety of potential actions. Generative mapping relies on a community of mappers, but usually this is not linked to a community of those who can use the map, since no specific type of mapping-enabled activity is considered as part of the project.

These cases allow us to identify two types of relations between a community of mappers and a community of those who use the maps. In the first case, groups of users belong to the same group. This can be seen in the case of crowdfeeding projects, where the members of the crowd both develop and use the maps to address the issues mapped. In the second case, the community of users that participate in mapping and those who use the maps can be seen as two different groups. In most of these cases, the mappers can be considered as members of a digital crowd or online groups of volunteers, while those who use the maps to address the issue of mapping are institutional actors.

In some cases, the institutional actor initiates and supports the mapping in order to support their own activity. In these cases, the maps serve as facilitators of collaboration between the community represented by the mappers and external actors. In such cases, we can see that mapping is more likely to be followed by a mapping-enabled activity and to serve the mutual interests of all sides. In other cases, the maps force institutional actors to respond. The purpose of the map in these cases is to get the issue on the agenda and to attract attention. However, this symbolic representative value of the map in many cases does not necessarily lead to action, despite the claims that maps will increase transparency and accountability.

In all the cases considered, we have seen that a central role in connecting mapping as an activity and the activity mediated by mapping was played by intermediaries. In some cases, the intermediaries are an outcome of spontaneous self-organisation, as in the case of the Help Map coordination centre. In the case of Typhoon Yolanda, intermediaries are presented by online groups of volunteers, including SBTF and DHN. In the case of Kenya, the intermediary is an NGO (Spatial Collective). Some of the urban mapping platforms embed a mechanism that links mapping to action. In the cases of Rosyama and Zalivaet.spb, the automatic generation of complaints, as well as the activities of the founders of the mapping platforms, ensure that the outcome of mapping forces institutional actors to address the issues mapped.

The additional trend that can be seen is that the organisational actors develop internal capabilities of mapping by relying on the analysis of big data and therefore rely less on the engagement of the crowd. This can be seen as a shift from crowdsourcing to insourcing of digital mapping. At the same time, we can see that some institutional actors seek to neutralise the link between mapping and mapping-enabled activity through the development of platforms that allow them to control the outcomes and offer a semblance of participation. The latter can be addressed as a form of vertical crowdsourcing (Asmolov, 2017).

Conclusion

The focus on participatory mapping in the context of activity systems has allowed us to explore the relationship between those who create the data and those who use it, and in particular to ask to what extent these groups are interrelated. The investigation has focused on the degree of integration between various types of activity as represented in the links between different communities of users. Maps always exist in a context of activity. The balance between activity directed towards the development of a map and activities that rely on mapping differs, however, from map to map.

The analytical differentiation between mapping as activity and activity mediated by mapping allows us also to investigate the relation between these two forms of activity and suggests a model for the structure of this relation. In the first case, the same community conducts both mapping and the activity based on the mapping. In this case, mapping as an activity is a segment that has been integrated into a larger activity system. In the second case, the mapping as an activity and the mapping-enabled activity are two separate systems with independent objects of activity and different communities.

Addressing the question of the structure of the relation between mapping as an activity and the activity enabled by mapping allows the identification of different kinds of ‘mapping failures’. The first type of failure is where mapping

as an activity is not followed by an activity mediated by mapping. In this case, the map remains a meaningless object. For instance, in some cases a community of social activists (such as an NGO) will ask a community of mappers to create a map (either a geographic or an issue map), but this map will not in the end be linked to or integrated within any specific activity.

The second type of failure can be seen when a community that needs a map in order to achieve its purposes is not able to mobilise a community of mappers to create the required mediating tool or more generally does not realise the mapping needed. A third type of failure, which can be seen within activity systems mediated through online maps, is around the object of mapping. In these cases, there is a contradiction between, on the one hand, the way the mappers imagine the desired activity enabled by mapping and, on the other hand, the forms of activity desired by the people experiencing the problem on the ground.

One may argue that because it is easier today to participate in mapping than in the activity enabled by it, more internet users are taking part in the process, but not necessarily in the solution of the issues mapped. Consequently, ICTs contribute to shifting the balance towards mapping activity, while fewer resources deal with mapping-enabled activity. While almost anything can be mapped, this does not guarantee that mapping will contribute to a solution to what has been mapped. Conversely, mapping becomes part of a symbolic gap between increasing awareness of a problem and the decreasing amount of resources available to solve this problem. Considering maps in the context of activity systems should help to address this gap, and help the users of digital maps not only to navigate the environment but also to change it.

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3. Knowledge and spatial production between old and new representations: a conceptual and operative framework

Maria Rosaria Prisco

> Proprio perché tutto dipende dalle rappresentazioni, occorre che esse siano in grado di comprendere e regolare i processi di trasformazione del pianeta.
>
> (As everything depends on representations, it is necessary that they are able to understand and inform the processes of planet transformation.)
> (Dematteis, 1985, p. 101)

This chapter critically analyses whether new data sources, generally referred to as 'big data' and volunteered geographic information (VGI), can represent a way of overcoming the limits of traditional geographical representations based on official statistics and indicators. It also asks whether this new availability of spatial information simply increases the amount of georeferenced data or, through the support of a theoretical framework, it can also open up new and more effective ways of revealing places and their identities and thus improving community participation as practice for policymaking and planning.

If read in its historical context, the recent emergence of the big data era and the so-called 'fourth paradigm', based on data-intensive analysis (Anderson, 2008), appears to be in perfect continuity with the late 19th-century quantitative turn in social sciences where statistical quantification of human behaviour played a key role in explaining the world and in forming modern Western identity (Hacking, 1990). This 'objective' knowledge also produced a new approach to social engineering based on managing natural and social facts more easily through numbers (Barnes, 2013). The current 'datafication' of knowledge represents the power accorded to data in the construction and reproduction of social representations based on the huge availability of digital information and the power of the Internet (Newell and Marabelli, 2015).

This approach also has epistemological and ontological implications, in particular when the analysis is carried out at subnational level. As Shelton (2017) states, data used to represent the phenomena under investigation are strongly influenced by what is simpler to quantify and easily counted, causing a

misrepresentation or underrepresentation of all that is not visible or is difficult to operationalise through the traditional top-down approach to knowledge production. The result is the production of partial geographies in which all that is not easy to represent, like conflict, cultural, ethnical and social diversity, essentially becomes invisible (Vanolo, 2018).

All these aspects are part of the subjective/emotional side of place representation carried out on different scales, from the body to the home and neighbourhood, up to larger scales characterising what Lefebvre (1991) defined as 'lived spaces'. These 'lived spaces' are traditionally neglected in positivist geographical studies based on a conception of space as an object bounded by administrative limits and by economic and technical criteria. As Davidson et al. (2005, p. 1) note: 'The difficulties in communicating the affective elements at play beneath the topographies of everyday life have meant that, to a greater or lesser extent, geography has tended to deny, avoid, suppress or downplay its emotional entanglements'. A limit probably due both to the limited availability of data and to the intrinsic difficulty in quantifying and operationalising subjective aspects, especially in relation to their spatiality.

This approach is particularly inadequate when values are at stake in the analysis as, for example, in the recent indicators framework built to assess the progress of policies for human well-being and sustainability: the ongoing sustainable development goals (SDGs) promoted by the United Nations (UN) in 2015. Despite the significant shift in considering different measures of human progress beyond the criteria of gross domestic product (GDP), the way to represent the complexity stemming from this new approach to development remains bound to the traditional systems of indicators based on official statistics produced by national institutions. According to this perspective, the geographical dimension of sustainability is restricted to the study of spatial differences and quantified using administrative spatial units with a comparative approach at global level. By describing regions or cities only in terms of their contents – that is, wage earners, pupils' achievements, number of unemployed people and so on – they become mere objects of comparison in the ranking exercise of attributing above/below scores with respect to the national average.

The container approach to space is not able to grasp some complex issues of the sustainability/well-being concept and constitutes a rather poor conceptual and methodological basis for dealing with a complex place-based concept like sustainability (Manderscheid, 2012). Where people reside and act, their subjective and relational dimension of spatiality from the body and its multilayered interrelations with others scaled up to global level, is an issue that requires a more complex vision of spatiality, which Lefebvre (1991) and Harvey (2006) effectively introduced in their conceptualisation of space. This

framework of reference can help in decoding and understanding the role of new sources of data in the production of a more participatory geographic knowledge.

Starting from this field of observation, the chapter will test the possibilities offered by new sources of geographic data usually defined as big data (in particular those produced through people's voluntary contributions) in supporting a research path that can lead to more participatory and coherent spatial representations with the complexity that emerges when values and people and the specificities of places are at stake. The chapter will also examine the role of VGI and explore the ways in which a new approach to spatiality can help to decode and understand this avalanche of data.

From drought to a deluge of spatial data

The term 'big data', typically used to mean a wide range of data sources with specific characteristics and epistemological, methodological and legal implications, has since around 2010 become a 'popular technological meme' (Gorman, 2013). Despite its popularity across a wide range of disciplines, from information science to medicine, sociology, economics and management, the term does not yet have a structured and universally accepted definition. Through a survey of 1,581 conference papers and journal articles that contained the full term 'big data', de Mauro et al. (2016, p. 131) propose a definition independent of the various fields of application and based on big data as an information asset 'characterised by such a high volume, velocity and variety to require specific technology and analytical methods for its transformation into value'.

To the well-known 'three V' criteria of data (volume, velocity and varieties) (Laney, 2001), some scholars (Boyd and Crawford, 2011; Kitchin, 2014) have added other criteria, in particular: completeness (the ability to grasp the characteristics of entire populations or systems); relationality (generally data have common key fields attached to other data sets); and high-resolution information involving a fine level of detail, including spatial scale resolution.

Among different typologies of sources of big data identified by the current literature (Kitchin, 2014; Miller, 2010) and major statistical agencies, the classification of the sources provided by the UN (UNGGIM, 2013) is particularly interesting for its relationship with data contents:

- *What people say – online content*: international and local online news sources, publicly accessible blogs, forum posts, comments and public social media content, online advertising, e-commerce sites and websites created by local retailers that list prices and inventory.

- *What people do – data exhaust*: passively collected transactional data from the use of digital services such as financial services (including purchases, money transfers, savings and loan repayments); communication services (such as anonymised records of mobile phone-usage patterns); or information services (such as anonymised records of search queries).

One of the most important characteristics of this avalanche of data is the possibility of georeferencing the information produced. Mobile phone users, access to the Internet, weather sensors, tracking of vehicles providing location in real time, social networks, shopping in the point of sale (POS) circuits and so on, allow the analysis and prediction of events with a geographical precision that was unthinkable in the mid-2010s. The number of social media users worldwide was 2.46 billion in 2017 (European Commission, 2019), although not all digital tracks are georeferenced. Roughly 2 per cent of the total number of tweets collected (almost 500 million tweets per day and 326 million people using Twitter every month in 2017) showed the user's location with a street level accuracy, mainly due to privacy problems (Leetaru et al., 2013). Moreover, despite the low percentage of geotagged data from social networks, some researchers are developing an algorithm able to predict a Twitter user's location without the need of a single geotag (Krishnamurthy et al., 2014). Batty (2013) suggests that the big data revolution will profoundly change geographic analysis thanks to the availability of small-scale information that will allow the emergence of some phenomena previously not easily measurable.

Another relevant big data issue is the ongoing shift in the production of data. Traditionally, data are collected by national statistical authorities that monitor the whole process from production to dissemination. One of the most relevant effects of technological advances since 2010 has been the involvement of non-professional producers in mapping activities and spatial data collection, the so-called 'produsers', that is people playing the twin role of producer and user of data (Budhathoki et al., 2008). These new ways of geographical data production can take place either voluntarily (through ad hoc spatial interfaces and the use of social networks, blogs, e-commerce, opinions about products and services and the like) or through the involuntary tracks generated by the use of mobile devices or other everyday practices (use of credit cards, health cards, public transport, satellite box car insurance, for example). Many terms are used to classify citizen-derived geographical information, such as crowdsourcing, user-generated content and VGI (See et al., 2016). However, in general, this range of technologies and human participation practices is defined as the 'Geoweb': the integration of Web 2.0 and geospatial information technology (such as Google Earth, OpenStreetMap (OSM), geographic information system (GIS), quantum geographic information system (QGIS)) (Elwood

and Leszczynski, 2012). Some scholars have defined this new production as a revolution, an 'unprecedented moment in human history: we can now know where nearly everything, from genetic to global levels, is at all times' (Sui and DeLyser, 2012, p. 13). Boyd and Crawford (2011) also highlight the ability of big data to make connections between different kinds of personal, collective, social, financial and spatial data, producing a significant informational value in the analysis of relationships and behaviour patterns and a new paradigm for sociospatial research (Jiang and Thill, 2015).

Crowdsourced data or the emergence of a new point of view on space

Within the more general phenomena of crowdsourcing and user-generated content, the result of the voluntary data production processes has been defined as VGI (Goodchild, 2007), a particular kind of georeferenced crowdsourcing that represents the contribution citizens make to local knowledge ('citizens as sensors'). Citizens create, collect, publish and share geographic information on the Web, playing an increasing influence on government operations, on urban and regional planning and on a wide range of business activities. Citizen involvement also concerns mapping activities, which have previously been the exclusive responsibility of the central authorities. The development of GIS-oriented applications for mobile devices has further facilitated the creation and sharing of information maps, allowing the construction of user-friendly web platforms not requiring any professional cartographic skill ('collaborative mapping'). This is the case with OSM,[1] a collaborative map of the world created by a community of mappers who contribute to acquiring, reviewing and updating data on roads, trails, cafés, railway stations and other open data not covered by copyright. In 2019, 15 years after its creation, the OSM community of mappers was made up of more than five million registered members around the world.

Another example of VGI is the use of geotagging in the daily activities of people moving through the city. Cranshaw et al. (2012) developed a new representation of cities not based on the administrative boundaries of districts, but on what they define as 'livehoods': geo-social neighbourhoods defined by geographic proximity and by the cultural similarities of people in terms of social behaviour and daily use of the city. EmoMap is an application developed by the Vienna University of Technology (Capineri et al., 2018) that tries to understand the relationship between the urban context and the emotional responses of people crossing and living in different areas of the city.

1 See https://www.openstreetmap.org/stats/data_stats.html.

The information produced from the users of the Geoweb is increasingly employed by the governments and organisations that play a central role in stimulating and organising citizen input into local planning (Certomà and Rizzi, 2017; Johnson and Sieber, 2013). The UN is experimenting with VGI's potentiality through U-Report,[2] an anonymous messaging service available through the Facebook Messenger app that allows young people to speak out on issues that matter in their area. Over time, they also have the opportunity to contribute to discussions on certain issues, giving feedback about their experience as a U-Reporter to the central or local authorities. This service works in more than 53 countries around the world, from Argentina to Liberia and New Zealand. Citizen crowdsourcing is also the basis of the social experiment carried out by the Barcelona municipality through Decidim, a free open-source participatory online platform helping 'citizens, organizations and public institutions self-organize democratically at every scale'.[3] Bria (2018) states that over 70 per cent of urban policies in Barcelona have been proposed and decided through the online participation of citizens.

Albeit without adopting a precise technological mandate as in the case of Barcelona, in 2018 Rome's III Municipality government requested the collaboration of citizens (Morosi, 2018) in producing a collaborative map of under-used or abandoned spaces, in order to allocate them for cultural purposes. This ongoing mapping exercise, based on the open-data platform Reter,[4] a critical and collaborative cartography project, has led to spaces emerging that had never been considered in the past, by means of the Rome municipality's official map: parks, gardens, schools, associations, community centres, bookshops, parishes, public buildings, squares, open spaces, streets, urban stairs, private terraces, interior courtyards in popular condominiums, all potential spaces where people can meet and develop cultural programmes based on public pedagogy. A new way of providing collective knowledge about places is provided by local people living there, a living and non-static map, with an affective and emotional dimension. In such a context, the cultural and entertainment dimension acts as a motivation for citizens to get actively involved (Figure 3.1).

The active production of information provided by the citizen is only a part of the Geoweb universe. A larger proportion of it is produced involuntarily by social media and mobile app users, which Campagna (2016, p. 48) defines as 'social media geographic information' (SMGI), a sub-category of VGI: 'any piece or collection of multimedia data or information with explicit (i.e. coordinates) or implicit (i.e. place names or toponyms) geographic reference collected through the social networking web or mobile applications'. An

2 See https://uk.ureport.in.
3 See https://www.decidim.org.
4 See https://reter.info.

Figure 3.1. Spaces of entertainment discovered by collaborative mapping in the III Municipality of Rome: an internal condominium courtyard (September 2018, https://www.facebook.com/grandecomeunacitta/photos/a.485400815204313/485401775204217/?type=3&theater, accessed 28 Feb. 2019, used with permission of the author Carlo Marcolin).

unstructured data set of content that, if integrated with other data sources, can improve the knowledge of citizens' perceptions and mood through 'sentiment analysis'. Feick and Roche (2013) identify the 'geowebbers' as Debord's 'psychogeographers' – *flâneurs* in urban space, exploring, using and producing new unstructured, but potentially valuable, data for local understanding.

The Geoweb has also transformed the traditional and professional GIS-user interfaces into simple, yet compelling, web browser-like interfaces. As Sui (2008, p. 4) argues, the 'wikification of GIS is perhaps one of the most exciting, and indeed revolutionary developments since the invention of [GIS] technology in the early 1960s'. VGI is a sort of postmodern GIS 'in which individuals are able to assert their own views of their surroundings and play a part in local decision-making' (Goodchild, 2010, p. 20). The UN has recognised that 'VGI and crowdsourced data … has the potential to enable user's view of the geography, which if utilized by policy and decision-makers, will allow for potentially more effectively targeted interventions and more tailored public services' (UNGGIM, 2013, p. 29).

Capineri (2016) suggests that the experiential nature of VGI content can challenge the dominant narratives, traditionally provided by statistical indicators, because VGI represents a situated knowledge, inscribed in places and based on local practices and culture. Despite the technocratic implications of an excessive confidence in technology and the risks of the exclusion of people who do not have the required skills, Certomà and Rizzi (2017) posit that crowdsourcing is a tool able to generate new forms of urban governance through the active participation of citizens in the local political life.

This promising universe of new data provides huge quantities of geographical information that need to be not only exploited, but also decoded and understood within clear theoretical and epistemological frameworks (Kitchin, 2014; Sui and DeLyser, 2012). The emergence of information produced by people and communities claiming their point of view, without the filter of statisticians and other experts, undermines and calls into question the role of a neutral and objective knowledge, mostly based on the quantitative paradigm described earlier.

A paradigm based on the idea of space as a geometric and bounded entity inspired the analyses of positivist geography and other disciplines such as regional science. If the place where people and their perceptions and emotions reside matters, a new dimension of spatiality should be considered, a multilayered and dynamic vision that is the basis of the so-called postmodern turn in geography theorised by scholars such as Lefebvre (1991) and Harvey (2006).

Beyond geotagging: towards a conceptual framework for big geodata

One of the most interesting outcomes of the postmodern turn in geography is the transition to a new way of looking at space. In the recent past, many scholars have suggested that space has a much deeper meaning and importance than just an absolute and Euclidean dimension and they have proposed a theory in which space is seen as absolute, relative or relational, or any combination of these depending on the circumstances. As Harvey (2006, p. 145) puts it: 'An event or a thing at a point in space cannot be understood by appeal[ing] to what exists only at that point', depending on a wide amount of spatial relations on different scales and subject to historical influences. In the attempt to reach an even more analytical conceptualisation that allows us to disentangle, reaggregate and, at the same time, unify the concept of space, Harvey (2006, p. 152) suggests proceeding through a 'speculative leap'. This consists of associating his former three-dimensional conceptualisation of space ('absolute/relative/relational') (Harvey, 1969) with the spatial trialectic ('experienced/conceptualized/lived space') proposed by Lefebvre (1991). This association generates a 3 x 3 matrix in which each cell represents a specific way of conceiving the meaning of space (Harvey, 2006) (see Table 3.1).

Table 3.1. The matrix of spatialities (Harvey, 2006, p. 152)

	Material space (experienced space)	*Representations of space (conceptualised space)*	*Spaces of representation (lived space)*
Absolute space	Walls, bridges, doors, stairways, floors, ceilings, streets, buildings, cities, mountains, continents, bodies of water, territorial markers, physical boundaries and barriers, gated communities	Cadastral and administrative maps; Euclidean geometry; landscape description; metaphors of confinement, open space, location, placement and positionality; (command and control relatively easy) – Newton and Descartes	Feelings of contentment around the hearth; sense of security or incarceration from enclosure; sense of power from ownership, command and domination over space; fear of others 'beyond the pale'
Relative space (time)	Circulation and flows of energy; water, air, commodities, peoples, information, money, capital; accelerations and diminutions in the friction of distance	Thematic and topological maps (e.g. London tube system); non-Euclidean geometries and topology; perspectival drawings; metaphors of situated knowledges, of motion, mobility, displacement, accelerations, time–space compression and distanciation; (command and control difficult, requiring sophisticated techniques) – Einstein and Riemann	Anxiety at not getting to class on time; thrill of moving into the unknown; frustration in a traffic jam; tensions or exhilarations of time–space compression, of speed, of motion
Relational space (time)	Electromagnetic energy flows and fields; social relations; rental and economic potential surfaces; pollution concentrations; energy potentials; sounds, odours and sensations wafted in the breeze	Surrealism; existentialism; psychogeographies; cyberspace, metaphors of internalisation of forces and powers; (command and control extremely difficult – chaos theory, dialectics, internal relations, quantum mathematics) – Leibniz, Whitehead, Deleuze, Benjamin	Visions, fantasies, desires, frustrations, memories, dreams, phantasms, psychic states (e.g. agoraphobia, vertigo, claustrophobia)

By introducing Lefebvrian categories, Harvey (2006) assigns great relevance to the 'subject', that is, the inhabitant of the city, with all her/his perceptions of the real context of the place ('experienced space') involving feelings and emotions ('lived spaces'). This, in turn, allows Harvey to stress – within a clear postmodern framework – the importance of the positionality of the subject in the knowledge and representation of space. Furthermore, by introducing the category of 'representation of space', Harvey raises the issue of political power, in its capacity through mediated representations, to produce and reproduce space and to influence its perception and use.

In the matrix, the different position of the cells allows, once crystallised, the identification of the phenomena taking place in space by decomposing them. What is more, through the inverse dialectic movement process across the cells, the matrix also allows us to recombine a complex, transcalar and dialectical view of space.

In this way, the matrix permits the deconstruction and, at the same time, the reassemblage of different types of space. It is possible to describe 'absolute experienced space', that is the space of walls, streets, bridges and all the elements that a human being is able to perceive; the 'relative spaces of representation', as in the case of the frustration of commuters generated by being trapped for hours in traffic on their way to or from work; the 'relational spaces of representation', that is the artistic production in space mediated by the artist. The same space, as in the case of a city square, can be described by the cadastre map, by a postcard, by the time needed to reach it from the nearest train station, by the quantity of air monitored by air-pollution control systems; it can be described by the city's official tourist guide, containing all the information on how to access the square and presented through an artistic medium. Finally, it can assume several features if, along with this information, we add emotional factors: the feelings of people living there, of people passing by in the square for business or pleasure, the place that the square has in the individual as well as in the collective memory.

However, this stimulating view of spatiality is limited by an operational impasse, because as we move away from a Cartesian and geometric conception of space, the representation and analysis of phenomena in terms of dialectic and emotional spatiality becomes increasingly difficult and complex. The space of sensations, emotions, imagination and meanings embedded in everyday life, experienced through the complex network of symbols and images of its inhabitants and users, is essentially qualitative, fluid and dynamic. As Zhang (2006) suggests, an important element in Lefebvre's (1991) space theory is the introduction of the 'viewer's point of view', because its trialectic is not intended as a cake cut into three slices, but rather as three different images that overlap. Each image represents a different moment of the human spatial experience.

This conceptual perspective can help to clarify the role that new sources of information can play in geographical studies. They can allow the analysis of spatial phenomena in quantitative terms, via the availability of a large amount of georeferencing data passively collected, not only in a static way, but also in terms of flows and movements, and also in qualitative terms, via the information about what people say and voluntarily produce through online content. This is a central point of the potential that big data can offer to geographical studies: a deeper knowledge of places and local dynamics beyond simple geotagging based on the possibility of locating available information.

SDGs: Indicators as usual

In order to test the heuristic power of the inspiring conceptualisation of spatiality described in the previous section, it must be understood how the categories identified in the matrix can provide a relational and complex representation of the phenomena analysed in their spatial dimension and if new sources of data like VGI can support it.

The exercise proposed consists of testing the operational potentialities of the matrix through the representation of the concept of sustainability in an urban context.

In 2015 UN member states adopted the 2030 Agenda for Sustainable Development, defined as 'a shared blueprint for peace and prosperity for people and the planet', comprised of 17 SDGs: a global call for action against poverty and other deprivations, the implementation of policies for health and education, the reduction of inequality, the support of economic growth, and the challenge of climate change in order to preserve the planet.

The goals were defined according to the concept of sustainability involving three dimensions (environmental, social and economic), with the aim of capturing both the time perspective of intergenerational sustainability and the spatial perspective of intragenerational sustainability among nations and regions. The 17 goals comprise of 230 indicators that cover the 169 targets expected to be achieved by 2030.

Despite this significant shift in the global approach to social and economic development, the way of representing the complexity stemming from this new route, in particular at the local level, remains bound to the traditional systems of indicators based on official statistical data produced by institutions to communicate a vision of the local as objective and neutral (Kaika, 2017).

The 'Cape Town Global Action Plan for Sustainable Development Data' (UN, 2017) only generically sketches the need for 'new sources of data' (Objective 2.3), without considering data highlighting the individual component of sustainability. The production of geographic information (Objective 3.4) is also requested in order to be integrated with statistical data,

but without a specific reflection on the objectives and actors involved, as well as the choice of spatial units relevant to the analysis of the targets at sub-national level, such as in Goal 11: 'Make cities and human settlement inclusive, safe, resilient and sustainable'.

Leaving aside the criticisms around the ideological bases, the effectiveness of the policies and the fundamental contradictions regarding the unsustainability of economic growth and environmental protection as consistent objectives of the SDGs expressed by some scholars (Easterly, 2015; Nightingale, 2018; Swain, 2018), many objections have been raised regarding the issue of a data-driven approach. Two of the main elements at stake that have been raised are the lack of a theoretical basis (Szirmai, 2015) and the inconsistency of the framework indicators due to the contested concept of sustainability not being directly observable or measurable (Spaiser et al., 2017). When measuring discrete or simple phenomena (like industrial production or goods transported by train), the role of indicators is quite simple and not questionable. However, when the phenomenon to be represented is a contested concept, like sustainability or human well-being, then it is necessary to adopt some care in its conceptualisation, construction and use. Mair et al. (2018) state that if sustainability is a non-univocal concept, the representation provided by indicators only reflects the vision of one of the possible interpretations of the concept and not a universal meaning. This problem is also intertwined with the ethical implications of indicators that in modern Western society are separable from technical issues seen as neutral and objective. If data do not consider the moral dimension of sustainability of different communities involved, there is a risk that data do not reflect people's real values. Nevertheless, indicators produce visions of the world, shaping and determining policies and action (Liverman, 2018). It is precisely here that the problem of the scale of representation intervenes, being the values strictly connected to the local dimension where people live and act. If urban is not only a territory or a simple portion of space but the place where sociospatial relations act simultaneously (Massey, 1992), then it is difficult to synthesise it in just one way, and a rethinking of the traditional categories (such as centre and periphery) of urban representation is needed.

If the concept of sustainability is widely defined as a pillar of the strategy of the SDGs, the concept of 'city' that inspires Goal 11 of the SDGs remains opaque and difficult to operate. Unlike the general consensus on the importance of cities for sustainable development that appears in the background as an unquestionable truth, a clear definition of the city does not emerge from UN documents, and the SDG devoted to cities seems to be somewhat of a compromise between the different schools of theoretical thought (Barnett and Parnell, 2016). A consequence of this indefinite theoretical assumption is the lack of an adequate scale of analysis for the implementation system, centred on indicators at the national level, without conceptualising and undertaking 'new

forms of relational comparative analysis, those that escape the normalizing assumptions on traditional styles of comparative analysis' (Barnett and Parnell, 2016, p. 11).

With these considerations in mind, we propose testing the matrix of spatialities outlined above (Table 3.1) in order to understand whether urban sustainability can be better represented by traditional indicators and, at the same time, if the subjective dimension of the communities involved in SDG policies can be integrated into the framework of indicators. The matrix, through a holistic approach, also allows the vision of the connections that link the different aspects of the problem analysed and of the different spatial scales involved in the implementation of the strategy.

In SDGs, Goal 11 is devoted to policies that will make cities and human settlements inclusive, safe, resilient and sustainable. Urban sprawl is one of the main problems that world cities are facing: 'Urban sprawl is a complex phenomenon that is difficult to quantify and measure accurately … moving from sprawl to compact form is more likely to be a direction in a continuum rather than across fixed and measurable categories' (Frenkel and Ashkenazi, 2008, p. 57). The official indicator proposed to monitor the implementation of policies is 'average ratio of land consumption rate to population growth rate, 1990–2000 and 2000–2015', based on a stratified sample of 194 cities. As stated in *The Sustainable Development Goals Report 2016* (UN, 2016, p. 33), this indicator has a significant disclaimer:

> Unfortunately, a low value for this ratio is not necessarily an indication that urban dwellers are faring well, as this can indicate a prevalence of overcrowded slums. Unplanned urban sprawl is associated with increased per capita emissions of carbon dioxide and hazardous pollution and often drives housing prices up, all of which hamper sustainable development.

It is clear that the indicator simplifies a highly complex problem that cannot be measured in the same way for all world cities or through a single measure and a spatial administrative unit.

In this exercise urban sprawl is proposed as a 'stylised fact' of spatial injustice, a multidimensional 'space-embedded' phenomenon that can be considered as a good example of the circular and cumulative relationship between spatial forms and social behaviours.

Starting from the material aspects of urban sprawl in terms of 'absolute/relative/relational/experienced space' (first row of the matrix), we will then broaden the analysis to the other social and spatial phenomena connected to it.

The first step consists of deconstructing urban sprawl into its main spatial and social forms and effects:

- home–workplace commuting;
- energy consumption;

- air pollution;
- infrastructural costs;
- agricultural land consumption;
- land waterproofing and sealing risks;
- natural habitat fragmentation (biodiversity losses);
- social costs: segregation of non-drivers or non-car owners, disadvantaged groups, lack of neighbourhood relationships, lack of identity and sense of community belonging, lack of places to socialise.

These dimensions are closely interdependent, and have a clear spatial dimension that is, however, difficult to grasp through static analysis.

In Table 3.2 we describe urban sprawl, in a relational way, and its unsustainable human impact, that is the daily home–workplace commuting of people living in urban-dispersed peripheries. By integrating the different spatialities and scale of urban sprawl, the matrix allows us to bring out the complexity of the phenomenon:

- experienced/absolute space (i.e. transport networks);
- conceptualised/absolute space (i.e. the way in which commuting space is represented by official documents, plans and projects, thematic maps, tourist guides, tube maps);
- lived/absolute space (i.e. the imaginary of commuters, their anxieties and frustrations).

Each cell identifies a specific type of original space that helps to deconstruct a concept (the mobility of commuters within a sprawled urban context) and to incorporate its intrinsic spatiality.

The next step consists of filling up the matrix with the quantitative and qualitative information according to their spatiality. As shown in Table 3.2, the matrix contains different types of information at different spatial scales. In our case, the spatial reference of commuting flows comprises people resident in a given urban area with diffused urban characteristics that need to be related to the other spatial levels of the analysis.

The result of the reassemblage of the information contained in the matrix is a relational representation of the investigated phenomenon. This allows us to grasp and disentangle different levels of the analysis and different points of view of the urban sprawl and to focus, in turn, on both quantitative and qualitative aspects, or choose an overall narrative in which space is integrated into the analysis.

If the first column of the matrix represents discrete phenomena easily operationalised through quantitative data and indicators, the column relating to the 'lived space' is instead difficult to be represented through traditional quantitative tools, but it nevertheless plays an important role in our

Table 3.2. The matrix of spatialities: spaces of urban commuting

Space	*Experienced*	*Conceptualised*	*Lived*
Absolute	Streets connecting periphery to city centres; public transport lines; no. of inhabitants per square km	Documents of territorial planning for mobility, territorial statistics and local labour systems, sectorial territorial studies, landscape description, documents related to real-estate market	Emotions, feelings of insecurity generated by the location of their own house, comparison with people living in historical/central areas of the same city)
Relative	Average commuting home–workplace times; home–workplace commuting flows; movements for business-related reasons	Thematic maps (information on traffic and public transport) of the area, train/bus timetables	Perception of commuters regarding commuting times; anxiety caused by transport delays, traffic; anxiety, discomfort
Relational	CO^2 concentration caused by transport; incidence of diseases in the population according to type of disease; socialising places; accessibility to primary and secondary services; ICT connectivity: web, Wi-Fi	Artistic representations (i.e. surrealism), psychogeography, literature, blog	Perceptions of the quality of life and social relationships; feeling of isolation; lack of social identity (comparison with people living in historical/central areas of the same city)

understanding of the urban sprawl. The role of big data can be supportive in all the different phases/cells of the matrix, in particular for the relational aspects of the observed phenomena (e.g. the daily commuting of passengers through transport card chips, the use of the city made by the commuter through their geotags). However, it is in the third column relating to the lived space that the use of crowdsourcing reveals its most interesting potentialities for all the reasons explained in the previous paragraphs. It is here that people involved in daily commuting can express their point of view, which cannot emerge through the indicators selected to implement Goal 11 of the SDGs. These voices can produce

new spatialities and contribute to the inclusion of citizen and communities in the decision-making process, allowing those minority views to be taken into consideration (Kharrazi et al., 2016).

The coexistence of multiple scales and sources involved in the analysis invites us to explore the possibility of using different – although interrelated – analytical tools (Sui and DeLyser, 2012), including methods, techniques and different types of sources, trying to make a hybrid integration that is able to reassemble as much as possible the complexity of the theme, where 'mathematics, poetry, and music converge if not merge' (Harvey, 2006, p. 124).

Conclusions

The large and increasing availability of geospatial data about individual and social preferences, opinions, values, movements and relationships, although still largely unstructured and in search of new measures for the assessment of its quality, can contribute to a new information base for improving our collective knowledge of places. In this chapter, we have tried to clarify, on conceptual grounds, the role that this avalanche of data, especially those voluntarily produced by web users, can play in improving the research agenda of geographical studies. These data sources represent not only a chance to enlarge the availability of geographic data, but also, and more importantly, they can support the development of new representations of spatial processes at various scales, allowing them to move from a static to a dynamic level in terms of flows, processes and relationships. VGI, in particular, can also challenge the representation provided by traditional indicators, producing different narratives and discourses about places. People can act as living indicators, incorporating dimensions like subjectivities and emotions still largely neglected in the case of policies devoted to well-being like the UN SDGs.

The idea of spatiality that emerges from the conceptual perspective proposed in this chapter represents a critical topic to be considered in order to avoid the risk associated with the technoscientific epistemology produced by the growing and pervasive availability of data. The possibility of representing living spaces, through the voice of local communities, without the intermediation of power and experts, is nevertheless a politically relevant issue. It also requires the development of a new methodological approach where the integration of data, formats, methods, tools and subjects producing information becomes crucial and a major challenge for the future research agenda.

Despite this promising scenario, many issues need to be explored. Inclusiveness and participation in the Geoweb still show patterns of inequality both geographically and socially. The participation in crowdsourced information takes place mainly in urban areas where infrastructural information and communications technology (ICT) facilities (internet, Wi-Fi and so on) are

more available; a distribution that unfortunately confirms that the digital divide follows the traditional lines of social injustice on a global scale. Moreover, as is evident from this chapter, the voluntary contribution to the production of data directly usable for collective information concerns only a part of the big data universe. To the traditional debate on the exclusion from the Web of those who do not have the means and the computer skills necessary for participation, we must add the problem of those who own and process these large amounts of data. These new subjects only partially coincide with the public institutions and represent a potential threat to democratic information and to the privacy of people. Citizens' digital rights include the rights of privacy, security and information self-determination and must be placed at the centre of digital policies (Bria and Bain, 2018).

The scientific community, in particular the producers of official statistics, is still wary of the role and quality of crouwdsourced data. If traditional statistics are produced through documented and reproducible phases and methodologies, in the world of big data information comes from multiple sources, the synthesis is done by the user and the sampling process is not provided before data gathering. The assessment of quality and reliability of these new data sources is a complex issue that cannot be limited to the field of statistical studies but implies the rethinking of the epistemological framework for social analysis in an era where the production of knowledge is no longer left exclusively to the scientific community (Saltelli et al., 2016).

The practices of online democratic participation reported in this chapter are still wide-ranging in nature and intensity and need a more comprehensive assessment of their ability to become integrated in local government processes. To avoid the risk of a new technocratic way of producing knowledge, the information asset of big data and online participation is only a part of the debate between citizens and institutions. Technology is not an endpoint but only a tool to improve broad participation in place construction.

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4. Data colonialism, surveillance capitalism and drones

Faine Greenwood

The world is undergoing a process of 'datafication' (Mayer-Schönberger and Cukier, 2013) and the aid sector is no exception. Humanitarian and development workers are using newly available big data products to make operational decisions, learn more about crises and monitor the impact of ongoing response. This 'humanitarian data ecosystem' (Raymond and Al Achkar, 2016) encompasses many information sources, including social media postings, open-source maps, detailed records of mobile phone calls, as well as imagery taken from satellites and drones. Much of this information now comes from platforms or data sets controlled by private corporations, such as Facebook, Google and Twitter (Burns, 2018; Taylor and Broeders, 2015), and humanitarians increasingly partner with private corporations that have the data collection and analysis capacities they do not possess themselves (Fontainha et al., 2016).

Taken together, these developments can be described as a 'technocratic turn' in the humanitarian aid and development sector, as technical expertise grows in importance and impact (Read et al., 2016). At the same time, international debate has flared over the role that technology companies play in government and in our personal lives. Critics are developing new descriptions of the 'data extraction' (Zuboff, 2015, 2019) processes these companies rely upon to make profits. Couldry and Mejias (2018) and Thatcher, O' Sullivan et al. (2016) refer to 'data colonialism', a term that describes a means of 'capitalist accumulation by dispossession that colonizes and commodifies everyday life in ways previously impossible' (Couldry and Mejias, 2018, p. 1). Zuboff (2019) describes the system of 'surveillance capitalism', in which human data by-products are converted into wealth, often at the expense of the producers of this raw material.

Small civilian drones are particularly representative objects of this technocratic turn in humanitarian aid, due to both their perceived novelty and to the 'disease' of surveillance capitalism with which they are often associated. The drone 'allows us to project our intelligence into the air and to exert our influence over vast expanses of space' (Wallace-Wells, 2014). Drones are sociotechnical 'assemblages of the vertical' (Crampton, 2016, p.1) that

permit us to view the world from a novel perspective: below the high-altitude flight path of manned aircraft and satellites, but above the viewpoint of an earthbound human being (Garrett and Anderson, 2018). In the context of humanitarian aid and development, this new perspective is often hailed as one that permits humanitarians to do their jobs more effectively and to quite literally *see* need more clearly: it allows the circumstances they operate in to become more 'legible' to them (Scott, 1998). However, this new-found aerial perspective also brings with it novel risks to the people who are being surveilled, often without their explicit consent or knowledge. Importantly, these risks are by no means restricted to drones, which are simply one of many new data collection technologies used by humanitarian aid workers today. The ethical quandaries that they present are closely linked to those presented by the use of, for example, geolocated mobile phone data to track the spread of disease or the use of facial recognition technology to control refugee access to financial aid. This chapter will use civilian drone technology as an entry point to a broader consideration of data collection practices in the aid and development sector today, situating the technology within the dual frameworks of data colonialism and surveillance capitalism.

