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The humanitarian 'digital divide'

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Acronyms

4IR	fourth industrial revolution
AHA Centre	ASEAN Coordinating Centre for Humanitarian Assistance on disaster management
AI	artificial intelligence
CIA	Central Intelligence Agency
DFID	Department for International Development
ICE	Immigration and Customs Enforcement
ICRC	International Committee of the Red Cross
ICT	information and communication technology
ICT4D	ICT for Development
IFRC	International Federation of Red Cross and Red Crescent Societies
INGO	international non-governmental organisation
ML	machine learning
NGO	non-governmental organisation
oPt	occupied Palestinian territories
UAV	unmanned aerial vehicle
UNHCR	United Nations High Commissioner for Refugees
USAID	United States Agency for International Development
WFP	World Food Programme

Executive summary

The rapid adoption of digital technologies in the humanitarian sector has already changed how responses are designed and delivered. Digital technologies – understood in this study as information and communications technology (ICT), including mobile phone applications, biometric identification systems and various mapping tools – promise a means of delivering relief at scale in a quick and cost-effective manner. With internet access having grown tenfold since 2000, mobile operators connecting 700 million new subscribers in the past three years and a proliferation of tech hubs and start-up businesses in the global South, new technologies also allow people affected by crisis to hold organisations to account and improve their own response capacities.

There is an assumption in the sector that digital transformation will make humanitarian responses more inclusive, and in some areas this has been the case. For example, initiatives involving participatory mapping have increased the visibility of otherwise marginalised residents of informal settlements and displacement camps, crowdsourcing platforms report dangers in conflict contexts, and social media can disseminate critical information in health emergencies further than was previously possible.

However, ensuring that people affected by crisis have access to the assistance, protection and information they need for their survival and recovery, irrespective of who they are, has proved difficult to achieve in digital terms, despite inclusivity being an important goal for the sector. The concept of a 'digital divide', which often falls along gender, geographical, economic, age and other identities that intersect with existing vulnerabilities, is not new. Access to, meaningful use of and participation in the design of digital technologies is not evenly distributed. Social as well as economic barriers often mean that fewer women and girls have access to the internet or a mobile phone, while younger, wealthier and more urban populations utilise tools such as social media more frequently than other groups.

Inclusion is also limited by in-built biases inherent in many technologies – for instance facial recognition software, whose 'coded gaze' has not been taught to recognise diverse datasets of faces, or automated mapping technologies that lack the contextual understanding to recognise houses in disaster-affected areas. Perhaps most importantly, affected people are rarely included in the ownership and management of their own personal data: a concern receiving renewed attention following reports of poor data responsibility practices on the part of large international aid organisations, and the recent announcement of a partnership between the World Food Programme (WFP) and data analytics company Palantir Technologies. Just as unequal access may exclude some vulnerable groups, questionable practices around informed consent in obtaining biometric data arguably constitute a form of 'forced inclusion', whereby the rights to be invisible or forgotten – viable protection strategies in many humanitarian contexts – are compromised.

In response to many of these concerns, the humanitarian sector has begun to engage with the debates in wider global civil society around data responsibility and 'doing no digital harm'. Yet it must be recognised that technology can entrench and increase existing inequalities of power and influence, further excluding the most vulnerable in humanitarian crises. In a sector long defined by unequal relationships, the enthusiastic and uncritical adoption of new technologies may risk cementing power imbalances between international 'responders' and affected 'recipients', and reverse gains made by humanitarian organisations to localise responses.

While further adoption of such technologies is likely inevitable, tapping into their empowering potential will require a conscious effort to avoid reproducing vulnerabilities and inequalities already present. In considering both the opportunities and risks of utilising digital technology in humanitarian responses, particularly through local technology solutions, HPG research will assess the impact these approaches have had on furthering or limiting inclusion, as well as how best to use and adapt these tools to deliver relief and services effectively and impartially.

1 Introduction

Global society is grappling with a wave of digital transformation, described as the fourth industrial revolution, characterised by new technologies that fuse the physical, digital and biological worlds (Schwab, 2017). Within the international aid world and specifically the humanitarian sector, digital transformation is being embraced at varying degrees. While some organisations are approaching it tentatively and in a piecemeal way, others are embedding digital innovation and processes enthusiastically and holistically across the board. But as the Sustainable Development Goals aim to 'leave no one behind', is it accurate to assume that digital transformation will both increase the coverage of humanitarian action and – crucially – its ability to assist the hardest to reach people who are affected by humanitarian crisis?

Unlocking the potential of digital technology offers opportunities to increase the effectiveness, efficiency and coverage of humanitarian action. Digital approaches show promise in different ways – for instance, in collecting and analysing data, such as using drones to map disaster sites, volunteer 'crowdmappers' to process the data and machine learning to analyse large and complex datasets to improve targeting (Meier, 2015). Programming can be streamlined through seamless and secure transfer of digital payments to recipients or by using biometric verification of aid recipients for efficiency and security (Gelb and Clark, 2013; Capgemini Consulting, 2019; Susim, 2019). Technology also connects and gives agency to affected people – for example through apps enabling them to directly contact first responders, or for aid recipients to give feedback to aid agencies and for volunteer networks to fundraise over social media with crowdfunders (Bond, 2018; Currion, 2018b).

However, there are increasing concerns, backed by evidence, about the dominance of technology globally and in development and humanitarian assistance, and the risks such technologies can present in situations of armed conflict (Rahman, 2018; Thomas, 2018). Rather than overcoming the considerable power imbalances already present in the humanitarian sector, fears that technology will maintain and even further the exclusion of vulnerable populations have been raised, particularly in connection to issues around refugee data and identity, fake news propagated by social media and the trialling of technology on the most vulnerable populations (Hosein and Nyst, 2013; Jacobsen, 2015a). There are worries that agencies engaging in digital transformation are not doing enough to be 'intentionally inclusive' or to avoid unintentionally excluding groups who may already be left out of current approaches (Chernobrov, 2018). There are uncertainties around both how to ensure this impact does not further marginalise the hardest to reach or those already left behind and how to mitigate the biases of the technology sector.

While the private sector has often been the engine of innovation in digital technology, there have been legitimate and longstanding concerns from the aid community about its role in its many different dimensions. These include its often-assumed superior competence, efficiency and sustainability, as well as the faith in so-called 'tech fixes' or single products to address needs in complex social contexts. Digital transformation raises the magnitude of those concerns due to the increased potential impact and speed of change.

To explore these issues, this paper draws on a review of literature from humanitarian, development and wider societal sources, as well as interviews with experts and engagement at international conferences and workshops. It is the first output of the 'digital divide' project of the HPG Integrated Programme 2019–2021 (HPG, 2019).

