Mobile for Humanitarian Innovation

Landscaping the digital humanitarian ecosystem

December 2018

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Mobile for Humanitarian Innovation

The GSMA Mobile for Humanitarian Innovation programme works to accelerate the delivery and impact of digital humanitarian assistance. This will be achieved by building a learning and research agenda to inform the future of digital humanitarian response, catalysing partnerships and innovation for new digital humanitarian services, advocating for enabling policy environments, monitoring and evaluating performance, disseminating insights and profiling achievements. The programme is supported by the UK Department for International Development.

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Executive Summary

As the number of people affected by humanitarian crises continues to rise and as crises become more prolonged, humanitarian stakeholders (including humanitarian agencies, NGOs, and others) are responding in different ways, by partnering with the private sector, integrating innovative approaches and using digital technology to increase accountability, efficiency and impact. These changes, among others, are laying the foundation for a digital ecosystem for humanitarian assistance. Though nascent, this digital ecosystem has the potential to increase the addressable market, leading to more scalable solutions and platforms that will improve or enhance humanitarian outcomes, both for stakeholders and for crises-affected people.

The GSMA consulted with industry experts across five main thematic areas to better understand the opportunities, benefits and challenges of building a digital ecosystem for humanitarian contexts. These consultations yielded important insights and recommendations for the humanitarian and private sectors, specifically mobile network operators (MNOs). Taken together, these findings signal the importance of approaching the thematic areas collectively, recognising their equal importance and interdependence in building a digital ecosystem for humanitarian contexts. **Core to this is the role of effective partnerships—particularly between humanitarian organisations and MNOs.** Successful partnerships leverage each other's strengths and core competencies to deliver digital humanitarian assistance in short-term response and recovery efforts in addition to long-term development impacts.

Industry experts identified the following insights on how digital technology interacts and can impact each thematic area:

Gender and inclusivity

For women, persons with disabilities and other vulnerable people, certain pre-existing barriers and stigmas can exacerbate the impact of humanitarian crises and can constrain their ability to respond to these crises. A persistent lack of data on gender and disability in humanitarian contexts compounds this problem. Despite this, there are green shoots where digital technology is alleviating or reducing some of the barriers currently faced by vulnerable people, including appropriate mobile content relevant to the humanitarian context, mobile-based learning, and digital tools to support aid workers on the ground.

Mobile financial services (MFS)

MFS can be a viable channel to distribute portions of aid, particularly humanitarian cash transfers (HCTs), which have the potential to offer increased transparency, reduce fraud and theft, and provide fast and flexible delivery and greater freedom and enhanced dignity for recipients. Collaborative industry efforts and principles are helping to signal the growing importance of the transition and role the private sector can play. Further, the GSMA's research found that for MFS providers, there is a potential market of approximately 118 million USD in transfer fees from HCTs in 2018.

Food security and climate change

In the ten-year period ending in 2015, 1.8 billion people in developing countries were affected by climate and weather disasters. These types of disasters are intrinsically linked to food insecurity, which is particularly acute in developing countries. Mobile and digital technology can strengthen interventions to prevent and respond to climate-related disasters and food insecurity. This includes supply chain solutions, population tracking, facilitating cash transfers, early warning systems, surveying and collection tools, agronomic advice and smart agriculture, among others.

Digital identity

While digital identity credentials can provide an alternative to traditional identity credentials in humanitarian contexts, certain requirements may make its application difficult, including an official entry point, strong authentication processes, and inclusivity mandates for aid delivery. However, humanitarian agencies are the key champion of digital identity technologies and refugee camps offer the most promising use case for now.

Mobile-enabled utilities

While energy, water and sanitation services are critical requirements for forcibly displaced persons (FDPs), many lack access to these basic utilities. Though not traditionally a primary concern in humanitarian contexts, it is increasingly becoming a priority for humanitarian agencies. Mobile technology can be used in a variety of ways to expand or improve access to energy, water, and sanitation services in humanitarian contexts through mobile payments, machine-to-machine connectivity and by leveraging mobile infrastructure.

Together, these findings have shaped recommendations for the sector, in addition to specific recommendations for **humanitarian stakeholders as well as MNOs and the private sector**:

- Additional research is needed on how digital technology is accessed and used by FDPs and how it can potentially improve their outcomes in humanitarian contexts.

- Humanitarian and private sector players will greatly benefit from sharing information and coordinating efforts/interventions in humanitarian settings. There is currently little information sharing between the relevant stakeholders.

- Customer-centric research, more specifically human-centred design, enables digital services providers to understand the specific needs of vulnerable populations and therefore tailor specific products for them in humanitarian contexts.

- Mobile channels and tools can enhance digital literacy among crisis-affected population and it is prudent for the humanitarian and private sectors to explore their use.

For **humanitarian stakeholders**, specifically:

- Implement and advocate for digital solutions with governments and the private sector where appropriate.

- Standardise and improve data collection during during humanitarian contexts, ensuring data is collected on vulnerable populations such as women and persons with disabilities (PWDs).

- Increase the digital capacity of frontline workers to better support vulnerable people.

- Have a coordinated approach when engaging with MNOs.

- Help the private sector better understand humanitarian contexts and how they could get involved.

For **MNOs and the private sector**:

- Identify areas where government involvement can support the reach and adoption of mobile services.

- Draft and formalise agreements for pre-and post-emergency strategies with humanitarian organisations and governments.