Big data, innovation and humanitarian aid

Humanitarian data collection has been present since very early in the history of the humanitarian movement. Read et al. (2016, p. 5) trace the 'continuing fascination with speed and accuracy in information management, as well as fundamental ethical issues arising from data mining' to the 1870s and J.C. Chenu's and Florence Nightingale's statistical analysis of casualties in the Crimean and Franco-Prussian Wars (L. McDonald, 2013). The so-called 'humanitarian data revolution' (Dickinson, 2016), however, is a more recent development, aligned with other data-driven technological advances outside the humanitarian sector. Many commentators (Meier, 2015; Read et al., 2016) trace the origin point or foundational moment of this new epoch of humanitarian data to 2010 and the response to the devastating Haiti earthquake. A new cadre of remotely distributed, spontaneous digital volunteers used map-making software, social media postings and other digital data sources to improve humanitarian situational awareness. These new networks of volunteers are often referred to as 'digital humanitarians' (Hunt and Specht, 2019; Meier, 2015). Social media postings (especially geotagged postings) ostensibly permit humanitarians to learn more about what is happening during a disaster, who needs help and where resources ought to be directed. Humanitarian satellite imagery analysts use high-resolution imagery to search for signs of impending famine, track population movements and monitor ongoing conflicts. These data collection efforts extend beyond the

realm of immediate crisis response and the traditionally defined humanitarian sector and into the closely linked international development sector as well. The 'digital traces' left by mobile phones and social media provide information on population health, movement, public opinion and other matters that are not represented in often scant statistical data, providing development workers with a far greater range of quantifiable information than they had access to in the past (Mann and Ferenbok, 2013; Taylor and Schroeder, 2015). Burns (2015, p. 25) asserts that emergency management, disaster relief and international development are all 'deeply interlocked regimes of knowledge, power, and morality', with often amorphous boundaries between them. The interlocked nature of these sectors is reflected in their similar approaches to the use of 'big data' in their activities today.

Much of this data is not collected by humanitarian or development workers themselves, nor is it posted on platforms that they control. Instead, humanitarian data analysts often rely on data that come from somewhere else, including social media networks like Facebook, satellites operated by governmental or private organisations and mobile phone records that are released to humanitarians by telecom providers. Using external data sources costs less, involves less labour and is a less time-intensive prospect for humanitarians than self-collection, with companies sometimes donating the data to aid organisations themselves as an act of 'data philanthropy' (Jerven, 2013; Kirkpatrick, 2011). Supporters of these practices believe that using these data and the technologies that analyse them is 'more accurate, faster, and more egalitarian' (Read et al., 2016, p. 7) than the analogue humanitarian data collection practices of the past (Burns, 2018).

Read et al. (2016) argue that this technocratic turn in humanitarian aid was mediated by a number of factors, following the new corporate orientation that took root in aid organisations beginning in the 1980s and coupled with growing pressure on organisations from governments and donors to work more efficiently and transparently. These public–private partnerships embody the logic of what Currion (2018) describes as 'market humanitarianism', a system that combines the worst aspects of both hierarchy and market (Seybolt, 2009).

This neoliberal approach is echoed in the rhetoric surrounding new technologies for humanitarian aid, like small camera-carrying drones: technology that is 'efficient, effective, and cheap' will help save more lives and reduce the cost of humanitarian aid (Sandvik and Jumbert, 2016, p. 12). This orientation also incorporates and normalizes metrics stemming from the drive for 'capital accumulations' (Burns, 2019), emphasising cost saving, consumer choice and returns for aid donors who increasingly demand ever-more precise accountability in return for their financial investment.

Digitised methods are increasingly presented as a means of achieving this level of granular accountability, permitting donors to more clearly see the 'impact' of their giving.

Today's aid workers are often encouraged to learn from the 'innovative' technological expertise of private sector organisations (Mitchell, 2011). Humanitarian aid organisations are urged to hire data specialists and to increase the data literacy of existing staff. A blog post on the World Economic Forum (2018) on big data and humanitarian aid warns that 'data is the new oil and, in order to maximise its extraction, there is a specific need for a skilled workforce'. Currion (2018) and Burns (2019) link this aid sector embrace of private sector tech expertise to the economic assumptions of neoliberalism, coupled with the growing sense that humanitarian aid itself functions as a sort of quasi-market. Currion (2018, p. 5) asks, 'How better to succeed in this marketplace than to partner with organizations that have already succeeded in another marketplace?'

As a result, decision-makers in the aid sector were perhaps well-primed to welcome new partnerships with large corporations, especially those dependent on the extraction of data from individuals. Many of today's largest and most widely known tech companies have announced recent partnerships with aid and development organisations. In 2017, Facebook's Data for Good team launched its Disaster Maps Initiative, which uses Facebook data to search for areas where aid is most needed during a disaster. The company had partnered with 30 non-profit organisations and agencies by late 2018, including the United Nations International Children's Emergency Fund (UNICEF), the International Federation of Red Cross and Red Crescent Societies and the World Food Programme (WFP) (Cheney, 2018). In September 2018, the UN, the World Bank, the International Committee of the Red Cross (ICRC), Microsoft Corp, Google and Amazon Web Services announced an 'unprecedented global partnership to prevent future famines', which will 'use the predictive power of data to trigger funding through appropriate financing instruments, working closely with existing systems' (World Bank, 2018). In February 2019, the WFP announced a five-year collaboration with data analysis company Palantir, to improve the efficiency of its aid delivery.

Drones in humanitarian aid: an overview

Drones are unmanned aerial vehicles (UAVs), usually equipped with some level of on-board computational power beyond that of traditional remote-controlled aircraft. They range in size from the military RQ-4 Global Hawk at 14,950 pounds (6.7 tonnes) to the Hubsan X4 Micro Quad Copter, which weighs less than an ounce (28 grams). They are built by at-home hobbyists using spare parts, by consumer technology companies and by military suppliers. This

chapter focuses exclusively on small drones (under 55 pounds or 25kg) that are built by non-military contractors and are intended for civilian purposes, as these are the type that appear to be most widely used by humanitarian and development actors.

Drones are not a new technology. The Kettering Bug, the first functional UAV, was introduced in 1918 and billed as a 'flying torpedo' (Newcome, 2004; Stamp, 2013), while armed drones equipped with television technology were first used in warfare in 1944 (Lerner, 2017). As these military-specific drones developed, so too did hobby remote-controlled aircraft: the world's first successful small remote-controlled aircraft was built in 1938 (Yarrish, 2011). By the 1980s, Japanese farmers had begun using unmanned helicopters to spray crops (Sheets, 2018). The development and success of smartphones bolstered demand for small, powerful sensors and processors and remote-controlled aircraft hobbyists began to incorporate these into their model designs, making their aircraft 'smarter'. Hobby drone companies began to emerge in the 2000s, including Dajiang Enterprises (DJI), a Chinese company that by 2019 would become the world's largest civilian UAV manufacturer. In 2013, DJI released its Phantom model, a relatively easy-to-use quadcopter-style drone equipped with global positioning system (GPS) and capable of carrying a small external camera.

Today's civilian, consumer drones are capable of carrying high-resolution cameras, which can be used to collect video and still images. They are equipped with GPS receivers and can geotag the images they collect, which can then be processed into geographically accurate maps. Unlike the long-range drones used by the military, small multirotor drones can fly for approximately 30 minutes and have a maximum transmission range of 4.1 miles, meaning that operators are required to be relatively close to what they are attempting to surveil (DJI, 2019). As of 2019, small civilian UAVs have become a growing international market, while many nations have begun to introduce regulations that govern their use. At the moment, the so-called 'big five' technology companies (Apple, Facebook, Microsoft, Alphabet and Amazon) are largely not directly involved in the consumer drone market. However, drone-focused companies regularly use products that are produced by the 'big five' companies, such as Google Maps (for navigation), Apple iPhones and iPads (as a means of providing a visual interface for the drone), and Amazon Web Services (for data processing and storage).

How humanitarians use drones

Civilian drones have been used by disaster responders since at least 2000, when the Japanese government used the Yamaha R-Max unmanned helicopter to remotely evaluate volcanic activity in Hokkaido (Sato, 2003). Damage

assessment has proved to be a particularly popular use for civilian drones in humanitarian contexts. In 2012, the International Organization for Migration (IOM) used drones to map damage from Hurricane Sandy in Haiti, while in 2013, drones were used to assess damage from Typhoon Haiyan in the Philippines. Drones were used for damage assessment in the aftermath of the 2015 Nepal earthquake, while in 2018, drones were used by disaster responders during the response to Hurricane Florence in the Eastern United States (Karpowicz, 2018) and to assess damage from the Sulawesi earthquake in Indonesia (DroneDeploy, 2018).

Some humanitarian organisations are also experimenting with civilian drones for purposes outside of damage assessment, such as package delivery and population monitoring. In 2018, the United Nations International Children's Emergency Fund (UNICEF) and the government of the Republic of Kazakhstan announced the establishment of jointly run drone-testing corridors in that country (UNICEF, 2018), while the IOM regularly flew drones as part of needs and population monitoring efforts over refugee camps in Bangladesh (Humanitarian Data Exchange, 2019). The WFP has supported a number of humanitarian drone projects since 2015, including UAV cargo delivery experiments in the Dominican Republic (WFP Innovation Accelerator, 2019), UAV disaster assessment trainings in Mozambique (WFP Insight, 2019b) and emergency warning efforts in Bolivia (WFP Insight, 2019a).

Organisations dedicated to humanitarian and development drone use have also begun to emerge in response to the growing use of the technology. The Humanitarian UAV Network was founded in 2014, with the goal of serving as a central organisational point for humanitarian drone users. The organisation also introduced the UAV Network Code of Conduct (2019), which represents one of the first attempts at enshrining best practices and ethical standards into humanitarian drone use. The WeRobotics non-profit, founded in 2015, focuses on using robotics (particularly aerial civilian drones) to further humanitarian and development goals; its projects include both drone data collection and drone delivery efforts.

Drone use by humanitarian and development workers today can be broadly divided into two representative categories: data collection and the delivery of objects. Little data currently exist that attempts to quantify the particular drone models used by humanitarians, or the specific ways in which these drone models are used. Data collection uses are exceptionally heterogenous, due to the ever-growing variety of sensors that can be attached to consumer drone models. Organisations may in some cases use a single drone model to collect multiple types of data, from photographs and orthorectified maps to 4K videos and thermal photographs. While manned aircraft can take very high-resolution photographs, it is much more expensive to operate these aircraft

and the photography equipment they carry than it is to operate a small drone (Greenwood and Kakaes, 2015). Purchasing satellite imagery is also very expensive, and the process of tasking a satellite and analysing those images often requires a highly specialised skill set (Radjawali et al., 2017).

Because today's consumer drones are inexpensive and relatively easy to use, they have been adopted by many individuals and organisations who previously lacked access to aerial imagery. Notably, drone imagery has been used by a number of indigenous groups (Paneque-Gálvez et al., 2017; Radjawali et al., 2017) as a means of codifying their rights over traditional land, countering figurative (and literal) erasure of their presence by the 'land-grabbing' activities of neoliberal capitalists.

Unlike exclusively data-collecting drones (which are often made by consumer producers and less technically complex to operate), delivery drones are more often developed and deployed by private companies like Zipline, which operates medical delivery drones in Rwanda. The company evocatively describes its drones as 'life-saving' technology, developed as part of the company mission to 'provide every human on Earth with instant access to vital medical supplies' (Zipline, 2019).[1]

Data colonialism and surveillance capitalism

While critics of mass personal data collection have existed for as long as the practice and the companies that rely upon it have, these critiques have found new attention and consideration since around 2010, as the world grapples with unsettling realisations about the power of technology platforms to distort democracy, alter human relations and twist our societies into new and unwelcome forms (Manjoo, 2017). In the second decade of the twenty-first century scholars have defined and described new frameworks that describe these data collection practices and their particular effects on human society. This chapter, in its consideration of drone data collection in humanitarian aid, will rely upon two such frameworks: data colonialism and surveillance capitalism. Both will be summarised briefly in this section.

Couldry and Mejias (2018, p. 2) describe 'data colonialism' as a process that combines the 'predatory extractive practices of historical colonialism with the abstract quantification methods of computing'. In their analysis, data are the new oil, which must be appropriated from the human actors that generate them via a process that they call 'data relations'. This constant tracking of human behaviour brings about a phenomenon that they describe as 'data colonialism', a distinctively 21st-century manifestation of colonialism

1 It should be noted that delivery drones can also be used to collect visual spatial data.

that normalises 'the exploitation of human beings through data, just as historic colonialism appropriated territory and resources and ruled subjects for profit' (Couldry and Mejias, 2018, p. 1). Key drivers of this new form of data colonialism include private companies that are heavily dependent upon the accumulation of individual data, such as social media companies like Facebook, mobile telecommunications companies like AT&T and advertising technology specialists such as Google.

The firms that profit from data colonialism, in this framework, view human social life as an open and ownerless source of raw data that is *just there* (Couldry and Mejias, 2018). For this data to be extracted for profitable purposes, however, Couldry and Mejias (2018, p. 3) contend that 'life needs to be configured so as to generate such a resource'. Further, data from one individual in one moment need to be aggregated with other data from other times, permitting new conclusions to be drawn. Ultimately, the constantly watching, constantly tracking data practices perpetuated by these companies 'invade the space of the self' in their efforts to incorporate all of life into 'an expanded process for the generation of surplus value' (Couldry and Mejias, 2018, p. 8). Corporations attempt to normalise this process to the public and to regulators by likening the data that they rely upon to a natural resource that will be lost to humanity unless it is cleverly appropriated. Further, they argue that the data exhaust that humans emit cannot be *owned* by anyone (although it certainly can be *used* by anyone who has enough technical expertise to do so). Couldry and Mejias (2018) argue that these ideas resemble colonial arguments of the recent past that worked to justify the violent appropriation of terra nullis that clearly belonged to and was inhabited by indigenous people (Cohen, 2017).

Thatcher, O'Sullivan et al. (2016) describe the capture of big data related to individuals and to groups as an inherently asymmetric process. In their analysis, power asymmetry is integral to the process of data colonialism: the relations between the producers of data and the collectors and owners of data 'mirror processes of primitive accumulation or accumulation by dispossession that occur as capitalism colonizes previously non-commodified, private times and places' (Thatcher, O'Sullivan et al., 2016, p. 5; see also Harvey 2003, 2004).

The process of capital transforms data from a set of observations 'into a multidimensional flow of algorithmically linked data points', collected by various smart devices that transform human beings into 'potential sensors' (Thatcher, O'Sullivan et al., 2016, p. 5). Ultimately, Thatcher, O'Sullivan et al. conclude that: 'If the processes by which big data commingle with everyday life are understood not as a "frontier" to be colonized, but as processes by which everyday life *is* colonized by "big money and big power", then a new theoretical

terrain for understanding big data is opened' (Thatcher, O'Sullivan et al., 2016, p. 11, original emphasis).

The use of data colonialism as a metaphor for this type of large-scale, profit-driven data collection and use is by no means restricted to the aforementioned sources. A 2016 anonymously authored piece for *Model View Culture* (Anonymous, 2016) argued that the information and communications technology for development (ICT4D) sector continues the 'legacy of colonialism within aid work' via two trends: a 'lack of ethical processes around data collection and management' and 'ongoing Western control over data'. The author concludes that it 'seems clear that the lack of protections are used as another form of exploitation on the "global South" under the guise of aid, and the primary benefit is not intended for the project participants'.

In a 2018 interview with the *Internet Health Report* (Mozilla, 2018), Renata Avil, a Guatemalan senior digital rights adviser at the World Wide Web Foundation, defined 'digital colonialism' as 'the new deployment of a quasi-imperial power over a vast number of people, without their explicit consent, manifested in rules, designs, languages, cultures and belief systems by a vastly dominant power'. Information researcher Michael Kwet (2019) describes digital colonialism as a 'crisis' that is 'wreaking havoc on the global South' as its practitioners consolidate power (in the form of data) and impose Silicon Valley's 'extraterritorial governance' around the world. He stresses that it is 'time to talk about Silicon Valley as an imperial force', as a precursor to making the difficult changes required to counter its influence.

Related to data colonialism is the concept of 'surveillance capitalism', defined by technology scholar Shoshana Zuboff (2015, p. 75) as 'an emergent logic of accumulation in the networked sphere' that is dependent on a 'global architecture of computer mediation'. The framework of surveillance capitalism is similar to that of 'data colonialism' in its criticism of new means of technology-driven profit creation that are dependent upon the extraction of data from human sources. It represents a second useful framework for considering the collection of data by humanitarian and development workers with drones.

Zuboff (2019, p. 8) notes that surveillance capitalism is not a technology in and of itself, but is instead a 'logic that imbues technology and commands it into action' that 'unilaterally claims human experience as free raw material for translation into behavioural data'. The resulting products are 'about predicting us, without actually caring what we do or what is done to us' (Zuboff, 2019, p. 70). Under this logic – which shares some attributes with the concept of data colonialism elucidated by Couldry and Mejias (2018) – the practitioners of surveillance capitalism are highly motivated to find new sources of raw material from which they may extract behavioural surplus data, encompassing every

aspect of human experience that is mediated through technology, including our voices, faces and elemental details of our likes and dislikes (Zuboff, 2019, p. 70). Further, Zuboff (2019, p. 8) asserts that surveillance capitalists are attempting to intervene in our lives in an effort to 'nudge, coax, tune, and herd behaviour toward profitable outcomes', leading to a world in which technology and technology companies work not just to 'know our behaviour, but also to shape our behaviour at scale'. According to Zuboff (2019), the ultimate goal is to automate us, by subordinating the means of production to a means of behavioural modification, leading ultimately to the creation of a new type of power that she calls 'instrumentarianism'. This power manipulates human behaviour to suit the needs of the corporate powers that profit from it, rather than to fit our own needs. It exerts itself through the 'automated medium of smart networked devices, things, and spaces' and it is becoming ever-more difficult to meaningfully escape from its influence (Zuboff, 2019, p. 8).

Echoing language that is often applied to settler colonialists, Zuboff (2019, p. 9) describes Google as a pioneer of surveillance capitalism, an organisation that has launched an 'unprecedented market operation into the unmapped spaces of the Internet, where it faced few impediments from law or competitors, like an invasive species in a landscape free of natural predators'. According to Zuboff (2015, p. 78), the companies she is critiquing are engaged in 'incursion into undefended private territory until resistance is encountered'.

Zuboff (2019, p. 10) argues that surveillance capitalist companies do not view the public as their customers, because their true customers are 'the enterprises that trade in its markets for future behavior'. Nor do they view the public as potential employees, because the technology companies of today generally employ far fewer people than the most profitable corporations of the past. Instead, Zuboff (2019) suggests that Google and similar large corporations view the public as a source of raw material in a fashion that evokes the colonial idea of the exploitable and easily manipulated 'Other' (Eves, 1996). Colonists were not accountable to the people they profited from, nor are practitioners of surveillance capitalism accountable to the people whose data they extract: the surveillance capitalist company simply takes what it wants (Zuboff, 2015). And just as the colonialists of the past loudly asserted their moral right to extract raw material from their colonies, so do today's surveillance capitalists 'assert their right to invade at will', using arguments based around self-determination, Darwinian survival and the supposed inherent value of innovation to normalise their 'digital dispossession' of humanity (Zuboff, 2019, pp. 24, 100). Ultimately, Zuboff (2019, p. 100) argues that we 'are the native peoples now whose tacit claims to self-determination have vanished from the maps of our own experience', rendering us similar to the indigenous inhabitants of terra nullis described by Cohen (2017, p. 213).

Humanitarian aid, drones and data colonialism

The international humanitarian aid and development sectors are regularly criticised for their perceived entanglement with colonial and neocolonial systems and attitudes. According to these critics, aid and development professionals may replicate old asymmetries of power: they may regard the people that they are attempting to help as 'backward' (Olivius, 2015), fail to consider the needs or perceptions of aid recipients (Dijkzeul and Wakenge, 2010) and impose neocolonial economic and social patterns upon the countries they work in (Langan, 2018). Critics of digital humanitarianism have also begun to question the optimistic narrative that accompanied its introduction, and the power that data holders now have over the development and aid sector (Taylor and Broeders, 2015). Aid organisations hold much more information about the people they assist than the latter do about them, in a pattern similar to the asymmetries in knowledge and power between the average person and the data aggregation companies of today (Zuboff, 2019). Aid organisations reliant upon the humanitarian imperative to push through technical innovation may use this motivation to weaken critical voices about the impact of these technologies on data privacy and security (Hosein and Nyst, 2013; S. McDonald, 2016).

Duffield (2016, p. 148) criticises the 'hubris and technological determinism' that has come with the ascendance of digital technology in humanitarian aid work in the global South. He asks if this new digital connectivity is helping to 'reproduce stagnation, inequality and external control rather than ameliorate such conditions'. In their ethnographic study of the response to Typhoon Haiyan in the Philippines, Madianou et al. (2016) investigated the effectiveness of mobile phone-based 'accountability to affected people' initiatives. They found that these data were largely not 'fed back' to the communities actually impacted by the typhoon, but were instead sent to donors as evidence of 'impact', creating an illusion of accountability that was not evidenced by actual results. They concluded that 'rather than improving accountability to affected people, digitized feedback mechanisms sustained humanitarianism's power asymmetries' (Madianou et al., 2016, p. 960).

Read et al. (2016, p. 11) also take note of this apparent one-way interchange of data between local communities and the organisations that purport to help them:

> Although cloaked in the language of empowerment, data technology may be based on an ersatz participative logic in which local communities feed data into the machine (either through crowd sourcing, or by being enumerators or subjects in most traditional surveys) but have little leverage on the design or deployment of the technology.

The above critiques are applicable to a wide range of technologies and processes, many of which are used by digital humanitarians today. They are by no means specific to civilian drones, but encompass a broader set of ethical and operational concerns and fears. Drones do, however, offer us a specific entry point into a broader debate over the place of data collection technology in the aid and development sector and it is to the specific matter of spatial data that I now turn.

While the positive aspects of spatial data collection are widely understood and discussed in the humanitarian and development sector today, considerably less attention has been given to its downsides and to the historical and ethical implications of these data collection practices. Colonists have long relied on cartography as a means of cementing territorial control via the collection of spatial information and knowledge (Hunt and Specht, 2019; Kirsch, 2016; Sletto, 2011). Maps do not inevitably encode colonial power, but they are also not necessarily objective or inherently neutral. Instead, they make possible new modes of exploitation, such as the processes described as data colonialism and surveillance capitalism.

Proponents of open-source mapping projects often argue that their efforts help people by making them more 'legible' (Scott, 1998). To be 'put on the map' is a way to gain societal legitimacy and access to important services and legal protections. But being made more legible is not always desirable. Critics are increasingly challenging the narrative that maps (like those produced with drone imagery) are inherently tools of empowerment. They note that these map-making efforts 'frame recognition in terms of titling, demarcation and legal reform, sidestepping more complex political questions about how indigenous claims have been shaped by processes of colonialism, dispossession and inequality' and force people to conform to externally imposed notions of property ownership (Bryan, 2011, p. 49).

Taylor and Broeders (2015) observe that the practice of 'reading like a state' outlined by Scott (1998) in his description of legibility has been altered in the big data era. They suggest that remote data analytics often observe people unaware of this observation who cannot meaningfully consent to the collection of their data even if they wanted to do so (Taylor and Broeders, 2015). Further, they draw a distinction between Scott's notion of legibility and the data-driven visibility of today, noting that people are made visible due to the huge volume of observed data about them that can be collected by governments and private corporations and that therefore people who are more connected are more visible than others (Taylor and Broeders, 2015). Visibility, more so than legibility, offers the power to 'influence and intervene to a wider, more distributed set of actors: the corporations who gather and analyse the data, plus whoever they choose to share it with (or can capture it through other

means), who may be state actors, international development institutions, or other corporate partners' (Taylor and Broeders, 2015, p. 230).

This concept is illustrated clearly in Facebook's recent effort to create a data map of the human population by applying computer vision techniques to match satellite imagery with government census information. This data map covers 23 countries and Facebook intends to use this information to determine how best to deliver internet services via satellites and drones to people living in different geographic areas (Shinal, 2017). The Facebook Connectivity Lab that has pioneered this programme claims its mission is to 'connect the unconnected and underserved in the world' (Gros and Tiecke, 2016). However, the Free Basics connectivity that the company offers does not give users access to the open web, instead mediating their connectivity through Facebook's application. Facebook appears to be carrying out this project under the assumption that connectivity and visibility are inevitably superior to the alternative. This behaviour could credibly be read as not dissimilar to that of colonising powers who worked to impose 'modern' (and implicitly superior) ways of life and being upon indigenous people. Constine (2018) suggests that Facebook and its advocates appear to 'believe that some internet is better than none for those who wouldn't otherwise be able to afford it', even if that connectivity comes at the price of making new users visible to (and thus exploitable by) the practitioners of surveillance capitalism.

People who reside in less-connected and less-developed parts of the world increasingly find themselves forced to choose between visibility and invisibility, and the introduction of drone technology – whether it is used to make maps or to deliver connectivity to social media applications – is part of this choice. Participatory mapping can therefore present 'an impossible choice; one in which participants encounter the dilemma of needing to shed or set aside notions of how territory has been historically contested and negotiated in order to secure legal recognition of their rights in a hoped-for future' (Bryan, 2011, p. 46). In an increasingly data-mediated world, people who refuse to make maps themselves may still be mapped by corporations like Facebook or Google, or by resource-extraction companies that are 'commodifying and transforming space at an unprecedented scale' (Radjawali et al., 2017, p. 818). Further, they lack 'clear exit rights from the effects of heavily deployed technologies' (Fox et al., 2006, p. 100). Without control over their spatial data, Fox (2002) argues that disempowered people will be no better off than if they had not been mapped at all.

Data colonialism and surveillance capitalism remove this control from everyone who is encompassed in their networks. For example, Radjawali and Pye (2015) cite a case where a small Indonesian village was literally erased from government censuses, as the satellite imagery that the census relied

upon was too low resolution for the settlement to be visible. Ironically, the problems created by these ubiquitous technologies may only be able to be addressed by the technology itself. The solution to failures of humanitarian technology is thus forced to come from the application of more technology (Hershock, 1999; Tenner, 1996). Map-makers from indigenous communities are aware of these dynamics. By using drones, they can fight against systems where 'access to maps and spatial information is limited and commodified' (Paneque-Gálvez et al., 2017; Radjawali and Pye, 2015, p. 1). As participants in an indigenous mapping workshop concluded, 'the more we map, the more likely it is that we will have no choice but to map' (Fox et al., 2006, p. 105).

Drone data, like all forms of digitally mediated data, cannot be 'uncollected'. Data that are collected for one purpose can be appropriated and used in unintended and unexpected ways. The rise of digital humanitarianism has been accompanied by a spread of open-data principles from the world of technology to the aid sector, which place importance on making data as publicly available and easily accessible as possible (Principles for Digital Development, 2019). Humanitarian data collectors who subscribe to these principles must therefore make choices about which data are too sensitive to share publicly and which data can be made freely available on sources designated for this purpose (such as the Humanitarian Data Exchange or drone-specific platforms like OpenAerialMap[2]). At the time of writing, there is little clarity on how these sensitive decisions are being made by humanitarian organisations regarding drone data.

As of February 2019 it is now possible to download high-resolution drone maps, collected by IOM staff, of the Cox's Bazaar refugee camp from the Humanitarian Data Exchange and from the OpenAerialMap platform (Humanitarian Data Exchange, 2019). The OpenAerialMap platform asks users to submit high-resolution drone data and aerial maps, which are then made publicly available. The platform does not appear to screen this data for sensitive imagery, nor are privacy or security risks mentioned explicitly in the website's documentation. In 2018, Humanitarian OpenStreetMap Team (HOT) volunteers were encouraged to use this drone imagery of the camp to identify and map roads that cut through the area.

Most critiques of consumer drone data emphasise dangers to individuals, who may be photographed or videotaped by a stealthy drone without their knowledge or consent. Fewer critiques consider the dangers that might be presented to groups of people or individuals by drone imagery that does not portray any individuals at all, but rather their neighbourhoods, homes and other aspects of their physical context (Taylor et al., 2017). Indeed, little

2 See https://map.openaerialmap.org/#/-84.375,-5.528510525692789,3/square/21000?_k=8tjb1j.

research exists that directly links the public dissemination of high-resolution drone images and maps to their potentially harmful effects on people affected by disaster.

Researchers are increasingly aware of the problems posed by data aggregation (de Montjoye et al., 2015; Xu et al., 2017), by which disparate sources of data are combined to come up with new and often unexpected conclusions. These risks are by nature difficult to predict. It is also difficult to predict what non-humanitarian actors, such as corporations or government entities, might do with this data if they are permitted open access to them. Data colonialism is largely dependent upon the extraction and recombination of terra nullis data – like the data that Facebook collects – into new forms, forms that are often opaque or unintelligible to the people whose data have been appropriated. As humanitarian organisations work to better organise and consolidate the data they hold to improve their operational efficiency (as is the motive behind the WFP's collaboration with Palantir, announced in the late 2010s), it appears inevitable that the risks posed by the open sharing of this data will grow. Humanitarians may also be motivated to consolidate and share these data to protect themselves, as part of their efforts to reduce on-the-ground risks to their staff (Hoelscher et al., 2017). Duffield (2016, p. 161) warns that these 'security concerns are encouraging the convergence of the localised humanitarian, development, government and security databases into systems with a wide international reach', largely unchecked by regulations or oversight.

This security-motivated drive to collect more data about more people operates in tandem with drives that motivate the private sector practitioners of surveillance capitalism and data colonialism. There are numerous instances of large internet companies sharing data they hold on their users with national governments, either voluntarily or under legal or political duress. Furthermore, the data that are held by either governments or by private sector companies may be stolen or otherwise revealed to the public. Humanitarians cannot assume that data shared with one actor will reliably stay with that actor.

Experimentation is another site of potential risk connected to humanitarian drone technology. The authors of a Google-published White Paper on the development of infrastructure that will permit company engineers to run 'better, faster' tests, write that: 'At Google, experimentation is practically a mantra' (Tang et al., 2010, p. 1). This experimental attitude is de rigueur among Silicon Valley companies – for example Facebook's former motto to 'move fast and break things' (Vardi, 2018) – and this bleeds over into the humanitarian world's technology efforts. In 2017, when the government of Malawi and UNICEF launched an air corridor for testing UAV uses, private companies were encouraged to apply to use the airspace for testing purposes (UNICEF, 2017). The drone delivery company Zipline, mentioned above, highlights this

experimental approach in its work, as it tests its technology in Africa with the eventual goal of exporting it to the United States and Europe.

McDonald et al. (2017) asked at what point should humanitarian innovation be described as becoming 'human subjects experimentation', noting that this dividing line is poorly defined. Sandvik (2015, p. 75) observed that Africa is 'the perfect recipient of good drone interventionism', not only because the continent is construed as being eternally in need of externally imposed aid, but because of its (relative) inability to resist the rescue and investment efforts of outsiders, regardless of whether they target African territory or African airspace.

This experimentation is often accompanied by another assumption: that people who live in poorer parts of the world must know little about (and thus will be frightened by) civilian drones. In a 2016 survey of humanitarian actors carried out by Fondation suisse de déminage (FSD), 57 per cent of respondents felt that 'local populations feel threatened by the use of drones', although, as the survey authors note, these responses seem to be at odds with the highly limited available evidence regarding public perceptions of the technology (Soesilo and Sandvik, 2016).

These survey replies align with a common perception that people in developing countries are not as technically aware or technically competent as the humanitarians that are attempting to help them, an assumption that logically encompasses drone technology. If humanitarians operate under the (at this time largely unsupported) assumption that local people are frightened of or ignorant about drones, they may use the technology anyway, but in ways that exclude local people. They may fail to work with local partners who are knowledgeable about the technology and the context. As Tingitana and Kaiser (2018) note in a blog post for the WeRobotics drone non-governmental organisation (NGO): 'Time and time again, we've seen large organizations in these sectors hire foreign drone companies to carry out aerial surveys that local drone pilots could do equally well and in a fraction of the time'. The use of drone technology by humanitarians can also, without adequate oversight or consideration of these issues, reinforce existing inequalities pertaining to the production of data and spatial data across gender, racial and class lines (Paneque-Gálvez et al., 2017; Radjawali et al., 2017).

It is also worth considering where the drones themselves come from. Consumer drones are widely available across the world and require less effort and skill to use than home-made models. It is reasonably safe to assume that time-strapped aid workers will largely rely upon their products. Dajiang Industries, the current market leader in the consumer drone sector (Skylogic Research, 2019), does not have a business model that is currently dependent upon the extraction of user data, but this does not mean its model will not shift in the future. There are a few competitors that produce similar products at the

same price point as DJI does, creating the risk that aid users of the technology will be locked into their systems.

Initiatives are underway that seek to make drones a more standardised and legitimate part of countries' national airspaces, including the creation of unique digital drone 'licence plates' and other means of remote identification (Moon, 2018). Some of these proposals may require that drone users pay a significant fee to operate in national airspace systems, or may centrally collect the data of drone users, integrating drones more thoroughly into the processes of data colonialism and surveillance capitalism. Some nations already require drone users to pay a large licensing fee (such as South Africa), while others, like Mexico, require groups that photogrammetrically process drone data to hold a government permit (Paneque-Gálvez et al., 2017). A world in which drones are only usable by the rich and well-connected (including international aid workers) will not be a more equitable one.

Addressing data colonialism in drone use

Digital humanitarianism is an inherently hopeful endeavour, a movement that perceives itself as harnessing the power of networked technology to help people around the world, breaking down technical, social and economic barriers. Spatial technologies, like drones, 'hold incredible epistemological and tactical promise' (Burns, 2018, p. 8.), they are tools that can conceivably be used to make the world a more equitable and ethical place. The processes of data colonialism and surveillance capitalism threaten to leave these hopes unrealised. Instead, they threaten to create a 'surveillance humanitarianism' that appropriates the ethical goals and considerations of the aid movement at the expense of both humanitarian aid workers and the people they wish to serve. These forces are powerful, but it is not too late to push back against them. Indeed, it is clear that data colonists recognise (and wish to be linked to) the moral authority that humanitarian aid still holds. By using this authority – in a number of differing, but interlocking ways – the aid and development sectors can push back against the march of digital dispossession.

The first step may be to recognise – and reject – digital colonisers' arguments about the supposed necessity of their data extraction methods. Hosein and Nyst (2013, p. 58) write that 'the choice between privacy and development creates a false dichotomy and spurs over-simplified arguments about the role of technology'. Similarly, Zuboff (2019) argues that technology companies have created a false dichotomy, where we are led to believe that their surveillance systems are inevitable and a required part of capitalism. She calls for mass resistance to these quantifying forces, which must of necessity be accompanied by political pressure beyond the abilities of individuals.

Couldry and Mejias (2018, p. 11) also describe a vision of resisting data colonialism that 'rejects the idea that the continuous collection of data from human beings is natural, let alone rational; and so rejects the idea that the results of data processing are a naturally occurring form of social knowledge, rather than a commercially motivated form of extraction that advances particular economic and/or governance interests'. They previously noted that 'a continuously trackable life is a dispossessed life, no matter how one looks at it. Recognizing this dispossession is the start of resistance to data colonialism' (Couldry and Mejias, 2018, p. 10).

A humanitarian movement that recognises these forces should be empowered to assert its values. It should feel capable of turning down collaborations with or data-sharing agreements with data colonisers, but it must also be able to clearly explain why. Some humanitarian aid and development organisations are developing codes of conduct, handbooks and other compilations of best practices to serve as a 'moral road map' for their interactions with data-collecting technologies and technology companies. In the case of drones, the Humanitarian UAV Network Code of Conduct (2019) is the most comprehensive current attempt to develop a set of ethical standards for humanitarian drone use, covering data issues, local involvement, privacy protection and other categories. The International Committee of the Red Cross (ICRC) 2017 *Handbook on Data Protection in Humanitarian Action* (Kuner and Marelli, 2017) also specifically considers the problem of data protection with drones. Both standards call for humanitarian drone users to conduct both practical and ethical risk assessments prior to flight, to develop data-sharing techniques in advance of collecting the data itself, to engage local communities to the extent realistically possible in data collection efforts and to minimise the amount of data collected. However, these standards lack any real enforcement mechanism and it is unclear to what extent they are actually being adhered to today. More work is needed to ensure that they are both widely known and followed in the humanitarian aid and development sector. While these ethical codes are important, they are no panacea. It is clear that adherence to a certain set of rules or criteria is not enough to arrest the spread of data colonialism and surveillance capitalism. Powerful companies and their supporters are capable of influencing what these rules look like, while toothless codes of conduct that rely largely on internal policing merely put a legalistic fig leaf over extractive practice.

Little academic research exists that attempts to formally link human security and safety to the collection and dissemination of drone-collected data. There are few technical or formal guidelines that concern themselves with minimising these risks. For example, it is unclear what types of blurring or image redaction might reduce the risk of harm to affected populations from drone-collected

data, what types of sensitive information are discernible from drone imagery collected at different altitudes and at different resolutions or how security risks from drone video differ from security risks from drone photographs. This is likely due to the relative novelty of the technology and its uses in humanitarian, disaster-response situations. Whatever the cause of these gaps, they must be filled if aid organisations intend to conduct meaningful risk assessments of the collection of drone data.

There is also very little research that attempts to determine how different groups of people in different cultures and in different geographic locations feel about and approach the use of drones and drone-collected imagery in humanitarian contexts. The vast majority of existing survey and opinion research related to drone technology and privacy has been carried out with US and European populations. This absence of research, unfortunately, extends beyond drone data. As Payal Arora (2016, p. 1694) writes, there 'is a dearth of studies on how marginalized populations in the global South view, construct, and practice privacy'. Local, contextual knowledge is protective against processes of data colonialism and involving people more closely in data protection processes gives them a chance to maintain agency over information that is collected about them. In the absence of this information, humanitarian aid workers run an increased risk of using the technology in ways that reinforce data colonialism and surveillance capitalism: consider the strange absence of local people in the aspirational 'technoscape of the Ebola drone' described by Sandvik (2015, p. 11). Still, it is important to note that better research will do little to protect individuals if large aid organisations continue to engage in partnerships and data-sharing agreements with data colonists.