1.1 Terminology

This paper explores digital technology, meaning devices that transmit digital data, encompassing mobile phones, computers and a range of digitally connected devices. This does not include devices using analogue data like radio or television. It focuses on information and communication technology (ICT) such as mobile phones and their applications, rather than wider technology such as cargo drones or refrigeration for vaccines, for example. It references the field of ICT4D (ICT for development), which is also referred to as digital development: an initiative that aims to make technology more accessible to people and economies in the developing world.

Digital transformation refers to the ways in which digital technology can be used to deliver objectives differently – for example through digital cash transfers to aid recipients, or in developing a better understanding and analysis of context – and how it can be employed within aid organisations. To ensure every part of an organisation is configured and connected to do business in the digital era, the necessary systems, policies and tools must be in place, as well as the people and processes necessary to understand and apply digital technologies appropriately. For example, in addition to having the computing power and software to manage beneficiary databases, organisations need to engage in risk management and contingency planning on data policy and procedures in the event of a data breach, and develop and implement policies on data privacy, access and usage.

Technology is intertwined with innovation. While the humanitarian innovation community is very focused on innovation in a number of areas – for example, by looking at processes – it is still the case that much humanitarian innovation activity relates to technology and how tools can be adapted to deliver relief and services more effectively and efficiently in crisis contexts (Obrecht and Warner, 2016).

In understanding the changing role of technology in humanitarian response, the impact of the same tools in the wider development sector should also be acknowledged. For example, the rapid growth of mobile phone ownership is opening up new tools, spaces and dangers in the world's poorest contexts, while disaster preparedness is adopting new digital methods of assessing and disseminating information prior to the onset of hazards (Willitts-King and Spencer, 2019). The 'digital divide' separating those with and without access to various technologies has already been recognised and studied in the development space; in a humanitarian setting, perhaps with heightened vulnerabilities and pressures to intervene quickly, technology may correspondingly present increased opportunities – and risks – which have not been explored so fully (Vinck, 2013; Corbion et al., 2018; Bemo et al., 2016; Mesmar, 2016).

Section 2 of this paper outlines the current landscape of digital technology usage in humanitarian action, key trends and challenges, while Section 3 focuses on the question of inclusivity of humanitarian action relating to digital technology in the context of wider debates. Section 4 identifies gaps in our understanding and outlines a research agenda.

2 Landscape and trends in digital technology

2.1 Introduction

Digital technology has long been an important tool in the humanitarian sector. The response to the 2010 Haiti earthquake was a watershed moment in the evolution of 'digital humanitarians' (Read et al., 2016: 1319), where volunteer 'crowdmappers' used SMS and social media to gather and communicate information (Meier, 2015). Many key trends and tensions in the period since 2010 have been mapped in OCHA's *Humanitarianism in the network age* study (OCHA, 2013) and its subsequent *World humanitarian data and trends* report (OCHA, 2018), as well as the IFRC's *World disasters report* on technology and the future of humanitarian action (IFRC, 2013).

Beyond humanitarian action, the development sector has been increasingly focused on digital tools. The 2016 *World development report* focused on the digital dividend, highlighting that the benefits of greater digital access were not equally shared; without a firmer analogue foundation in terms of regulation, for example, this divide will persist (World Bank, 2016).

Recognising the rapid pace of change and complex impacts on society of technological change, the UN Secretary-General in 2018 instituted a High-Level Panel on Digital Cooperation, which found that successful digital cooperation in an age of 'digital interdependence' needs to bring in a wider range of organisations from the aid and private sectors (UN, 2019). Focusing on the central importance of the private sector and its relationship with other actors, the World Economic Forum Fourth Industrial Revolution (4IR) project explores how to harness the positives and manage challenges (Schwab, 2017). Many aid agencies and funders have published digital strategies and guidance in recent years to frame their approach to digital technology, including the UK's Department for International Development (DFID), the United States Agency for International Development (USAID) and the International Committee of the Red Cross (ICRC) (Kuner and Marelli, 2017; DFID, 2018; USAID, 2019).

A key and widely used framework specifically focusing on the relationship between digital technology and development are the 'Principles for Digital Development', which have been endorsed by 194 organisations including major donors and agencies (Dawson and Davies, 2019) (see Box 1). The humanitarian sector does not yet have its own set of widely endorsed sector-wide digital principles, although principles for certain technologies or applications of those technologies (i.e. the Barcelona Principles for Digital Payments in Humanitarian Response) have been developed and agreed among a critical mass of actors (Tholstrup et al., 2017; see also Raymond and Harrity, 2016).

Box 1: Principles for Digital Development

Design with the user

User-centred design starts with getting to know the people you are designing for through conversation, observation and co-creation.

Understand the existing ecosystem

Well-designed initiatives and digital tools consider the particular structures and needs that exist in each country, region and community.

Design for scale

Achieving scale requires adoption beyond an initiatives pilot population and often necessitates securing funding or partners that take the initiative to new communities or regions.

Build for sustainability

Building sustainable programs, platforms and digital tools is essential to maintain user and stakeholder support, as well as to maximise long-term impact.

Be data driven

When an initiative is data driven, quality information is available to the right people when they need it, and they are using those data to take action.

Use open standards, open data, open source and open innovation

An open approach to digital development can increase collaboration in the digital development community and avoid duplicating work that has already been done.

Reuse and improve

Reusing and improving is about taking the work of the global development community further than any organization or program can do alone.

Address privacy and security

Addressing privacy and security in digital development involves careful consideration of which data are collected and how data are acquired, used, stored and shared.

Be collaborative

Being collaborative means sharing information, insights, strategies and resources across projects, organizations and sectors, leading to increased efficiency and impact.

Source: www.digitalprinciples.org.

2.2 Key trends

Three key trends that are globally relevant to the humanitarian sector are:

1. The growing but unequal access to technology.
2. The rapid pace of change in technology.
3. A gradual geographical shift towards the global South in terms of where changes in tech innovation and adaptation are being increasingly recognised.

2.2.1 Increasing connectivity and technology access

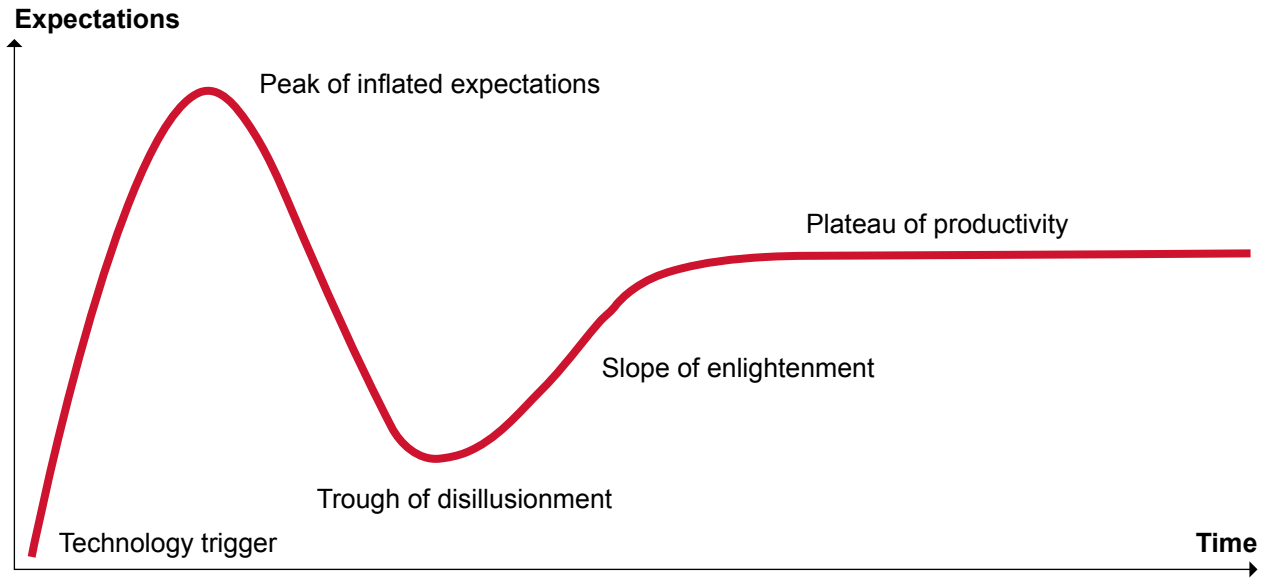
Access to technology has been increasing globally. Internet access has grown tenfold since 2000, with more than 53% of the world's population able to access the internet in 2019 (ITU, 2019). Though this is only 19% in less developed countries, access is expanding rapidly – since 2014 mobile phone operators have connected 700 million new subscribers worldwide, with another billion people gaining access to the internet through a mobile phone (GSMA, 2019). This increasing connectivity in even the poorest countries is often part of a trend of so-called technological 'leap-frogging', whereby a proliferation of mobile phone ownership occurs in contexts that lack older infrastructure such as landlines. Other approaches include Google's Project Link and Loon, respectively aiming to expand internet access through fibre optic cables and aerial balloons, and USAID's mSTAR initiative. However, as this review highlights, this growth is far from equal. In lower- and middle-income countries, women are 10% less likely to own mobile phones than men (ibid.) and a combination of social and economic factors often result in increased growth and connectivity without inclusion. In other cases, vulnerable populations such as refugees are actively denied access to these technologies by host countries, as is the case for Rohingya refugees in Bangladesh (McVeigh, 2019).

2.2.2 Pace of change and the hype cycle

Against this backdrop of increasing access, a key feature of the technology landscape is the rapid pace of change and the fads associated with particular technologies. Analysts refer to the 'hype cycle' (see Figure 1), where hopes of the panacea-like qualities of certain technologies for particular sectors or geographies are raised. These expectations move from the initial 'innovation trigger' to the 'peak of inflated expectations' before descending into the 'trough of disillusionment', then up again on the 'slope of enlightenment' to the 'plateau of productivity' (Gartner, 2019).

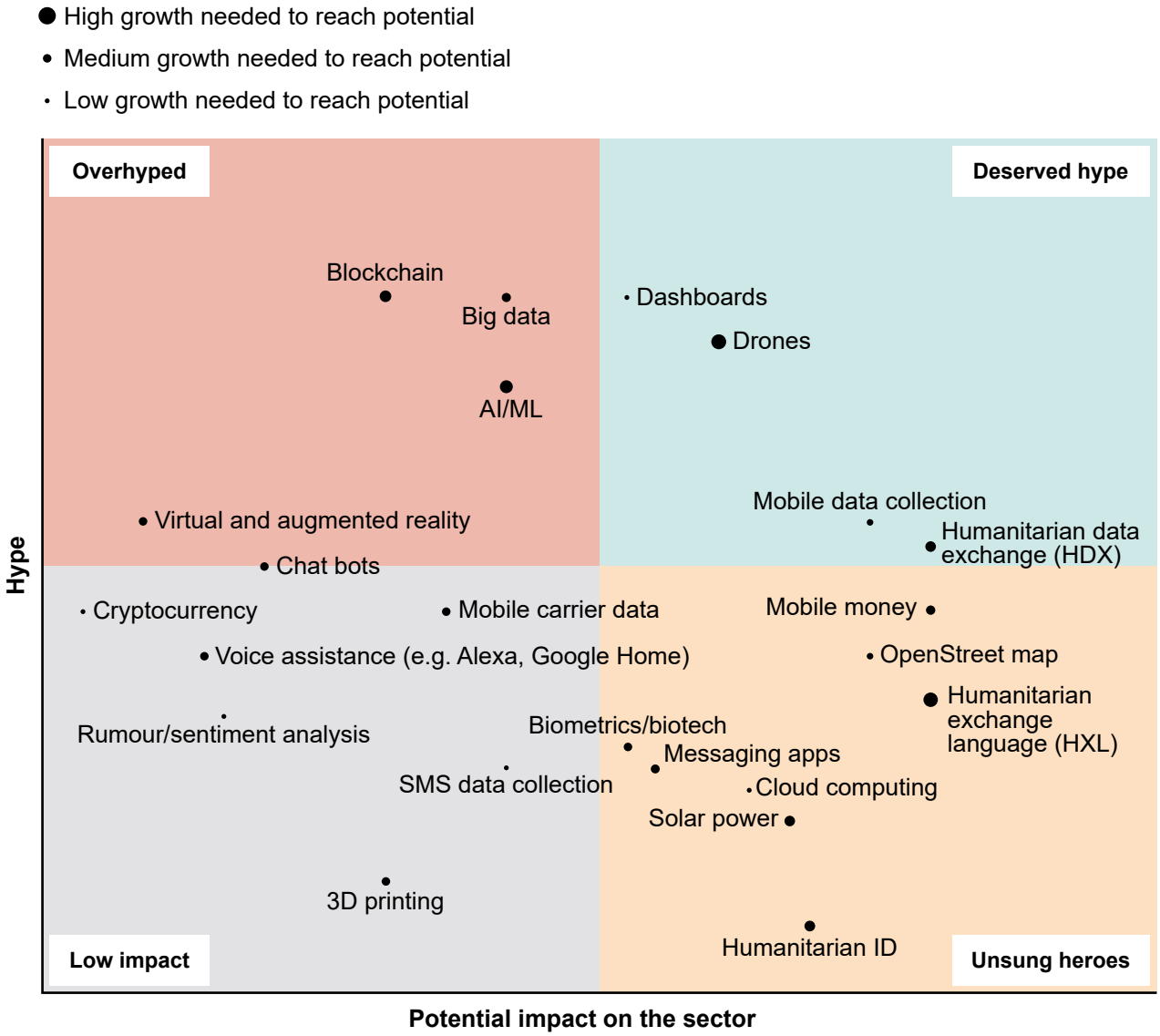
The technology hype cycle in developing countries and humanitarian contexts is linked

Figure 1: Hype cycle for emerging technologies



Source: adapted from Gartner (2019).