Localisation is one means of addressing these risks, in large part because it is a means of sharing power and influence over technical projects between more people. Andrew Schroeder (2018) of WeRobotics commented in a blog post that 'if drones are going to fulfil their humanitarian potential, the structures, skills, and knowledge that guide them cannot depend on large international agencies or rapid importation at times of crisis'. One such practice is participatory mapping, which includes many different community members and stakeholders in the mapping process. Often this is done explicitly as a means of reducing the colonial 'view from above' implications of colonial mapping projects. It is not a panacea, data from such participatory projects can still be shared (and exploited) in unexpected ways (Specht and Feigenbaum, 2018). However, these efforts do give the people whose data are being collected a clear role and a voice in the collection and analysis of their information and more such work is needed. Paneque-Gálvez et al. (2017, p. 16), referring to Peruvian community mapping efforts that incorporate drone imagery, write that 'we need to *Amazonize* drone technology so that it can become truly

useful in such a socially and environmentally challenging context'. They call for the establishment of new drone schools that cater to the specific context of indigenous people, referring to the example of Irendra Radjawali's Swandiri Institute (Radjawali and Pye, 2015) as an example of this model.

Humanitarian and development workers should be aware of the legal status of drone use in the areas that they work and how these legal changes may impact local users of the technology. Regulations ensuring that drones can only be effectively used by deep-pocketed and well-connected organisations remove the technology's grassroots potential. More powerful organisations should work to assist smaller ones with pushing back against exclusionary lawmaking.

As part of supporting these localisation processes, humanitarian drone users should also ensure that they look beyond Eurocentric ideas about big data, data sharing and technology. Arora (2016) writes that today's debates about the impact of big data on human society continue to be highly Western-centric. Moreover, while the West is in the midst of considerable societal debate about the negative impact of big data on its societies, discourse around 'big data projects [in] the Global South have an overwhelmingly positive connotation' (Arora, 2016, p. 1682). Arora (2016, p. 1694) further notes that we must 'pay more attention to where the values in digital design emerge and who dictates these information infrastructures to create allowances for a richer databased identity', adding that the global South 'should be actively engaged with current debates – such as the right to be forgotten – as multinational IT companies confront national sentiments, values, and institutions, illustrating how context continues to matter'.

Milan and Treré (2018), meanwhile, in their exploration of 'big data from the South', ask us to consider how the processes of datafication that this chapter critiques might look 'upside down'. They warn against the trap of 'digital universalism' that attempts to 'gloss over differences and cultural specificities' (Milan and Treré, 2018, p. 324) in its criticism of big data and the practices that accompany it. Drawing on work from Arora (2016) and Udupa (2015), they note that while the majority of the world's population resides outside of the West, we 'continue to frame key debates on democracy and surveillance – and the associated demands for alternative models and practices – by means of "Western" concerns, contexts, user behaviour patterns, and theories' (Milan and Treré, 2018, p. 320). They urge us in our thinking to make 'the move from datafication to data activism/data justice', by examining the 'diverse ways through which citizens and the organized civil society in the South engage in bottom-up data practices for social change and resist a datafication process that increases oppression and inequality' (Milan and Treré, 2018, p. 328).

Ultimately, we can decolonise our use of drone technology in humanitarian aid. It is well within our power to decline to create a system of 'surveillance humanitarianism' or to facilitate its creation by others. We can realise the

power of new technology to save lives and reduce human suffering without embracing the practitioners of data colonialism and surveillance capitalism. The humanitarian aid sector should stand as an essential moral voice against data colonisers. Indeed, its survival as an independent and effective movement depends on it.

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5. The role of data collection, mapping and analysis in the reproduction of refugeeness and migration discourses: reflections from the Refugee Spaces project[1]

Giovanna Astolfo, Ricardo Marten Caceres, Garyfalia Palaiologou, Camillo Boano and Ed Manley

Introduction

Even if the use of statistics and data analytics has been widely criticised in the past decades, in the light of the rise of identity politics and globalisation (Davies, 2017), when it comes to migration, data still play a crucial role in policymaking, humanitarian intervention and public discourse. Indicators are used by governments, international organisations and security agencies to monitor and control movements, arrivals, border crossings and violations, asylum-seeker requests and transfers.[2] According to the International Organization for Migration (IOM), 'data are the lifeblood of decision-making and the raw material for accountability' (UN Data Revolution Group, 2014). Not only are data fundamental to design policy, but they are also critical in humanitarian work. In particular, the allocation of resources for reception and assistance would be impossible without data.

1 The Refugee Spaces data project and platform were funded by the Bartlett Faculty of the Built Environment, University College London, through the Materialisation Grant over the period 2016–18. Data collection and analysis was conducted by four teams. We would like to thank Gala Nettelbladt, Tahmineh Hooshyar Emami and Asimina Paraskevopoulou for working on the Germany, France and Greece cases; Kayvan Karimi for overseeing the data collection strategy; and Ed Manley and Stephan Hugel for developing the Refugee Spaces platform. We are also grateful for the always prompt advice provided by Professor Roger Zetter (Refugee Studies Centre Oxford), Dr Marta Welander (Refugee Rights Europe) and Dr Nando Sigona (Birmingham University). Finally, our thanks to Murray Fraser and Ella Sivyer for supporting the team throughout the delivery of this Bartlett-funded project. This chapter reflects the views of the authors, not of everyone who has been involved in this research.

2 For example, in the context of global migration, UNCHR and IOM are humanitarian organisations that are prominent data providers, as well as Frontex (The European Border and Coast Guard Agency), which is acting from a securitisation perspective.

After the so called 'European refugee crisis',[3] data on arrivals and asylum requests have also heavily fed media narratives and the Internet[4] – to either raise compassion or exacerbate xenophobia (Wodak, 2015). According to Fawaz et al. (2018), migration flows are currently portrayed in two opposite ways: refugees and migrants are either 'depicted as mere victims of external pressures that have forcefully displaced them and exposed them to the violence of host communities' or as invaders who threaten 'the livelihood, coherence, work, health and way of life' of host communities (Fawaz et al., 2018, p. 4). Similarly, Triandafyllidou (2018, p. 215) argues that there are common yet contrasting interpretative frames that are shared across countries:

> Socialist, Social Democrat and other center-left or left-wing parties and media adopt the moralization frame, upholding notions of solidarity and providing protection despite the massive character of the flows, while right-wing and far-right-wing politicians in particular adopt an interpretive frame of threat and risk, using this frame to create divisions within Europe.

In both cases, data are used to reinforce the notion of crisis and chaos, often relying on univocal and sensationalist interpretations without building a contextualised and nuanced understanding of the migration phenomenon. In particular, numbers are manipulated to either magnify or minimise a situation. They feed expert discourses, and politicians are eager to quote statistics and quantify social phenomena (Cheesman, 2017; Fotopoulos and Kaimaklioti, 2016). According to Anderson (2017, p. 1529),

> for those involved in the migration industry, in general the more bodies processed the better, but for policy-makers and politicians the ostensible goal is reduced numbers. As with criminals, governments are always open to the charge that there are too many migrants and too many is a difficult number. One million entrants to the EU were too many but it was less than 0.5 per cent of the EU population. At the other end of the scale, one migrant murderer not deported is always one too many.

From humanitarian calls for action to warnings of impending collapse, Europe widely considers itself to be in crisis, at a political breaking point that justifies extreme measures. As Anderson (2017) puts it, politicians, policymakers and all those involved in the migration industry share a common

3 See note on the term 'refugee crisis' at the end of the chapter.

4 A swift review shows that since around 2017 a slew of websites and web platforms has been created to show migratory data. Of those, five deal exclusively with flow density, five on location of border deaths and the rest include a blend of data-analysing population trends, asylum applications and camp locations. Specific attention has been given to the reporting on the Mediterranean route and number of arrivals. Less attention is paid to migrant and refugee subjectivities. Websites collecting stories of migrants are comparatively few, with migrant stories being systematically excluded (Singleton, 2015), turning migrants into 'faceless masses' (Adams, 2018, p. 542).

interest in responding to the 'crisis' through enforcement. Data on arrivals and border crossings have created the need for and justified the hardening of border policy; even though such measures did not result in better and safer migration management. On the contrary, it has been argued that higher investments on securitisation and deterrence coincided with an increase in fatalities at the border (Léonard, 2010; Neal, 2009; Perkowski, 2012; Squire et al., 2017; Steinhilper and Gruijters, 2017).[5]

It is often difficult to disentangle the causal relationship between discourses and measures. According to Krzyżanowski (2013, 2018), since 2014 responses in policy and political actions have entailed various subsequent 'discursive shifts' (Fairclough, 1992) and policy changes, leading to policies and actions becoming legitimised by political and mediated discourses, as in the case of the refugee quota. For years, European countries have operated a redistributive system according to which refugees and asylum seekers are allocated to European Union (EU) member states based on agreed quotas. During the peak of arrivals in the spring and fall of 2015, however, the system stopped working. There was clearly a shift from seeking to manage and to channel the flows through quotas, to the construction of the refugee flows as a crisis that called for more drastic measures (Triandafyllidou, 2018), such as increase of border refusals and removals to reduce public anxiety. These policy developments were in an interactive relationship with developing media, political discourses and civil society mobilisations around the refugee crisis.

During 2017–18, numbers of arrivals have slowly and steadily decreased, which has been interpreted as a decrease in migration flows, subsequent to policy changes. It has been further used to celebrate a successful policy and to placate xenophobic sentiments. However, many argue that the arrival drop is not generated by a decrease in flows, but rather results from the closure of the route and the diversion of the flows. If this is the case, then the problem has not been mitigated but simply moved elsewhere. Such an example of the complex entanglement between data, media discourse and policy measures sheds light on how data are produced by a certain discursive practice that creates the need for those data to exist in the first place.

Interpretations of the Foucauldian social theory on discursive practice and its relation to power suggest that data – admin data, censuses, statistics and 'evidence' in general – operate as technical devices to sustain dominant

5 One has to read comparatively Frontex budget figures and independent research on official (e.g. securitisation) and unofficial (e.g. smuggling) costs and refugee deaths. For example, such research is conducted for the Migrants' Files project (Journalism++, 2013). Frontex budget figures are available via the Frontex website (https://frontex.europa.eu/about-frontex/key-documents/?category=budget&year=2017) and European Court of Auditors website (https://www.eca.europa.eu/Lists/ECADocuments/FRONTEX_2016/FRONTEX_2016_EN.pdf). Frontex budgets increased from €92,000,000 in 2011 to €302,029,000 in 2017.

structures of power. In order to expose such structures of power, there is a need to question what data are collected, by whom and for whom, who decides what data to collect and for what purpose, how and what data are shared, disclosed and aggregated. Critical insights into data collection methods might help to understand and contain the divisive narratives that frame the current influx of refugees into Europe (Haynes et al., 2006; Triandafyllidou, 2018) on the one hand, and make sure that data support better migration research and policy on the other. For this purpose, what follows is a closer look into the relationship between discourses and power followed by a review of publicly available existing data on migration. Reflections stem from a two-year data project called Refugee Spaces,[6] an open digital platform conceived to stimulate debate on the ways in which European countries have represented and responded to recent migratory waves.

Data and discursive practice

In *The Archaeology of Knowledge* (1972), Foucault develops his notion of discourses as 'systems of thought composed of ideas, attitudes, courses of action, beliefs and practices that systematically construct the subjects and the worlds of which they speak' (cited in Lessa, 2006, p. 285). According to such a definition, discourses create a 'regime of truths' (Foucault, 1978, p. 101) that legitimise some knowledges as true and normalise the norms that sediment power and the truth it produces. Furthermore, discourses are pervasive, implicit in 'the ideas and statements that allow us to make sense of and see things' (Schirato et al., 2012, pp. xix–xx). As a result, 'social reality is produced and made real through discourses' (Phillips and Hardy, 2002, p. 3). Ultimately, discourses legitimise a certain way of making sense of the world and those who inhabit it (Mole, 2007). We argue that data are also part of that system of thoughts that forms a discursive practice and that data support a certain way of making sense of the world. As a consequence, data produce new knowledge not because they are universally truthful – on the contrary, their truth is always a construction with a purpose – but for the simple reason that they exist as part of a discursive practice.

Any discourse within a given context constructs a regime of truths as well as carrying power relations. Indeed, discourse is strongly related to power; it is both an effect and instrument of power in a project of constructing subjects that can be disciplined and populations that can be regulated. By contributing to the circular creation of knowledge and power, data also produce the subjectification of those who are contained in it (as happens for instance with the categorisation

6 See https://www.refugeespaces.org.

of the 'asylum seeker' or the 'refugee' as normalised subjects). To understand how data 'construct the subjects and the worlds of which they speak' (Lessa, 2006, p. 285), it is useful to remember that data are a representation of the world, not the world itself. It is possible to modify data and their narrative, constructing a perception that will be rationalised and consumed. However, perception is a cultural construct. As Bacchi and Bonham (2014, p. 178) put it, Foucault's focus is on the 'things said', not in terms of their content but in relation to the operation of a whole package of relationships.

According to Foucault (1971, p. 8), 'in every society the production of discourse is at once controlled, selected, organised and redistributed by a certain number of procedures'. Discourses are part of the organised practices (mentalities, rationalities and techniques) through which subjects are governed, leading us to the idea of governmentality: 'The ensemble formed by the institutions, procedures, analyses and reflections, the calculations and tactics that allow the exercise of this very specific albeit complex form of power, which has as its target population, as its principal form of knowledge political economy, and as its essential technical means apparatuses of security' (Foucault, 2007, p. 108). Fimyar (2008, p. 5) summarises thus:

> By merging 'governing' ('*gouverner*') and mentality ('*mentalité*') into the neologism 'governmentality', Foucault stresses the interdependence between the exercise of government (practices) and mentalities that underpin these practices. In other words, governmentality may be described as the effort to create governable subjects through various techniques developed to control, normalize and shape people's conduct. Therefore, governmentality as a concept identifies the relation between the government of the state (politics) and government of the self (morality), the construction of the subject (genealogy of the subject) with the formation of the state (genealogy of the state).

Governmentality refers to how power is exercised in Western societies (Foucault, 1991, pp. 102–4), where the sovereign power of the ruler merges with 'police' to secure a state's internal stability coincident with redefining 'population' as an object of governmental techniques. Such a process of governmentalisation of the state (Foucault, 1991, p. 91) is 'an invention and assembly of a whole array of technologies that bring together the calculations and strategies of the constitutional, juridical, fiscal and organizational powers of the state in an attempt to manage the economic life, social habits and health of the population' (N. Rose, 1999, p. 18).

In a liberal state the welfare of the population is perceived as the ends of the government. Security of the economic and social development of the population is its fundamental concern and the basis of state prosperity. To achieve this, the population is framed into apparatuses of security (including police). Lives (and bodies) become objects of systematic administration and

data and statistics become a means towards this. Mapping has historically been a key strategy of governmentality (Harley, 1988). The same can be said for statistics, censuses, data on population trends, flows, etc., which extend and reinforce the legal statutes, territorial imperatives and values stemming from the exercise of political power over a certain territory. Data on population and migration conform to Bentham's concept of a panopticon, in which the one views the many.

This way of thinking gave rise to the concept of 'biopower' (power over life) and 'biopolitics' (exercise of this power by the government) (Foucault, 2008). Biopolitics is characterised by administrative intervention aimed at optimising the life of the population. In other words, state and government extend their terrain of interest towards all life processes: how humans live, procreate, become ill, maintain health and die. Biopolitics is concerned with the family, with housing, living and working conditions and with patterns of migration.

Migration is an essential biopolitical concern. In order to ensure the most effective management of lives, biopolitics divides the population into subgroups (e.g. refugees, criminals, migrants, the employed) that either contribute to the collective prosperity of the population or constrain it. Those that constrain it are to be tightly regulated. Of course, such practices lead to discrimination, exclusion and racism, whereby race (or other 'Othering' processes) appears as a defence mechanism of the life and welfare of the population against internal and external threats.

While it was not directly part of Foucault's *oeuvre* (Fassin, 2001, 2011, 2016), his impact on migration debates today is confirmed by a fast-growing body of work. Relevant for this chapter are the debates concerning the surveillance and discipline of international mobility and labour migration (Geiger and Pécoud, 2013; Rudnyckyj, 2004; Salter, 2013) and migration and governmentality (Bigo, 2002, 2008; Darling, 2011; Gill, 2009; Hess and Kasparek, 2010; Huysmans, 2000; Hyndman, 2012; Jeandesboz, 2011; Mezzadra and Neilson, 2013; Nyers, 2006; Papadopoulos et al., 2008; Salter, 2013; Squire, 2011; Walters, 2012).

The Refugee Spaces platform

If discourses are situated within relations of power, they do not stem from a single point of reference. The systems of ideas, attitudes, courses of action, beliefs and practices that surround them – including data – can also be used to disrupt and subvert a certain regime of truths and the norms that construct subjects. Power and resistance are interlinked. Subjects can make use of discourses in subversive manners, creating new meanings. Counter-narratives and counter-archives that resist mainstream narratives illustrate

such resistive practices (Garelli et al., 2018). Examples that have produced critical data to oppose fearmongering narratives have acted as essential sources of knowledge production in humanitarian campaigns and academic research and include the well-known Forensic Oceanography project (Heller et al., 2011), WatchTheMed (WTM, n.d.) and the Migrants' Files (Journalism++, 2013).

In a similar vein, the Refugee Spaces platform compares data on demographic trends and the cost of migration across different geographical contexts and standpoints, to give a more nuanced reading of current narratives of chaos and crisis. To demystify the representation of an invasion and the burden of protection, the platform compares relative and absolute data on arrivals of refugees and asylum seekers to Europe and the Middle East. The resulting map shows how, over the period 2010–15, Italy has seen an increase in its refugee population of around 122 per cent against an increase of around 32,200 per cent in Turkey (Refugee Spaces, 2018). Another map shows how while governments and media discourses have portrayed the recent wave of arrivals to Europe as an onslaught, the Continent currently hosts only 6 per cent of the displaced population globally, with all European countries hosting few people compared to the top-hosting countries in the world.

In order to question the media-constructed idea of migration as a burden to sovereign states and hosting communities, the Refugee Spaces platform further compares public spending for refugee reception and social integration with the cost for relocation, detention and securitisation in each state. The map shows that in Italy alone, the ratio between reception and securitisation is 1:2 (Lunaria, 2013). Another map compares the amount of resources allocated to humanitarian response with the investments in security and military operations at sea; while the first is decreasing, the latter keeps growing steadily. From 20 million euros in 2006, Frontex's annual budget reached 90 million euros in 2010 and 143 million in 2015. Today, it is 300 million euros (AEDH, 2017; Frontex, 2018; Perkowski, 2012).

Data collection and analysis: methodological and ethical challenges

Aside from the production of a set of maps and visualisation aimed at questioning the media-constructed idea of a 'refugee crisis', the Refugee Spaces platform has exposed the numerous challenges associated with treating secondary data on migration, particularly admin data, statistics and censuses. During the implementation of the project, we reviewed numerous data sets collected, aggregated and shared by institutional and governmental sources in Italy, France, Germany and Greece. Such examination enabled the development of critical insights on the fragile nature of data collection

methods and their resolution, consistency and reliability within countries and across Europe.

First, the majority of available data on migration flows – concerning arrivals, border crossing, asylum requests and transfers – are collected by large organisations (e.g. Eurostat, the Organisation for Economic Co-Operation and Development (OECD), national governments and the United Nations High Commissioner for Refugees (UNHCR)), because collection and analysis are time-consuming and onerous and only centralised nation states or supranational bodies can afford to undertake it across large populations in a standardised fashion. However, with such limited alternatives in production and sources, the demand for data and their subsequent interpretation risks being univocal, easing the path for unilateral pre-set narratives. In this context, grassroots organisations and academic research could potentially offer the possibility of having a more pluralistic system of data collection. Charities, activist groups and researchers have been able to collect accurate and diverse data in smaller sample pools, including a closer estimation of population, age and gender, educational background, aspirations and experiences of violence in the host countries.[7] Nevertheless, their knowledge often remains hidden, unavailable and disconnected from policy, media narrative and national statistics. Academic research in particular tends to exclude non-academics and those in civil society without access to policymakers from accessing data – possibly to avoid their work being sensationalised (Düvell et al., 2010; Singleton, 2015). This therefore makes national government statistics the most accessible data because they are listed in public records.

Second, national statistics are the product of a centralised administrative system, whose units may not be sufficiently representative of the localised variation in the data. Nuances are hardly captured, often compromising the accuracy of a reported trend and/or leading to misinterpretation. Furthermore, research stemming from these data might reproduce the same categories and the same inaccuracies as those originally found in the administrative source. Notable gaps (i.e. information not represented or captured by centralised data collections) can be linked to a range of criteria including a specific crossing/settlement status, the provision of fake identification documents, the involvement of people-traffickers and smuggling cartels and the multiple counting of the same asylum seeker while crossing more than one European border. Fear of being registered by border control officers in a country that may not constitute the migrant's chosen destination has also led to certain data to be inaccurate.

7 Refugee Rights Europe (Welander, 2015), for example, researches and documents the lived realities of refugees and displaced people seeking protection in Europe, with a specific focus on human rights violations and inadequate humanitarian conditions.

It is widely acknowledged that the privileged status of a nation can contribute to inherent biases of migration statistics and can attempt to simplify what is a complex phenomenon. Under the need for standard uniformity, national aggregates and statistics impose systems of classification and definition (i.e. refugees, asylum seekers, economic migrants, etc.) that make it possible to discern how far a given classification extends across a certain phenomenon. The resulting 'categorical fetishism' (Apostolova, 2015) annihilates identities and ultimately undermines the ability 'to capture adequately the complex relationship between political, social and economic drivers of migration or their shifting significance for individuals over time and space' (Crawley and Skleparis, 2018, p. 48). Individuals disappear within statistical data, while their stories are represented as homogeneous, undiversified and decontextualised. By being presented as 'an undifferentiated mass' (Fawaz et al., 2018), refugees and migrants are consequently misrepresented to lack either agency or the skills of the 'settled citizenry' and to unreasonably demand Western assistance (Behrman, 2014, pp. 249, 268). Numerical aggregates and averages not only reflect an abstract centralised representation of migrants that is far from reality, and dehumanise the particular needs of individuals, they also create a distorted image and perception of migration ultimately influencing a climate of hostility.

However, reducing the complexity of migration into simple figures offers governments and organisations the opportunity to circumvent the need to acquire contextual detailed insights about migrants' challenges, journeys and aspired destinations. This blindness to local variability and subjectivity is precisely what can make statistics less beneficial, leaving the understanding of the reasons behind migration being grossly overlooked. As research by the MEDMIG project (Crawley et al., 2016) shows, it is precisely the lack of understanding of lived experiences that is ultimately compromising the ability of migration policies to respond effectively to the increased movement of people.

Third, our research has also shown that data are rarely equally available across countries.[8] In the absence of what Bonnor (2006, p. 149) defines as 'European public access culture', we struggled to access consistent data and information across Italy, France, Greece and Germany. France proved to have the most systematic and high-resolution compilation of information regarding location and regional governance of the centres for reception, accommodation or detention of refugees, asylum seekers and migrants, enabling us to identify and map around 700 centres within the national borders. In the case of Italy, we mapped just under 300 centres out of nearly 4,000, as the information

8 Data collected for the Refugee Spaces project are from open-access sources and the compiled data sets are available at https://www.refugeespaces.org.

regarding other centres is either not collected or not disclosed.[9] However, data on number of refugees per centre is collected in a more systematic fashion in Italy compared to France. In Germany around 100 centres were mapped; information available proved difficult to compile as migration management is highly decentralised. Each of the 16 federal states has different measures and diverging policies on how to collect and publish data on reception and detention centres (Mouzourakis and Taylor, 2016). Thus, across the country there is no comparable information available on reception and detention arrangements.

Similarly, we found that different sources within the same country were inconsistent. For example, in relation to the same variable, the figures published by the Eurostat agency on the number of arrivals or refusals of entry per year for a given country sometimes differed from those provided by the Interior Ministry of that country, or those gathered by a local non-governmental organisation (NGO).[10] This could be attributed to the fact that data cover different time periods or are collected at different locations. For instance, data on arrivals are collected at the border, while data on asylum requests and number of refugees are collected at the border *and* in the reception or detention centres. Tazzioli (2015), Sigona (2015) and Rozakou (2017), among others, have made a considerable effort to show how such fragmentation leads to miscalculations and double counting, for instance, in the case of data on sea arrivals. Besides the inherent fragmentation of data sources, the heterogeneity of the systems of classification and the different time and spaces of collection, these type of data sets are also in constant flux and such oscillations are not easy to capture.

Similar inconsistencies were found on data showcasing the declared and actual capacity of centres. If there is an uncalibrated variability, these indicators could potentially misestimate requirements for budget allocations and provision of adequate living conditions in host locations. For France, official audits suggest there is no consistency between declared and actual capacities

9 The location of around 3,000 Centri di Accoglienza Straordinaria (Centres for Emergency Reception – CAS) do not show in any list, document or report. These structures are identified by the prefectures, in agreement with cooperatives, associations and hotel facilities, according to the procedures for awarding public contracts, after consulting the local authority in whose territory the facility is located. The stay should be limited to the time strictly necessary for the transfer of the applicant to the second reception facilities. For further details regarding the non-disclosure of information around the location of CAS see Cittadinanzattiva et al. (2016).

10 As an example, in the case of Italy, we noticed minor discrepancies between (a) people accommodated in reception centres in Italy in 2017, according to UNHCR (2016, 2017b); (b) people accommodated in reception centres in Italy in 2017 according to the Ministry of Interior (Ministero dell'Interno, 2017b); (c) sea arrivals to Italy according to UNHCR in November 2017 (UNHCR, 2017a); and (d) sea arrivals to Italy according to the Ministry of Interior (Ministero dell'Interno, 2017a, 2017b).

(Cours des comptes, 2015, 2016). Similar problems have been identified in Greece and Italy, while for Germany data on the capacity of centres is localised and far from traceable, let alone verifiable (Kalkmann, 2017; Katz et al., 2016; Mouzourakis and Taylor, 2016).

Fourth, not all data were equally disclosed. If asylum requests are the most comprehensively collected and shared, governments do not give access nor disclose comprehensive updated data on the location of shelters, reception, accommodation and detention centres in Europe. This can be ascribed to several factors, including the lack of data collection systems, the inability to cope with the fast pace of changes, as well as with ethical or security reasons. Our research suggested that the only comprehensive data sets are on the category of 'asylum seekers' for which there exist actual numbers, costs and locations. This information is available at different administrative levels per country. In France it is collected at regional level,[11] while in Italy it is collected at national level, and data are categorised according to centre typology (Ministero dell'Interno, 2015). Such inconsistency has rendered comparability across European countries extremely challenging.

A final and important point is related to the rationale of data sharing among different institutions, such as border agencies and governmental agencies. Data on arrivals of migrants and refugees constitute a telling example of this. Data on arrivals released by government and media are based on Frontex's data sets on border crossings. Clearly, arrivals and border crossings do not have the same significance and value. Arrivals are one-time data, while border crossings can be multiple as the same person might attempt a crossing on more than one border or more times on the same border. As a consequence, numbers of arrivals communicated by governments and media are not 'actual' arrivals; on the contrary they are estimates, often inflated compared to actual numbers (Sigona, 2015).

Such an example sheds light on several aspects and challenges related to data collection methods. In particular, it questions the collection modus operandi of national governments and border agencies. In light of their alleged authority, we – researchers, policymakers and the public – tend to overtrust large-scale data collection bodies, with little consideration for where their interest is positioned. This in turn risks leading to the reproduction of uncritical discourses. In the case of the inflated data on arrivals explained above, this is conducive to the perpetuation of the myth of a 'foreign invasion', eliciting reactionary discourses

11 The French Office for the Protection of Refugees and Stateless Persons (Office français de protection des réfugiés et apatrides – OFPRA) produces annual reports (*Rapports d'activité*) listing in detail numbers associated with reception at the administrative level of 'departments' (*départements*) (for a total number of 52 departments). The reports are accessible online since 2001 (OFPRA, 2001) and updated annually.

and practices against hospitality and inclusion and encouraging feelings of mistrust and hate.

Data representation

The above interrogation into methods of data collection and interpretation, as well as the rationale according to which we built the Refugee Spaces platform, are underpinned by a simple reflection stemming from Foucault's interpretative frames: data collection and analysis are not as free of judgement, intention and purpose as commonly perceived. Being the product of a discursive practice and nourishing that same discursive practice (Boehnert, 2016) data are never neutral or objective. They are always subject to interpretation and deliberation, be it in the form of selecting what data to collect and disclose or not, or in the form of graphic representation and symbolic annotation of visual arguments (Bertin, 1967; Bresciani and Eppler, 2015). They can lead to multiple narratives that largely depend on why and by whom data have been produced and interpreted. Not only can the same set of data be combined in multiple ways to produce different narratives, it can also be understood differently according to the reader's or user's system of values.

Considered from a critical standpoint, the production and interpretation of data – whether quantitative or qualitative in nature[12] – are always dependent upon the positionality and subjectivity of the collector agent. Feminist theory has long advocated for an understanding of data-based research and knowledge as always constructed from a specific subject position (Bordo, 1987; Haraway, 1988; Harding, 1986, 1991; McDowell, 1992, 2016; G. Rose, 1997). More recently, D'Ignazio and Klein (2016, p. 1) have tested feminist research principles to data visualisation to develop 'alternative visualisation practices that better emphasize the design decisions associated with data'. Principles are aimed at dismantling binaries and categorisations (such as gender, class, ethnicity), as well as challenging claims of objectivity by recognising the data collectors' positionality and questioning the actors that have generated a particular data set. Similarly, Data for Democracy (2016) – which operates within the community of data scientists and technologists who work towards improving data standards – has put in place an ethical framework that is precisely based on the acknowledgement of positionality throughout all aspects of data work.

Yet, this is still to be recognised by the majority of data producers and end-users, whether researchers, media or policymakers. Few scholars recognise that the assumption of objectivity and neutrality of data is misleading (Adams, 2018; Cloke et al., 2004; Düvell et al., 2010) and that the production of knowledge

12 This distinction is broadly debated among geographers (Demeritt and Dyer, 2002; Philo et al., 2013).

is always inherently biased or 'ethico-political' as Fuchs puts it (2017, pp. 44–5). Data are still presented as being objective in media and policy discourse in order to reflect a certain regime of truth and to invest political agendas and public discourse with ideals of 'evidence'. Only by challenging ideas of evidence and neutrality and embedding within the data collection process a reflection around the subjectivity of data – a 'reflective practice' – can we actually aspire to produce counter-narratives on migration and ultimately better data for better policy.

Conclusion

Following a review of the spiralling discourse on migration and refugees since 2015, this chapter has attempted to highlight how the alleged scientificity and objectivity of data increasingly contribute to obscuring the political and ethical subjectivity of media narratives and governmental practices by using statistical evidence for which methods of collection and aggregation are questionable in their origin and validity.

As evidenced by the Sustainable Development Goal (SDG) 17, as well as by the UN data revolution initiative (UN Data Revolution Group, n.d.), the call for better use and presentation of data on migration is growing. The chapter puts forward a series of critical observations about the reliability of institutional and administrative data and their resolution, consistency, collection methods and accuracy. This criticism, coupled with theoretical understanding of discursive practices in politics, reveals implications entailed in the use of data as governmental technology. Can policy be improved by means of scientific inquiry? Better data collection methods will help, but it is not the only requirement for ethically driven data-informed policy.

A growing number of researchers, activists and politicians warn that misleading data-driven reports and websites about the magnitude of migration flows into Europe are creating unjustified fears about refugees, as well as undermining efforts to manage humanitarian problems faced by those fleeing war zones (Butler, 2017). More websites and projects are focusing on migrant testimony (Italian Coalition for Civil Liberties (CILD), n.d.; Killing, 2017; Politzer and Kassie, 2016; Sossi, n.d.; Wang, 2017; Welander, 2015) to oppose abstract and generalised views of migrants and refugees. However, their number remains small and stories are represented from a single point of view – that of those who see them arriving. Most data portals remain largely inaccessible to either refugee or resident populations who are the 'subjects' of migration data collection efforts, rather than active agents.

On the other hand, little consideration is given to the implications of conducting research and producing data on refugees and migrants. This chapter has emphasised issues of data availability and the lack of access to

data. Nevertheless, it is also important to note that open access and sharing of data can create equally large ethical concerns, especially in the context of migration and refugees. For instance, UNHCR (2015) makes data access widely available to the public and to refugees; however, it cannot control the way third parties treat its data sets and mitigate risks of potentially indiscriminate and harmful usage.

Data-related malpractice might transform individuals into targets and perpetuate social marginalisation, discrimination and violence in both their country of origin and their host country (Bedford, 2017; Cheesman, 2017; Cloke et al., 2004; D'Ignazio and Klein, 2016; McDowell, 2016; Novack, 2015; Ruhil, 2018; UNDGC, 2017; UNOCHA, 2014; Vujakovic, 2002). Even more problematic is the sharing of spatial data, especially when it involves the disclosure of specific locations. For instance, making public and sharing spatial data on the location of refugee shelters or camps can be and has been used to target individuals (e.g. see Spiegel, 2015, on abuses tracked in Germany).

In this sense, still too little emphasis is put on the necessary critical standpoint from which to review the presentation and interpretation of spatial data (Tufte, 1990, 1997) and their social consequences. This has been a central concern during the preparation of the cartographic material for the Refugee Spaces project. The exact location and address of the centres for reception and detention has been blurred in order to avoid the possibility of transforming them on to a target. Research aiming to empower users and producers of data can end up being detrimental and disempowering, for instance when it reproduces power structures or when it perpetuates the 'known' instead of letting the 'unknown' emerge. Linda McDowell (1992, 2016) highlights the kinds of challenges encountered in qualitative data collection when working with refugees, including that of adequately capturing the complex temporalities and gender dynamics that are part of the refugee experience.

It is clear that a great deal of change still needs to happen. We need to stop looking *at* migrants and start looking *with* them, attending to their individual experiences, motivations and risks, encouraging public participation in, and engagement around, questions of data collection and interpretation, while testing more solid ethical frameworks for improving data standards well beyond existing rigid protection policies and acknowledging issues of positionality in all stages of data work, from collection to sharing.

Note on the term 'refugee crisis'

We acknowledge that the term 'refugee crisis' is widely contested among scholars, humanitarian and civil society actors (Koselleck and Richter, 2006; Krzyżanowski, 2016; Roitman, 2013), both because it is inexact – the recent

flows concern migrants and asylum seekers not refugees (Crawley and Skleparis, 2018) – and because it is a stigmatising and alarmist notion. However, it allows us to refer to a series of events in a concise way. We embrace the view that this is a multiple crisis (Boano and Gyftopoulou, 2016; Roitman, 2013). It is a crisis in terms of the increased volume and different pace of refugee and migrant flows, in terms of receiving countries' asylum reception policies and with regard to European politics and policies, as it brings to the fore the divergent views of different member states.

Nonetheless, it is a term that also triggers a dramatic rise in suspicion and asylum panic (for a critical discussion on policy responses, see Triandafyllidou, 2018). Ultimately, this is a crisis of the notion of Europe itself. As the nomos of Europe lies in the mutualisation and legitimisation of its borders and territories, which is enacted through the 'open border' scheme of the Schengen area, the waves of migrants fleeing into Europe push this system of control towards collapse. They are unknowingly but steadily dismantling the biopolitical system that constitutes one of the pillars of Europe and consequently threatening the European construction – or rather, pushing its deconstruction. The ways in which this is happening are multiple, from the political/territorial impacts of mass migration, to the representation of these processes through discourses, narratives and media analysis (Astolfo and Marten, 2016, p. 7). However, the notion of crisis is neither negative nor positive, but represents a breaking point and a turnaround (from the Greek *Krino*).

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6. Dying in the technosphere: an intersectional analysis of European migration maps

Monika Halkort

More than 6,000 migrants have died in the Mediterranean since 2014 (IOM, 2020a). When the number of disappeared is included the figure rises as high as 19,803, about half of all those reported dead or missing while crossing a border on land or sea globally (IOM, 2020b). The devastating death toll has led some to describe the Mediterranean as 'a macabre death-scape' (Heller and Pezzani, 2017), the 'world's deadliest border' (Albahari, 2015) or one of the largest 'mass graves' in European history (Center for Political Beauty, 2015).

In an effort to contain the high death toll, the European border and coastguard agency Frontex established a dense web of geospatial intelligence, comprised of remote sensing devices, satellite imaging and real-time tracking technology for the dual purpose of intercepting migrant vessels and assisting bodies in need. Combined with the calculative capacities of big data and algorithmic computing, this pervasive regime of scopic possibilities allows for the real-time tracking of maritime movements and conjures up matrices of 'situational awareness' that promise to render the sea governable and transparent for the purpose of stopping smuggling activity and irregular border crossings. Humanitarian agencies, activists and people smugglers are simultaneously experimenting with the possibilities of real-time earth observation, pursuing objectives quite distinct from the Frontex surveillance regime.

Measured by the sheer volume of data generated by humanitarian agencies, activists and border security, it is fair to suggest that irregular migration constitutes one of the best-mapped 'crises' in the history of humanitarianism. And yet looking at the amount of information available on dead and missing bodies, it is startling to realise that little to no reliable data exist. It is not known how many bodies are never retrieved from the sea and thus these bodies become unavailable, either for counting or identification (Laczko et al., 2017). Between 1990 and 2013, the majority of those who washed up on Europe's shores remain largely unidentified (Binnie and Kambas, 2016; Last et al., 2017).

This chapter interrogates the key factors contributing to the critical gaps and blind spots within the maps of Europe's alleged migration 'crisis'. Drawing on intersectional analysis and post-humanist, feminist thinking, I assess how logics of utility, cost effectiveness and securitisation articulate and reproduce the logics of racialisation, subalternity and enclosure that are constitutive of the ways dead and missing migrants become readable, visible and intelligible in humanitarian border regimes. Born out of critical feminist theory, intersectional analysis (Crenshaw, 1991) examines how apparently value-free, bureaucratic processes such as counting, mapping and data extraction (re)distribute violence unevenly across populations, amplifying possible harms for those who are already targeted on multiple levels at once, such as race, class, gender, ethnicity and able bodied-ness (Grosfoguel et al., 2014). Relayed back to the context of digital mapping, this involves interrogating how targeted exclusions and power asymmetries are amplified, reformulated and/or reproduced by digital infrastructures as they diffract unifying signifiers such as race, class, gender, age or ethnicity across sociotechnical, legal and political registers and domains. Their combined impact has produced a new underclass of 'datafied' subjects – digital subalterns – that are kept outside the political and symbolic order and whose inaudibility is a direct result of their ambivalent standing within registers of security and the state. The absence of dead and missing migrants on Europe's crisis maps is indicative of a double rejection and denial. It bespeaks a radical rejection of the ethical and political responsibilities towards floating bodies that defy the political authority of the state, while at the same time denying their material agency to give testimony and to speak their own truths.

Empirically this chapter draws on a purposeful sample of (big) data sets and visualisations generated by the main organisations governing irregular migration in the Mediterranean, most notably the European Union (EU) border and coastguard agency Frontex, the International Organization for Migration (IOM), the International Commission on Missing Persons (ICMP), the International Committee of the Red Cross (ICRC) and the United Nations High Commissioner for Refugees (UNHCR). Additional material was gathered from operational reports, workshop proceedings and semi-structured interviews with staff members of all the above-mentioned organisations, representatives of the North Atlantic Treaty Organisation (NATO), national coastguards and Frontex officials at the international border management and security conference SHADE in Rome, 2018. This eclectic mix of sources allows for a layered analysis of how the conflicting interests of humanitarian actors, security and border policing and activists intersect with the materiality of legal, political, technoscientific rationalities and environmental conditions to extend the border as political space and epistemic practice deep into the operational

scripts of contemporary data regimes. In line with this approach the main emphasis will be on the non-linear transition of the corporeality of migrant bodies into map data and the particular modes of silencing, objectification and foreclosure or subordination that this entails.