Figure 2: Hype vs potential impact of humanitarian technology



Source: adapted from Johnson (2018).

to this global view, but operates according to different pressures, the availability of technologies and on different timescales. A mapping of potential impact against hype for a number of humanitarian technologies in 2018 illustrates somewhat subjectively how the hype cycle might be unfolding in this sector (Figure 2) (Johnson, 2018).

According to this analysis and recent HPG interviews, current peak hype surrounds artificial intelligence/machine learning (AI/ML), which is the application of advanced computing power and complex algorithms to analyse multiple datasets and find patterns that could not be otherwise be generated; this shows significant potential but evidence of impact is still emerging. An example of the changing fortunes along the hype cycle can be seen for blockchain, which along with big data and AI/ML was among the most hyped according to Johnson (2018) and later Vota (2019). These technologies require the most growth to achieve their potential – although the potential impact is nonetheless middle to high. Analysis in 2018 of 43 blockchain in development projects found no evidence of blockchain delivering value (Burg et al., 2018) and a recent study of blockchain in the humanitarian sector found no current projects that were fully end-to-end or digital (Coppi and Fast, 2019).

2.2.3 Changing geographies

The third trend is the shifting geography of technology development. While the dominance of Western global technology companies remains significant, the evolution of technology start-ups and innovators in developing countries and crisis-affected regions is under-recognised. This disconnect has impeded effective humanitarian responses, including in distributing information in health emergencies such as the 2014 West Africa Ebola crisis (Fast and Waugaman, 2016). In recent years, millions of dollars in venture capital has flowed into countries such as Nigeria, Kenya, Rwanda and South Africa, taking advantage of advances in mobile phone ownership, internet access and a young population, in what has been nicknamed the 'Silicon Savannah' (Draper, 2017; Ramachandran et al., 2019). As of 2019, the GSMA has identified 618 active tech hubs across Africa: spaces that bring together entrepreneurs, students and digital professionals in primarily large cities such as Lagos, Cairo, Cape Town and Nairobi. Networks such as Afrilabs, the Innovation Support Network and Southern Africa Innovation Support bring their members together to advocate for policies and regulations more conducive to growing the tech sector (GSMA, 2019b). Given the market dominance of Silicon Valley technology firms such as Facebook and Google, the significance of this trend is still unclear, meriting further exploration and research.

2.3 Key debates

2.3.1 Perspectives on the role of technology

Techno-optimism or -solutionism – the view that technology will provide benefits and offer solutions to major problems – is found in the humanitarian sector as much as it is in wider society (for example see Fast (2017) in relation to 'big data'). According to techno-optimism, digital tools may offer a means for the cash-strapped and overwhelmed humanitarian sector to deliver relief at scale, saving money and effort to expand aid and service provision in a global context of increasing needs. With most humanitarian crises being protracted, involving conflict, displacement and persecution, technology-based approaches may also promise a straightforward 'fix'. Rather than engaging in longer-term and complex social, political and economic issues, digital tools may suggest ways to navigate or mitigate problems quickly and effectively. Although such techno-optimism is frequently misplaced, it is arguably continuously maintained in the humanitarian sector due to the high turnover of staff, a lack of analysis of historical interventions and an 'abundance of frequently changing language and buzzwords': a state characterised by Lewis (2009) as a 'perpetual present'. Many agencies also embrace technology in order to be seen at the forefront of testing new technologies (Coppi and Fast, 2019).

The draw of technological approaches for humanitarian actors may also be partly linked to the central concept of 'neutrality' in both humanitarian practice and common understandings of technology. Such tools are often mistakenly seen as both objective and infallible despite evidence to the contrary. For example, in 2013, 6,500 refugees in Mauritania were denied access to refugee assistance because of problems with the biometric registration system. Their status as refugees and as appropriate recipients of aid was questioned sooner than the technology (Hosein and Nyst, 2013: 38). Additionally, the alleged neutrality of technology can enable or accelerate existing inclinations by so-called 'bad' actors; as well as providing assistance, technology can facilitate atrocities by allowing governments to identify opponents through identity databases, or for those databases to be stolen or sold (Hosein and Nyst, 2013; Rahman, 2018; Jacobsen, 2015b).

Concerns over negative aspects of technology globally have led to a backlash in certain quarters of society (referred to colloquially as 'techlash' (Smith, 2018)). Techno-optimism has been dented by high-profile scandals such as the role of Cambridge Analytica in covertly acquiring voter data with the aim of influencing the results of key elections including the United States and Kenya; revelations about how Facebook user data has been utilised by third parties, and the company's inability or unwillingness to police the proliferation of so-called 'fake news' on its platform; and

the realisation that home assistants such as Amazon Alexa have been monitoring and storing personal conversations.

Negative stories have also affected the humanitarian sector, the most prominent example being the $45 million partnership between the WFP and data analytics and intelligence gathering firm Palantir Technologies, announced in February 2019. Initially presented as a pilot project to combine datasets to cut costs in the delivery of food aid, the partnership attracted criticism from human rights and data transparency advocates, who argued that Palantir has facilitated rights abuses through its previous work with organisations including the Central Intelligence Agency (CIA), Immigration and Customs Enforcement (ICE) and Cambridge Analytica (Corbett, 2019; Raymond et al., 2019; Responsible Data, 2019; WFP, 2019). They argued that, in the name of increased efficiency and cost savings, the highly sensitive data of the 92 million people served annually by the WFP was being put at risk (Madianou, 2019b: 1). WFP defended the partnership by noting how the efficiencies created by Palantir's technology would allow them to deliver food to 'tens of millions of additional people' and promising that 'data confidentiality remains the non-negotiable cornerstone of our work' (Porcari, 2019).