Situating border deaths in the Mediterranean

Mapping dead and missing migrants poses a series of intractable challenges. It confronts humanitarian agencies, activists and border security with the difficult task of accounting for bodies that are no longer immediately present or that have reached a stage of decomposition in which they cannot be easily identified. There is no system in place to report migrant fatalities in any systematic and reliable fashion. Many bodies are never found or recovered from open waters and even if they are discovered, it can take years before their identity is established (Laczko et al., 2017). This is in part due to the clandestine nature of irregular border crossings. They are designed to be untraceable and to disguise the point of departure and identity of those involved. Migrants and refugees do not carry passports or any other personal identifiable information in the hope that this will protect them from being sent back if intercepted by border patrols. This severely complicates the process of attaching a name, place of origin and surviving relatives to those who die or go missing. Doing so requires lengthy and tedious forensic investigations in which unique identifiers such as DNA samples, dental records and other authenticating details are collected and compared with data from a time before the presumed death (Grant, 2015; Mediterranean Missing, 2016; Pinchi et al., 2017). Few coroners or medical examiners from the local municipalities along the Greek, Italian or Turkish coastline are prepared, or equipped, to conduct such a demanding task due to a lack of financial resources and technical expertise (Last et al., 2017; Pinchi et al., 2017).

The chance of retrieving corpses lost beneath the waves is even smaller. Doing so demands specialist instruments such as transport vessels with human refrigerators and remotely operated underwater vehicles (ROVs), which marine control offices and national coastguards of EU border states can rarely afford (Kovras and Robins, 2016; Pinchi et al., 2017). This leaves search and rescue teams, fishermen and survivors of shipwrecks as the only first-hand source available to humanitarian agencies and activists for documenting fatalities. Yet, given the traumatic circumstance of their journey, survivors may not always remember the exact number of fellow travellers or may not be in a position to be interviewed at all. As a result, the current death toll circulated by activists and humanitarian agencies varies greatly. While IOM reported a total of 17,589 by the end of 2018 (Kovras and Robins, 2016; Pinchi et al., 2017),

activists such as United for Intercultural Action (2018) or Fortress Europe (2016) count 34,361 and 27,382 for the time periods of 1993–2018 and 1988–2016 respectively. These rather striking differences can be explained by the different time periods measured, but they also result from the fact that each group builds on its own unique set of secondary sources. These include official records from national coastguards and medical examiners, media reports, non-governmental organisations (NGOs) and civil society groups to verify and supplement survivor and eyewitness accounts.

The uncertainty created by the gross variation in the migrant death count challenges the idea of the Mediterranean as a transparent and governable space that Frontex likes to imagine in its annual mission reports (Frontex, 2018). It exposes the 'patchy visibility' at play in the real-time tracking of movements across borders, bringing a critical remainder of blind spots and 'shadow zones' (Tazzioli, 2015, p. 5) to the fore. At the same time, it has left migrants in an ambivalent state of 'known unknowns' – an amorphous mass of muted bodies, without name or identity – visible only through their last recorded geopolitical location and vague descriptions of the immediate circumstances of their deaths. Such circumstantial evidence can certainly reveal changing patterns and trends once they are aggregated into statistical charts, flow diagrams and situational maps, yet they also leave behind what Lahoud (2014) calls an 'excess of variables' without clear designation, opening up 'a natural reserve of complication' that can be exploited and mobilised for various political agendas and aims. For Frontex, they provide a convenient backdrop to underline the success of their own rescue operations and to legitimise the increasing militarisation of Europe's borders under the pretext of saving lives and preventing future deaths (European Council, 2019; Frontex, 2019). For intergovernmental organisations such as UNHCR and IOM, on the other hand, these knowledge gaps open up ample space to affirm their position as central clearing houses of politically sensitive information and to use their first-hand access to survivors and eyewitnesses of clandestine border crossings for developing new projects that further strengthen their authority as data brokers in global migration governance (IOM, 2014).

The increasing monopolisation over migrant data by intergovernmental organisations has become a source of much frustration among humanitarian activists, such as UNITED, Fortress Europe or WatchTheMed (WTM), who have been counting the human cost of 'irregular' migration since the early 1990s, long before IOM arrived on the scene. They openly criticise the organisation for depoliticising their work by making the phenomenon more knowable, predictable and hence governable in the interest of affected states (Heller and Pezzani, 2013). Data on 'irregular' migration, in their view, do

not merely describe a pre-existing social reality, but rather contribute to its existence. In Heller and Pezzani's (2013, p. 292) words: 'If the border only exists in its violation, the latter must first be detected, either by human perception or by its various technological extensions'. Against this, activists draw on a variety of open-source tools and crowdsourced geospatial intelligence to produce their own set of 'counter-maps' and 'counter-statistics' as part of a wider political project to shame European states into action and change their asylum and border policy. While ambitious in their political aims, these lobbying activities did little to release the dead and missing from their liminal status as 'known unknowns', much less to reinstate their agency to speak on their own behalf. Instead, the activist maps merely added another version of truth to the conflicting 'knowledge ecology' (Heller and Pezzani, 2013, p. 291) surrounding 'irregular' border crossings in the Mediterranean. Thus rendering the voice, recognition and visibility of migrants contingent on the variously differentiated definitions of border death and the struggle of where to situate it in the political geography of Europe that divide humanitarian agencies, activists and European states.

Frontex, for example, does not count border deaths per se, instead they record only those they encounter in search and rescue and security missions in which their own forces are involved. IOM's Missing Migrants Project (IOM, 2014), on the other hand, counts all deaths at external state borders or those that occur during migration towards an international destination. However, IOM does not include those who die after their arrival in Europe, that is, in immigration detention facilities, refugee camps and asylum homes, or after deportation to their homeland. Also excluded are deaths connected with a migrant's irregular status, such as labour exploitation or lack of access to free health care. Activists, by contrast, include a variety of instances far away from the European border, such as in the Sahara desert on the way to the Libyan coast, but also deaths in detention centres inside Europe, which IOM and Frontex do not count. Migrant deaths, in this view, do not follow territorial or legal definitions of the border, but instead include the sum total of deaths that emerge as an effect of Europe's bordering practices and their dissemination into other states (Heller and Pécoud, 2018, p. 9). Thus, while the death count of Frontex and IOM reinscribes the border as a central organising principle for safe and controlled migration and accepts border deaths as an unintended consequence of protecting the national interests of European states, the activists' maps stand firmly in line with their wider political project to delegitimise bordering practices as a technology of containment and undue restriction of human mobility. Yet each map, in its own way, projects a universal experience of harm upon the singularity of dead and missing corpses and in doing so converts the power to look into a self-legitimising mandate to speak on their behalf.

Death as geopolitical location

The conflicting interests and mandates undergirding the death count of irregular migration renders the bodies of dead and missing migrants as highly contested geopolitical locations where fundamentally opposed concepts of human mobility and the border collide. To speak of the body as location in this context is to recall the inherent instability and situatedness of knowledge and vision and to stress their inherent entanglement with historically distinct relations of power and privilege. Maps, just like any form of representation, always speak from particular places, not just in a geographic sense but also with regard to onto-epistemic (dis)positions that determine who gets to speak, on what terms and to what effect (Barad, 2003; Gajjala, 2013; Haraway, 1988). Attempting to relay this inherent partiality of knowledge into an emancipatory project, feminist scholars have long insisted on the body as the primary locus of political definition and self-definition, mobilising it for 'a politics of location' (Haraway, 1988, p. 589) from which one's partial perspective can be enunciated and reclaimed. As Petra Hinton (2014, p. 101) writes, in emphasising the historical and political specificity and substance of what it means to be a woman, a refugee or migrant, feminist scholarship has aimed at disrupting the myth of objectivity and disembodied viewing that has been constitutive for Western epistemology and science, revealing the sexual, cultural and historical determinations that produce objects, environments, subjects and bodies while successfully obscuring the mechanisms of silencing and marginalisation that they engender and sustain. In the words of Donna Haraway (1988, p. 585), a pioneer of feminist critiques in science and technology studies, 'vision is always a question of the power to see and the violence implicit in our visualizing practices'. Both operate in hegemonic spaces that ground knowledge in the disembodied fantasy of seeing everything from nowhere and that allow a distancing of the knowing subject from the world, 'purging the marked body from all elements of subjectivity' (Agostinho, 2019, p. 5). Against this backdrop the activist maps appear equally complicit in the silencing of dead and missing migrants, just as the mappings of Frontex and IOM do. Their ambition to resituate 'the space of death'[1] by turning the surveillant gaze of the state against itself merely stabilised the matrix of intelligibility that read the human cost of irregular border crossings from a disembodied view of nowhere, in pursuit of political projects that left the migrant's own partial perspective invisible and foreclosed. What is more, by recording migrant deaths primarily on the basis of their last known geolocation, the activists, just like Frontex and IOM, ended up spatialising death in ways that reified the territoriality of the current geopolitical order, in so far as they read the material substance of the

1 Charles Heller interview (2018) with author.

dead and missing solely in relation to the state and the expansive geography of its border regime. What was lost on the way was the potential to rewrite the map from the viewpoint of the dead and missing migrant body itself – not as a fixed or bounded essence – but as a multiplicity, a scattered and diffracted presence, stretched across various spatial, temporal and affective registers and locales. Admittedly, the extensive notion of border deaths in the activists' account is a first important step in this direction. Not least because it successfully extends 'the space of death' to the full spectrum of localities where migrants may have died or disappeared. But the activists' determination to condemn the political violence of the border ended up evidencing, above all, the interests of the state, without reinstating the fractured voice of the migrant as political space and location in its own right. The rather tragic irony here is that these effects unfold against a backdrop of a radical decentring of power in the field of vision. New sensory devices and remote viewing techniques have opened up a whole new spectrum of frequencies for engaging with forms of intelligence and modes of speech that have previously been inaccessible to humans or disavowed. Scholarship on this extended field of sensibilities (Bratton, 2014; Hansen, 2014) has shown how the datafication of ever-more aspects of the world enables insights into the basic building blocks of life and the planet (i.e. climate change, subatomic activity or the biophysicality of the body), which far exceed the capacity of human perception, opening up ways of knowing, understanding and interacting with domains of experience that would otherwise be foreclosed.

The fact that hardly any of these possibilities are currently utilised for the search and retrieval of dead and missing migrants calls for a critical review of the particular modes of silencing and erasures that take place in the non-linear transition between the materiality of the body and their data proxies and how they may reify, reproduce, but also transform long-standing patterns of structural inequality, racialisation and targeted exclusions inherited from historical knowledge regimes. What is clear from the above is that databased vision has added new layers of complexity to the politics of location inhered in digital mappings. It allows new actors to make use of maps and to insert alternative visions into the geo-/biopolitics of knowledge production, while at the same time diffracting the objectifying force of 'disembodied viewing' (Haraway, 1988) into a highly decentralised and distributive operation, with the effect that the question of who or what does the seeing and from what location becomes increasingly less clear. Before demonstrating how this decentring of visuality is implicated in the silencing and delegitimation of migrant bodies in the Mediterranean, I want to spend a few moments laying out some conceptual contours for this new post-human visual regime.

The material agency of digital crisis maps

Maps are never value free but operate in historically situated fields of power that give them political efficacy and value (Blomley, 2003; Elden, 2010; Harley, 1989). As such they cannot be separated from the rules, tastes or technical abilities of societies that produce them, nor from the geo- and biopolitical effects they have when they are used (Bargues-Pedreny, 2019). Humanitarian maps are no exception in this regard. They may be presented as purely utilitarian, free from political or economic interests, but as Specht and Feigenbaum (2018, p. 1504) contend, whatever their political context, method or motif, humanitarian maps can never escape their embodiment in military technology, whose conventions of seeing are firmly rooted in practices of containment, persuasion and oppression that defined modern-colonial knowledge regimes. Therefore, humanitarian maps at best fail to represent the plurality and fluidity of emergent crises and at worst further malign the interests of security or humanitarian agencies. Specht and Feigenbaum's (2018) critique draws attention to the critical role of operational rationalities and infrastructural arrangements in the performativity of digital maps. Their reliance on satellite imagery, crowdsourcing volunteers and geographic information software (GIS) makes the mapping of crises and catastrophes dependent on platforms, filters and geocodes designed by non-local actors (i.e. international space agencies, commercial satellite operators or platform monopolies such as Google), all of whom bring their own terms and conditions to bear on what appears and what is written out of the map (Specht and Feigenbaum, 2018). Therefore, crisis maps operate in a long-standing tradition of scopic regimes that have successfully harnessed visuality for control and profit (Sheppard, 2015), embedding their utility within wider power differentials of political economy. And yet, following Sheppard (2015), while the impulse towards exerting visual power through the disciplinary and territorial deployment of maps may still resonate, the instantaneity of satellite imaging and ubiquitous earth observation has also added new layers of instability to mapping practices that come with their own flavour of objectification and immanence.

The seamless integration of real-time GIS with locative media and algorithmic computing has given way to a knowledge politics in which maps, as an 'external' cognitive artefact, connect human reasoning with computational methods such that inherited distinctions between time and space, observer and observed, map and territory, are becoming increasingly blurred (Brantner, 2018; see also Sutko and de Souza e Silva, 2011). Thus, the surface appearance of the world, to paraphrase Bargues-Pedreny (2019, p. 3899), no longer provides a stable referent for modelling space and topological relations, much less for identifying change and distributions across space and time. Social, political and economic processes are increasingly studied on the basis of data sources that are only

remotely connected to their underlying object, with the intention to reveal new patterns, tendencies and relations by selectively assembling previously unrelated data points (Amoore, 2011; Clough et al., 2015). Hence, digital maps, as Bargues-Pedreny (2019, p. 3895) writes, no longer intend to grasp the world as an object that can be held in place, claimed or governed. Instead, they are mapping specific aspects and correlations that can be flexibly reconfigured into infinitely variable descriptions of the world.

This inextricable entanglement of data, space and world introduces a whole new range of actors and agencies into the struggle over how to see where to situate the partiality of embodied perspectives, decentring the loci of power and accountability. This diffraction of visual agency becomes ever-more pertinent as artificial intelligence (AI) and machine vision are increasingly reconfiguring the world in their own image, independent of the preoccupations of human perception, aspirations and aims. They confront us with a kind of 'autonomous visuality' (Sheppard, 2015, p. 2), an active, non-localisable perceptual system that opens up new possibilities for the production of difference and the patterning of behaviours, while at the same time enrolling new political spaces of exclusion, delegitimation and erasure in geocoded space-times. These self-referential, generative capacities invest digital infrastructures with critical agentive possibilities that simultaneously enact and represent objects, designs, bodies and environments on the basis of values they themselves engender. That is, geographic coordinates and location tags but also demographic codes or ethnic and genetic markers, thereby converting bodies into material-semiotic nodes (Haraway, 1988, p. 595) that allow for the realignment of experiential surfaces along techno-political heuristics, such that logics of racialisation, dehumanisation and enclosure easily diffuse deep into the operational rationality of digital maps.

With this in mind, digital mapping technologies can be understood as powerful ontological machines, which variously position living and non-living forms in relation to their environment and other modes of being. Such positionings are not reducible to discourse and representation, but unfold as 'productive materialisations' (Clough et al., 2015, p. 157) of data relations that reconfigure and redraw the physical and the symbolic boundaries of objects, places and bodies in ways that hold their position within the normative registers of nature–culture, human–non-human distinctions in a state of continuous ontological uncertainty and flux. Such an approach demands to assess the normativity of digital maps across the full spectrum of materialities that constitute the 'facticity' of the body (Young, 2005, p. 16), including socio-economic and environmental conditions, as well as technoscientific, legal and political practices and arrangements, all of which sustain the dialectics of recognition through which digital maps produce their techno-existential effects.

The critical task for the remainder of this chapter will be to discuss how these non-linear transitions of the facticity of the body into and out of data affect the way dead and missing corpses become visible, readable and intelligible as subjects of legal and moral protection able to make their voice and presence count and heard.

The violence of non-identification

The recovery and forensic investigation of natural disaster victims and mass casualties has greatly benefited from advanced imaging technologies, such as panoramic cameras, ground-penetrating radars, surface laser scanners or photography in the near ultraviolet (UV) spectrum (Urbanováa et al., 2017). When combined with drones, underwater robotic devices or the real-time earth observation capacities of satellite systems, these tools can create a critical resource for the search and collection of drowned bodies from deep seas and other inaccessible terrains. The recovery operations after major crashes such as the 2009 Air France plane crash in the Atlantic or the Malaysian Airlines accident in the Indian Ocean in 2014 both involved the use of remotely operated vehicles (ROVs), equipped with colour video cameras and long-range sonar scanners, capable of detecting scavenged and decomposed corpses on seabeds that would be unsafe or unfeasible for humans to search (Ellinghama et al., 2017). Similarly, oceanographic forecast models can now be used to predict the resurfacing of drowned corpses that remained undetected during ROV missions. This requires combining weather data with forensic research about the main oceanic factors that lead sunken bodies to resurface from the sea (Ellinghama et al., 2017, p. 230).

Yet, none of these possibilities has so far been mobilised for the recovery of dead and missing corpses in the Mediterranean, bar three notable exceptions: the two shipwrecks off the coast of Lampedusa, Italy, on 3 and 11 October 2013, which left 639 people dead (Molinario, 2014), and mass casualties off the coast of Libya in April 2015, among whom 700 people died (Mediterranean Missing, 2016). In each instance big navy vessels with submarine robots were deployed to recover corpses lying 370 metres beneath the surface, which were then carried on land with large transport barges properly equipped with liquid nitrogen refrigeration systems. The total cost of this operation amounted to 9.5 million euros, paid for by the Italian government (Pinchi et al., 2017). The high death toll of these accidents drew a lot of media attention, which may explain why such exceptionally vast infrastructure resources were made available (Mediterranean Missing, 2016).

The cost involved in using high-end underwater equipment on a regular basis is certainly one reason why it is only mobilised in rare circumstances. And

yet, when compared with the overall budget made available for the surveillance infrastructure of Frontex, it becomes possible to see involvement of the wider political economy. The EU has earmarked a budget of 2.2 billion euros for the 2021–7 period, which will enable Frontex to hire 10,000 core operational staff and purchase its own equipment, such as vessels, surveillance drones and vehicles, available to be deployed at all times and for all necessary operations (European Commission, 2018). This is a major boost for the operational capacities of the agency that has so far relied on the support of air, sea and land assets volunteered by EU member states. Frontex currently commands a fleet of 22 ships, equipped with night-vision instruments and military radars, as well as medium-range, long-endurance drones, which stream real-time observational data to Frontex's central control room in Warsaw (Frontex, 2018). Additional surveillance capacities, such as satellite images, flow monitoring and big data mining instruments for predictive trend analyses, are made available through the European Space Agency (ESA) (ESA, 2017, 2018). Finally, the automated identification systems (AIS), used for commercial cargo tracking, are also an integral part of Frontex's situational awareness regime. These pervasive scopic possibilities are almost exclusively put in the service of securitisation, that is, for combatting 'criminal' activity and 'irregular' border crossings and not for identifying migrant vessels in distress or for recovering dead bodies lost at sea.

From the viewpoint of law enforcement this selective deployment of machine vision follows a strictly utilitarian logic. The dead are of no value for the purpose of border policing. They are no longer perceived as an acute threat, and hence there is little to gain from knowing how many people died and where or who they are. It is those who facilitate the journey – human smugglers and their middle men or possible survivors – who are of central concern. IOM, on the other hand, has put the use of state-of-the-art mapping technologies and big data at the centre of its mission to facilitate safe and humane migration by way of knowledge provision, humanitarian assistance and the coordination of international cooperation in migration management. The agency commands similar privileged access to the real-time flow monitoring and remote data-tracking capabilities of ESA. But it also maintains its own Global Migration Data Analysis Centre (GMDAC) that compiles all available information into two open data portals: the Migration Data Portal (GMDAC, 2019), dedicated to the mapping and analysis of general trends in global migration, and the Missing Migrant Project (IOM, 2019), which tracks the number of migrant fatalities around the world. Drawing on these rich data resources, IOM has produced a series of reports (Ardittis and Laczko, 2017; Brian and Laczko, 2016; Laczko et al., 2017) that highlight critical gaps and weaknesses in the current state of information about migrant fatalities, stressing in particular the lack of systematic data collection on the

dead and missing that would ensure the identification of nameless bodies and allow for their proper burial or return to their families. The reports also make practical suggestions for improvement. Most notably there is a global database for collecting and exchanging post- and ante-mortem data, including DNA samples and personal identifiable information such as body marks, clothes and personal items, to support migrant families searching for lost relatives. Yet up until this point IOM has not been able to secure the necessary funding for such a global exchange platform, nor has it been able to promote a steady and effective data exchange between its member states. Part of this has to do with IOM's weak institutional mandate, which severely limits the amount of pressure it can exert (Pécoud, 2018).

Unlike UNHCR, which operates on the basis of internationally recognised, humanitarian principles and laws such as the 1951 Geneva Convention, IOM cannot rely on a clear, internationally agreed political agenda to enforce policies, recommendations and demands (Pécoud, 2018, pp. 1626, 1632). This requires IOM to carefully balance its ambitions with the priorities and interests of national governments, on whose collaboration and financial support it depends (Andrijasevic and Walters, 2010; Geiger, 2018; Heller and Pécoud, 2018; Pécoud, 2018, p. 1627). A special issue in the *Journal of Ethnic and Migration Studies* (Pécoud, 2018) summarised IOM's ambivalent position as follows:

> It is an intergovernmental organization, but at times seems to function like a private company, while also competing with civil society groups and NGOs. Its focus is on migration, but it also performs other tasks that have little to do with migration (like rebuilding regions affected by natural disasters). It is called an organization for migration, but does much against migration, for example, by returning unwanted migrants to their country or preventing unauthorized migration. IOM appears as a loosely connected network of projects and field offices, addressing a heteroclite range of issues, and moving quickly from one to another, according to opportunities and circumstances.[2]

In my own interview with IOM, the project coordinator for the Missing Migrants Project readily admits that the organisation's efforts to improve the quality of data on dead and missing migrants are severely compromised by

2 UNHCR, by contrast, maintains a far more critical and distanced approach to states hosting or receiving migrants and refugees. It routinely blames European states for the securitisation and militarisation of its borders, drawing on its vast pool of data resources to highlight direct correlations between Europe's pushback policy, the criminalisation of civil society rescue missions and migrant deaths in the Mediterranean sea (UNHCR, 2018). IOM, by contrast, is far less forthcoming in critique of states for their negligence and violation of international law. For an in-depth critique of evaluation of IOM's global operations see the special issue of the *Journal of Ethnic and Migration Studies* (Pécoud, 2018).

the hesitancy of affected states to invest in the systematic documentation of migrant death. However, this reluctance is not only a lack of political will but also a shortage of financial resources and technical expertise. Stefanie Grant (2016, pp. 64–5), senior researcher on human rights of the dead, described the main factors preventing a proper information management of migrant deaths in no uncertain terms:

> Local and national death registration and identification systems are neither designed nor adequate for the particular challenges arising in the context of international migration. The magnitude of migrant movements across the Mediterranean has overwhelmed the capacity of European border-states such as Italy, Greece, Malta and Turkey to deal even with the basic tasks of death registration and the care of the dead.

The most pertinent problems in this regard are the lack of forensic expertise, insufficient morgue and cemetery space, inadequate procedures and lack of collaboration between local municipalities, police forces, international organisations and home states. Added to that is the profound lack of trust and the fear of migrant families to engage with state institutions and the police, which often prevents them from requesting or providing information about their relatives, even if a proper system was in place.

The combined impact of mistrust, lack of cooperation and conflicting political, financial and strategic priorities and potentials has resulted in a striking imbalance between the level of detail and amount of data made available through the interpellating gaze of securitisation and policing, and the quality and depth of knowledge generated through a careful examination of the individual migrant body, up to a point where these gaps and blind spots take on profound racialising and dehumanising effects in their own right. This structural impossibility for the experiential surface of the body to speak for itself not only disintegrates the dead into a scattered assemblage of data fragments, spread across legal, political and administrative registers, but it has left the migrant body by and large unreadable and unrecognisable as an historical subject and also as a subject of legal and moral protection and care.

Simone Brown (2009) coined the notion of 'digital epidermalisation' to describe the dehumanising effects of technologies that cast certain kinds of bodies outside the order of normalcy on the basis of calculations of the textures of the skin. Her work builds on the alienating effects of biometric devices, i.e. electronic finger printing, face-recognition software or iris scans, but the notion of digital epidermalisation equally applies to forensic data and crisis maps. Building on Fanon (1967), epidermalisation provides a way of thinking about the ontological insecurity of the racialised body as it experiences its 'being through others' (Brown, 2009, p. 133). Brown (2009) explains that this dissociation between self and world is experienced not least through the skin – a porous surface perceptive to touch. Calculating its texture into an

abstract matrix of plot points mapped against normative templates or grids conjures up a visual economy of recognition in which variously charged registers of alienation – race, gender, age, ethnicity, migration – can become the measuring stick for rendering some bodies as deviant or lacking, and hence to deny their social and political relevance. In Browns words (ibid.): 'The body is dissected, fixed, and woven out of a thousand details, anecdotes and stories, denied its specificity' and hence cast outside the political and symbolic order, the paradigmatic position of ontological insecurity (see also Fanon, 1967).

The selective reading of dead and missing migrants into and out of data, and indeed the refusal to verify their identity as such, can equally be read as an ontological displacement, albeit in the opposite direction. Here it is the refusal to make contact and to establish a connection with the experiential surface of skin, as embodied locality of the migrant's subjectivity, that becomes the point of dehumanisation and displacement. It reveals a new face of racialisation, subalternity and erasure peculiar to contemporary data regimes. It conjures up an arithmetic of skin in which certain deaths no longer register and that renders them outside of existence, or outside the spectrum of humanity.

This structural abandonment is not a systemic glitch nor is it reducible to inefficiency or lack of funds. It is integral to the biopolitical calculus of migration and the violence of the humanitarian border regime at large. It has locked dead and missing migrants into an ambivalent state of 'absent presences' that powerfully evokes Spivak's (2010) notion of the 'subaltern' – as the one placed outside the symbolic order – defined above all by its inability to speak on its own terms. Subalternity, it is worth remembering, is not an incapacity or impossibility to speak, but a *failure* of speech, the inability to register one's voice within the surplus of reason that always already laid out the terms and conditions of speech in advance (Sunder Rajan, 2010). Relayed back to the specific context of digital speech – by way of mapping and datafication – this denial of enunciation is not a function of discourse or targeted exclusions on the level of populism and ideology, but needs to be understood through the non-linear transitions of the facticity of the body into and out of data and the specificity of muteness and inaudibility this affords.

Conclusion

The proliferation of real-time mapping and surveillance technologies in the management of 'irregular' migration is indicative of the increasing securitisation of the Mediterranean, both as a political and humanitarian space but also as a moral location. It reflects a critical shift in the biopolitics of 'surplus populations' that calls long-standing ethical commitments and legal obligations into question, or renders them entirely obsolete. The criminalisation of NGOs that have rescued migrants in recent years has shown that the commitment to

indiscriminate search and rescue operations at sea can no longer be taken for granted, nor is the principle of unconditional assistance and non-refoulement of persons seeking asylum consistently met. This is even more surprising as digital mapping technologies have enhanced the possibilities for pre-emptive seeing and risk calculations to an unprecedented scope and scale. In this chapter I have tried to show how this political space of calculability silently inscribes the border deep into the operational logic and protocols of crisis mapping that delegitimises the muted migrant body as a subject of moral and legal protection and care. The strategic misrecognition is indicative for the new faces of subordination afforded by datafication. It has produced a new underclass of datafied subjects – digital subalterns – whose unreadability and inaudibility directly reflect their ambivalent legal and political standing within the humanitarian bordering regimes.

The problem cannot be resolved on the level of rights to datafication. Existing principles and frameworks in international humanitarian law, international human rights law, international criminal law and international maritime law all confer rights on the dead, in particular the right to be identified after death. None, though, refers specifically to the treatment of the dead in the context of irregular migration (Ampuero Villagran, 2018, p. 10; Grant, 2016, p. 1). This resulted in a highly uneven recognition of state responsibilities towards drowned and deceased corpses, enabling European governments to draw a clear distinction between citizens and non-citizens. Read in context with the historical power asymmetries and inequalities that continue to define the (post-)colonies of the South, one could say that the selective recognition of ethical and legal principles and obligations implicitly makes the figure of the citizen and by extension 'whiteness' and Europe as the invisible measuring stick to determine whose deaths matter and how they are made to count. In this regard, the systemic non-identification of migrant bodies can be read as the result of a double rejection and denial: as a rejection of the ethical and political responsibilities towards those who openly challenge and undermine the political authority of the border, but also as a denial of the material agency of the racialised Other to give testimony and speak their truths, on their own terms and on their own behalf.

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7. Now the totality maps us: mapping climate migration and surveilling movable borders in digital cartographies

Bogna M. Konior

> Prophecy now involves a geographical rather than a historical projection; it is space not time that hides consequences from us.
> (John Berger cited in Toscano and Kinkle, 2015, p. 87)

In 1998, when the United States had long secured its position as a global superpower and a leader in greenhouse gas emissions, soon to be presidential candidate Al Gore delivered a speech at the California Science Center. In it, he painted a bright image of a digital future, where all of the world's citizens could interact with a browsable, computer-generated, three-dimensional globe. Touching this 'digital earth' would activate geographically specific environmental and social information, allowing for a tactile relation to a planetary space that, if unmediated, would be too vast for humans to perceive. The Internet was to play a crucial part in this design, assuring that the project remained public and free. Gore (1998, p. 89) was dismayed that the vast amount of data collected by satellites had not been yet put to use:

> The Landsat satellite is capable of taking a complete photograph of the entire planet every two weeks, and it's been collecting data for more than 20 years. In spite of the great need for that information, the vast majority of those images have never fired a single neuron in a single human brain. Instead, they are stored in electronic silos of data. We used to have an agricultural policy where we stored grain in Midwestern silos and let it rot while millions of people starved to death. Now we have an insatiable hunger for knowledge. Yet a great deal of data remains unused.

In his address, Gore proposes that an increase in the collection of 'georeferenced' information would translate into the ability to conduct diplomacy in virtual reality, predict crime patterns with geographic information systems (GIS), preserve biodiversity, predict global rates of deforestation and other climate-related changes and increase agricultural productivity. Global climate change cooperation appears here as a problem that could be solved were the world sufficiently mapped with the latest digital tools. In the 20 years

since, the 'blue planet', beforehand perceived as the unquestionable common denominator that could transcend differences in social standing (Franke, 2013 p. 14), has become an icon of '[the] voracious promise of integration and cosmic naturalisation of capital' (Toscano and Kinkle, 2015 p. 35). The global economy has been entirely subordinated to the flows of finance: vast quantities of data, remotely collected by mobile sensors and monetised, became the seminal commodity of 'surveillance capitalism' (Zuboff, 2019). Just three years after Gore's optimistic speech, in reaction to the dotcom bust, Google's leaders embraced their current financial model reliant on increasing ad revenue. Combining their already vast computational power with unparalleled access to user logs, they were able to generate predictions of user behaviour and translate them into parameters of ad relevance. While surveillance capitalism was born in relation to advertising, ads no longer limit its scope. Governments, the military, non-governmental organisations (NGOs) and scientists seek access to complex predictive behavioural data traded on the 'behavioural future markets' (Zuboff, 2019, p. 45). Speculation on future behaviours, rather than scaring capital away, has become its feeding ground and its propelling machine. In a world where human behaviour is viewed as a free resource to exploit for profit, simulations and risk predictions are a gold mine. The territories of knowledge and information mapped by these markets provoke conflict. The watchers are 'invisible, unknown, and unaccountable' and the watched are mere sources of behavioural surplus fed into the predictive machine (Zuboff, 2019, p. 67). Watch or be watched. Map or be mapped (Paglen, 2008).

One of the fastest-growing data sets is predictive and concerns climate-induced migration. For a variety of environmental, economic, political and cultural reasons, 'the twenty-first century will be the century of the migrant' (Nail, 2015, p. 1). While the exact definition of a 'climate migrant' is still up for debate (Biermann and Boas, 2010, pp. 62–7), environmental change, the economy that triggered it and the related political turmoil provoke researchers to rethink the models of global governance. Whether this means 'create[ing] new institutions and governance mechanisms from scratch' (Biermann and Boas, 2010, p. 60) or speculating on ascending forms of transnational sovereignty (Wainwright and Mann, 2018), this challenge calls for a cognitive remodelling of our planet in a hitherto unprecedented manner, one that needs to bypass the borders drawn on traditional maps between sovereign states. Questions concerning our 'global commons' or 'natural resources' are increasingly important, while simultaneously, as Sussman (2012) identifies, we live in a post-global age, where the only things that slide with ease across national borders are ecological calamity and finance. With that said, the border has not receded from sight. To the contrary, new borders are erected on a planetary scale. In 2009, a team of 28 scientists led by Johan Rockström coined the

term 'planetary boundaries', which has subsequently become one of the most cited frameworks for thinking about global sustainability (Biermann, 2012; Hughes et al., 2013; O'Neill et al., 2018; Rockström et al., 2009; Steffen et al., 2015; Whiteman et al., 2013). The nine boundaries – atmospheric aerosol loading, nitrogen and phosphorus flows to the biosphere and oceans, land system change, freshwater consumption, ocean acidification, climate change, chemical pollution, biodiversity loss and stratospheric ozone depletion – call into place a cosmic spatiality constrained by uncrossable borders. As the planet is surveilled by the all-seeing eye of capital, border crossings become the key political problematic.

This chapter explores the connection between cartography and current mapping of climate migration. First it examines several existing representational maps and counter-maps that deal with the movable borders in the era of climate change, with the stipulation that these representational maps do not capture the essence of climate migration mapping. It subsequently proposes that the essence of climate migration mapping today is to be found within the infrastructure of satellite monitoring and security. This infrastructure, such as the European Union (EU) satellite monitoring project Copernicus discussed in this chapter, is built on the assumption that migration predictions immediately require an in-built early risk response system. In consequence, mapping, surveillance and simulation of political risk become indistinguishable, while the 'behavioural surplus' of actors in the global South is constantly mapped and analysed in order to 'secure' climate migrants before they are even tangibly brought into existence by environmental change. Herein lies the extension of colonial cartographies: just like colonisation requires the production of humans who need 'colonising', securitisation requires the production of humans who need 'securing' (Duffield and Waddell, 2006, p. 2). This demands a re-evaluation of what exactly 'cognitive mapping' (Jameson, 1990) should be in the times that humans are the ones being mapped rather than doing the mapping. Within the futurological prediction of climate-induced migration patterns, surveillance mapping does not restrict itself to space but encompasses 'space-time' and the future itself becomes a commodity.

Maps of the Anthropocene

Even a seemingly straightforward projection of a curved surface on to a two-dimensional plane is no simple matter of collecting and communicating information (Harley, 1989). Maps make choices about how they reflect the world (see Pickles, 2004; Wood, 1992). Most famously, the Mercator projection, created in 1569 and still used today, situates the United Kingdom as the centre of the world and distorts the size of continents, asserting the West's

imperial position (Harpold, 1999). Today, Google generates contradictory maps, taking into account political conflicts (Ribeiro, 2009). Much has been written about the relationship between cartography and colonialism, where the map, rather than representing, created the territory that it sketched (Specht and Feigenbaum, 2018; Stone, 1988). Do maps 'find the world or [do they] make it up?' (Specht, 2018, p. 1). The partition of Africa by the colonisers between 1881 and 1914 is a prominent example of the latter. The map, based on the imperative of political economies, can summon the territory into existence: 'The territory no longer precedes the map, nor does it survive it', but rather, 'space is constituted through mapping practices, among many others, so that maps are not a reflection of the world, but a recreation of it, mapping activates the territory' (Kitchin et al., 2011, pp. 2, 6). France, Britain and Germany saw in Africa a market that could generate massive trade surplus by buying more than it sold, providing free natural resources and free slave labour.

This overlap between colonial gaze and capitalist imperatives has been explored by numerous critics (Blaser, 2019; Friedmann, 2005; Larrain, 2013; Mbembe, 2003) and kept alive not only by those who, like Zuboff (2019), want to understand political mutations of technological and financial infrastructures, but also by a growing number of interdisciplinary scholars clustered around the term 'the Anthropocene' (Haraway, 2015; Mirzoeff, 2014; Moore, 2014; Todd, 2015). The designation has become increasingly popular as a way of pointing out that many 'natural' transgressions follow the spatial development of industrial capitalism and colonial history. First coined by the Dutch chemist Paul J. Crutzen and ecologist Eugene Stoermer in 2000 (Crutzen and Stoermer, 2000), the term 'Anthropocene' gained currency in 2007, when paleobiologist and stratigrapher Jan Zalasiewicz requested that the Geological Society of London's Stratigraphy Commission review the case for a new geological epoch to replace the currently prevailing Holocene. It has since been hotly debated. Proposed starting dates include the invention of agriculture 8,000 years ago, the invention of the steam engine, the Great Acceleration and the bombing of Hiroshima and Nagasaki (Davis and Turpin, 2015). Recently, however, Simon Lewis and Mark Maslin (2015) suggested that the Anthropocene is an extension of colonial imperialism, slavery and the fossil fuel trade, dating it back to the 1610 'golden spike' in the geological record. The spike indicates that humans had made an irreversible change to the planet's biochemistry in consequence of the global slave trade and the intercontinental transport of animals, plants, as well as microbial life forms across the Atlantic Ocean. Lewis and Maslin (2015) argue that the death of 50 million Native Americans and the resulting loss of agriculture as well as subsequent forest regrowth altered the concentration of carbon dioxide in the atmosphere.