2.3.2 Digital risks and regulation

Under pressure to strengthen their role in managing risks, global technology companies have called for governments to do more to regulate their activities, with the G20 starting discussions on new approaches to global data governance (Sacks and Sherman, 2019). This is either interpreted as a ploy by 'big tech' to divert attention away from their own responsibilities or a constructive recognition that the issues transcend the ability of the tech sector to regulate itself on a global scale.

The humanitarian sector has expended considerable effort on better understanding the risks of digital technology, particularly in conflict contexts. Research and policy have focused on 'doing no digital harm' (Corbion et al., 2018) and 'digital dignity' relating to issues as wide ranging as the relationships between international humanitarian law, cyber warfare, and drones; digital identity and biometrics; the ethics of AI; the effect on dignity and psychosocial impacts of technologies such as drones; and a raft of issues relating to data protection. Despite the risks, tech companies have pushed to introduce technology where there is potential rather than evidenced misuse.

2.3.3 Data responsibility

Data responsibility is one of the most explored areas of digital technologies in the sector, due to widespread unease among experts about the eventuality of a data protection scandal affecting vulnerable people. This was demonstrated in November 2017, when a platform used to store the sensitive data of cash transfer programme recipients by 11 large non-governmental organisations (NGOs) and UN agencies was breached, exposing sensitive personal and financial data of individuals receiving aid across West Africa (Parker, 2017, cited in Bryant, 2019). The issue of data protection is rooted in 'digital agency', or the 'sense of ownership and control over one's own electronic data, and the ability to independently create, access and make informed decisions about it' (Kaurin, 2019: 1–2).

Even when guidelines exist, neither those to whom data belongs or those who collect it have proper data protection in place. WFP, for example, was accused by an internal audit of 'sloppy handling of sensitive data' and failing 'to follow rules it has set for itself' (Parker, 2018). A similar audit of UNHCR in 2016 found that the staff implementing the programme 'did not thoroughly know or understand UNHCR's data protection policies' (Thomas, 2018).

The ICRC published an industry-wide set of data protection guidelines (Kuner and Marelli, 2017) and the OCHA Centre for Humanitarian Data (2019) recently circulated a working draft of its data responsibility guidelines – both of which could mitigate risks posed by collecting and storing data if they are understood and followed. The Signal Code developed by the Harvard Humanitarian Initiative sets out rights and obligations relating to information during crises. It articulates five human rights to information during crisis:

- The Right to Information.
- The Right to Protection from Harm.
- The Right to Data Security and Privacy.
- The Right to Data Agency.
- The Right to Redress and Rectification (Greenwood et al., 2017).

A common thread is the principle of data minimisation – collecting the least amount of data needed to avoid the risks of what has been called 'surveillance humanitarianism' (Latonero, 2019).

This is particularly important in relation to 'function creep': how data collected for one purpose can be used for something else. What could begin as a functional collection of data (for example, for a food distribution programme) can easily transform into a database underpinning a foundational collection of data (i.e. blanket refugee registration) if not guarded against carefully (Gelb and Clark, 2013; Rahman, 2018). WFP's internal audit found that it was gathering more information than necessary, including religion, 'without a specified or legitimate purpose' (WFP, 2017; Parker, 2018). In terms of data protection, 'function creep' is problematic because the full uses of the data would not have been disclosed to individuals at the time it was collected, and its use by alternative programmes would not be authorised, and may not be desired.

Function creep is particularly dangerous in refugee settings, where the displaced population may have reasons for not wanting their information shared with either their host country or country of origin for fears of discrimination, forced repatriation or retaliation for fleeing rather than fighting. For instance, UNHCR may be asked to share biometric information by host or donor governments (Jacobsen, 2015b).[1] This has already occurred with the Rohingya in Bangladesh and with Central African Republic refugees in the Democratic Republic of Congo, and in Kenya the biometric system was designed to cross-match data between national and humanitarian databases (Sandvik et al., 2017; Thomas, 2018). Many proponents of biometrics note that similar instances of data sharing occurred prior to biometrics – most notably during the genocide in Rwanda (see Hosein and Nyst, 2013) – and thus the technology does not matter; yet, this technology does make it easier to promote discrimination than previous methods. Technology also makes it easier for data to be stolen, or even sold (Rahman, 2018). By contrast, ICRC's biometric policy stipulates that third parties can only access biometric data if necessary for the purpose for which it was collected, if they agree to be bound by the ICRC policy and do not process the data for other purposes and as long as there is no risk to the life, safety, dignity and integrity of the beneficiary, their family or other people (ICRC, 2019).

As the use of biometrics continues to grow, the humanitarian sector needs to find ways to harness its strengths while also mitigating its risks. These risks go beyond technical failure[2] and relate to broader issues that have plagued the humanitarian sector since its inception: human rights issues around data protection; accountability issues around informed consent; and imbalanced power dynamics. For example, without considering potential protection implications for refugees, the early use of biometrics by UNHCR was seen as both a humanitarian and policy-level success story and promoted as 'vital to the distribution of humanitarian aid' (Jacobsen, 2015a: 153). Because of this, Magnet (2011: 3) argues that 'biometric technologies succeed even when they fail' and 'fail even when they succeed', due to the damage they can cause vulnerable people and groups. More recently, humanitarian actors and agencies have spoken of biometrics in glowing terms around 'giving people an identity' to provide biometrics with 'a cloak of legitimacy' (Hosein and Nyst, 2013; Madianou, 2019a: 594). Rather than automatically introduce biometrics,

1 UNHCR's data protection policy reserves the right to share data with host countries and other 'third parties' that comply with the policy (Walkey et al., 2019).

2 Technical failures include false positives, the recognition of a match that is not a match; false negatives, the rejection of a match that is a match; biometrics that are hard to capture, such as fingerprints that are not clear because of hard labour, darker coloured irises, etc.; technology that can be hacked, fooled, corrupted or misused and other failures that result due to lack of electricity, faulty equipment or network connections (Magnet, 2011; Gelb and Clark, 2013; Hosein and Nyst, 2013).

however, humanitarian agencies and donors should question whether the lack of identity is the real problem, and if so, whether it can only be resolved by the provision of one (Privacy International, 2019).

In 2015 Oxfam imposed a moratorium on the use of biometrics in its work: 'given the number of unknowns ... we felt it was best not to become an early adopter' (Kondakhchyan, cited in Thomas, 2018). In a March 2018 update, the benefits of biometrics in reducing fraud were assessed and found to be limited and unfairly focused on beneficiaries, rather than 'upstream' instances of fraud. The author concludes that the risks of gathering biometric data 'far outweigh' the potential benefits 'in almost all cases' (Rahman, 2018: 12).