There has been no shortage of computer-generated maps, crafted alongside the aesthetics of classical cartography, which aim to measure up to the reality of the Anthropocene and climate change as one of its defining parameters. Esri, the international supplier of geodata, GIS and web GIS, currently valued at over a billion USD, has recently debuted the Anthropocene Atlas, developed by the Wildlife Conservation Society. The website includes several interactive maps ordered around themes such as population density or the rise of megacities (Esri, n.d.). The website GIS Geography[1] has compiled a list of maps, including the Earth Climate Change Global Map by the National Aeronautics and Space Administration (NASA), the Surging Sea Map by Climate Central, the Four-Degree Interactive Map by the Met Office and the Sea Level Map by the National Geographic, which are primarily concerned with registering or even 'proving' the effects of climate change. While some scholars praise GIS as a possible counter-mapping tool (Kwan, 2012), it has also been the subject of intense critical scrutiny, focused either on its political implications for different social groups (Burrough and Frank, 1996; Obermeyer, 1998; Winter, 2001) or its (in)ability to represent local and contextual knowledge (Aitken, 2002; Elwood, 2001; Ghose, 2001; Sieber, 2000). The obvious thing to point out about the aforementioned maps is that they attempt to register the pace of changes in the biosphere without acknowledging the uneven social conditions that produce them. They implicate humanity equally, an approach that has been consistently criticised for neglecting the specific history of the Anthropocene and its roots in colonial and imperialist economies (Biermann et al., 2016; Cuomo, 2017; Grusin, 2017). Presumably intending to address this problem, CarbonMap.org is an interactive map where countries are resized based on their (past, current and predicted) extractions, emissions, fuel burning and consumption of the resulting goods. These interactive cartograms (maps distorted to reflect a data set) were developed by an independent data visualisation company for the World Bank's Apps for Climate Change competition. While they attempt to link social and geographical conditions, the limitation is that the cartograms remain organised around nation states. It could be more informative to distribute the data by class – a small group of the super-wealthy are responsible for the lion's share of global carbon emissions (Klein, 2015). Aware of this uneven social and industrial history, the *Atlas for the End of the World* (World Maps, n.d.) proposes an 'ecological cartography' as a counter-mapping practice organised around biodiversity themes such as land degradation, health of waters or deforestation. These maps, all accessible via a dedicated website, are accompanied by ambitious educational essays that relate current ecological predicaments to social history. Optimistically, however, the authors propose that the problem of distortion and the resulting power dynamics of exclusion

1 See https://gisgeography.com.

in two-dimensional maps will 'largely absolve itself [due to] global positioning systems (GPS), remote sensing and real-time visualizations with the increasing ability to cheaply stream data to personal computers' (World Maps, n.d.). They also argue that the key element of ecological cartography is embracing this process, eventually creating an atlas that would be a 'web-based platform that tracks the evolution of the hotspots, if not all of the world's 867 ecoregions in real time' (World Maps, n.d.). These maps can be understood as counter-maps – their purpose is to destabilise or question dominant representations and open up the possibility of mapping the world differently (Nash, 1994; Sparke, 1998). And yet, as if following Gore's vision, they understand their own maps as sketches for the coming integrated real-time flow of ecological cartography, implying that the objective recording of data is able to correct imbalances of power inherent in the subjective selection and organisation of information in two-dimensional maps.

But does this comprehensive recording and processing of data resolve the problem of power inherent in mapping? The answer seems to lie beyond investigating specific representations made through maps. In an age where both visibility and invisibility can do equal harm, maps also exert power by withholding information. Architect, theorist and head of the Forensic Architecture research group at the University of London, Eyal Weizman (Weizman et al., 2014, p 72) notes that power lies also in the choice of what to 'un-show':

> The resolution of commercially available satellite imagery of the kind we see in newspapers, such as suspected nuclear sites in Iran or destroyed villages in Darfur or Gaza, are limited to a resolution of half a metre per pixel, which means the size of a pixel is exactly the size, or the box, in which a human body fits. Within that logic of visibility, there is also a structured, built-in lacuna: the loss of the figure, or the human.

New media call for a re-evaluation of the relationship between technology and space. Geography's recent communicational turn (Falkheimer and Jansson, 2006) considers, for example, how mediation produces new spatial narratives or how media infrastructures are distributed spatially (Adams, 2011), as if directly responding to some of the most influential work in media studies, from Marshall McLuhan's (1964, p. 5) electronically constructed 'global village' to Henry Jenkins's (2004) 'convergence culture', where media are compressed within everyday spaces. Critical geographical research also considers how 'smart' technologies such as real-time spatial search apps produce rather than represent the territory. For example, whole working-class neighbourhoods can be excluded from the economic map of the city by not being sufficiently reviewed and promoted on Yelp (Frith, 2017). The current 'spatial turn' in media studies is increasingly preoccupied with infrastructure (e.g. Bratton, 2016; Starosielski,

2015) or with analysing how mediation influences how people interact with places (Wiley and Packer, 2010). The focus increasingly shifts from examining how humans represent the world *through* maps to how the world, that is, our 'accidental [technological] megastructure' (Bratton, 2016, p. 31), *maps humans*. Jennifer Gabrys (2014), for example, describes how in the smart city, humans are not only constantly mapped by machines but themselves become sensors that, continually monitoring themselves, produce behavioural surplus that the machines can analyse and optimise. In some cases, the question then becomes not how to have the mapping machines map us better, but whether machines should map us at all.

This brings to mind Fredric Jameson's famous if underdeveloped framework of cognitive mapping. In *Cartographies of the Absolute: An Aesthetics of the Economy for the Twenty-First Century*, Alberto Toscano and Jeff Kinkle (2015, p. 73) attempt to map the invisible economies of capitalism, arguing after Jameson that 'cognitive mapping cannot involve anything so easy as a map'. To drive this point home, in his seminal work on the cultural logic of capitalism, Jameson (1991, p. 409) writes that 'once you knew what *cognitive mapping* was driving at, you were to dismiss all figures of maps and mapping from your mind and try to imagine something else'. This is because, as Jason Farman (2015, p. 89) puts it, 'maps tend to obscure their own authorship to deliver their content, thus seeming to create the interface (and its politics) entirely. As a result, the networks of circulation that allow maps to arrive are often obscured'. Instead, cognitive mapping describes for Jameson (1991, p. 415) aesthetic practices that can grasp the relation between the element and the system, specifically, 'the Imaginary representation of the subject's relationship to his or her real conditions of existence'. In simpler terms, it gestures at the relation between our individual understanding of the world and the totality of economic relations at a specific time in history. In even simpler terms, aesthetics that hint at the totality known as capitalism, or the totality of class relations, are doing the work of cognitive mapping. The problem of cognitive mapping bestows a task upon culture. Capitalism, Jameson (1991) argues, is essentially an alienating relation to space and it consequently makes it impossible for our psychogeography to align with the physical spaces that we inhabit. While 'space' is for those living under capitalism a scrambled and incoherent territory, aesthetics alone have the power of hinting at the totality behind disjointed elements.

In light of current Anthropocene research, we could speculate whether climate change is a totality separate from capitalism and therefore requires its own type of cognitive mapping or whether mapping capitalism and mapping climate change are, in fact, the same process. Dipesh Chakrabarty (2009, pp. 219, 221) argues, for example, that while 'the story of capital, the contingent

history of our falling into the Anthropocene, cannot be denied by recourse to the idea of species', while at the same time asserting that nevertheless 'the whole [ecological] crisis cannot be reduced to a story of capitalism'. Against scholars who argue that the Anthropocene is simply a decoy that diverts attention from the fact that capitalism had been the problem all along (Malm and Hornborg, 2014; Moore, 2017), Chakrabarty (2009, 2017) insists that humanity must develop an understanding of itself as a species, a task that invalidates many of the current 'humanist' axioms of historical understanding that aid us in understanding humanity as social, rather than geological.

Perhaps an interactive, GIS-based installation project such as Italian Limes could be cognitively mapping the movable border within this new social-geological dynamic in the Anthropocene (Italian Limes, n.d.). Part of the 2016 exhibition 'Reset Modernity!' curated by Bruno Latour, the project explores remote Alpine regions, where national borders between Austria and Italy morph due to melting glaciers and global warming. It advances a new media cartography that does not result in a traditional map. In the spring of 2016, the team led by researchers from the Comitato Glaciologico Italiano, the National Institute of Oceanography and of Experimental Geophysics and the Department of Physics and Earth Sciences at the University of Parma installed a series of autonomic devices at the foot of Mt Similaun. The sensors allowed them to track the changes in the tridimensional geometry of the glacier in consequence of melting ice. The project's website (Italian Limes, 2016) states:

> Since 2014, Italian Limes has aimed to monitor the shifts in the Austrian–Italian watershed on the Alps as an inquiry into the relation of borders and their representation. International borders have become one of the most reported topics on public media. In Europe, a network of apparently dormant 19th-century frontiers woke up from the dream of a borderless continent and materialised into a 21st-century psychosis of police checks, barbed wire fences, migrant encampments, proxy sovereignties and displaced jurisdictions. Almost completely exiled into the map, borders have claimed back their mark on the territory, wielded by governments as the ultimate defence for the continuance of the nation state.

The installation is based around an interactive real-time representation of shifts in the border, continually measured by a grid of 25 solar-powered sensors, which record change every two hours. This is an automated form of counter-mapping that allows us to grasp the relation between the geological and the social. The border has been considerably altered between the 18th and 20th centuries, chiefly in consequences of the two World Wars, provoking the development of ever-more accurate border mapping tools, beginning with aerial surveys in the 1920s, to trigonometric networks, and finally GPS (Italian Limes, n.d.). Concurrently, Alpine glaciers have been melting at an accelerated rate, eventually provoking adjustment in the social definition of the border.

In a 2006 agreement between Italy and Austria, the legal term 'moving border' was introduced and alongside it the necessity of constant monitoring of the shifting border and the updating of state maps. The 'maps' that Italian Limes creates are not projections onto a two-dimensional plane but rather a projection-mapped three-dimensional reproduction of the glacier and an automated 'drawing machine', a programmed pantograph that translates the real-time changes into coordinated drawings. Is this a type of cognitive mapping or maybe, still, '[culture] conflates ontology with geography and endlessly processes images of the unmappable system [of global capitalism]? (Jameson, 1995, p. 4).

Perhaps because the idea of cognitive mapping dates back to the 1990s, Toscano and Kinkle (2015) focus on novels, photography, films, posters and – most interestingly – architecture. After Jameson, Toscano and Kinkle (2015, p. 44) argue in favour of making the invisible visible: 'forcing into being a certain kind of political visibility' as a form of counter-mapping. They see in aesthetics, and especially in visual culture, an opportunity of grasping the totality of capitalism and therefore *acting* on the totality of capitalism. Is this not, however, similar to Gore's imperative that more data means better action, more knowledge means a better world? Gary Marx (2016) sees in this the implicit fallacy of surveillance capitalism – 'some information is good, more information is even better'. If capitalism 'represents' itself in the activity of extracting data, perhaps cognitive mapping is not necessarily an aesthetic project anymore? In *The Geopolitical Aesthetic: Cinema and Space in the World System*, Jameson writes (1995, p. 10) that postmodern capitalism is 'inconceivable without the computerized media which eclipses its former spaces and faxes an unheard of simultaneity across its branches'. Technology thus seems to at least provide the opportunity for representing the unrepresentable. But in the current economy, as Hito Steyerl (2012) argues, we are *already* 'represented to pieces'. So is the planet – the business of climate data and geodata visualisation is booming. Does the problem really lie in the fact that we cannot sufficiently represent the totality of climate change and capitalism? Do we possess insufficient visualisation tools? Are our mapping technologies not sophisticated or accessible enough?

If the method of surveillance technology is multiplying visibility, making everyone hypervisible and therefore easy to track, prepped for the harvesting of biodata, should we maybe consider withdrawing from mapping altogether? While Jameson's (1991, p. 36) statement that technology 'seems to offer some privileged representational shorthand for grasping a network of power and control' remains relevant, in the context of new media, it is important to remember that Jameson (1990) understands representation as *figuration*, and that he understands ideology, after Althusser, as an *apparatus.* We do

not need, therefore, to restrict ourselves to analysing and producing visual representations but to pay attention to the specific figurations made through the material apparatus. In other terms, Toscano and Kinkle (2015, p. 450) write perceptively that commanding maps result not from a 'representation of logistics' but from the 'logistics of representation' – it is not (only) about what is in the images but about the forces that produce the images and act on them. This again directs our attention to infrastructures that map rather than the maps themselves. Cognitive mapping is no longer humans trying to map totality. It is the totality mapping us.

Totality maps us: surveilling climate migration

While the map of Africa created by the colonisers – and its continued reflection in the existing geopolitical reality – was a blatant visual proof of economic power, surveillance capitalism does not expose its own logic in the same way. Nevertheless, Zuboff (2019) draws an explicit connection between colonialism and the current form of capitalism. Both define something that had previously not been a commodity as *free* or as a *surplus*, whether that is land, water, human behaviours, humans themselves or their cognitive processes: 'For today's owners of surveillance capital the experiential realities of bodies, thoughts and feelings are as virgin and blameless as nature's once-plentiful meadows, rivers, oceans and forests before they fell to the market dynamic [under colonialism]' (Naughton and Zuboff, 2019, para. 28). The term 'digital native', Zuboff notes, is cruelly appropriate (Naughton and Zuboff, 2019).

The terms 'environmental refugee' and 'climate migrant' date back to the 1980s, when the possibility was first suggested (El-Hinnawi, 1985; Myers 1986, 1989). Shortly after, the alarmist discourse, based mainly in the United States, of catastrophic 'waves of environmental refugees' (Homer-Dixon, 1991, p. 7), 'the coming anarchy' (Kaplan, 1994) and the 200 million-strong 'environmental exodus' (Myers and Kent, 1995) began to take hold. A decade later, mainstream news and pop culture caught on. In 2004, Hollywood debuted its disaster blockbuster *The Day After Tomorrow*; the *Guardian* ran the heading 'Now the Pentagon Tells Bush: Climate Change Will Destroy Us' (Townsend and Harris, 2004); and David King, chief scientific advisor to the UK government, stated that climate change represented 'a far greater threat to the world's stability than international terrorism' (cited in Brown and Oliver, 2004, para. 13). In 2007, when Al Gore received the Nobel Peace Prize for his work on climate change, the connection between preventing climate migration and the preservation of peace was solidified. No wonder, then, that the most impactful (policy-wise) research related to climate migration right now is in security studies (Baldwin et al., 2014). Climate migration is there envisioned as a security threat to Europe, the United States and Australia before it ever happened. While climate migration

has been called 'the human face of global warming', images of projected migrants have been criticised as predictable extensions of colonial rhetoric. Numerous studies focus on analysing the dehumanising visual representations of refugees as a threatening mass of bodies or as racialised, docile victims of global warming (Bleiker et al., 2013; Methmann, 2014; Methmann and Rothe, 2014). The global North feels threatened by migrants and by the instability that they are thought to carry within. However, there exists no clearly delineated group of climate migrants. Terms such as 'migrant' and 'refugee' are already contentious in their misuse and embodiment of existing resettlement policy (Biermann and Boas, 2010). Clearly discerning environmental causes for individual migrations becomes increasingly difficult as 'climate refugees' can reject being labelled as such (Farbotko and Lazrus, 2011).

A recent *New Yorker* article paints regions that are exposed to extreme weather events, sea level rise, drought and water scarcity, especially sub-Saharan Africa, South Asia and Latin America, as the dangerous three migration 'hot spots' because they represent 55 per cent of the 'developing world's populations' (Kormann, 2018). However, Miami, Houston, Tokyo, New Orleans, Hong Kong, New York and Amsterdam are also at high risk of flooding and yet the alarmist narrative rarely revolves around the inhabitants of these cities needing resettlement. They are instead commonly portrayed as citizen-saviours that need to fight against global warming (Baldwin, 2012), while the racialised migrants are envisioned as 'an object of governance', inherently troubling and in need of control, living on the 'ground zero of global warming' (Methmann, 2014, p. 425). While wealthy countries of the North may protect a share of their citizens through 'adaptation measures such as reinforced coastal protection or changes in agricultural production and water supply management', it is predicted that those living in poorer countries might need to rely on international support or will have no choice but to migrate (Biermann and Boas, 2010, p. 61). Long-term predictions are potentially catastrophic (Biermann and Boas, 2010, p. 69):

> According to a number of studies, a temperature increase of 3–4 degrees centigrade could lead in the worst-case scenario (high population level and low economic growth) to 302 million people flooded each year by storm surges by the 2080s, assuming evolving protection mechanisms. However, this would be only 34 million assuming enhanced protection, and even lower if lower temperature targets could be maintained. More than 90 per cent of these affected people will be from Africa and Asia.

At the same time, some studies predict that most citizens will choose to stay in their countries and migrate locally rather than internationally (Clark, 2007; German Advisory Council on Global Change, 2006); 'many assessments directly link predictions about changes in environmental parameters with the migration of the current or predicted population living in the affected areas … it is merely assumed that [all] these people will decide to flee' (Biermann and

Boas, 2010, pp. 67–8). The discursive, imagined climate migration is epic in scale. For now, it remains a 'futurology', a speculative possibility (Baldwin et al., 2014). Both the news headlines and the security software that is increasingly targeted at migrants are 'written in a future-conditional tense' (Baldwin et al., 2014, p. 121). Not to neglect the real dangers of climate-induced uprooting, the mapping of 'hot spot' regions is inherently asymmetrical.

Let's take the EU Copernicus programme, a system created for earth observation and monitoring, as an example. Consisting of satellites and *in situ* sensors, it focuses on six main areas: land, marine, atmosphere, climate change, emergency management and security, and is handled, among numerous other national bodies, by the German Federal Agency for Cartography and Geodesy (Wiatr et al., 2016). The data are freely available and Copernicus encourages their use by public, private and research institutions. At the same time, two modules on security and early warning are built in. Drawing on satellite and ground station data, it not only collects information about climate change but measures population pressures, chiefly in African countries. These tools already factor in an emergency response. Environmental monitoring intersects with border control and maritime surveillance; in fact, Copernicus contributes to the European Border Surveillance System by tracking border areas. As Iraklis Oikonomou (2017, p. 1) writes, the EU's flagship space projects, Copernicus and Galileo, 'are characterised by an element of politico-military sensitivity due to non-civilian applications that both projects involve'. He urges us to consider that satellite monitoring is currently 'planned, organised and funded by industrial actors whose primary motive is the maximization of profitability', thus echoing Zuboff's argument about 'future behaviour markets' that surveillance capitalism produces (Oikonomou, 2017, p. 2). The EU promotes and popularises its space programmes through a security and common benefit rhetoric: 'Space assets and offered services are today indispensable enablers for a wide spectrum of applications to answer societal challenges in fields such as climate change and environment, transport, development and competitiveness in Europe and beyond' (European Security Research and Innovation Forum, 2009, p. 166). However, while the official policy reports clearly indicate that the programmes fuel military needs and stakeholder interests, the popular rhetorical impulse is to present them as public, civilian research projects (Oikonomou, 2017, pp. 3–5). Through such coaxing, a symbiosis between the public and the military becomes naturalised (Marx, 2016) as public and private interest are presented as interchangeable (Dwyer, 2016).

These predictive mapping tools are at the same time the tools of implementation – the presupposed climate migrants are controlled, both in their bodily movements as in the images that the media create of them. An existing migrant can be tracked from point A to B by existing state surveillance tools,

but a 'climate migrant', not in existence yet, summoned to presumed existence by yet-unknown catastrophes, has to be mapped by predictive surveillance. The explosion of a climate catastrophe is a projection-*as*-implementation tool that legitimises the tightening grip of security technologies along the existing axis of power. Such mapping extends the 'view from above', or what Michel de Certeau (1984, p. 92) describes as 'looking down like a god', into a pre-emptive strike, where the world, seen from above by military and information industries, is chiefly a safety problem (Steyerl, 2011). For Zuboff (2019), knowledge and information created through surveillance are thus the main territories of power and contestation. Felix Stalder (2018, p. 336) adds that predictions that emerge as a result of such surveillance are a type of magical knowledge – the prediction itself can never be verified because it has already been acted on and therefore the reality submitted to the prediction has already been altered:

> Outside of rapidly shrinking domains of specialized or everyday knowledge, it is becoming increasingly difficult to gain an overview of the world without mechanisms that pre-sort it. Users are only able to evaluate search results pragmatically; that is, in light of whether or not they are helpful in solving a concrete problem. In this regard, it is not paramount that they find the best solution or the correct answer but rather one that is available and sufficient. This reality lends an enormous amount of influence to the institutions and processes that provide the solutions and answers.

In the futurology of climate migration mapping, time itself becomes a weapon. Monitoring tools are spells that call into being what they want to prevent. This is meltdown culture, the volume of data analysis tools and thermal-imaging cameras rising as ice glaciers are melting. Even though climate change is our ongoing, mundane reality, the discourse narrates a coming great disaster, barren lands, starvation and thirst. Surveillance, which touches not just specific information anymore but 'life in general' (Lyon, 2010, p. 327), grasps it an eschatology. Within an increasingly mediated experience that we have of the world, incomprehensible climate narratives, despite their scientific reality, migrate to the realm of what previously might have been called the fictional, the simulated or the otherwise designed (Jasanoff, 2010). While we can observe changes in weather, we cannot observe climate change within the bounds of human perception. We know about climate change through a cluster of statements, headlines on the news and other attempts to make vast data sets understandable. Essentially, as far as our experience is concerned, climate change is statistics and simulations. This would mean that speculation and prediction is very much 'the real' today. The maps of climate migration might be speculative but this does not mean that they are not real. In fact, they are so real that they become reality.

This finally returns us to the question of Jameson's cognitive mapping and his assertion that each historical stage of capitalism generates a space unique to it following the 'quantum leaps in the enlargement of capital in the latter's penetration and colonization of hitherto uncommodified areas' (Jameson, 1990, p. 348). As Daniel de Zeeuw (2011, para. 5) summarises:

> Jameson traces the need for cognitive mapping back to the historical moment when a gap was first produced between the 'existential data' and empirical position of the individual observer and the unlived and abstract socio-economic or geographical system in which it is embedded. This moment largely coincides with the invention of technical mediators for colonial sea trade, whose function it is to coordinate the individual's existential data and the geographic totality (for example: the compass and the [sextant]).

If the tools of surveillance capitalism colonise and commodify futures, mapping is a question of space-time rather than just 'space'. While humans increasingly need to be secured and locked within delineated borders, both on a national and a planetary scale, capital flows freely and the 'escape velocity [that it generates] turns [all of] us into deportees of a new kind' (Virilio, 2010, p. 13). Paul Virilio (2010) writes about the current space of capital as the space of 'geocide', delineated by the creation of zones of free capital through which humans constantly move, continually inserted and expelled, no longer simply restricted in movement but forced into the logistics of behavioural commodity extraction. The surveillance apparatus stratifies, the conditions of uneven access it creates foreclose not only information but the future itself. Integrated with the commercial aspects of the futurology of surveillance and security, digital cartographies hail from the future, retroactively creating the territories that they map.

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8. The rise of the citizen data scientist

Aleš Završnik and Pika Šarf

In surveillance capitalism (Zuboff, 2015), surveillance is often monetised to the detriment of the masses in order to benefit the few and exacerbate existing inequalities. Digital forms of surveillance are part of our everyday life and we cannot opt out of them easily as surveillance has become ingrained in smart cities, automated mobility and e-government services, in work places and consumption routines, in payment systems and entertainment. Since the world of massive information infrastructure underpins all social processes, it is impossible to escape the surveillance gaze. The economic rationale of 'digitising in order to increase efficiency' is being progressively enforced on a legal basis, for instance when attempts to avoid facial recognition technology in public space by covering one's face is legally labelled 'disorderly behaviour' (Malik, 2019). This represents a fundamental turn from 'innocent until proven guilty' as avoidance of surveillance itself becomes a transgressive act.

The use of surveillance technologies to reverse the surveillance gaze has gained certain traction in theorising 'the gaze from below'. Authors have made significant contributions to the other side of surveillance and the potential thereof by attempting to answer a number of quintessential questions: How can individual autonomy and dignity, fairness and due process, community cooperation, empowerment and social equality benefit from surveillance? What are the ways in which those who are subject to surveillance manage, negotiate and resist the spread of surveillance? The 'new surveillance' (as defined by Garry Marx, 2002) is forming complex networks of power relations and resistances (Green, 1999). Objects of surveillance have become empowered agents, not the passive and powerless parties they used to be (Ball and Webster, 2003). They are growing into active entities that reflect on surveillance practices and try to escape and avoid them or draw public attention to illegitimate, discriminatory or otherwise unfair practices. Resistance and counter-measures were labelled and conceived very differently in the literature, for example, as 'counter-surveillance' (Monahan, 2006), 'surveillance and empowerment' (Monahan et al., 2010), 'inverse surveillance', 'sous-veillance' (Mann et al., 2002) and the 'hijacking' of surveillance (Koskela, 2006, 2009). Mann et al. (2002) deem 'sous-veillance' to occur when objects of surveillance use

oppressive tools against the oppressors themselves. According to Monahan (2006), 'counter-surveillance' as a form of tactical interference often results in surveillance technologies working against themselves, in order to redress institutional power asymmetries.

The assessments of the power of the 'gaze from below' have been mixed: Andrejevic (2007) wrote about 'lateral surveillance' in his seminal book *iSpy* and claims that the use of surveillance technologies replicates the underlying logic of the 'all-seeing' or 'sensor' society and produces a flood of images that the information technology (IT) industry encourages. The trend of peer-monitoring networks has amplified and replicated the power of government or corporate surveillance in a climate of perceived risk and savvy scepticism (Andrejevic, 2005). On the other hand, lateral surveillance can have an empowering potential. Koskela (2006), for example, claims that interactive webcams and citycams, whose detailed real-time streaming video is used to a promote space, have empowering roles.

The development of information and communications technology (ICT) coupled with the rise of big data and algorithms brought the promise of unprecedented citizen empowerment through both active engagement as well as passive oversight of the governance of the state. The new technologies were supposed to return power to those to whom it belongs in a democratic society – the citizens (Gigler and Bailur, 2014). However, reality has failed to live up to that promise as it is becoming increasingly clear that the mere application of new technologically supported tools does not stimulate citizen engagement by itself, at least not in all parts of the society (at the same time). The digital divide between the underprivileged members of society – whether individuals, groups or entire countries – that do not have access to computers and consequently the Internet, and the wealthier, privileged members that fully enjoy the opportunities ICT offers has been widely discussed (Compaine, 2001; Norris, 2001; van Dijk, 2006; Warschauer, 2004). The emergence of big data and artificial intelligence (AI) has created a further divide among the technological 'haves' as only a fraction of those with access to computers also have access to databases, processing power and storage, on the one hand, and the knowledge and expertise to put them to use, on the other. This has created a new class described as 'big data rich' (as distinct from 'big data poor') (Boyd and Crawford, 2012), which has monopolised these powerful tools for decision-making and prediction to the detriment of the majority of the population. The statement of Google executive and Egyptian activist Wael Ghonim in the aftermath of the Egyptian revolution that, 'If you want to liberate a society, just give them the Internet', no longer holds true, as regular citizens cannot comprehend the sheer amount of data it now provides (Rao, 2011).

As the trend towards the paradigm of 'open data' gains traction, it becomes necessary to ask how much emancipatory potential this paradigm actually carries. Since the public sector generates a large amount of data, an important prerequisite to bridging the existing data divide is the availability of open data, that is (governmental) data that anybody can access, use and share. Numerous stakeholders on both national (data.gov, data.gov.uk, govdata.de, dati.gov.it, podatki.gov.si) and international levels (EU Open Data Portal, UNdata, World Bank Open Data) have in recent years made their data sets freely available online with the aim of ensuring public transparency and accountability, stimulating democracy and citizen participation and improving public sector efficiency.

It is not enough that the data are only available; they also need to be meaningfully organised and presented in order to encourage citizen participation. In this process of extracting meaning for various social ends, infomediaries (i.e. third parties that analyse and visualise open data made available by the government) are becoming more important than individuals who usually have neither the knowledge nor the capabilities to transform the 'raw' data into understandable and socially meaningful actionable information that produces knowledge. Mayer-Schönberger and Zappia (2011) illustratively ask whether we 'will see the rise of a new caste of intermediaries that hold the key to making sense of the seas of data now accessible'. Infomediaries are gaining power over the data and the way in which they visualise, map and present them to citizens may shape the way they perceive them. The question then is how much power 'the new caste' absorbs and whether the new 'citizen data scientist tools' (CDSTs) can democratise surveillance capitalism.

In 'Four Critiques of Open Data Initiatives', Kitchin (2013) concludes that 'we lack detailed case studies of open data projects in action, the assemblages surrounding and shaping them, and the messy, contingent and relational ways in which they unfold'. This chapter provides an informative analysis of specific CDSTs in a specific post-socialist country. The open data initiatives that have triggered the rise of the citizen data scientist (with the exception of Zlovenija, which uses Facebook users' posts) have much to offer, but we ask *who* possesses the data, *what ends* their analysis and visualisations serve and *who* is empowered by them.

In this chapter we present several CDSTs used in social practice in Slovenia and evaluate them according to common criteria: the type of tool (e.g. non-governmental organisation (NGO) based, state based, intended for the implementation of an international initiative); who or what are the targets and end goals of the tool; datafication intensity (the use and reuse of data, what the data sources of the given tool are); the type of resistance (the force of the tool, ranging from passive avoidance to active subversion); and

the empowerment dimension (who is empowered). The concluding section provides an analysis from a more nuanced perspective of the empowerment of CDSTs. Methodologically, the chapter is based on a review of many more CDSTs than presented herein and that are up and running in Slovenia and beyond, but we decided to narrow our focus to locally informed CDSTs in order to reveal context-specific uses of data and their potential to empower users. The findings from the review were double-checked and substantiated in semi-structured interviews conducted with the anonymous author of Zlovenija and with Matej Kovačič, one of the designers of Supervizor (subsequently Erar), the head of analytics and information security at the Commission for the Prevention of Corruption of the Republic of Slovenia (CPC) at the time the tool was set up.

Case studies of CDSTs

Erar: monitoring public spending

In 2011 the CPC started a project named (in translation) Transparency, of which Erar,[1] an online application for monitoring the expenses of public bodies, is an important part. The rationale behind the tool is that the transparency of financial flows between the public and private sectors increases the level of responsibility of public office holders for effective and efficient use of public funds, facilitates debate on adopted and planned investments and projects, decreases the risk of illicit management and abuse of office and above all limits systemic corruption, unfair competition and clientage in public procurement procedures (Kovačič, 2016). Erar's predecessor, Supervizor (Supervisor), was awarded a 'United Nations Public Service Award' in 2013.

The online application enables simple browsing through the financial transactions of public sector bodies, government spending and a graphical presentation thereof. Users can view all monetary transfers from a selected budget user, for example an agency or public primary school, or even all money transfers from a budget user to a selected company. Data can also be presented for a specified period of time. The application also shows data about public procurements and business entities in Slovenia along with their management and ownership structure and information from their annual reports. An important part of the application is a subsection that presents a list of publicly owned companies and information about them (see Figures 8.1 and 8.2).

1 Initially called Supervizor, see https://erar.si.

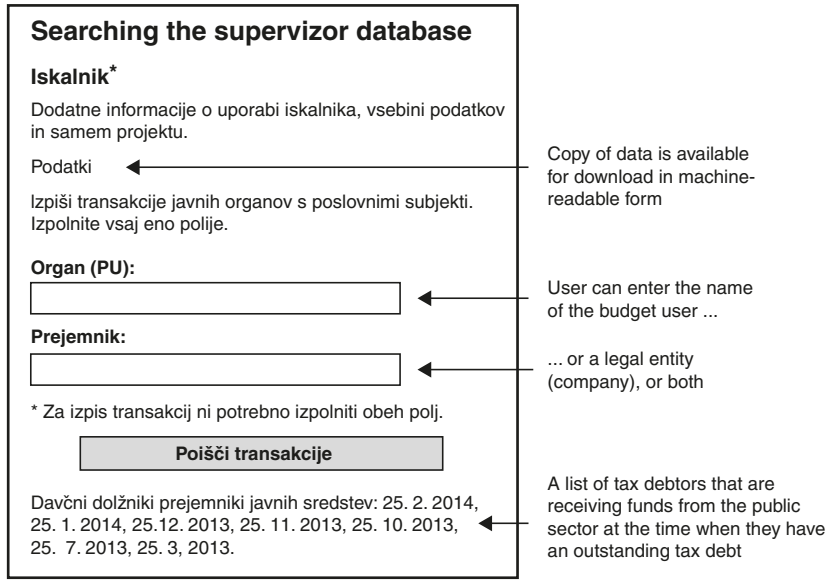

Figure 8.1. Supervizor search engine (Kovačič, 2016).

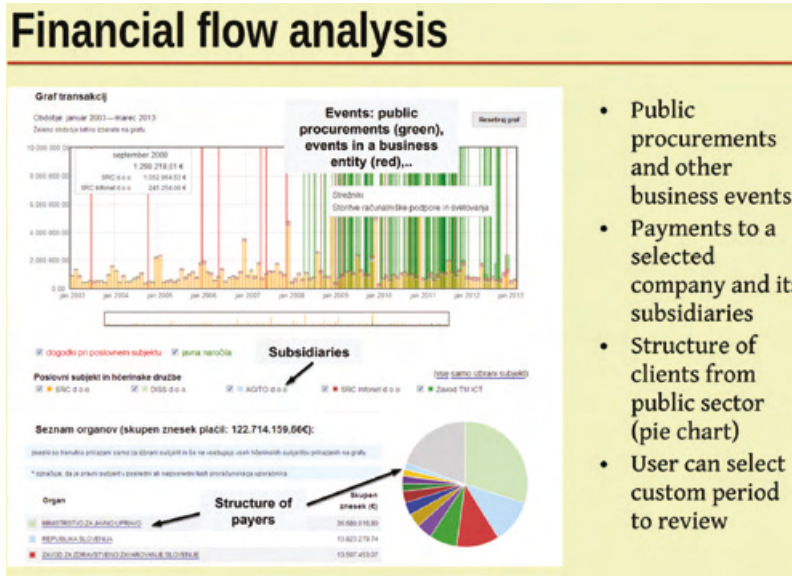

Figure 8.2. Financial flow analysis of public spending enabled by Erar (Kovačič, 2016).

About data sets

Several authorities provide nine types of 'open-data' data sets, on which the application is based:

1. The Public Payments Administration (PPA) provides payment services to direct and indirect budget users. Erar includes PPA data on the financial transactions of budget users from 1 January 2003 onwards.
2. AJPES (the Agency of the Republic of Slovenia for Public Legal Records and Related Services) provides:
   (a) ePRS Slovenian Business Register – the central public database on all business and legal entities, their subsidiaries and other organisations' units located in Slovenia (public and private institutes);
   (b) eRTR – the register of legal entities' bank accounts; and
   (c) JOLP – the public posting of annual reports, enabling users to review annual reports submitted to AJPES.
3. Data from the Central Securities Clearing Corporation on securities.
4. The Register of Taxpayers.
5. The Register of Budget Users (RPU).
6. Data comes from the database of public procurements, including low-value procurements (published on the public procurement portal).
7. The accounting entries of payments to direct budget users from the MFERAC (Ministrstvo za finance enotno računovodstvo (Ministry of Finance Unified Accounting)) database maintained by the Slovenian Ministry of Finance (from 1 January 2003).
8. Data on tax debtors (published online by the Tax Administration of Republic of Slovenia).
9. Data on financial transfers to so-called favourable tax environments ('tax havens'), published online by the Office for Money Laundering Prevention.

Some types of data are not incorporated in the application, such as transactions where the purpose is the payment of a union membership or transactions made by intelligence agencies.

Use cases

Erar can be used for several investigative purposes and – despite being the tool of a government agency – it has contributed to the substantial public and political outrage since its inception. At the municipal level, the use of the tool has enabled the discovery of several misappropriations made by accountants in municipalities. At the state level, other agencies such as tax authorities have admitted that the tool has enabled them to perform investigations more effectively. It has also helped trigger government change.

In 2013 the CPC issued a report with the claim that a 'strain of corruption risk' existed within the sphere of the then prime minister Janez Janša. By using the Supervizor tool and merging data, the Commission identified the prime minister's significant wealth of unexplainable origin, which led three coalition partners to leave the government. A majority of the members of the parliament then passed a vote of no confidence and the government was subsequently dismissed on 27 February 2013. The collapse of the government was not a consequence of a criminal conviction, or sole use of the Supervizor tool. Rather, it was a result of the new idea taken up by the CPC leadership, with Goran Klemenčič as president of the CPC, that public data should be more extensively correlated in order to prevent corruption among the highest public officials. Moreover, the tool triggered direct changes at the ministry level. When in 2015 Supervizor published data on budgetary payments to individuals that were paid in addition to their salaries, it revealed that relatively large amounts were paid to the elite of the higher education system. In 11 years, more than 1 billion euros of budgetary funds were spent on such additional payments to the educational elite, representing more than one-tenth of Slovenia's annual budget. The then minister of education, science and sport, Stanka Setnikar Cankar, was forced to resign as it was revealed that as the former dean of the Faculty of Administration of the University of Ljubljana, she earned on average EUR 4,000 per month in addition to her salary, totalling EUR 636,000 in 11 years. However, the legal battle between her and the CPC due to irregularities concerning the publication of the data resulting in a violation of her privacy rights is not yet finished.

The Erar tool enables the detection of direct violations of restrictions on business activities due to a conflict of interest (Article 35 of the Integrity and Prevention of Corruption Act 2010). Such a conflict exists when a public sector body or organization that is obliged to conduct a public procurement procedure in accordance with the regulations or that carries out a procedure for granting a concession or other form of public–private partnership (such as ordering goods, services or construction work), enters into a public–private partnership or grants a special or exclusive right to an entity due to specific personal ties. The prohibition enters into effect when a public official or a family member thereof participates as a manager, member of management or legal representative in the company at issue, or has more than a 5 per cent level of participation in the founder's rights, management or capital. Contracts awarded in breach of Article 35 are void. Public bodies have to report potential restrictions of the business activities of their office holders by means of an online form within one month of assuming office and no later than eight days after any change thereto.

When it entered into operation, Erar enabled the swift detection of violations of restrictions of business activities as links were established between the database of restrictions of activities and the database of payments from public bodies (in order to detect prohibited business activities) and the

Slovenian Business Registry (in order to detect which officials should have reported business restrictions but failed to do so). Kovačič (2016) compiled a list of suspected violations of restrictions on business activities in 2012 and showed that violations took place in 68 cases (429 contracts) and the total value of illicit business amounted to EUR 1,436,208.28. The CPC repeated the analysis and no violations were found a year later (Kovačič, 2016).

Another use of Erar is to compare the public procurement success of companies in periods with different governments: Is there a link between individual governments and the disbursement of funds to particular companies? Or, to put it differently, are companies significantly more successful in public procurement procedures during a particular government, and vice versa? Kovačič (2016) showed that there are significant differences not only in the success of particular companies, but also with regard to particularly vulnerable sectors. ICT companies providing equipment to public authorities multiply their profits under one government while their business comes to a halt altogether when the government changes (see Figures 8.3 and 8.4). Such high inflexibility of the market was established especially regarding ICT services, pharmaceutical products and construction work. Some companies are highly dependent on financial transfers from direct budget users as they receive a great amount of their income only from budget users, which constitutes a noticeable risk of corruption (Kovačič, 2016).

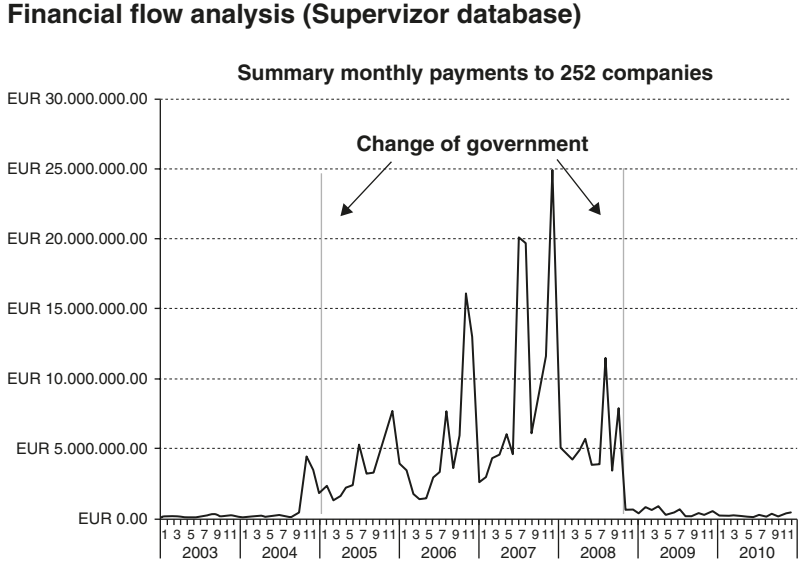

Figure 8.3. Financial flow analysis in relation to the change of government (Kovačič, 2016).