The issue of data protection arose in June 2019 in Yemen when the Houthi rebels argued that they, not WFP, should have access to the biometric data of those in their territory because they felt the collected data was being used as part of an intelligence operation. WFP, on the other hand, argued that they needed to collect and control biometric data to prevent the Houthi rebels from diverting aid from those who needed it, and they would not continue to distribute food unless the data was collected (Latonero, 2019). Distributions did not resume until August, when WFP introduced biometrics in the region.

Finally, concerns about the ethical challenges of artificial intelligence automating decision-making based on analysis of large datasets to identify patterns and draw connections have been raised across humanitarian and development spaces as well as wider society. The OCHA Centre for Humanitarian Data is developing a peer review framework for predictive analytics that could address some of these worries (Poole, 2019).

2.4 Conclusion

While there are benefits to digital technology in humanitarian action, many assumptions are not borne out in practice. For example, despite the widespread adoption of biometrics with the aim of reducing fraud, there has been no publicly available effort to compare the cost to organisations of establishing and operating biometrics systems with the cost of fraud.

While the language of digital risks is gaining traction beyond a narrow technical audience, there is limited organisational readiness to deal with both new opportunities and risks and threats (see Coppi and Fast, 2019; Raftree, 2019). The pace of change of technology is too fast for organisations to consider the policy implications and the complexity of some technologies can be challenging for non-technical experts to fully grasp, leading to digital approaches being siloed in organisations, particularly in ICT teams or innovation hubs (Cheney, 2017). Additionally, emerging policy frameworks are not necessarily put into operation and sufficient support is not always given to data literacy (an issue being addressed by the OCHA Centre for Humanitarian Data). The 2016 *World development report* emphasis on the need for strong analogue foundations here resonates strongly: without the right resources, capacities, policies and governance, technology cannot fulfil its potential (World Bank, 2016).

3 Inclusion and technology: the humanitarian digital divide?

Against this backdrop of increasing access to technology, there has long been a 'digital divide' – inequality in access to technology and its associated benefits (Madianou, 2015: 3). Conversations around localisation and inclusion in humanitarian and development sectors seem somewhat disconnected from the prevailing focus on digital opportunities and risks.

In the context of humanitarian action, inclusion can be understood as ensuring people affected by crisis have access to the assistance, protection and information they need for their survival and recovery, irrespective of who they are (HI, 2015: 1). Encompassing rights and the notion that voice and meaningful participation are a necessity, inclusion is also central to the foundational humanitarian principle of impartiality: that aid should be provided on the basis of need alone, without discrimination. However, inclusive responses have proved difficult to achieve and the coverage of needs by the humanitarian sector has been assessed as poor and getting worse (Searle, 2016: 2; ALNAP, 2018: 121).

Achieving greater inclusion necessitates an understanding and active removal of the barriers faced by marginalised individuals and groups, which are often defined by age, gender, disability, religion or political or social identity. Inclusion has seen a renewed emphasis in the wider development space since the Sustainable Development Goal priority to 'leave no one behind', and commitments to making humanitarian responses more inclusive can now be seen in initiatives such as the Core Humanitarian Standard and the *Charter on inclusion of persons with disabilities in humanitarian action* (HPG, 2019: 3). Debates persist on what inclusion constitutes in practice and what is required to achieve it (HPG, 2019).

3.1 Approaches to inclusion

Technology and inclusion are closely related. A four-year research programme on technology and accountability in development contexts, Making All Voices Count, found that 'the application of technologies often amplifies existing inequalities of power and influence, and newer technologies can be inherently excluding' (McGee et al., 2018). Yet this is not the focus of digital policies.

Policy frameworks in the development sector, such as the Principles for Digital Development, offer useful elements that can be applied to the humanitarian sector, though neither sector focuses specifically on the issue of inclusion. One exception is Plan International's draft *Guidance on practicing the Principles for Digital Development in a gender transformative and inclusive way*, which explores how to take an inclusive approach to digital transformation for international development.

Where development approaches do touch on digital inclusion, they tend to focus on access and equality – increasing access to internet or mobile data services for a wider range of groups to ensure everyone benefits equally. For example, DFID's digital policy states that the organisation 'will aim to ensure a strong focus on inclusion and poverty reduction within digital policy. This will help ensure marginalised and

excluded people and communities have equal opportunities, voice and choice to benefit from digital technologies' (DFID, 2018). Alternatively, initiatives such as WomenConnect Challenge by USAID assess the social norms that limit women's adoption of technology in developing contexts (Nicols, 2019).

The private sector has its own part to play: this can be driven by motives relating to profit or social impact objectives; for example when businesses aim to increase market access by reaching the unbanked (financial inclusion) or enabling a diverse group of users such as those with disabilities to access their products and services. A key focus for development and humanitarian organisations is that of the so-called 'last mile', which seeks to find business models or technologies that can connect services or products to potential users. In terms of the last mile in digital technologies, this could come in the form of connecting low-income users with internet services that are already being used by those more affluent, for example via underutilised parts of the TV spectrum (Pathways for Prosperity Commission, 2018: 8; Song, 2019; World Vision, n.d.).

3.2 Technology and inclusion in humanitarian contexts

There has been limited exploration of the links between technology and inclusion in humanitarian contexts. The following themes emerge from available literature and expert discussions.

Technology has in many instances facilitated greater inclusion. It can help vulnerable people, such as refugees, to engage with and be visible to host governments and humanitarian actors and this has led to more effective responses in some instances. Recent examples include initiatives such as Humanitarian OpenStreetMap, where volunteers have mapped disaster-affected contexts to assist humanitarian responders over the last 15 years. Among its users has been Map Kibera, a project to document and make visible the streets of the largest urban informal settlement in Africa, making the presence of its residents felt to authorities and aid providers and increasing the pressure for service provision, as well as passing information to the ICRC and other humanitarian responders. During flooding in Malawi in 2015, Missing Maps collected data on areas underserved by existing maps for the benefit of the ICRC and other responders (Capgemini Consulting, 2019: 46). Mapping technology has also been utilised in conflict contexts to provide information for affected people and increase accountability of belligerents, with AirWars mapping reports of explosions, SyriaTracker monitoring reported rights violations and SafePath directing users in contexts such as Libya to avoid the worst fighting.

Digital technology also continues to facilitate greater access to information for people affected by humanitarian crises, a recent example being the release of a report of a UN rights probe in Bangladesh, which disseminated findings to its Rohingya audience through a mixture of audio and video clips via the messaging platform WhatsApp (Loy, 2019). In times of crisis, restrictions on some technology use are lifted, as in the case of BBC Media Action's Ebola Broadcast Service that benefited from a temporary lifting of WhatsApp's limit of a maximum of 100 people on broadcast lists, meaning more than 14,000 Sierra Leoneans received life-saving information during the 2014–2016 outbreak (DIAL, 2018: 26).