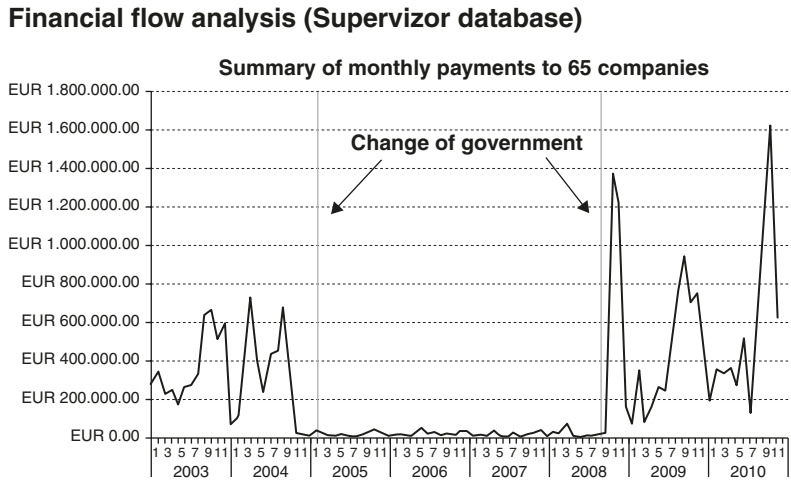

Figure 8.4. Financial flow analysis in relation to the change of government (Kovačič, 2016).

Who Influences? (Kdo vpliva?): monitoring lobbying

The platform Who Influences?[2] was devised to provide insight into lobbying processes in Slovenia through visualisations of two different kinds of networks: (1) the network of contacts between private enterprises and their lobbyists, on one hand, and politicians, political parties and governmental institutions, on the other; and (2) the network of transactions between companies in which lobbyists are legal representatives. The online visualisation shows a network of interconnected dots of various sizes, in which every dot represents either a lobbyist, an organisation or a company, a lobbied institution (e.g. the Government of the Republic of Slovenia, a ministry, the National Assembly or a local community) or an individual decision-maker. The size of the dot increases with more lobbying contacts – the more active a participant is, the bigger the dot becomes. Clicking on a dot provides the user with further information about the time, location and purpose of the lobbying activity and organisations that have established connections with a particular decision-maker (see Figure 8.5).

The platform Who Influences? is based on publicly available data on lobbyists and lobbying activity that have to be reported to the CPC on the basis of the Integrity and Prevention of Corruption Act. Consequently, its quality and accuracy depend entirely on self-reported data, which in the case of some ministries and municipalities is lacking or even completely non-existent. It is possible that some areas of government are not interesting for

2 Slov.: 'Kdo vpliva?', see https://www.kdovpliva.si.

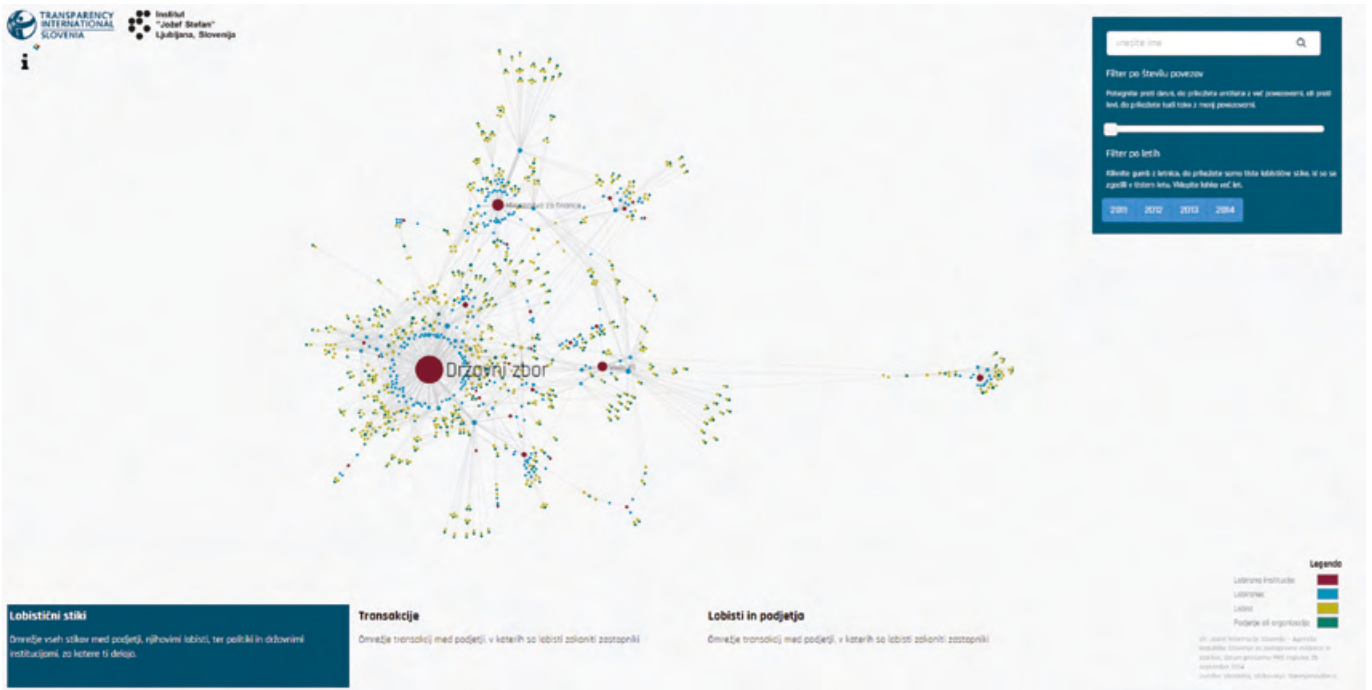

Figure 8.5. Who Influences? Visualisation of the network of lobbying contacts (Kdo vpliva? (https://www.kdovpliva.si, accessed 15 July 2019).

lobbyists at all; however, it is far more likely that some partakers fail to comply with the requirements of the law and do not report lobbying activities to the Commission.

Parlameter: monitoring parliamentary activities

Parlameter is a parliamentary informatics tool that 'facilitates monitoring of the National Assembly's working process through an analysis of voting and transcripts'.[3] Similar digital visualisation tools have been developed to provide parliamentary oversight in numerous countries worldwide as well as on the international level (e.g. Vote Watch Europe monitors the activity of the European Parliament). Parlameter therefore follows the growing trend in parliamentary monitoring known as 'parliamentary informatics', that is, the application of ICT to monitor parliamentary work and legislative procedure. A recent study showed that among 191 parliamentary monitoring organisations (PMOs) monitoring more than 80 parliamentary bodies, including national parliaments, sub-national parliaments and international legislative bodies such as the European Parliament and the General Assembly of the United Nations, approximately 40 per cent use parliamentary informatics and in most cases ICT technology is employed to provide a user-friendly visualisation tool (Mandelbaum, 2011).

Parlameter provides a user-friendly instrument for exploring the legislative procedure by searching for information about: (1) individual members of the National Assembly (hereafter MPs (Members of Parliament)); (2) the political parties represented in the National Assembly; (3) plenary and extraordinary sessions of the National Assembly; and (4) legislative proposals. First, Parlameter enables monitoring of individual MPs, a feature it shares with a majority of other PMOs, since it promotes accountability and more effective public scrutiny (Granickas, 2013; Mandelbaum, 2011). Apart from MPs' demographic data (age, education, previous employment, number of terms of office, party affiliation) and links to their social media sites, Parlameter also provides indicators of MPs' (in)activity in the legislative procedure, for example MPs' attendance records, committee memberships and the number of parliamentary questions posed and speeches given per parliamentary session. Users may also view how each MP has voted on a particular legislative proposal, while comparison tools enable users to easily identify MPs with similar or different voting preferences. Additionally, Parlameter analyses parliamentary discourse, which significantly distinguishes it from other PMO tools. It does not just facilitate access to MPs' speeches during both plenary and committee sessions, but it identifies the words most commonly used by a particular MP

3 The name of the tool is a wordplay on a measuring device for length (Slov.: meter) and the common name of Slovenia's National Assembly (Parliament). See https://parlameter.si.

and positions him or her according to the diversity of his vocabulary used in parliamentary discourse. The tool also conducts a stylistic analysis of the language used in parliamentary discourse by measuring three features: the use of euphemisms, colloquialisms and stylistically marked words.

Second, Parlameter provides a very similar set of information on the political parties represented in the National Assembly: general information about the party (the leader of the parliamentary group and his or her deputy, the list of elected MPs); the voting records of the parliamentary group; the number of parliamentary questions posed and proposed amendments; and an analysis of parliamentary discourse, including transcripts of all speeches, the most commonly used words, the diversity of language and a stylistic analysis.

Third, the subsection on the legislative process provides information about proposals that went through the legislative procedure, which is accompanied by a short summary, voting on amendments and the legislative proposal as a whole and the current status of the proposal (adopted, rejected or still in the legislative procedure).

Additionally, Parlameter provides a variety of tools: 'Parliamentary Compass', which positions all MPs in a two-dimensional virtual space based on their compatibility of views (MPs with similar views are placed closer together); 'Groups of Words' shows how often an MP or a party mentions a particular word or group of words during the sessions of the National Assembly; and 'Parlameter Notifications' sends a notification to users via email when a selected word is used in the National Assembly. Parlameter's newest feature is 'Commentality', a tool designed to measure public opinion by sending feedback, similar to liking on social media sites, regarding statements referring to legislative proposals (see Figure 8.6). Its aim is to keep the audience engaged without enabling users to comment on a particular proposal (Commentality, 2019).

To sum up, Parlameter is primarily a convenient tool for researchers and journalists, but at the same time its goal is more far-reaching: it pursues the aim of making the legislative procedure of the National Assembly more transparent, accessible and therefore understandable to the general public (Gligorović, 2016). When Parlameter was introduced in December 2016, the president of the National Assembly, Milan Brglez, noted that 'more intensive and user-friendly familiarisation with the work of the National Assembly is a necessary prerequisite for a better understanding of its work … Such tools enable inclusive democratic oversight and present the potential for more diverse and intense political participation' (cited in Gligorović, 2016).

Although information on the working process of the Slovenian National Assembly is publicly available on its official website, it is published in a form that is difficult for a regular user to effectively use, which severely complicates or even undermines parliamentary monitoring by civil society. Parlameter, on the other hand, provides information in an accessible, understandable and

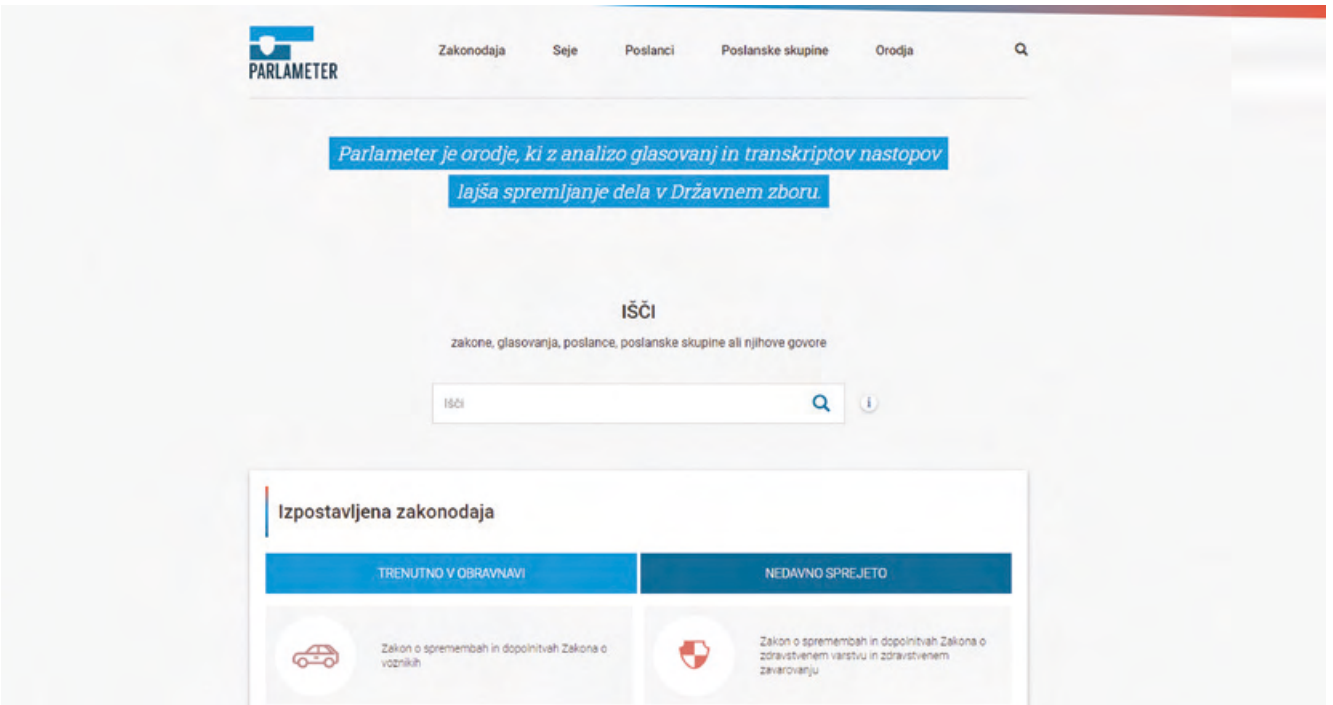

Figure 8.6. Parlameter search engine (https://parlameter.si, accessed 15 July 2019).

searchable format. It is the new infomediary for extracting meaning from data for the wider public.

Legislative Activity Violation Counter

The Resolution on Legislative Regulation (2009) establishes principles regarding the legislative procedure, guidelines for the assessment of the effects of new laws and guidelines for consultations with relevant stakeholders in the course of preparing legislative proposals. The Resolution targets members of the National Assembly and seeks to increase the overall quality of legislation. Inter alia, the Resolution also determines minimum standards for consultations with the public by establishing a minimum threshold for consultations ranging from 30 to 60 days.

In order to test the effectiveness of the Resolution, the national NGO umbrella network Centre for Information Service, Co-Operation and Development of NGOs (CNVOS) designed the Legislative Activity Violation Counter (CNVOS, n. d.) to measure how often the Resolution's public consultation provisions are violated. The Counter (see Figure 8.7) covers all the regulations for which the Resolution determines a minimum period of public consultation and all other acts for which such consultation is envisaged by the Rules of Procedure of the Government of the Republic of Slovenia.

The Counter's website collects data on the total number of violations and presents these by individual ministry, with an indication of the names of the regulations for which the prescribed minimum period for public consultation was not observed and the number of deviations. The website also shows a list of proposed regulations with an unspecified deadline for the submission of comments and those proposed regulations without any invitation to submit comments where a draft regulation was simply published on the website of a ministry.

Žvižgač.si: the Slovenian whistle-blower portal

'Žvižgač'[4] is an online portal that enables users to submit public interest information anonymously and safely, without fear of being exposed to their family, friends, employers and the media. Since in most countries (including Slovenia) whistle-blower protection is still not regulated legislatively, individuals that decide to speak up and expose corruption, fraud or other cases of misconduct risk numerous negative consequences, including public humiliation fear of retaliation, job loss or even criminal prosecution. Protection of their identity is at this point the only way to avoid undesirable negative impacts due to whistle-blowing. With this aim in mind, various open-source software applications have been developed since around 2018, for example,

4 Translated as 'whistle-blower' in English, see https://zvizgac.si.

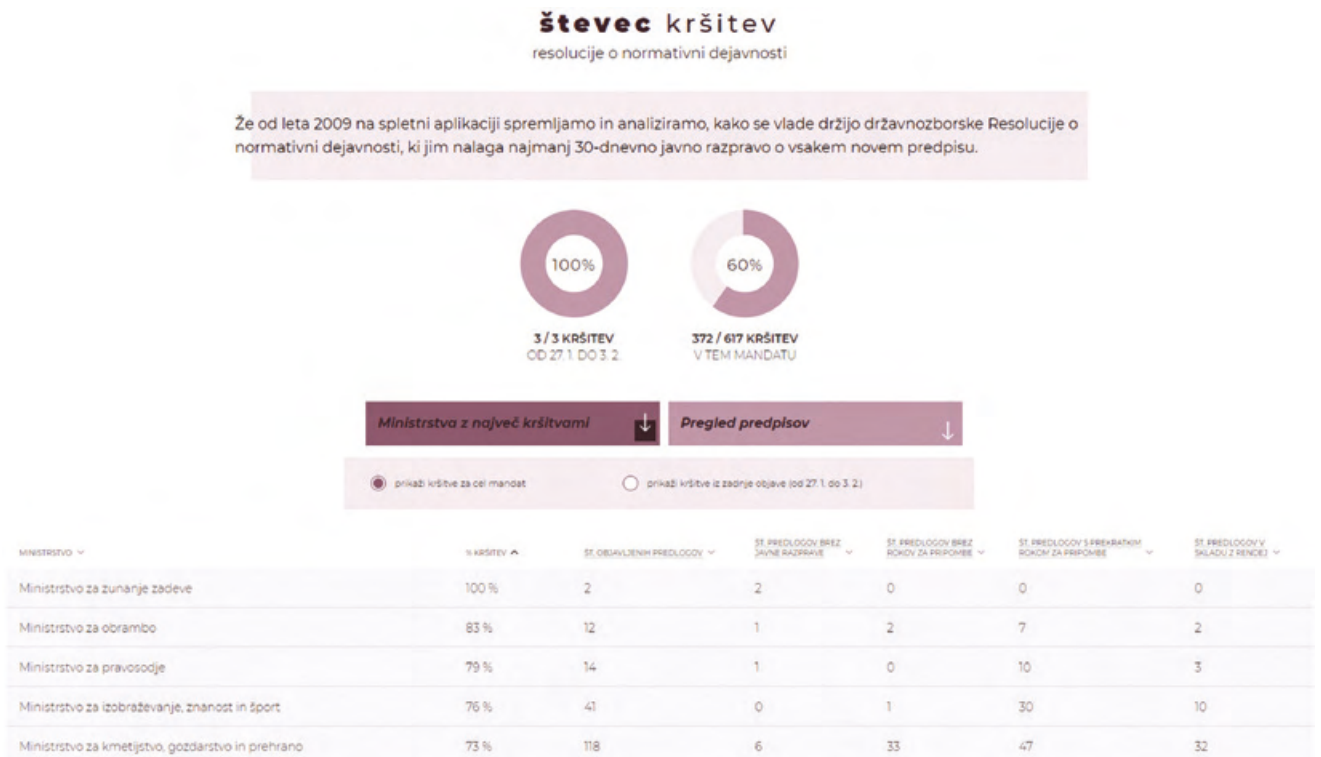

Figure 8.7. Legislative Activity Violation Counter (https://www.cnvos.si/stevec-krsitev, accessed 15 July 2019).

GlobaLeaks, AdLeaks and SecureDrop. Žvižgač is based on the latter, which was created by Aaron Schwarz and has now been adopted by established international media (e.g. Forbes, the *Guardian*, *Financial Times*, *New York Times*).[5] Before being disclosed to the wider public, all information and tip-offs transmitted to the portal are independently verified and assessed as to whether the publication is in the public interest (Žvižgač, 2019). Potential whistle-blowers may also find useful tips on how to use Tor software or how to legally safeguard their position on the Žvižgač website, for which it provides a comprehensive tool for informing and combatting corruption or similar illegal or undesirable practices.

iSee: paths of least surveillance

iSee is a web-based and wireless application based on a database updated in real time that allows any user to programme urban routes with the smallest exposure to surveillance cameras (IAA, n.d.). Developed by the Institute for Applied Autonomy (IAA), iSee charts the locations of closed-circuit television (CCTV) surveillance cameras in Ljubljana, Slovenia (as well as in New York and Amsterdam, the Netherlands) in order for users to find routes devoid of public space surveillance or with the least surveillance. The programme uses starting and destination points and calculates the shortest distance without (or with the fewest) security cameras (see Figure 8.8).

The idea behind iSee, as explained by its designers, is as follows:

> Given heightened awareness of public safety and increased demand for greater security in the face of the growing threat of terrorist violence, projects that undermine systems of social control may seem to some viewers to be in poor taste. It is the Institute for Applied Autonomy's position that such times all the more strongly call for precisely these kinds of projects. (IAA, 2004)

While the aim of the application is not to directly interfere with the surveillance apparatus of cities, the project was launched in the aftermath of the September 11 attacks and was extremely pertinent as to raising awareness of the increasing overreaction of security apparatuses around the globe.

Mapping the public space without surveillance was a realistic and practical alternative in the early 2000s in Ljubljana, but with the proliferation of the monitoring of public space in the 2010s, when the number of cameras skyrocketed,[6] it has become impossible to avoid the prying eyes of CCTV cameras and users can now only find routes with the shortest distance and the fewest security cameras.

5 See https://securedrop.org.
6 On CCTV in Slovenia see Završnik (2014).

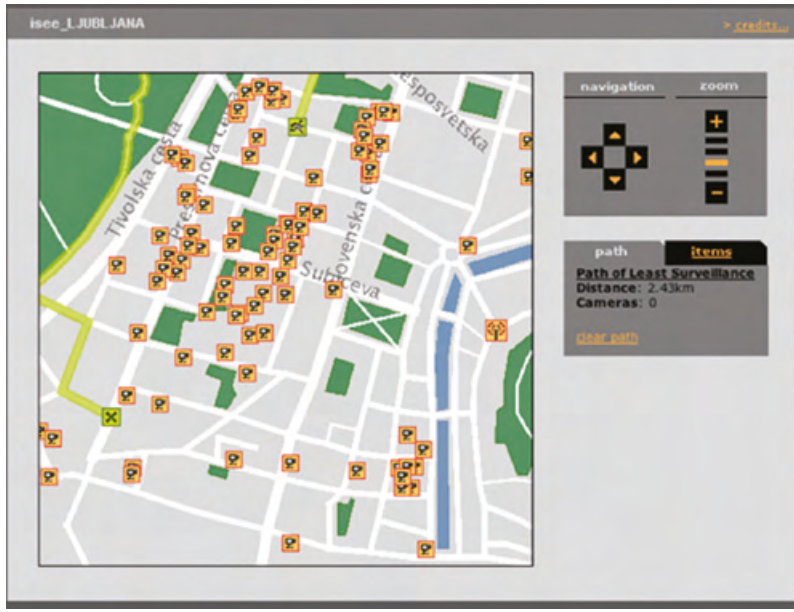

Figure 8.8. Map of Ljubljana with the locations of the CCTV cameras (iSee project).

The iSee project triggers pertinent question related to 'renegotiating the limits of private and public domains' (Nakashima et al., 2010, p. 295). The proliferation of surveillance of public space with CCTV cameras (increasingly augmented with gunshot detection systems, or face, gate and other similar biometric recognition systems) triggers a dilemma associated with the traditional view that a person cannot reasonably expect privacy in public space. iSee reflects discomfort with blurring the lines of anonymity in public space in a similar vein as mosaic theory. The latter builds on the insight that when combined with other data, information about a person becomes much more telling and suggests that an expectation of privacy exists (or at least should exist) even in public space, due to the way people live their lives in the digital age (Završnik and Križnar, 2018). While not radical in its approach – compared to other projects that aim at destroying cameras[7] – the project nevertheless renders visible the larger pattern of surveillance proliferation and calls into question its purpose, agenda and effects (Monahan, 2006).

7 See, for example, Stallwood (2013).

Redaar: traffic-ticket monitoring

The traffic-ticket monitoring mobile app Redaar, freely available at GooglePlay, maps past infractions and helps drivers avoid parking in locations where and at times when they are more likely to be ticketed. Slightly fewer than a million traffic violations occurred between the beginning of 2012 and September 2014. Given that there are 1,300,000 registered vehicles and 1,400,000 active driving licences in Slovenia, this is a relatively high number (Plahuta, 2015). The great majority of the traffic violations were parking and toll tickets, which shows how they have become a major source of revenue for municipalities.

The idea of the app is to simultaneously monitor minor offence authority activities and empower users to escape enforcement for parking violations. Drivers can set the app to show the following issued traffic citations: parking, speeding, driving while using a mobile phone, ignoring safety belt laws, unpaid tolls, driving under the influence (DUI) and traffic accidents (Virostatiq, 2015). The app, created by data scientist Marko Plahuta, is based on the analysis and visualisation of two years of traffic violations data. Data sources were obtained from: the traffic warden service in Ljubljana; the national police; the Motorway Company of the Republic of Slovenia (DARS d.d.), which manages state roads; the public undertaking 'Ljubljanska parkirišča', which manages car parks in the capital; and the local traffic warden services of several Slovenian towns. Given the temporal data for each issued ticket, the app shows on which streets drivers are more likely to be ticketed in the morning, at midday or in the evening (see Figure 8.9).

Similar applications for mapping traffic violations are focused on crowdsourced speed-camera alerts (e.g. in the Slovenian context, 'BrezKazni.si' and 'Radarji in Hitrostne kamere', available at GooglePlay). For instance, the speed-camera mobile app Traffic Light Cameras (designed by bigDream) maps fixed and mobile speed cameras and includes extensive country-specific information on fines for speeding.

'Zlovenija': policing 'from below' or vigilantism?

Zlovenija[8] was a response of civil society to the hatred directed at migrants in public posts on Facebook that emerged at the peak of the migrant crisis in 2015. The idea was simple: the most brutal, extreme, outrageous, vile comments posted on Facebook were exposed on a Tumblr page and supplemented with the name and enlarged profile picture of the person posting them. The authors of Facebook comments could request the removal of the post if they deleted the original comment and apologised. The apologies subsequently replaced reposted

8 The title Zlovenija is a wordplay on the country's name Slovenia (Slov.: Slovenija) and the Slovenian word for evil 'zlo', combining the two in one word, so-called 'Evil-venia'.

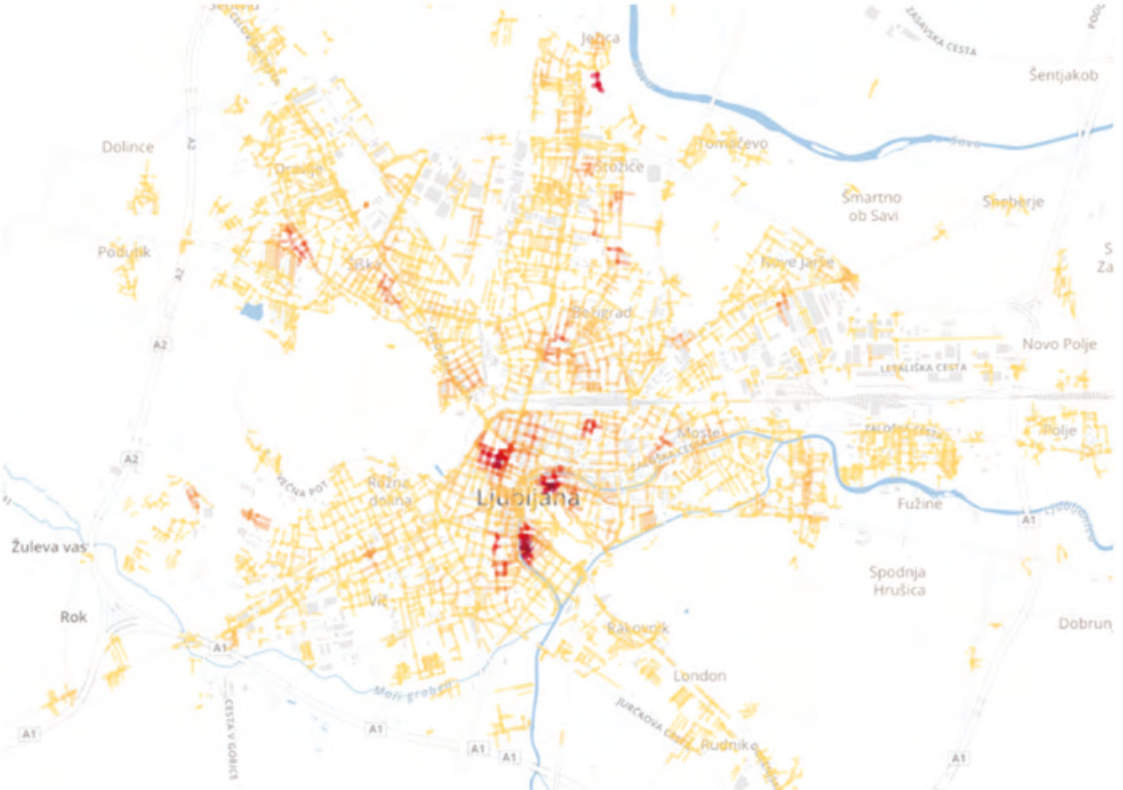

Figure 8.9. Map of Ljubljana marking the frequency of traffic ticketing (Redaar, http://virostatiq.com/slovenija/prometni-prekrski-2012–2014/index-en.html, accessed 15 July 2019).

Facebook posts on Zlovenija. Tumblr is a visual microblogging website that is easy to use and crowdsource new content, thus it provided a perfect platform for displaying the faces of hatred to the widest audience possible (Oblak Črnič, 2017). This initiative, which started as a spontaneous response to the hatred infecting the country, became a powerful tool in the hands of civil society in a matter of just two weeks (Interview with Zlovenija, 2018). What was at first just an overlooked Tumblr page became a pillory with the mission of initiating discussion on the issue of hate speech, reminding people that the Internet is a public space and that words have meaning and consequences, holding up a mirror to society and condemning all intolerance and violence (Zlovenija, 2015). Zlovenija triggered mixed responses. On the one hand, a part of the general public agreed with and even admired the objectives Zlovenija was trying to achieve. On the other hand, it was condemned for being too extreme, no better than what it was trying to expose, and comments often raised questions as to both its legality and legitimacy.

The T-shirt in Figure 8.10 reads (in translation): 'Run. Do good', followed by a comment stating: 'On to trains. That is, freight trains and directly to Dachau' (referring to the concentration camp Dachau) (Zlovenija, 2015).

Zlovenija differentiates from the other visualisation tools mentioned since it was created by civil society not to monitor those in power, but to expose immoral (if not illegal) acts of members of society. Therefore, it cannot be understood as a form of either sous-veillance or counter-surveillance, but rather as an act of digital vigilantism, a practice described by Trottier (2017, p. 56) as 'a process where citizens are collectively offended by other citizen activity, and respond through coordinated retaliation on digital media'. However, the phenomenon of Zlovenija shares numerous characteristics with sous-veillance techniques as they (1) use the technology to hold up a mirror to society; (2) put an empowerment tool in the hands of civil society enabling active participation; and (3) endanger the right to privacy of the exposed individuals. All of the above-described sous-veillance tools are based on publicly available data (open data) provided by the government. In the same vein, all posts published on Zlovenija were taken from publicly available ('open') profiles on Facebook, regarding which one cannot reasonably expect privacy.[9] The method Zlovenija used nevertheless seems more severe, since it exposed ordinary individuals, not public figures (see Table 8.1).

9 Under Facebook's 'Statement of Rights and Responsibilities', when publishing content or information using the public setting, 'you are allowing everyone, including people off of Facebook, to access and use that information, and to associate it with you (i.e. your name and profile picture)' (Facebook, 2018).

Figure 8.10. Example of a post on Zlovenija: enlarged Facebook profile picture accompanied by a hateful comment expressed by that particular individual (Zlovenija, 2015).

On the benefits of open data for CDSTs

Open data has entered mainstream discussions, as the example of the Open Data Charter signed by the G8 (Group of Eight) leaders testifies. The Charter establishes several principles that all G8 members should observe in order to 'help unlock the economic potential of open data, support innovation and provide greater accountability' (G8, 2013). The benefits of open data have been well documented in the literature and include contentions that open data (1) leads to increased transparency and accountability with respect to public bodies and services; (2) increases the efficiency and productivity of agencies and enhances their governance; (3) promotes public participation in decision-making and social innovation; (4) fosters economic innovation as well as job and wealth creation (Kitchin, 2013); and (5) has an important internal value for the public sector itself as it gains access to data held by its other parts, or

Table 8.1. Citizen data scientist tools

Citizen data scientist tool	*Purpose*	*Initiator holder funding*	*Target*	*Source of data*	*Tools and data management intensity*	*Who is empowered*	*Scale of empowerment Type of resistance*
1 Erar	Monitoring public spending, transparency	State	Recipients of budgetary funds	Nine open-source databases[a]	User-friendly data presentation, intensive	National authorities, private individuals	Active subversion
2 Who Influences?	Monitoring lobbying, transparency	NGO	Lobbyists, lobbied individuals and institutions	Data reported to the CPC	Visualisation tool, intensive	Private individuals	Monitoring, has the potential for active subversion
3 Parlameter	Monitoring parliamentary activities	NGO	MPs, political parties	Open-source data (available from the National Assembly's website)	User-friendly data presentation, intensive	Private individuals	Monitoring, has the potential for active subversion
4 Legislative Activity Violation Counter	Monitoring parliamentary activities	National NGO umbrella network (CNVOS)	Legislative proposer (ministries)	Open data	Violations counter, moderately intensive	Private individuals	Monitoring
5 Whistle-blower portal Žvižgač	Whistle-blower protection	NGO	Corruption, malpractice	N/A	Submission portal, simple	Private individuals	Vigilantism
6 iSee – CCTV	CCTV monitoring	Engaged individual(s)	CCTV locations	N/A	Visualisation tool, moderate	Private individuals	Passive avoidance
7 Redaar	Traffic-ticket monitoring	Engaged individual	Automotive radar locations	N/A	Visualisation tool, intensive	Private individuals	Passive avoidance
8 Zlovenija	Revealing, mapping hatred	Engaged individual(s)	Individuals	Public Facebook profiles	Public pillory, simple	Private individuals	Vigilantism

[a]For a complete list of all nine open-source databases and a detailed description, see the Erar section, 'About data sets' earlier in the chapter.

can make new use of its own structured data, improved by feedback from the public (Janssen, 2012, p. 4).

The analysed CDSTs to some extent reflect the benefits of open data. For instance, the creators of the web application Erar claim that the tool's goals are to increase the level of responsibility of public office holders for effective and efficient use of public funds, to facilitate debate on adopted and planned investments and projects, as well as to decrease the risk of illicit management and abuse of office and to limit systemic corruption, unfair competition and clientage in public procurement procedures (Kovačič, 2016). Similar benefits can be established for the tools Who Influences?, Parlameter and the Legislative Activity Violation Counter as they all shed light on the operations of state officials and bring state power under increased scrutiny. Similarly, the immediate end of the whistle-blowing portal Žvižgač is to make those in power accountable for their actions.

However, such claims as to the benefits of CDSTs can hardly be made for the other analysed tools, i.e. iSee and Redaar. While iSee remains merely a tool for avoiding the surveillance gaze of the state and corporate sphere that does not directly contest the surveillance apparatus, Redaar goes even further and does not augment the accountability of the state, but undermines its effectiveness in pursuing the legitimate aim of penalising disorderly behaviour. Moreover, the CDST Zlovenija differs from the other analysed tools as it is not based on open government data (OGD) but on public Facebook posts. While it pursues a similar goal, which is to hold users accountable for their hateful comments about the migrants, it nevertheless is differentiated from the other CDSTs addressed in this chapter in one important aspect. The method of modern-day pillory that Zlovenija used was troublesome, and so were the targets it aimed to expose, as it was directed towards individuals for whom a public interest in the disclosure of personal data does not exist. Even Zlovenija's authors agree that 'it should not exist', since it could have immense negative impacts on the lives of the exposed individuals, therefore raising both legitimacy as well as legality concerns. Although its authors ultimately decided that the goal was worth the risk, this played an important role when deciding to discontinue Zlovenija's activities and ultimately led to its hibernation (Interview with Zlovenija, 2018).

Critiques of CDSTs

Kitchin (2014) outlines four critiques of open data: (1) it lacks a sustainable financial model; (2) it promotes a politics of the benign and empowers the empowered; (3) it lacks utility and usability; and (4) it facilitates the neoliberalisation and marketisation of public services.[10] Let us examine these critiques in relation to the analysed CDSTs and add a few more.

10 See response to the critique in Eaves (2013).

The first argument, which refers to the sustainability of funding in the absence of direct governmental support, could be further developed by distinguishing between financing the initial publishing of open data and funding subsequent open-data projects enabled thereby. One step is to make data accessible, yet another is to extract meaning from data, the role assumed by infomediaries. The second step is particularly problematic, especially if the tools are developed by NGOs and engaged individuals that – in the absence of financial support from the government – are completely dependent on private funds, which is the case for the majority of the presented CDSTs in Slovenia (Erar being the only exception). The economics of creating sustainably funded initiatives is quite evident in the iSee and Redaar tools, which are no longer available to users. The Redaar application also shows how insufficient funding can lead to the end of the development of a particular tool. It has to be taken into account, however, that the aims Redaar attempted to pursue might be considered illegitimate, therefore resulting in significant obstacles to securing private funding in the first place. At the other end of the spectrum, Erar, the only state-funded CDST examined, is still up and running, albeit in a modified version due to power struggles over the balance between the public interest in access to information on public spending, on the one hand, and personal data protection, on the other.

In his second argument, Kitchin (2013) rejects the premise that everyone can access and use open data, leading to more engaged citizen participation and empowerment of society. On the contrary, he argues that this process is conditional upon: first, the means of processing large data sets (hardware and software); second, the knowledge and skills needed to analyse and interpret them; and finally, public support and the political will to enable policy change. Kitchin (2013) further noted that 'even if some groups have the ability to make compelling sense of the data, they do not necessarily have the contacts needed to gain a public voice and influence a debate, or the political skill to take on a well-resourced and savvy opponent'. From all of the analysed CDSTs, the importance of the latter is particularly obvious in the case of Parlameter. Although its developers have both the means and skills to make sense of the information about the parliamentary process, there is little evidence that the tool actually had any impact on either political participation or oversight regarding the procedures of the National Assembly. In fact, Erar was the only analysed CDST that facilitated change on the national and regional levels in Slovenia. At the same time, it is also the only tool developed and financed by the government, which entirely supports Kitchin's claim that open data empowers the empowered.

Open-data protagonists view data as neutral and not something embedded in the wider political, social and cultural contexts and contaminated with

existing antagonisms. However, the open-data endeavour is never politically neutral or inherently a good thing. The politics of the data matters, and it is important to ask what the data reveal, how they are then used and in whose interests. In various contexts, the critical big data approaches have revealed how big data carries the allure of objectivity. For instance, in the predictive policing context, Joh (2017, p. 294) rightly observes that the police still have a creative role in creating inputs for automated calculations of future crime: 'Their choices, priorities, and even omissions become the inputs algorithms use to forecast crime'. In his analysis of the politics of statistics, Desrosières (2002, p. 2) claims that even formalised synthetic concepts, such as averages, standard deviations, probability, identical categories or 'equivalences', correlation, regression, sampling and so on, are 'the result of a historical gestation punctuated by hesitations, retranslations and conflicting interpretations'. Data are never 'clean', that is, devoid of social, cultural and economic circumstances.

It is then utopic to expect that open data will systematically and consistently over a longer period of time harm those in power. As our analysis of the Erar tool shows, the tool was able to cause political turmoil only in the short term. After the revelations regarding the risk of corruption in relation to the prime minister and one of his ministers, it ceased to include 'dangerous' data sets regarding the political elite and even the leadership of the CPC Commission was soon forced to resign due to political pressure.

Third, closely connected to this argument is the question of the utility and usability of the published data, since websites providing open data are often reduced to data dumps that instead of unveiling previously undisclosed information only provide a place to hide among the incomprehensible amount of published open data. Moreover, CDST developers in Slovenia are facing severe obstacles related to the quality and quantity of data. For example, Parlameter is based on data published by the National Assembly in a non-machine-readable format, which severely complicates CDST development. The challenges this presents are huge, but not insurmountable. On the other hand, Who Influences? is completely dependent on self-reported data, that is, the data reported to the CPC, which are incomplete or even entirely lacking with regard to some stakeholders.

Fourth, Kitchin (2014) claims that open data facilitates the neoliberalisation and marketisation of public services. The argument opens up the question of the context of data policies, that is, the question of the time and place of the implementation of open data. These determine how open-data policy is understood and how its meaning is attached and dependent on other social and political circumstances. While OGD started as a mainly UK and US driven initiative (Janssen, 2012), it has increasingly gathered attention in many

other countries and international organisations, including the Organisation for Economic Co-Operation and Development (OECD), which had a pivotal role in 'persuading' other countries to adopt the initiatives. However, in other countries the idea of open data attaches itself to the specific political and societal processes thereof. The contextualisation of specific CDSTs in space and time provides insight into the implementation of an abstract notion of OGD.

In the Slovenian case, open data has had a specific meaning and is clearly attached to the transition process from socialist autocracy to capitalist democracy. OGD was even more enthusiastically embraced than elsewhere, as it has been taken up by the specific politics of transition with the aim of achieving specific political ends and signifies much more than open data actually can deliver. The argument underpinning the open-data paradigm in Slovenia has typically been as follows: due to the fact that in the autocratic socialist system government data were systematically concealed from the public and secrecy was the norm, now, under a democratic regime, the state must provide the data it gathers. By doing so the government will almost automatically become more democratic, more accountable and less tyrannical. Open data hence carries a liberation sprit of breaking with the 'old and ugly' autocratic system. Moreover, open data is coupled with the ideal of a market-oriented political system as it symbolises not only a turn towards democracy vis-à-vis autocracy, but also towards capitalism and away from socialism. Open data is supposed to make the newly developed state more capitalist. The state bureaucracy, the argument goes, was a burden for society and a parasite on the economic sector. The government must become lean, 'vital', more efficient and subject to market economy laws. Its assets, including data, must be monetised. In such a system, transparency is also a means of economic growth. In the post-socialist transition, open data then serves a specific political end. This is 'the train' (a metaphor particularly frequently used in political discourse) that society must embark on in order to escape its haunting past. In such a sociocultural context it is not common to find critiques of open data. Critiques are politically perceived as belonging to the demonised past, as open data is the means of transforming the country into a 'normal' democratic capitalist state.

Our analysis, nevertheless, does not suggest abandoning the move towards opening up data. We assert that open-data initiatives are political per se and that they attach to specific policies already existing in a particular time and space. Such initiatives flourish because they attach to other political and economic processes, which they in turn help amplify. Open data, as any other sociotechnical system, is inescapably political in its uses. By protecting, for example, environments characterised by social, political and

economic inequalities, it can reinforce the conditions already at work there, to the detriment of social equality, justice and social cohesion. From such an understanding of open-data initiatives, we can observe how each of the analysed CDSTs requires that we be mindful of what data are being made open and how they are being funded, how data are made available, how they are being used and who is empowered by open data.

Turning to the analysed CDSTs, Supervizor is a pivotal example of how its power, which triggered a change in government, raised concerns due to destabilising the political status quo. However, Supervizor also provoked fear of 'going too far' with open data. It is not surprising, then, that in the years after the change in government in 2013, Supervizor was renamed Erar and the disputed data about budgetary payments in addition to individuals' salaries – and that led the minister of education, science and sport to resign – were removed from the application. The privacy commissioner changed the interpretation of the conflicting values at stake: personal data protection now overrides the public interest in knowing how public funds are spent.

In our analysis we identified an additional critique of open data. Thus, fifth, open data may often infringe upon other competing values and step into an ethical borderland. The examined CDSTs reveal how the publication of some types of data sets poses a risk to personal data protection and a threat to individuals' safety. The Zlovenija website went into hibernation relatively quickly, just 14 days after setting up the mentioned Tumblr page containing hateful Facebook comments, due to public pressure from the relevant public opinion makers (e.g. the eloquent former information commissioner) to protect the 'culprits' and not employ a vendetta or an 'eye for an eye' modus operandi. According to its authors,[11] they themselves were afraid for the life and limb of the exposed Facebook users. Moreover, the users themselves massively expressed apologies for their reckless trolling and requested that the Zlovenija moderator remove their posts on Tumblr with an explanation that the original Facebook posts had been removed.

Redaar and Zlovenija show how empowering CDSTs can quickly slide into an ethical grey area. On the one hand, Redaar was primarily used not to empower – in the sense of encompassing positive change, legal compliance or at least progressive social ends – but to breach the law by circumventing parking regulation enforcement. On the other hand, Zlovenija shows how the shaming of shamers can trigger clashes between human rights. The transparency of the shamers' comments, either voluntary or not, may conflict with their security. While it is unconvincing to claim that social media users who publicly post hateful messages have a reasonable expectation of privacy, there are legitimate

11 Interview with one of the authors under a pledge to maintain anonymity.

safety concerns when exposing them not only in online settings but also in the physical environment, as others have started to print out online comments and physically post them at various locations throughout the capital city of Slovenia, Ljubljana. Hateful comments exposed in different settings may trigger another wave of hatred, which goes in both directions: either targeted towards migrants, that is, the initial haters' targets, or targeted towards the haters themselves.

Conclusion

Open data is often seen not just as a building block of citizen empowerment, but as the only prerequisite to achieving active participation, leading to a transparent and accountable governance regime. This optimistic view goes hand in hand with the big data ideology that we just have to collect enough data and 'let them speak' (Mayer-Schönberger and Cukier, 2013) as they will solve problems by themselves. However, this perspective is overly simplistic and entirely overlooks the fact that open data is not by itself neutral and is not used in a social vacuum, but will be weighed against the current political, economic and social background by the respective stakeholders, who may use it either as a tool to facilitate democracy, transparency and accountability, or to pursue their own contingent – possibly illegitimate or even illegal – agenda.

The work of the citizen data scientist is political. The data need to be processed, analysed and interpreted in order to give them their 'true' meaning – what that is will ultimately be decided by the CDST developers who have the power to present the data in a way that best suits their own perception of the world and the aims they are trying to pursue. It remains less clear how much power the political work of data scientist projects entails. While some of the projects funded and supported by the government, such as Erar and Supervizor before it, have gained significant political power in Slovenia, the remaining tools did not have comparable results, either in the form of political change or in the consequent engagement. Regarding the latter, we are learning that open-data tools in general do not activate otherwise passive citizens, but rather they provide a new tool for the already engaged. The question therefore remains, are CDSTs bridging or deepening the 'data divide'?

As with any other technologically supported tool, CDSTs can be used either way. They could deepen the divide between the 'big data poor' and the 'big data rich' (Boyd and Crawford, 2012) and empower the elites to the detriment of the majority of the population, or they can genuinely serve as a catalyst of societal change. Moreover, when we look at the data, there is always a question of what we are looking at and what we are looking for. When you work with data there is always a story behind the processing of them. There always a question of normativity: what should and should not be

there for us to find. Finally, rather than as the interpretations of information that they are, we too often see them simply as representations and descriptions of objective reality.

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9. Modalities of united statelessness

Rupert Allan

Uganda hosts the largest population of refugees in Africa, and has a progressive 'open-door' refugee policy. Uganda's refugee settlements are not fenced-in camps. They constitute huge tracts of land,[1] in which refugees are encouraged to farm, make a living and trade with hosting communities (see Figure 9.1). Many of these settlements contain 'old caseload'[2] from as far back as the 1950s, from events such as the 'Acholi Wars' and the Rwandan genocide. In settlements near remote borders, arriving 'new caseload' refugees are typically instructed to go to certain hillsides in huge designated areas and settle on a plot 50 metres square. These areas are – by definition – just wilderness, and for decades refugees have been settling in this way relatively peacefully. So nobody thought to record where they were.

Documentation: the problem of population

In 2016, violence in South Sudan created a sudden mass influx of refugees across the border into Northern Uganda. The world looked on as the refugee coordination responded, adapting areas and opening new settlements. One of these – BidiBidi – became famous at that time as the largest refugee settlement in the world. With this event came the realisation that decision-making in both the United Nations High Commissioner for Refugees (UNHCR) and Uganda's Office of the Prime Minister (OPM) were under-informed. Of the 500,000 or so new arrivals, who knew what communities were where in relation to water, medicine, sanitation, education and security? These issues were exacerbated as another mass refugee influx followed less than six months later from the west (the Democratic Republic of Congo).

By January 2018 refugee figures were reported at 1.4 million in Uganda, but this was still an estimate. It was becoming increasingly acknowledged

1 Designated land acquired by the OPM, through various historically complicated agreements. Freehold and leasehold tenure systems create diverse claims that are debated by forums such as the North Uganda Land Platform (NULP). See https://uri.org/what-we-do/resource-library/mitigating-land-based-conflicts-northern-uganda.

2 'Old caseload' is an official term used by the UNHCR to describe refugee populations from previous major influxes (UNHCR, n.d.).

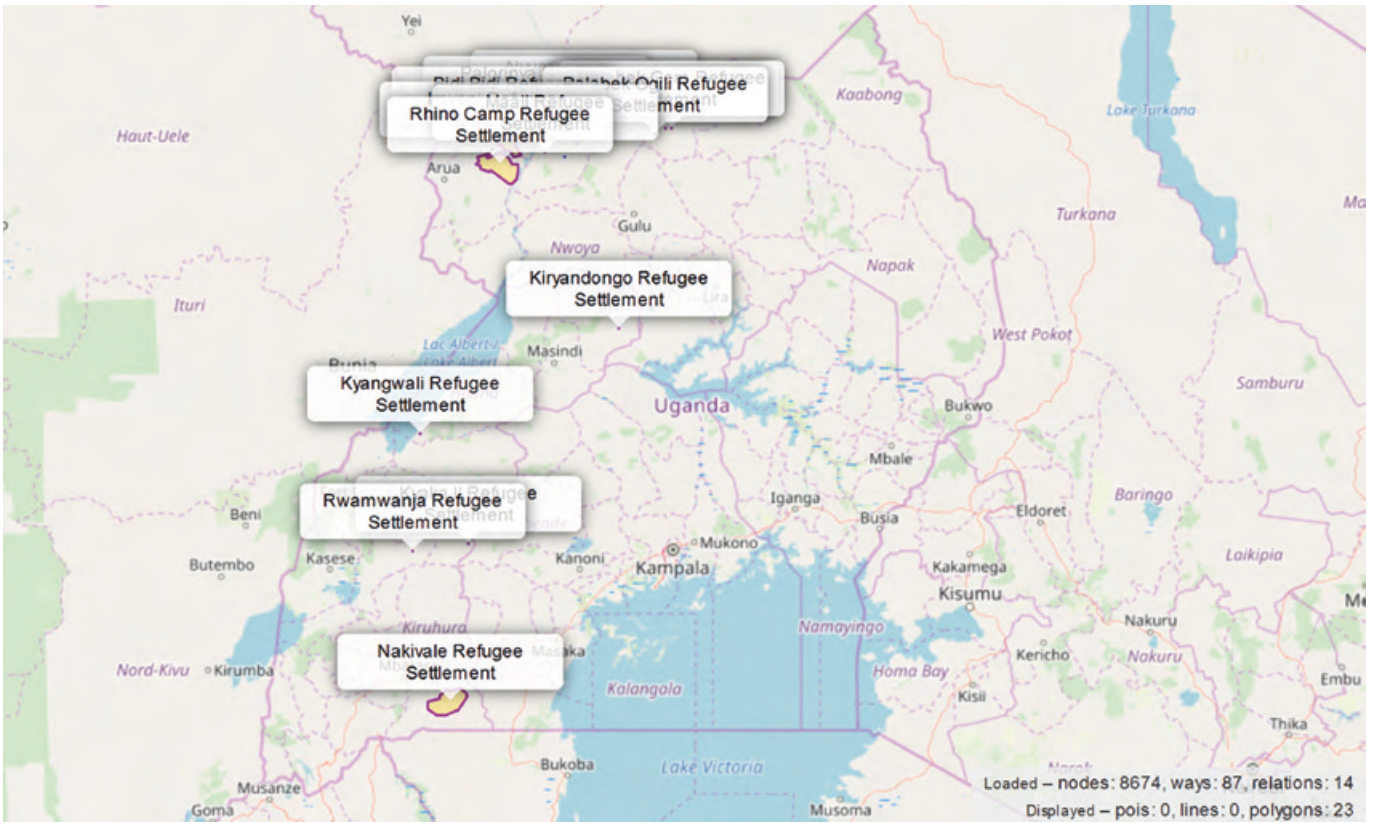

Figure 9.1. Uganda refugee settlements, March 2018 (OSM/Overpass Turbo).

that, despite decision-makers having said that there was some state-of-the-art interventional technology at their disposal, they were not sure how it worked and thus how it could be adapted to the increasing complexity of the situation. In the capital (and even field offices) nobody seemed to know what was really out there. In February 2018 several officials were suspended over what arguably amounted to a long-term lack of engagement with data (Okiror, 2018), as some of the financial discrepancies between funding and delivery started to become undeniable.

In response, by late 2018, a registration of refugee individuals, using biometrics and other top-down digital methods, was published by the UNHCR/OPM response coordination (UNHCR/OPM, 2018). Authorities could now approach a realistic estimate of refugee numbers in Uganda (at the time of writing, officially 1.2 million). But evidence suggested that this technique of enumeration was only partially useful. The ambiguities of the term 'hosting' are geographically complicated: Are internally displaced persons (IDPs) refugees? What if refugees had been born in Ugandan settlements? The multiple variables of cultural/gender, diverse medical needs and compounded geographical unknowns within and without settlements still made it almost impossible to allocate resources, stop disease outbreaks and control intertribal or international violence in the districts hosting incomers. And so the old problem of the 'last mile' (Balcik et al., 2008) remained obscured, as designated resources still failed to actually arrive on the terms under which they were originally provisioned.

UN sector challenges: formal and informal infrastructure

United Nations (UN) bodies carefully merge their systems as much as possible with national government, but humanitarian coordination over the decades has also become increasingly sector led. These sectors are traditionally split: water, sanitation and hygiene are dubbed 'WaSH', hospitals are 'health' and schools are 'education'. Sectors such as 'energy and environment' may at first seem non-emergency but disease and famine are immediate when unregulated deforestation, for example, causes populations to run out of wood that is much needed for sanitation and cooking. Equally, market and supermarket locations (cash-based intervention – CBI) have been notoriously vital for emergency response in sudden-onset disasters such as earthquakes or tsunamis. That police outposts fall under 'social amenities' but also under 'protection' (a sector that touches on all other sectors) demonstrates how this framework is in itself a work in progress.

The concept of a complete set of statistics on refugees implies many assumptions (not least the fundamental anomaly that statistics describe a

pursuit of 'stasis', and migrants are inherently mobile). For example, refugees are sometimes rich, they frequently return home and often they do not live in settlements where they are registered, let alone on their plot. Refugees may try to move house, often do business outside of settlements or even outside Uganda.[3] In other words, they are human. To this day in West Nile, the situated challenge of the human factor prevails and as the emergency response becomes one of development, authorities in advanced response modes still lack sufficient intervention information.

The accumulating mass of humanitarian institutional growth has made it difficult to operate holistically across or outside these sector frameworks and accommodate refugee complexities. The UNHCR established the Comprehensive Refugee Response Coordination (CRRF) to assist in the coordination of better inter-sector communication.

The digital landscape in Uganda

Historically, there has been a lot of data gathered in Uganda to try to tackle the issue of refugee management: information on people's needs, access to food, water and medicine. Because of the geographical and financial scale of the response, this has, almost exclusively, been sampled qualitative data from key informants representing scattered community views. Due to sheer numbers, Uganda has long been a global case study for the challenges and successes of refugee management. When the Northern Uganda influx peaked, the holes in this data became a part of the crisis.

After the mass influx, it was clear that much of the data being generated were not capable of accommodating important home-grown local priorities. Informal micro-resources, such as thousands of small rural wells and village doctors, were not being compared with official (and expensive) geospatial records gathered by scores of different 'implementing partners', non-governmental organisations (NGOs) which worked under the refugee coordination. Even if UNHCR were able to curate all the partners' data on their interventions, this data, gathered under multiple standards and partitioned by sector, could never prevent bore holes from being dug in areas already full of natural wells or health centres from being located too far from populations in need. In short, resource allocation was a fragmented mess unless it could incorporate empirical, comprehensive, up-to-date information on everyday community resources.

3 Information reported by surveyors Harriet Bakole and Micheal Yani, HOT Uganda Offices, Kampala, 20 January 2019.

Data siloing and proprietary data: Plug and Play

The humanitarian sector creates a sometimes fetishistic drive for innovation. Uganda is inundated with well-meaning technological solutions, and these include digital information collection and data management projects. Both NGOs and UN agencies have the unfortunate habit of hiring independent commercial (for-profit) consultants for tech-enabled interventions, rather than allotting the time of their own staff. Reasons are complex, but include heavy workload and lack of in-house capacity-building methods.

Another problem is that funding and support is predicated on (often digital) innovation, so hard-pressed humanitarian sector organisations might choose to pursue technology over social engagement. For many NGOs, innovation around data can result in information becoming locked or siloed within proprietary software because it is often in the interests of the consultants to restrict or deny access to content (and even methodology). With an eye on cutting costs, very few NGO-contractor terms of reference stipulate extended or indefinite sharing of data (e.g. uploading information to technically accessible open platforms) at the end of these projects. The resulting data sets are sometimes declared 'open', but may stipulate that the data must be accessed through a controlled private website. The passive mode of openness here is effectively artificial, because it compromises access through systemic exclusion (conditions on sharing/registration of other data, for example).

Governing authorities in Uganda believe that the way to sustain effective humanitarian intervention is to initiate a handover to local and national authorities. In some instances, this is made more difficult by the constant push for aid-linked innovation. Rather, funding for internal system reinforcement might prove more helpful where the skill of local authorities also faces practical obstacles enshrined in a history of non-adaptive improvements, which still proselytize ageing or obsolete technology environments: network electricity-dependent workstations; software licences with 'use-by' dates, and 'helplines' rather than global community support; software licences that need maintaining; electricity needs to be reliable for desktop computers; traditional office systems have been set up, under which staff are dependent on commercial helplines for support.

Innovation overload

Across the world, the responsibility upon everybody to engage with data is becoming increasingly inevitable, even if simply for self-protection. Whether the world likes it or not, it seems that avoiding the demands of the digital can have worrying implications. We love 'plug and play' products, and as Tim Ingold writes (2011, p. 26), it is

> objects themselves that capture our attention, no longer the materials of which they are made … It is as though our material involvement begins only when the stucco has already hardened on the house front or the ink already dried on the page. We see the building and not the plaster of its walls, the words and not the ink with which they were written.

New humanitarian products are frequently remotely conceived, initiated and deployed by a 'telepresent' and commercially interested society. Digitally enabled entrepreneurs serving the humanitarian sectors usually work from remote and insulated positions. Digital humanitarian solutions are sometimes created with little conception of (or interest in) the complexities of field-centred ontology. Further, through constraints of aptitude or time, there often seems to be a failure by responders to engage with the workings of these technological products and the communities on the ground. The speculative nature of some designs can even create a situation of need where there was none before. In precarious settings, inappropriate but well-meaning innovations can be at best 'litter' and at worst even life-threatening. The unused software and data in this landscape could start to resemble the obscene and redundant surplus hardware from notorious ill-judged humanitarian interventions (like the eventually over-provisioned 'Live-Aid' project of 1985, whose trucks and planes still litter the runway at Lokichoggio supply airstrip in northern Kenya). But this 'useless litter' is sometimes data, sensitive data. Worldwide, technological hardware continues to emerge, but with decreasing 'hard-wired' improvement between generations. Nowadays, accessible technology in sub-Saharan Africa is arguably matching this ceiling and it is often amply fit for purpose.

The expectation for 'plug and play' solutions can create a disinclination to understand the actual components of a problem, or attend to the semantics of site-specific issues – the 'ink' of the intervention. Granular-level data are demanding and difficult to deal with, but if the labour of engagement is not applied to technology – by commissioning decision-makers as well as technicians – the life-saving imperative to make the humanitarian landscape more accountable could degenerate into even deeper states of disconnectivity than ever before.

Technological ethics

There is growing ethical discussion of 'the digital' in humanitarian action, and mapping in Africa has always been a techno-colonial exercise (Dirk et al., 1996). Enthusiastic mappers declaring a commitment to map every corner of Africa should beware of the adage that 'maps are never value-free images' (Cosgrove and Daniels, 1989, p. 278). Critical writers from David Harvey (2009) to Edward Said (1978) clearly make the case that when we map there are preconditions embodied within the process. The exploitation of personal

data is well reported. On African consumption of technology, Nanjala Nyabola (2016, p. 158) writes:

> Data analytics tied to social media is one of those industries that wouldn't exist if it weren't for the millions of people who use social media every day to catalogue almost every facet of their lives. Firms like CA [Cambridge Analytics] take the millions of terabytes of personal information freely given by individuals and weaponise it for political interests.

Lessons can be learned, too, from other reports of self-interested participations in 'publicised' data transparency, as can be seen from D'Angelo and Ranalli's (2019) critical view of information politics in and around the US electoral process. Freedom of information and transparent data access can potentially evolve into unethical commercialisation of information, which can damage the best interests of democracy.[4]

Nevertheless, geographic information systems (GIS) are a vital tool when dealing with dispersed populations in need: digital technologies generally enable NGOs to outstrip previous reporting frameworks in terms of accuracy, granularity and field intimacy. With the mention of 'technology' and 'data', many humanitarian donors are satisfied with the promise of clearly improved intervention feedback. But many of these data still only partially represent the wealth of community engagement and field accountability that *could* be available.

HOT pilot: crowdsourcing non-settlement refugee data in the West Nile

In certain ways, the Humanitarian OpenStreetMap Team (HOT) could claim to be different. Important open-source ethos holds that important apps and software for managing information in resource-poor settings have been available (for free) for many years. And the ethos accompanying the technology is fully, and inclusively 'non-profit'. And free. For OpenStreetMap (OSM), this is in the form of Maps. Me, OSMAnd, QGIS and ODK (Open Data Kit)/ Kobo. So this makes the problem one of better application of basic digital tools, rather than the introduction of new technologies: adaptation, rather than innovation. Previous socio-economic blockers to digital inclusion are quickly dissolving with the market proliferation of significantly powerful and available smartphone handsets. Therefore in Uganda a HOT intervention seemed highly feasible, but it needed to be different from other data projects.

4 'By diminishing secrecy, they opened up the legislative process [of US election] to a host of actors – corporations, special interests, foreign governments, members of the executive branch – that pay far greater attention to the thousands of votes taken each session than the public does' (D'Angelo and Ranalli, 2019).

A funding call was posted, and the relevance of the open-data ethos to the situation (and to the UN Sustainable Development Goals (SDGs)[5] themselves) was recognised by the US State Department funders. So in March 2017, HOT initiated a pilot project in Northern Uganda titled 'Crowdsourcing Non-Camp Refugee Data', with a sister project in Istanbul. In Uganda, this became specifically framed to address the challenges that the UNHCR identified: resource allocation, host-community engagement, community inclusion and affordable – yet sustainable – information management. The project was to experiment with capacity-building using community-owned smartphones, crowdsourced data and open-source GIS. Although very different, both the Uganda and Istanbul projects proposed to expose self-identified community needs in precarious populations, and in Uganda, to present a 'common operational picture' to UNHCR (Wolbers and Boersma, 2013). HOT, whose short but avid history had encountered equivalent crises, reckoned that inclusion of previously undocumented 'informal community resources' would provide improved understanding of vital infrastructural realities on the ground.

Open-data format works across, within and without sectors, but working from the bottom up is very different in nature from the compartmental 'sectored' traditions of humanitarian information management. Mapping teams uniquely do not conduct the surveys themselves, rather they teach OSM methodologies to community members, who themselves become the surveyors. Donors and responders are then increasingly able to see life-saving data changes clearly pictured on OSM. The potential for the allocation of essential resources per refugee family, even per capita, is compelling. With everybody collaborating and working together, mapping both inside and outside of settlements, this could also be a way to address issues of inequality and conflict between refugee and host communities. As an independent self-organising movement,[6] HOT could see a solution in Uganda that existed independently from the restrictive legislation of top-down 'owned' information. Once funded, HOT was able to citizen-activate mapping teams, disregard the constraints of information politics and, based on nothing more than a fundamental right to internet access, start collecting data. Community-mobilised 'motorcycle mapping' techniques (which had proven effective in the 2014–16 Ebola outbreak in West Africa)[7] would play a central role in this intervention.

OSM origins and history

HOT's global agenda is characterised by the (self-)representation of underserved and hidden communities. It focuses on empowering people within their own

5 Notably 'reducing inequality', 'sustainable cities and communities' and 'responsible consumption and production', see https://sustainabledevelopment.un.org/?menu=1300.

6 William Connolly (2013) discusses resilience of such distributed networks of society as self-organising processes, responding to scales of politics below and beyond the state.

7 For specific use of OSM and motorcycles in the Ebola response, see Cassano (2014).

communities to take control of how they are represented, mapped and seen by the outside world, so the authorship and ownership of data remains with – and can be used by – the participants themselves. Communities can be empowered to use this citizen-generated GIS as a way to have the local voice heard. At the same time as joining a socially cohesive global and local movement of OSM, they can also use the platform for small business and personal navigation (like a more complete, publicly authored version of Google Maps). Importantly, this model is sustainable and free. Intrinsic to it is the creation of a local workforce that could, in this instance, join in on implementing and maintaining data themselves. And so, in these sudden influx conditions in Northern Uganda, this data project, initiated as a pilot, only a 'proof of concept' at the time, rapidly became the source of high-quality, actionable information for emergency use.

OSM can be imagined as a global creative collaboration platform, a publicly authored 'wiki map'. The project finds its heart not in the technology or tools it uses, or commercially interested organisations backing it, but in the OSM map itself. It can also work offline. OSM launched in 2004, when a 24-year-old entrepreneur, Steve Coast, set up 'a collaborative project to create a free editable map of the world' (Wikipedia, 2019b), inspired by the success of Wikipedia and the predominance of proprietary map data in the United Kingdom and elsewhere. Since then, it has grown to over two million registered users, who can collect data using manual survey, global positioning system (GPS) devices, aerial photography and other free sources.

OSM can record and geolocate images, sounds, web links, videos and all map data, and is free to use under community principles of mutual inclusion. It is supported in the online learning environment at https://learnosm.org and the global community platform https://www.wiki.osm.org. This resource (which in March 2018 recorded its 30 millionth edit) has for some years been harnessed by the global humanitarian community to assist in connecting community needs with resources in both response and development settings around the world. It was first notably used by humanitarians in Haiti in 2006, and again in the 2010 earthquake, in order to rapidly create accurate and current digital maps showing critical factors affecting the local population. During this and subsequent years, a humanitarian OSM organisation dedicated to creating 'fast-cycle' missing maps (Johnson et al., 2010) for humanitarian emergencies was conceived. The HOT/Missing Maps community worldwide is now made up of over 100,000 humanitarian OSM practitioners (see Figure 9.2).

As one of the three founders of the Missing Maps project with the American Red Cross (ARC) and Médecins sans frontières (MSF), HOT has been making and delivering geospatial digital (and paper) maps to assist in response to humanitarian crises since 2010. This humanitarian OSM movement can be seen as both a resource, a methodology and a philosophy. HOT shifts its shape to suit different contexts and the humanitarian OSM team has bilateral modes of distributed community network. A blank map continues to evolve,

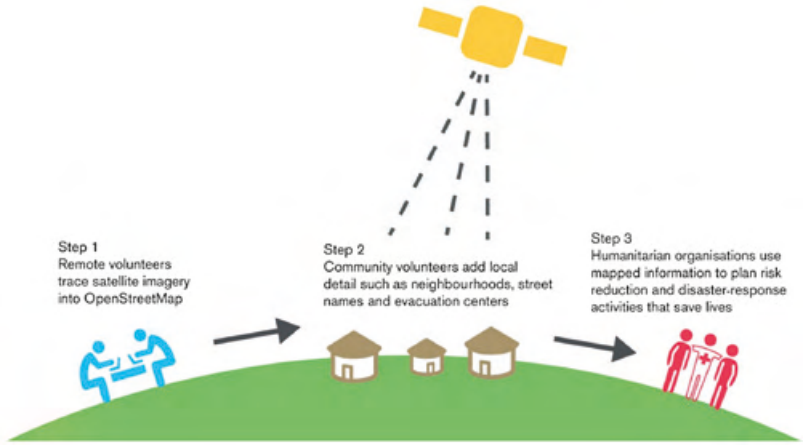

Figure 9.2. OSM participatory triangulation (Courtesy of Missing Maps).

as remote mappers gather at group 'mapathon' events to focus on disaster sites by using field-informed crisis mapping tasks. These are posted and coordinated on the HOT online 'tasking manager' and contributors select individual grid squares to hand-digitise and outline buildings, roads and infrastructure (e.g. hospitals, schools, markets). The OSM-user communities on the ground download the map, add values to the points (features), lines (roads/rivers) and shapes (fields, swamps, forest). They use open-source smartphone apps and other analogue tools, such as hard-copy annotated maps,[8] to record and reupload this information.

Reception of these methods by government authorities and NGOs

Painstaking efforts have been made in Uganda by UN coordination to account for partners' intentions (i.e. commitments to help by humanitarian coordinators), but in 2017, the picture of field realities and activities on the ground was fragmented. Aspects of refugee life were clearly being missed by the traditional UNHCR approach, as witnessed by HOT field surveyors in the field, who, once deployed, were repeatedly met with surprise: NGO staff had often never been seen in plots lying more than a short distance from major supply roads – not only in the surrounding areas, but inside the refugee settlements.

Uganda community mapping was to yield impressive results. In the first 12 weeks of surveying West Nile, ten HOT-supervised community surveyors recorded 8,300 public amenities in the Arua District, as well as community

8 For example, field papers, see http://fieldpapers.org.

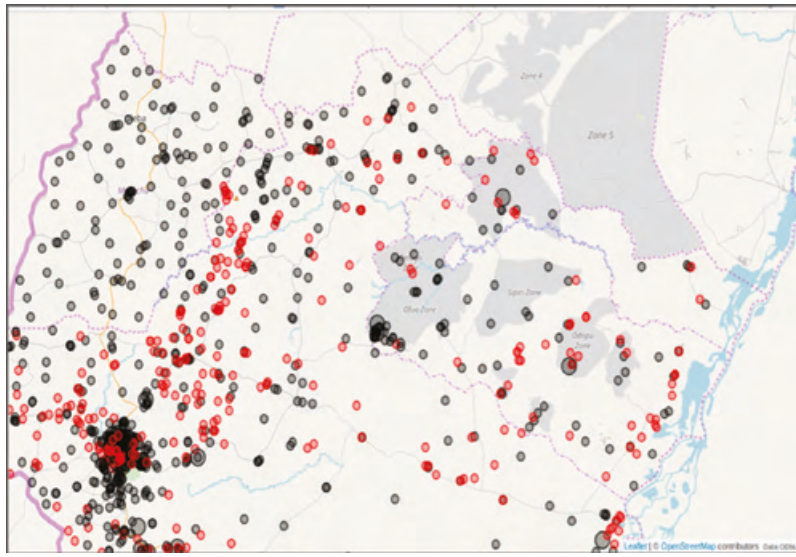

Figure 9.3. Waterpoints in Arua, non-functional showing in red (OSM/Overpass Turbo).

verifying the few existing geotagged features. This took only two field staff and two managers to coordinate and the performance was further replicated and scaled into other districts. The cost, in terms of humanitarian budget, was minimal. The investment value in useful data points was huge. From this intervention, information on many features could be analysed and local authorities were to report major engagements with the data for resource allocation at district, sub-county and village level.

Even simple maps at this level of detail proved arresting (see Figure 9.3). By colouring nodes (surveyed points on the map) at which the answer to 'Is this functional?' was 'No', around 30 per cent of the 3,500 water features mapped in the first two months could visually be identified as non-functional.

Once the community had been mobilised en masse, this type of visualisation was simple to produce. But when these maps were first shown to UN sector leads they were met with mistrust. A common reaction to the 'open' part of OSM is a fear that all data will be made public: 'Who had collected the data?' 'How could they be trusted?' 'How come they show so much more data than "official" maps?' and most of all, 'These "non-functional" reports can't be correct!' But HOT's information not only confirmed all existing UNHCR data, but additions, updates and corrections were enthusiastically corroborated by UNHCR field officers on the ground.

Community data, open data

Michal Givoni (2016, p. 1025) describes crisis mapping as 'a new modality of participatory humanitarian action in which global publics are mobilised to trace digital maps of disaster-stricken sites and to classify, verify, and plot on maps big data produced by disaster-affected people'. Participatory mapping enables cheap and accurate resource allocation and data de-siloing, mainly because of the time invested by the international community. It has been possible for some years to ensure that data on individuals (e.g. consented medical details) never leave the hard drives of the partner implementing the surveying. But demographic data (such as population numbers per site) can be shared and downloaded via the Humanitarian Data Exchange (HDX) by humanitarian organisations registered and vetted by the United Nations Office for the Coordination of Humanitarian Affairs (UNOCHA). From this, OSM uploads can be chosen with precision at any stage in the process. But these 'commits' should always acknowledge accompanying responsibilities towards ongoing data stewardship of currency, ownership and social relevance.

The concept of openness of data is better explained by the concept of open and complete control. No third parties mediate the data collected, and the user is never compromised in this. But with total control comes total responsibility. The will for this existed in Uganda, but it needed to be matched by specific commitment to engage with fast-evolving changes in global concepts of formal validation (and the growing acceptance of movements like OSM). OSM is open and editable by those engaging with it and is governed by the self-policing community. OSM does not have the potential to be exploited for mass marketing because, under the Open Database Licence (ODbL) laws, those exploitative bodies are required to reciprocally share all of their own data if they use open data. OSM is systemically protected by this caveat. However, that does not necessarily make digital recording of populations intrinsically humane and some of the ethical nuances and responsibilities feature clearly in the HOT Uganda project.

HOT Uganda participatory mapping process: how it works

HOT Uganda project design leverages the (perhaps unexpected) fact that in sub-Saharan Africa, mobile network is prolific. Almost every community in even the remotest locations in Uganda has – alongside the basic tools of existence (hoes, jerrycans, cooking pots) – a smartphone. Connectivity is everything and refugee settlements are clearly commercially viable for telecom installations, as evidenced by the plentitude of 'booster masts'. Every dusty village has a highly effective informal and dynamic mobile-based economy. Wooden shacks are

hand-painted with 'MTN' and 'Airtel' signs. 'Mobile Money' can be exchanged for airtime and mobile data can be exchanged for cash.

Community recruitment

The Uganda OSM project was built on a familiar model: training teams arrive in an open community environment, such as a marketplace or commercial centre, identify the busiest and best-equipped smartphone servicing trader and ask the (inevitably well-connected) dealer/repairer to round up 20 smartphone-literate acquaintances. But they must each have a smartphone. Smartphone possession encodes a number of characteristics about an individual: they can communicate, they are aspirational, technically engaged, sociable, and often represent an informal community group around the shared village computer.

Practice survey forms will have been written in a spreadsheet and uploaded using the simple coding of XForms to an online open-source server, to be deployed as app-readable page-swipe surveys (converted to Extensible Markup Language (XML) format at the server). Each person who has assembled then enters a race to first clear space on their phone, then download the necessary OSM-compatible apps (OSMAnd and ODKCollect). A survey is the next item to be downloaded and some mock interviewing of local people ensues. At each stage, eventual surveyors are identified on the basis of their aptitude. This shortlist of candidates is eventually selected to be the mapping group.

Uganda-specific practice

Uganda is a low- to middle-income country and decentralising leadership to local levels and promoting community self-sufficiency is a priority for the response coordination. The training of local administration in Uganda is coordinated with local community leaders. The HOT model implements training for all comers (including district officials) and is conducted in community/administrative centres. 'Sensitisation' campaigns with the local district and council authorities sound formal, but the benefits of making such comprehensive local data so openly available are always very warmly welcomed. Through this collaboration, community mapping can be legitimised within all-important local 'community entry' mechanisms. HOT inclusively adopts compatible tools like Microsoft Excel and ODK/Kobo to integrate (in fact, local government is informally run using tools such as WhatsApp). HOT also tries to engage stakeholder NGOs and host communities in collaboration, to allow both individuals and groups to create maps.

Part-time and occasional staff from local district administration often get deployed by HOT as surveyors, so that the experience can help them in their own institution. They will take new skills back to their work colleagues, as globally supported OSM members. Refugee and local hosting communities commonly work together, mapping the difference in services inside and outside

Figure 9.4. Training at UNHCR (Arua): local sub-county councillor, MSF worker, local teacher and refugee learn open-source GIS together.

of refugee-setting geographies. This common training environment also places NGO staff (often decision-makers) next to the beneficiaries they serve, and all participants are learning by doing (see Figure 9.4).

The socio-economic exclusivity of smartphone ownership is of utmost concern. There is a strong lending culture in Uganda (and many sub-Saharan settings), and it has been found that, invariably, people will find a way to be connected. Surveyors often turn up with a bad smartphone, but with good skills, and these people are subsidised by 'project-loan' smartphones.[9] Technological inclusivity is acknowledged (and tackled) at the heart of HOT interventional planning. Depending on project-loan phone availability, field-budget funds will be diverted to enable device sharing; 'earn-a-device' schemes (per data output) have been initiated and analogue OSM tools will also get used, such as field papers. The need for subsidised devices continues, and solutions to the issue of digital access and inclusivity are constantly found on a location-by-location basis.

Classroom training

The first morning of a 'capacitation' (training) event is usually chaotic. There are generator breakdowns, technical glitches, computer viruses and cracked screens. Almost every training is chronically oversubscribed, but in the

9 Donated, in Uganda's case, by the excellent 'NetHope' Foundation, see https://nethope.org.

Figure 9.5. Surveyor Philliam checking the OSMAnd App and his ODK surveys, with the blank paper map at hand.

scrummage to learn, it is preferred to train as many as possible in OSM, despite the limited number of selections who will graduate as full-term surveyors.

The first exercise after assembling and registration is the presentation of the blank map, containing at this point only satellite-traced shapes, from remote-mapping sessions (in London, New York, Heidelberg, for example). This image can already be seen online (in Maps.Me and OSMAnd smartphone apps), but is printed out at this point. Participants are encouraged to write their name on a post-it note and stick it in the vicinity of their dwelling (see Figure 9.5). This is a good way to assess and introduce map literacy, but also gives an idea of where people come from and is used for local contact when later moving field surveying into that area.