Although many assumptions are made about technology automatically expanding inclusion by advocates, the private sector and humanitarian organisations, **pervasive 'digital divides' mean inclusion is not guaranteed.** These divisions can be along gender, geographical, economic, age and many other lines that often intersect with existing vulnerabilities. Sometimes this is a consequence of infrastructure and economics: for example, the cost of 500MB data across Sub-Saharan Africa 'varies by more than 200 times, from $0.35 in Madagascar to $81 in Guinea-Bissau' (Pathways for Prosperity Commission, 2018: 21), meaning statistics around rising rates of mobile phone ownership should be heavily caveated by details of who can access such technology and for what. Within countries, there are also significant inequalities in ownership of mobile phones between urban and rural

contexts: according to UNHCR, 68% of refugee households in urban locations had an internet-capable mobile phone in 2015, compared to just 22% in rural areas (Walker et al., 2017: 26). For many isolated communities impacted by disaster, such as Samoa, there is still a 'heavy reliance on traditional and official information channels' rather than technologically-advanced methods (Martin-Shields, 2019: 618).

A digital divide is also present along gender lines in many humanitarian contexts, with differing rates of access to and use of various technologies. Phone and smartphone ownership are commonly understood to be more prevalent with men than women in a number of humanitarian and development contexts. For example, 94% of Syrian male refugees surveyed in camps in Greece own a phone, compared to 67% of women, and 31% of men used the phone for money transfers, compared with 7% of women (Latonero et al., 2018: 21). Refugee women in Lebanon also have lower rates of mobile phone use (95% for men, 88% for women) and adolescent girls there have the lowest rates of use (55% for 15–18-year-olds) (Crabtree and Geara, 2018: 4). Additionally, with many women and girls borrowing or sharing devices with others, including relatives or partners, this raises questions as to whether such access can truly be considered autonomous. Nearly 20% of female respondents of the survey in Lebanon, for example, reported that somebody else 'determined what they could or could not do on a phone' (Crabtree and Geara, 2018: 4). A Pathways for Prosperity Commission survey of seven countries in East Africa and South Asia found that, regardless of education, income or geography, women are 40% less likely to have used the internet than men, suggesting substantial social inequalities in access to digital technology (Pathways for Prosperity Commission, 2018: 9).

A further cause of exclusion is age. In Ukraine, for example, 56% of 18–34-year-olds have smartphones compared to 13% of those over 34, and in the occupied Palestinian territories (oPt), 73% of 18–34-year-olds and 39% of adults over 35 own smartphones. (Walker et al., 2017: 29). Similar to wealthy countries, social media use across humanitarian contexts is skewed to younger, urban demographic groups; caution should therefore be exercised in utilising individual channels to disseminate important information in times of crisis as coverage is likely to exclude older people and those in rural settings (Crawford and Finn, 2014: 496).

In addition to divisions relating to access, some commentators argue that different abilities to use technology effectively constitute a 'second-level digital divide'. This arises from differences in technical skills, which are products of the same social issues and divides over access, such as autonomy of use and appropriateness of the technology for particular contexts. Research also indicates that barriers related to language, access and skills can provoke information disjuncture and an inability to adopt technology effectively and independently (Lloyd-Zantiotis et al., 2013). This was highlighted by other studies: one paper on refugees concluded that a lack of effective adoption of technologies was less of a 'behavioural issue' and more a consequence of social, economic and technical barriers (Alam and Imran, 2015: 19).

That these divides impact disproportionately on the most vulnerable should be a critical consideration of humanitarian actors seeking to use technological approaches to assess needs and deliver assistance. Regardless of intention, it is clear from past interventions that these 'tech fixes', at least in isolation, can do little to address underlying structural problems that drive digital divides.

Inclusion is limited by in-built biases. There is growing recognition that with tools such as facial recognition technology, failure to be inclusive at the design and software coding stages can result in discrimination and exclusion during implementation. Rather than technology being neutral, it can reflect the biases of its human creators (Read et al., 2016: 1320).

This has been highlighted by advocacy organisations such as the Algorithmic Justice League, whose campaigns on 'the coded gaze' demonstrate that a lack of diverse datasets has resulted in data recognition software that is unable to recognise non-white faces (Buolamwini, 2016). The dangerous impact of this has been discussed in relation to its use in stop-and-search cases by UK police forces

(White, 2019) and in the reduced ability of driverless cars to identify non-white pedestrians (Hern, 2019). In the humanitarian space, where similar software is being used in, for example, family reunification programmes, diverse training datasets are crucial to avoid such adverse effects. Similarly, buildings in disaster-affected areas have 'unique spatial, structural and contextual features' that automated tools do not always recognise as residential housing. To utilise these tools to improve humanitarian responses, this software requires training in what to look for in these specific contexts (Deparday, 2018: 28).

Although affected people may be 'included' in responses because of tools such as biometric registration, they are **rarely 'included' in owning and managing their own personal data.** Data is collected and stored in databases managed by humanitarian agencies and host governments, in a manner that gives affected people little control (Thomas, 2018). Although more than 120 countries legally protect personal data held by private and public bodies, many of those impacted by displacement and crises lack such protections. While affected people may not have the means to access their own data, it is often unclear to humanitarian organisations which authorities and companies have access to it, with some service providers already having an obligation to 'flag suspicious activity on their client's accounts' (Corbion et al., 2018: 12).

Even where assurances do exist that data will not be intentionally shared, security for potentially sensitive data is also low, as was highlighted by an internal UN report on UNHCR's biometric ID system, which now covers 4.4 million people globally. The report found that in Kenya, the organisation 'did not consider it necessary to install encryption tools' and an audit of five country programmes in 2016 found 'all five country operations reviewed had limited knowledge of the [data protection] policies' (Thomas, 2018). This discrepancy is accentuated by a lack of knowledge and education of both affected people and humanitarian staff as to where data goes and what it is used for.