This introduction emphasises how GIS information as OSM enables the delivery of humanitarian assistance in the form of engineering, medical and cultural intervention in areas generally considered inaccessible and precarious. There is a lot to be overwhelmed by on this first day. Not least is the task of bringing people through the digital revolution in one day. Clarifying the usefulness of OSM for the longer-term advantage for business development, personal enterprise and other socio-economic projects is also a challenge. All this with intermittent mains power, usually from an unreliable local market generator on an extension, involving bare wires wrapped in carrier bags for insulating tape. So much is inevitably improvised and the venue is usually a shack, tent or hall. Participants often have not used computers before and in some cases cannot speak a language common to one of the HOT trainers

(however, surveys are translated into local languages and OSM itself exists in many international languages).

In the next stage, all trainees are signed up to OSM, using phone-tethered laptops (hard-wired infrastructure is always fragile in sub-Saharan Africa and wired telephones are scarcely used, 4G being more reliable than Wi-Fi service).

OSM is the online platform. Signing up, as with Facebook, gives the candidate sudden (if not yet conceived) access to OSM membership. This membership represents access to a huge online learning resource, with several professional-level curricula in modern GIS, all lodged on the 'OSM wiki' (Wikipedia, 2019c). More importantly, the new OSM member now has a potentially direct link to every OSM contributor – the expertise, skills, influence and assistance of hundreds of thousands of like-minded people, on essentially cash-neutral terms.[10]

WhatsApp groups

At the end of each training, a WhatsApp follow-up group is established, by which ongoing support can be given to the trainees and further training opportunities can be established and circulated. This is much more than a social group, however. For those selected as surveyors in this training, a second WhatsApp group will be formed. In a similar model to how local administration uses WhatsApp in Uganda, this will be the coordination tool used for future field-mapping. Outlying surveyors use WhatsApp to send map pins of their position (using OSM for Android/OSMAnd), important feedback relating to marginalised communities and also to transfer digital documents like their GPX (GPS Exchange Format)[11] tracks (collected in the OSMAnd app as they move). These will later be uploaded to OSM as roads/paths (sometimes roads are obscured from mapathon-goers by trees/clouds in satellite imagery).

Field training

This second day is an intensive day of field communication technique training with the best candidates selected from the day before. Real pre-prepared UNHCR/HOT surveys get workshopped and adjusted according to the area-specific services and hazards feedback gathered during the previous day's training. Surveyors are split into groups of three – an interviewer, an interviewee and an evaluator. The groups do a round of rehearsal in each of these roles and then a feedback session is held, where comments are shared about the sessions and also about the forms that they will now depend upon (and suddenly have much more commentary on!). Certain questions are now

10 Unless monetised by humanitarian funds, the process of mapping exists robustly around the world in 'open' collaborations between developers, philanthropists and business people.

11 GPX is an XML schema designed as a common GPS data format for software applications (Wikipedia, 2019a).

understood to be irrelevant, inappropriate or badly worded (and get updated). One such adjustment was made when selected surveyors came back on day two and described survey changes that needed making: in Uganda, refugees are formally assigned blocks in refugee settlements. But in many instances, the question 'What block is this?' needed adjustment from 'block', to 'tank', because water tanks – installed albeit temporarily – had taken on community significance as meeting points and community identifiers. The survey was duly changed and a new global OSM convention was proposed. The focus of HOT Uganda's work is partly on the collection of data, but also the communication of the terms attached to the universal spatial language of the map – the 'legend' – an arbitration of signifying systems by society; a dynamic connection of 'text with technology'.

HOT trainers often learn techniques from these ever-resourceful locals, particularly smartphone tricks. Sophisticated techniques develop out of resource-poor necessity. Community surveying is an exercise in dramatic role play, and the most productive of all the sessions. It is also the first time that the importance of local semiotics of tagging and taxonomy is discussed.[12]

After some more rounds, surveyors go on foot into the surrounding area, accompanied by a trainer, and conduct surveys in the local village/block. When they return, their data (which in their survey app has been configured to automatically 'send when finalised'), can now be seen on the online server (data collection and visualisation web page), with timestamps and locations attached. It can be viewed as a map, graph, list and many other options. This is when, for many of the trainees, the transparency and accountability of the process is revealed. They can claim that they asked a certain question in a certain place, but if the server places their geo-point somewhere else on the map, their colleagues can see otherwise. Initially, surveyors do not expect their work to be so visible and this can lead to a lot of hilarious interactions. Surveyors also manually report their surveys on the team WhatsApp group, as well as regularly checking in with a location pin to show where they are (live information is sometimes necessary for team security around border areas). As soon as the reports match the data seen by the field coordinators on the Kobo/ODK server, the remote mappers are paid for that day's work, using another local technology, 'Mobile Money' (the mechanism for most personal banking in Uganda) (Wikipedia, 2018).

12 WikiProject Uganda (Wikipedia, 2019c) also outlines the tagging conventions specifically negotiated by OSM contributors with the OSM Federation, as a new language of address between refugee and hosting communities on the ground, and common to the community of 'open' geography worldwide. These terms now serve as a refugee-context tagging taxonomy in emerging refugee environments being mapped around the world (e.g. Rohingya).

Figure 9.6. Local people, local tech: mobile infrastructures are more resilient. Smartphone charging in the field.

Motorcycle mapping

To optimise the speed at which this data can be collected, local forms of transport infrastructure are employed. At the end of this second day, surveyors are introduced to their new partner: the boda boda (motorcycle) rider. Motorcycle riders are selected, under supervision, by the surveyors, on the basis of geographic/local knowledge, language knowledge and professionalism. The two-person team then works together to strategise and navigate the region they are mapping. The robust security and logistics network of commercial boda boda fraternities is brought to the campaign by this partnership. With motorcycle mapping, collaboration takes place as occupational engagement between all participants, while the boda boda riders themselves are encouraged to learn and participate in the OSM process, bringing a number of fundamental assets, meanings and geographic practices to the table. Not least of these assets is the mobile infrastructure of the boda boda itself – particularly the battery, which is used to charge the team's smartphone (see Figure 9.6).

(In)Formal field ontology: walking the walk

Northern Uganda fieldwork is punishing. It takes hard work and surveyors physically visit every single feature of every single village. It cannot be done using short cuts, or 'telepresence'. The essential core of the project is a collaborative attitude and the ability to communicate. This will be what

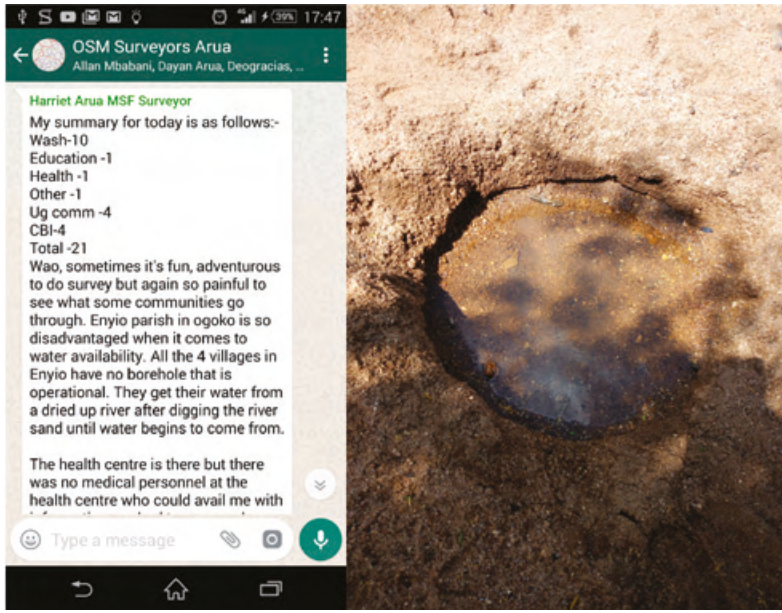

Figure 9.7. Surveyor: Harriet uses WhatsApp to report local detail and takes a geo-tagged photo of a riverbed, dug-out in desperation by drought-ridden villagers, as an informal public amenity. OpenStreetMap Key and Tag conventions will be attributed: 'man_made' = 'unprotected_well'. Locals, who will hold situated knowledge about their shared resource, are encouraged to contribute to attribution details in OSM.

gets a field surveyor the data (and the acceptance) they need. Fieldworkers will be badly received in the rural communities if they cannot convey why HOT's survey is different from the other hundreds of surveys more accessible communities regularly answer. To make data under the OSM orthodoxy useful to humanitarians, the data model remains continuously collaborative between HOT and UNHCR sector leads (Wiki OpenStreetMap, n.d.), in an attempt to maintain optimal alignment between OSM tags and UNHCR indicators. Local geospatial indicators apply to all of the humanitarian sectors. The surveyors, communities and interviewees all (ideally) continue to modify and collaborate on these as well. Five surveys are performed on each community, and then linked together by a sixth, introductory community profile survey that is carried out on arrival in each village or refugee block. Surveying is not an isolated event and happens in community discussions of how local priorities can be recorded.

The result of OSM mapping is a combination of both the official coordination data requirements and how the refugee community want to identify their needs

Figure 9.8. This (Formal) Public Amenity – a borehole with handpump (`Bush Pump') would be 'coded' in OpenStreetMap with the conventions of Key and Tag respectively. In this instance, 'man_made' = 'water_well', and 'pump'='yes'.

for themselves. So informal interventions are also mapped; traditional healers get mapped and tagged as 'health features' alongside large NGO hospitals; dug-out wells in dry riverbeds (WaSH) are mapped and detailed (see Figure 9.7) alongside formal bore-hole installations (see Figure 9.8).

Mapping all features that are tagged as 'non-functioning' precisely identifies service deficiencies, but integration of WaSH and education cross-sector information can be visualised in walking distances to water points and schools to predict school truancy (children are traditionally the household water collectors). Maps that can show flooding wells lying close to flooding latrines have a very real impact on cholera outbreak control. A well-known cross-sector analysis of data in context is on unlit latrines (UNHCR, 2017a). Women (a large proportion of the population[13]) report sexual violence when using services at night and these hotspots can now be geographically pinpointed (REACH/UNHCR, 2018). Resources such as trauma care

13 Reports by the UNHCR in 2017 that 'more than 85 per cent of South Sudanese refugees in Uganda are women and children under the age of 18' seem unfeasible, but numbers are understood to be large (UNHCR, 2017b).

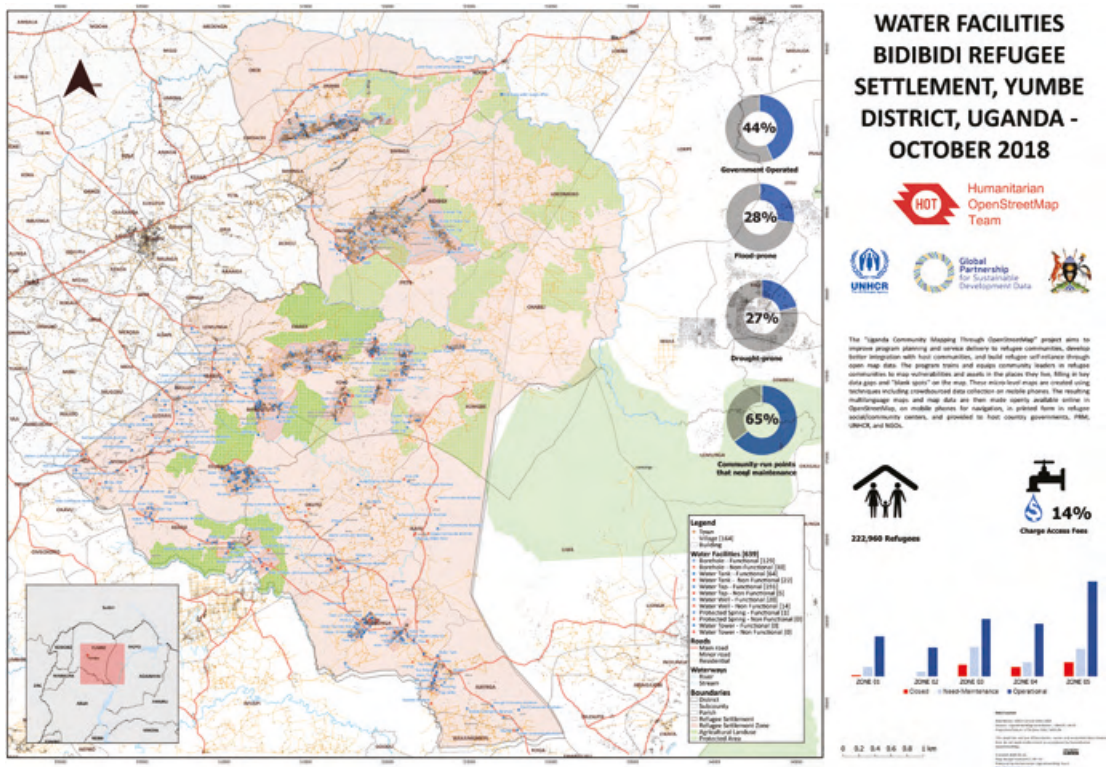

Figure 9.9. Community-witnessed data on water supply in the Bidibidi settlement, Yumbe, Northern Uganda.

(health) and lighting (physical planning) can be allocated to latrines/wells (WaSH), per location (protection).

These combinations of data are endlessly useful (see Figure 9.9) and the potential basis for future disaster preparedness (an Ebola outbreak, for instance) is provisioned for. This kind of data is received with open arms by local field offices, and at this point, the project shows an openly compatible geospatial platform connecting historic geospatial records and new community witnessed data with the outside world: connecting the 'specific' to the 'universal').

Mission accountability and financial transparency

Field-mapping campaigns can continue for weeks and months, with diminishing need for on-site supervision, as new leaders emerge in the teams. HOT have scaled projects into new areas by transferring increasingly skilled community members to lead. Many of the refugee and host participants come from violent and mendicant cultural settings where, after generations of (cross-border) war, the value of long-term planning let alone job security is seldom experienced. Surveyors can be put off by the exacting nature of the role, but a very satisfying work ethic often starts to evolve as daily wage payments stay transparently regular and 'their' map gets visually filled in and becomes visible on their smartphone app. As the surveyors graduate into fieldwork, they also start learning data cleaning from coordinators.

Accountability is conceived in other directions too. For humanitarians, it is fundamentally a transparent, cost-neutral project by which donors can engage and collaborate with their field counterparts, giving time rather than money to support the production of commonly owned visualisations from satellite and field data. Remote mappers as 'donors' in far-off mapathons see features that were simple shapes, lines and points getting names and attributes attached and indicating ground-truths.

This hyper-local accuracy demands participation. It involves surveyors and their communities in making decisions. Data collected in the field by HOT in Uganda enjoy strict data cleaning and total control at source. OSM can only share geographical and technical information about features themselves. However, certain data such as population or numbers (and locations) of disease cases may comprise vital narratives for responders. Surveys are therefore split by column of data type in a spreadsheet and human and demographic data are carefully anonymised and secured with different permissions. This separation effectively secures the system. It is how HOT are able, in conjunction with local police, to securely manage victim self-reporting of female genital mutilation in Tanzania.[14]

14 See HOT Tanzania on YouTube, https:// www.youtube.com/watch?v=QfprlqTk6i8.

The argument for lo-fi tech in humanitarian interventions

HOT has no direct competition in tackling the many geospatial issues faced by the UNHCR (digital inclusion, community engagement, cultural integration, accountability). But is OSM digital humanitarianism? Can its post-digital capacities offer insights into disentangling the problems of humanitarian digital telepresence? Or is HOT's brand of crowdsourced innovation just another contributor to the problem of innovation overload? Certainly, the revolutionary nature of device-based participation is not a catch-all humanitarian solution.

Glasze and Perkins (2015, p. 144) argue that 'researchers might also deploy mixed and ethnographic approaches, in order to learn more about particular moments of mapping practice'. HOT's data are technically accurate (up to 0.6 metres current smartphone accuracy and locally triangulated survey checks), but it is not 100 per cent 'true'. Nor does it claim to be. The process of collaborative/collective mapping is a strong 'legible' example of how technical solutionism can form an important consensually agreed situated knowledge between two or more cultures. Open data is 'in process': it is iterative and reiterative. Field mapping involves constantly changing versions of the map areas to be printed, used for navigation, adjusted and updated through digital upload again; then redownloaded and used for planning and navigating once more.

OSM is not made of software short cuts. In fact, it explicitly relates to the physical. It is by no means intrinsically digital,[15] but a some-time analogue, post-technological interpretation of everyday surroundings, a creation of human connections within communities in need. Without physical presence, HOT could never hope to have the impact it has. On the ground in Uganda, HOT's mantra is 'Local people, local tech, just add knowledge' (HOT, 2018). OSM has important analogue tools that use post-digital locally inclusive technologies such as pen and paper. 'Field papers' – A4 printouts of sections of OSM maps – print QR (quick response) code geolocators on to each of the map sheets. Once hand-drawn and written information is noted on the paper in the field, a photo or scan of it can be digitally geolocated by OSM editor software (e.g. Java OpenStreetMap Editor – JOSM). Editing can then be done between the paper image and the satellite image and merged as edits to OSM.

Cross-fertilising qualitative and quantitative data

There are various ways to check qualitative data and the ideal is to combine it not only with quantitative data, but with diverse approaches and opinions. Highly efficient dispersed consensus is reached by using the community themselves,

15 Or even the 'Internet of things'.

having them work together and cross-check each other's work. One key component of the Uganda community mapping project is the process of returning paper maps to settlement zones and sub-counties where the data originated, for review, further input, cultural ownership and continued participation.

To mitigate for misinformation (e.g. indiscriminate denial of any services in a community, to leverage more NGO finances), debate is triangulated by the surveyor in the public outdoor space of the village/settlement. Data are then cross-checked later through other local sources, and callbacks are conducted (using the contact number collected with the geo-point). This makes for a triangulated quality-checking process. In OSM, data are there to be contested, interacted with, then corrected; then updated again, then contested, ad infinitum. The terms, or 'taxonomies', are proposed for and agreed by consensual majority.

Individuals will sometimes give misinformation that they believe is expected, or for personal gain. HOT's ability to comprehensively map every single feature on the ground in every community has meant that real numbers and percentages can be cross-referenced with reported attitudes and perceptions of these realities projected from quantitative sample surveys. OSM-engaged NGOs are asked for their input as an organisation and often share qualitative data with the team.

Extrapolations from qualitative data are extremely useful for all aspects of humanitarian decision-making. The mass smartphone-enabled quantitative data allows not only evaluation of this, but radically changes the spectrum of possible analytics. Very basic data analysis can reveal extremely accurate numbers of people affected in exact locations, by assessing qualitative data on population per household and remote-mapped shelter imagery. In an ideal world, both qualitative and quantitative formats of data are used in tandem like this, for a rich and informed picture. Data are useless without analysis, and again, the truly useful information is to be found in the contest between the two types of data. Questions arise such as: 'Why are these data different?' and 'What issues are we missing here?' Qualitative data may express or contradict a narrative clearly visible in physical quantities (e.g. of patients near hospitals, teachers per schoolchild, refugees per settlement), and quantitative data should always be analysed in terms of what qualities they convey.

In all instances of humanitarian crisis, fieldworkers unanimously agree that any data is better than no data at all, and the 'rapid-cycle mapping' (Johnson et al., 2010) work of projects such as HOT/Missing Maps comprises an invaluable resource for most emergency data needs – even when incomplete. In practical terms, open data arguably benefits from its own self-professed fragility and this contest leaves important space for empathy and interpretation.

Principles of contest and consent: choice and community protection

The evolutionary nature of the ongoing and dynamic map is a major part of the HOT message in Uganda. Surveys collaborated for the community (by the community) adopt local terms to identify hyper-local assets. Unlike authoritative data, it is mobile, interactive and free from the requirement to claim fixed accuracy. That it claims no reassurances makes for the argument of a safer system in terms of credibility, trustworthiness and expertise.[16] OSM demands interaction, and is available on smartphone apps (Maps.ME, OSMAnd), by which it can be endlessly updated. Surveyors see new uploads as soon as the latest updates appear online. The reciprocal relation between local and global technologies and local and global communities is key. It is processual and internationally collaborative. It is a conversation.

Whether or not the participatory nature of OSM positively recolonises the map and its users, it does at least engage the users in a debate of its own maps and the proverbial 'ink with which they were written'. The personal 'epistemic disobedience'[17] afforded to each human participation to OSM is a highly important component of protection and representation. The participant becomes invested. People can delete their data on OSM. Hyper-local accuracy demands participation and it involves surveyors and their communities in making decisions.

This physical human choice is vital to mediate the digital machine at either end. The imperative to intervene has been encountered by HOT in other settings, where under changing political landscapes, undocumented immigrant data can fall into different hands over time. OSM data can be dangerous too. For example, in an informal settlement in Zimbabwe, local knowledge of 500,000 unofficial residents was mapped, but accuracy was restricted to only neighbourhood-level resolution. This vulnerable undocumented community needed representing, but although OSM was technically capable of identifying individuals house by house, mapping them would potentially expose them as well as represent them. The last few metres of tracing individuals was done by spoken word, ultimately maintaining anonymity.[18]

The capacity for participator feedback is key to responsive and responsible mapping. What cannot be forgotten is the physicality of communities and people in the field, and the difficult but rewarding work of the surveyors in

16 This form of 'consensualised' accuracy is effectively assessed by Muttaqien et al. (2018, p. 1324) as 'aggregated expertise'.

17 'Epistemic disobedience' is touched upon by Walter Mignolo (2009, pp. 7–8) as one of the conditions of 'decolonising' identities.

18 Missing Maps, Zimbabwe, MSF, 2014, see https://wiki.openstreetmap.org/wiki/Epworth_Mapping_Project#Neighbourhoods.

translating this reality. Dayan, now HOT field team leader for West Nile, reported diplomatic discussions in which refugees, living in often bullet-strewn border communities, fear being surveyed, 'since most of them are traumatised'. He explains that the nature of the mapping work finds that 'many [of the rural villagers] are political or military'. He went on to report:

> Before I left that village that day, I had to address questions of what we were doing … to give them a very clear picture of what HOT does … Because they ran away from violence, they receive me in a hostile way … We have to take time, so that they will understand that what we are doing will help them to have access to those facilities on the map.[19]

Textuality, addressing, semiotic coding

Paglen (2009, p. 1) writes that: 'In a nutshell, the production of space says that humans create the world around them and that humans are, in turn, created by the world around them.' As 'poster-child fetishism' or 'disaster tourism', static snapshots can quickly come to misrepresent. The concept of 'address' as verbal text quickly comes to have a lived (interventional) impact in humanitarian information management. So it is imperative that the interactive nature of digital mapping can represent – but also protect – those it serves. Open Data Kit (ODK) digital survey forms are a way of linking words to objects in a coded material way. OSM mapping practice seems to show that chosen words, descriptions and explanations are just as important as technological empowerment.

As mentioned above, communities under survey sometimes express answers that clearly reflect how they would like to be seen and perhaps not how they *actually* appear to an outsider. OSM allows for plural expressions of reality on the ground and often finds communities preferring more unexpected indicators. An example is local insistence on anglicised – not tribal – spellings of village names. The reason for this pedantry is the desire for information to be known and trusted in the right way by decision-makers, which may have a visceral impact in life-threatening situations of emergency administration.

Reality, representation and counter-mapping

In *The Freedom of the Migrant*, Wilem Flusser (2003, p. 86) writes that 'the creation of new information depends on the synthesis of prior information. Such a synthesis consists in an exchange of information … One can therefore speak of creation as a dialogic process, in which either an internal or an external dialogue takes place'. Texts such as *Mythologies* (Barthes, 1973) questioned the existence of a singular extrinsic reality, and this (and other) studies of semiotics investigated

19 Interview with Dayan Amandou, field team leader, 22 Feb. 2019, HOT Country Office, Kampala.

how ordered relations (codes) of significance create their own meaning. The deconstruction of this idea that humans are subject to only one (dominant) reading of meaning created, in both philosophical and practical terms, space to effectively reinvent meaning. The social constructivist project of OSM enacts this conception through address, creating a language of action and meaning within tagging conventions. OSM discourse tries to accommodate plural ontologies of place, but convey a unified meaning (even if that is characterised by contest). Interpretation happens in the construction of relevant survey questions, but also in the collection of those data. A transposition of 'the virtual' to 'the real'. As Barnes and Duncan (1992, p. 6) put it: 'A landscape possesses a similar objective fixity to that of a written text … [becoming] detached from the intentions of its original authors … various readings of landscapes matter more than any authorial intentions … [are] constitutive of reality, rather than mimicking it.'

Through the creation of the 'legend'[20] of the OSM map, we can infer that participants are subjects, auto-ethnographers and authors, simultaneously. OSM sets up the map landscape as an 'interrogative text', 'disrupt[ing] the unity of the reader by discouraging identification with a unified subject of the enunciation' (Belsey, 2003, p. 91). Meaning-making in OSM presents a condition of contest and consent, but it is vital that this interrogative feedback loop be maintained.

Satellite gaze: power, smoke and mirrors

In the years leading up to the launch of GPS, thinkers like Foucault ([1966] 1970) popularised disruptive readings of spatial intersubjectivity, rewriting object–subject relations in cultural sites of 'gaze' such as Diego Velázquez's painting *Las Meninas*, an interrogation of dynamic politics of intersubjective gaze in art and contemporary cultural theories. Mass production of GPS made available a technology that could similarly politicise the shifting gaze of international intelligence. So substantial has been this 'prospect-shift' that eventually the preoccupation with 'who is looking at whom' arguably diverts even heads of state themselves from linear notions of truth or news and they can become associated with ever-receding versions of populist reality.

Byung-Chul Han (2017, p. 1) writes that, 'Today, we do not deem ourselves subjugated *subjects*, but rather *projects*' (original emphasis). Expansions of Jacques Lacan's 'real' into 'symbolic real' (Žižek, 1999, pp. 222, 276) debate how media constructions of consensual and interactive reality influence contemporary understandings of 'the self'. Certainly interactive media overtly exploit ambiguities in 'mapped truth' (e.g. the *Pokémon GO* computer game using OSM), thereby positing a version of reality altogether different from

20 Indeed, the very word 'legend' implies shifting mythologies around definitions of fixity.

the version that traditionally presides.[21] Consent lies in the 'common land' of a space, but in a world in which terms like 'augmented reality', the 'real' and 'the hyper-real' are now in slippage, critics like Žižek (1999) contend that interaction, or a Foucauldian address process, secures credibility of truth: space has become a process, rather than an object.

Studies of human production of space have traditionally associated the perception of landscape texts with social and political manipulation. Jay Appleton's (1975) analysis of landscape poetics describes how estate landowners during periods of imperial growth in Britain demonstratively implied dominance by installing elevated buildings and watchtowers on landscaped grounds. This spatial aesthetic of cultural dominance over estate was coined 'prospect theory'. It features in subsequent writings on territory and colonial gaze (Fitter, 1995; Turner, 1981). Prospect theory was interestingly extended by Appleton (1975) to the concept of 'indirect prospect symbols': viewpoints overlooking (imaginary) territories at the peripheries of large country estates. According to Appleton (1975, pp. 80–1), these 'symbolically invite the speculation that they command a further field of vision'. Through this extension, not only do you govern all you can see, but by implication, all that can be seen from your outlying viewing positions.

So how does this apply to satellites and their cameras? Discussion becomes interesting when 'selfie' culture is applied to the placement of the satellites as a technological entity and the semiotics of 'indirect prospect' take on an extra dimension. According to Senft and Baym (2015, p. 1589), the selfie is a

> cultural artefact and social practice. A selfie is a way of speaking and an object to which actors (both human and nonhuman) respond … Selfies function both as a practice of everyday life and as the object of politicizing discourses about how people ought to represent, document, and share their behaviours … also a practice – a gesture that can send (and is often intended to send) different messages to different individuals, communities, and audiences.

As a GIS, the OSM community effectively sees itself through its own satellite cameras. Humans, in selfies, look at imagery – effectively of themselves – but through the lens of their own machine. And that gaze becomes modified by the act of looking. The communication of prospect here, too, becomes reciprocal between subjects and objects, and exploits that which (traditionally) has exploited it. In Bidibidi, the example of community agency was documented in the BBC series *Equator from the Air*.[22] The feature concerned itself extensively with the reciprocal relation between recording and creating the peri-urban order that is coming to signify 'Bidibidi the city'.[23]

21 Lacan's psychoanalytic writings on the 'mirror stage' of individuals have been developed into a politics of self-reflexive (inter)cultural identity.

22 *Africa: Equator from the Air*, BBC2, London, 26 May 2019, Network/National Television and online.

23 See Henri Lefebvre's discussion of the 'right to the city' (Lefebvre, 1968).

Subject, object, fetish and factish

The language of address and self- address in the theatre of crisis has long made reality itself a contest, with the process of its creation becoming increasingly inclusive. According to Scott Blinder (2012, p. 4), 'public opinion toward immigration is directed toward "pictures in our heads" of immigrants rather than immigration per se'. If the communities in Uganda own each survey data set, images from the field may, under the OSM rubric, reappropriate 'disaster tourism'. The representation of the subject in humanitarian intervention is something in which persons of concern take a keen interest. Selfie culture has become an intrinsic part of the media production–induction–consumption loop, but what may seem a superficial product of northern hemisphere narcissism is, not only ubiquitous but culturally contingent.[24] Loaned smartphones return from the field full of surveyor selfies.

The underlying message of the OSM processes in Uganda is one of reclaiming the map, with situated knowledge as a fundamental practice. 'Language is the medium through which a hierarchical structure of power is perpetuated, and the medium through which conceptions of "truth", "order", and "reality" become established … such power is rejected in the emergence of an effective post-colonial voice' (Ashcroft et al., 1989, p. 7). This voice finds itself *decolonial* in OSM (Mignolo, 2009). The data of the community belongs to – and in – the communities that it represents. With an open market on digital engagement itself, the responsibility to engage can now tackle real-time issues of misrepresentation, engaging with 'voluntourism' – and even cultural appropriation[25] – in the process.

OSM advocates could argue that, possibly for the first time, the subjects of disaster mapping may hold full control (and consent) over the artefacts of their own data. Bruno Latour's (1999, pp. 1–23) exhilarating discussion of cultural appropriations of myth in 'the slight surprise of action' opens up this meaning-making and ownership process a little further. It contemplates fetishisations as sites where collisions of object and of place seem inevitable. Latour discusses 'fetish' becoming 'factish' in the contest of cultural appropriation and iconoclasm. Ultimately, he argues that the object gains meaning only once that very meaning is challenged by the iconoclast. Paradoxically then, the iconoclast enables the meaning s/he objects to: a cyclical generative and degenerative process.

Latour uses the example of the Nepalese legend of the Jaggernath and the magic stone, in which the teacher (Jaggernath), seeks to emancipate his

24 Google reports that in 2014, people took approximately 93 million selfies per day on just Android models alone (Brandt, 2014).

25 This is something to consider even in the work of MSF ex-patriot workers, as Redfield (2013) and Givoni (2011) remind us.

community from subjugation in the worship of an untouchable stone (the saligram). The protagonist breaks the taboo of the saligram[26] by picking it up and forcing the awestruck community members to touch it too. The action provokes a revulsion not towards the controlling myth of the stone (which remains, if anything, *more* untouchable and sacred), but towards the attempted emancipation of the myth-busting process itself. Most of all, the essay describes the dehumanising of the iconoclastic protagonist, Jaggernath. And so, identifying components of meaning-making here (or to refer to Tim Ingolds (2011), the 'ink with which it is written') may not be what the community wants. Equally, post-structuralist camps might argue that society depends on consensual mythology to maintain social cohesion, and that there exists an intrinsic dependence upon 'legend' for meaning as a whole.

An iconographic parallel may be found in the representational politics of an installation in the Namibian desert, in which a solar-powered sculpture, with an MP3 player embedded, plays a sound reproduction of Toto's 1982 hit 'Africa' on a loop: 'The artist set up an installation called *Toto Forever*, made up of six speakers attached to a blue MP3 player – whose only song is *Africa*, set to play on an infinite loop – all standing atop white rectangular blocks set up in the sand. The installation, Siedentopf writes on his website, runs on solar batteries "to keep Toto going for all eternity"' (Aratani, 2019).

The song 'Africa' by the band Toto is a cultural appropriation of some distinction, which seemed to smooth out the squalor, injustice and discomfort of a 'real' Africa for a 1980s pop music audience. The song is noted playing in African bars by some who spent enough time there to remember how this romanticism of Africa from afar seemed incongruous with the realities of Ethiopian famine, apartheid dissolution and the West African civil wars. However, played in bars it is. And owned and loved by Africans, too. There is a 'reterritorialised' capacity to this, one could argue, in which its semantic script has been rewritten. And like the installation in the desert, the iconography has come to define the continent that, contested by all who engage, wilfully claims its right to a decolonial description or 'tag'. And this seems disobedient. Ironically, the main visual feature in Toto's pop video from the same year is – wait for it – a map.

Mobility, resilience and united statelessness

A conception of 'home' as a 'place' (rather than a 'process') implies threat to many in the world who do not self-identify as refugees. But mobility of meaning does not seem here to challenge social cohesion, but rather make it stronger,

26 Note that the taboo itself is not the same entity as the object.

through a debate of reciprocated relativist self-professed fragility. Stability in this territory comes from aggregated risk, resilience from connectivity and impact from participation.

Contemporary debate on the grey area between enforced and voluntary migration 'must account for the multi-causality of population movement' (Parater et al., 2019). Although traditional assumptions link displacement with disadvantage, global societies increasingly question the idea of home as a place, citing various reasons for embracing geographic fluidity. Questions around choice in itinerance are found across cultures, and these cultures are beginning to demonstrate connections. Digital nomadism is prized by some as an uber-class luxury in non-disaster settings, and in fact the ethos of this nomadic practice favours similar values of creativity, improvisation and community self-governance, which seem missing from the contemporary mainstream. OSM potentially connects these groups across cultures.

Discussion in this chapter has been concerned with mobility: mobile meaning, mobile infrastructure and mobile networks (in more than one sense). The lack of formal infrastructure in many sub-Saharan African settings is rapidly emerging as something of an advantage in a sociopolitical environment of mobile lifestyle (and even mobile meaning). Resilience derives from adaptability. Some might say that the historical fragility in many parts of Africa renders populations adaptable, immune to reliance on hard-wired infrastructure (e.g. copper telephone lines) so counted on by the global North. Mobile networks (commercially viable on a free market) make itinerance relatively dependable. Although settlement environments are deemed precarious, reliability is something that is immediately visible by line of sight (booster masts are prolifically installed). Here, network is physically present, not a blind function of unseen bureaucracy. And here, too, commercial interests can be legitimately hacked for social advantage.

Conclusions

Perhaps OSM collaborators create terms that challenge inevitable subjectivity, where the very fact of intersubjective expression can empower a liberated language of action. The terms afforded by OSM are owned by the local communities and their spokespeople. In Sierra Leone, motorcycle mapping has revealed villages self-identifying their particular locations as under one chiefdom even though the territory itself is spatially isolated from the main geographic body of that chiefdom: an island of local geopolitical significance.

Nobody – and yet everybody – owns OSM. The auto-ethnographic distributed quality of OSM is, perhaps, a coping mechanism in a world where truth is increasingly fragile. One of the engagements that has helped OSM to

be accepted in Uganda is ongoing HOT collaboration with Uganda's National Bureau of Statistics (UBOS) (Allan, 2018). Serious efforts are now afoot to undertake the next national census using OSM tools. If this is implemented, it would make Uganda a global pioneer in the adoption of these accurate, cost-effective and sustainable methodologies (and, in a cartographic sense, the most plurally inclusive nation on earth). It is clear that Uganda has a need for a robust, self-reliant and sustainable infra-structural system using OSM, which can have shared and minimised cost. This need is demonstrated through support from the World Bank and various UN agencies, but intervention methods used in Uganda need to merge with – rather than disrupt – existing local administrative systems. Responsibility needs devolving across citizens and sectors alike. For this, the accountability and granularity of OSM needs to be seen as enabling, rather than threatening.

OSM has been called a 'do-ocracy, meritocracy, technocracy, and bureaucracy … a radical change that is significantly different from other digital mapping projects' (Glasze and Perkins, 2015, p. 153), and it does seem a viable model for practical social constructivism. Solutions to crises are perhaps to be found in more human engagement with technology, but traditional social mechanisms seem able to reboot too, in this emerging post-digital mode. OSM's dealings with fragility firmly locate it in the realm of the self-organising systems which Connolly (2013, p. 119) identifies, of 'plural assemblage … composed of those sharing affinities of spirituality across differences of creed, class, gender, sexual orientation, and ethnicity'.

Innovative technical solutions (hacktivism, liberation technology) increasingly find post-digital recognition in self-governing communities like OSM, thereby making the 'radical desire to change the world'[27] less and less restricted to the economically privileged. A future where borders, boundaries and terms like 'alien' become redundant envisages global mobility, post-capitalist inclusivity and peer-to-peer pro-poor social cohesion becoming part of everyday existence. In the light of actor-network theories of social cohesion, those preoccupied with containment of territory and displacement may learn from the more resilient models of cooperative and adaptive community interventions to define mobility in its gathering global momentum as an inclusive expression of defiant and united statelessness.

27 A characteristic of 'boatpunks' – digital nomads who typify aspects of this global 'neoclass', see https://www.thelifenomadik.com/blog/tag/boat-punk.

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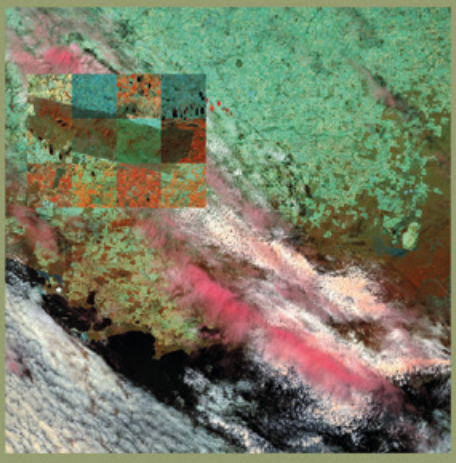
Index

Note: page numbers in *italics* refer to figures.



Cover image: '12 Months Over the Stirling Ranges' (detail), Grayson Cooke, 2018. A false-colour composite image of Stirling Range National Park in Western Australia. This image has been produced with the support of Geoscience Australia, and with the assistance of resources from the National Computational Infrastructure (NCI), which is supported by the Australian Government.

The digital age has thrown questions of representation, participation and humanitarianism back to the fore, as machine learning, algorithms and big data centres take over the process of mapping the subjugated and subaltern. Since the rise of Google Earth in 2005, there has been an explosion in the use of mapping tools to quantify and assess the needs of those in crisis, including those affected by climate change and the wider neo-liberal agenda. Yet, while there has been a huge upsurge in the data produced around these issues, the representation of people remains questionable. Some have argued that representation has diminished in humanitarian crises as people are increasingly reduced to data points. In turn, this data has become ever more difficult to analyse without vast computing power, leading to a dependency on the old colonial powers to refine the data collected from people in crisis, before selling it back to them.

This book brings together critical perspectives on the role that mapping people, knowledges and data now plays in humanitarian work, both in cartographic terms and through data visualisations, and questions whether, as we map crises, it is the map itself that is in crisis.

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