With many large humanitarian organisations adopting digital approaches to identification and affected people having little say in whether they wish to participate in the use of these tools, there arguably exists a trend towards **effectively forced inclusion.** While informed consent has always been a difficult concept in humanitarian contexts, taking the biometric data of vulnerable, crisis-affected people who receive critical assistance presents obvious challenges to rights, particularly without the existence of a viable alternative for those who do not wish to be included in biometric data collection. More broadly, some commentators have raised concerns that 'informed consent is seen as clashing with the emerging concept of duty to participate' (Ioannidis, 2013, cited in Crawford and Finn, 2014; 498). Additionally, while there is much discussion of 'giving people a digital identity' as a desirable outcome for vulnerable people (World Bank, 2019), there is little recognition of the 'right to be invisible'.[3] For particularly vulnerable and marginalised populations, remaining less visible and maintaining privacy and anonymity is a viable protection strategy that could be threatened by biometric and mapping technologies (Boyd, 2011).

Underlying many of these issues relating to inclusion and the humanitarian sector are questions of **power asymmetries**, and the ambiguous record of technology in contributing to more or less equitable humanitarian responses. Power imbalances in the humanitarian sector are well documented and continue to be characterised by large, well-financed UN agencies and international non-governmental organisations (INGOs) composed of senior staff from 'the global North' taking the lead in coordinating humanitarian responses, at the expense of local and national humanitarian actors (HPG, 2017). Despite isolated examples that bypass this traditional structure, the use of digital technologies by many humanitarian responders has been characterised as tending to 'reinforce

3 This is similar to the 'right to be forgotten', a prominent feature of EU General Data Protection Regulation (GDPR), which enshrines in law the right of EU citizens to demand data about them be deleted. A 2019 European Court of Justice ruling judged this right to not apply globally (Kelion, 2019).

existing bureaucracies and power structures' in a 'vertical and hierarchical way, rather than tapping into their horizontal, empowering potential' (Ramalingam and Bound, 2016: 196).

This has been suggested in several instances, most obviously in the enthusiastic adoption of unmanned aerial vehicle (UAV) or 'drone' technology by humanitarian organisations, including in the mapping of disaster-affected areas. As a dual-use technology developed originally for surveillance and military use, drones constitute a potent, 'highly symbolic' technology that represents asymmetric conflict in many contexts (Greenwood, 2019). The anonymity of those 'watching', as well as a lack of informed consent given by the 'watched', is a considerable barrier to meaningful accountability in humanitarian settings. With the range and surveillance capabilities of drones continuously improving, they may constitute a new phase of 'remote humanitarianism' that has been criticised as one of a 'paradox of presence', whereby aid workers have little contact with those they supposedly serve (Hunt et al., 2016: 3). While proponents of such technology such as the founder of Flying Labs and Digital Humanitarians, Patrick Meier, have demonstrated that through training of local pilots and adequate community consultation, drones can be utilised in a more inclusive manner, this is not the default approach of many actors in a humanitarian context.

Technology such as mapping or social media promise a more inclusive approach to humanitarian responses, whereby the agency of affected people is highlighted and amplified. Networks of assistance outside of the hierarchical structures of international assistance can be facilitated by such technology (Currion, 2018b). They could also, however, reinforce relationships that are regressive, entrenching divisions between 'data providers' – affected people who produce data to inform responses – and 'data processors', humanitarians who make sense of, own and act on that information (Crawford and Finn, 2014: 494). Importantly, these data processors also decide what information is relevant and valuable, which risks excluding less quantifiable knowledge that resides within affected communities (Burns, 2014: 4). Rather than the agency of affected people being valued, it may be merely the data they generate that is 'included', contributing to the running of a system that continues to be operated on the same traditional hierarchies, doing little to further reform initiatives in the sector such as localisation.

Finally, technological approaches can lead to greater willingness for experimentation, which may also reinforce power asymmetries (Sandvik et al., 2017). Environments with weaker regulatory frameworks provide ideal testing grounds to trial new technologies ahead of engaging with more robust governance structures elsewhere (Tomlinson et al., 2013). Jacobsen and Fast (2019) highlight this in relation to the ease of access to digital data from humanitarian subjects. Such observations suggest that a shift in culture, as well as policy, may be necessary to correct some of the power asymmetries associated with technological adoption in the sector in order to further meaningful inclusion.

4 Conclusions: gaps, opportunities and research priorities

Technology has driven major change in some areas of humanitarian response, but its use can also be biased and blind to risks. A tendency towards techno-optimism risks avoiding fundamental questions around the limits of technology, the role of the private sector (including local and regional technology entrepreneurs) and identifying when technology is and is not useful.

Technology is not inclusive by nature. The humanitarian digital divide exists and there is growing awareness of this, but the humanitarian system is currently focused mainly on digital risks, meaning insufficient attention is placed on questions of how to root digital tools in a more inclusive framework. We need to go beyond token moves to more inclusive digital approaches and really delve into what is required for genuine change.

HPG's wider research into inclusivity is exploring how the humanitarian system should consider inclusivity as an overarching aim rather than looking at specific vulnerabilities (Barbelet and Wake, forthcoming). Applying existing frameworks such as the Principles for Digital Development to humanitarian contexts is one way in which this could take place in relation to technology, but there are large gaps in evidence around what inclusive practice looks like in humanitarian technology, and what the key drivers of inclusivity are.

While there may be a growing appreciation of the need for digital technology in humanitarian contexts to be more inclusive, many parts of the humanitarian system are not clear on how best to do this or are taking a fragmented approach within and between organisations. Making digital humanitarian action more inclusive will require its designers to better understand and reflect the 'end user'.

This is very much in keeping with the principles of localisation, which have been a focus of debate in policy and practice within the humanitarian sector, explored in HPG's previous Integrated Programme of research (HPG, 2017). Localised and emerging technology solutions offer alternatives that could potentially be more appropriate for reaching vulnerable groups. But they do not automatically guarantee inclusivity; local power structures and elites can be just as prone to bias, meaning marginalised people are not included.

This 'digital divide' research project will document good practices and analyse the role that technology has played in a number of areas, while taking a bottom-up perspective exploring how end users experience technology in the humanitarian space. Consequently, it will aim to provide a strong set of practical recommendations on how agencies can better ensure more inclusive humanitarian action that maximises the opportunities of digital transformation and mitigates the many risks.

To do this we need more evidence from different perspectives (such as local and field-based views) on what works, and how to build in inclusivity. This includes exploring what difference technology has made in crises and discerning where it has been detrimental and what principles should be followed to harness its potential. This is partly a question of literacy – making humanitarians better acquainted with

the prospects and risks of various technologies, and aiding technologists to be more conversant with concerns relating to humanitarian action.

The fast pace of technological change presents particular challenges; as fads come and go in quick succession, it is necessary to focus on learning from the impact of more established technologies to best maximise the effectiveness of emerging technologies. By thinking deeply about how to engage with digital technology within humanitarian action with a focus on inclusion, its potential can be realised in a way that is more equitable and ultimately more in keeping with the principle of impartiality.

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