- When targeting refugees or the most vulnerable, MNOs can design services in partnership with humanitarian agencies. Successful partnerships are driven by a shared long-term vision, clearly defined roles, as well as clear business ownership and responsibilities.

- Explore incentives which stimulate development and encourage the private sector to enter humanitarian contexts.

Introduction

In recent years, the number of people affected by humanitarian crises—whether natural disasters, man-made disasters, or complex emergencies—has continued to increase. In 2017, 445 million people globally were affected by natural disasters.[1] This year, UNHCR estimates that there are 68.5 million forcibly displaced persons (FDPs) globally, of which 58 per cent are internally displaced, 37 per cent are refugees and 5 per cent are asylum seekers.[2] More than four out of five displaced people are being hosted in developing countries.[3] Further, estimates indicate that more than 135 million people around the world are in need of humanitarian assistance and protection in 2018.[4]

Driven in part by this increasing need, humanitarian stakeholders' responses to these crises have changed in recent years. The GSMA has observed a growing appetite from these stakeholders to collaborate in new ways with the private sector, integrate innovation and use technology to increase accountability, efficiency and impact.[5] At the same time, mobile and digital technology has also increased rapidly, now surpassing five billion unique mobile subscribers globally.[6] With 93 per cent of refugees covered by 2G and 3G networks, this rapid expansion is offering new opportunities for digital humanitarian response.[7] Not only is mobile technology an important lifeline for people to reach family and friends, but it also unlocks products and services that can improve outcomes for those affected by humanitarian crises, both in the short term, and in the longer term.

Envisioning a digital ecosystem for humanitarian contexts

To better support crisis-affected populations, the GSMA envisions a connected digital environment, where a range of accessible and sustainable mobile-enabled services are available to those responding to and affected by humanitarian crises, including the private sector and humanitarian community. Collectively, this digital ecosystem leads to more scalable solutions and platforms that can improve or enhance humanitarian outcomes.

With crises becoming more prolonged and displacement lasting an average of 10 years[8], investing in connectivity in areas of protracted displacement can increase the addressable market for the mobile industry and private sector and build out a digital ecosystem. Further, services like mobile money can build the rails for broader ecosystem growth in these contexts.

1. GSMA, "GSMA Humanitarian Connectivity Charter Annual Report - 2017," February 26, 2018,
https://www.gsma.com/mobilefordevelopment/programme/mobile-for-humanitarian-innovation/humanitarian-connectivity-charter-annual-report-2017/.
2. UNHCR, "Figures at a Glance," June 19, 2018, http://www.unhcr.org/figures-at-a-glance.html.
3. Ibid.
4. UN OCHA, "Global Humanitarian Overview 2018," 2018, https://www.unocha.org/sites/unocha/files/GHO2018.PDF.
5. Kyla Reid, "Mobile for Humanitarian Innovation," GSMA Blog (blog), February 26, 2018,
https://www.gsma.com/mobilefordevelopment/programme/mobile-for-humanitarian-innovation/mobile-humanitarian-innovation/.
6. "GSMA Intelligence," Unique mobile subscribers Oct 2018, n.d., https://www.gsmaintelligence.com/#.
7. UNHCR, "CONNECTING REFUGEES: How Internet and Mobile Connectivity Can Improve Refugee Well-Being and Transform Humanitarian
Action," June 2016, http://www.unhcr.org/innovation/wp-content/uploads/2018/02/20160707-Connecting-Refugees-Web_with-signature.pdf.

8. Xavier Devictor and Quy-Toan Do, "How Many Years Have Refugees Been in Exile? (English)." (World Bank
Group, 2016), http://documents.worldbank.org/curated/en/549261472764700982/How-many-years-have-
refugees-been-in-exile.

Following the launch of the Mobile for Humanitarian Innovation programme (M4H) in early 2018, the GSMA consulted with more than 100 industry experts across five thematic areas where digital technology can positively impact humanitarian contexts:

- Gender and inclusivity;
- Digital identity;
- Mobile financial services (MFS);
- Mobile-enabled utilities (including energy, water and sanitation services); and
- Food security and climate change.

For each thematic area, the experts helped the GSMA map the current landscape of stakeholders, barriers, opportunities as well as identify recommendations and future considerations for the industry. This publication aims to combine these findings, highlighting key insights from each theme, and synthesise the challenges, opportunities, enablers and recommendations across the sector.

These five thematic areas are not mutually-exclusive and are equally important in creating a digital ecosystem around humanitarian assistance. **Not only does a digital ecosystem provide crisis-affected people with a suite of life-enhancing mobile services, but it also strengthens the business case for MNO and private sector involvement by expanding the addressable market and range of digital products, services and platforms that can be offered and scaled.** Similarly, these themes are interdependent and should be considered holistically. For instance, inclusivity is a foundational issue cutting across other themes, while digital identity and mobile money can unlock other digital products and services. These interdependencies also emphasize the growing importance of partnerships between private sector and humanitarian stakeholders. Not without their challenges, these partnerships can create real opportunities to accelerate a digital ecosystem and effectively deliver digital humanitarian assistance, if the partners can achieve a shared vision and value.

This report endeavours to provide humanitarian stakeholders and the private sector, interested in implementing and experimenting with digital services, with potential paths forward.

Understanding humanitarian crises and assistance

While there is no simple categorization of humanitarian crises, most crises fall into one of three main types: natural disasters (including floods, earthquakes, droughts or epidemics); man-made disasters (including armed and civil conflicts, industrial or transport accidents); or complex emergencies (often a combination of the two).

Complex emergencies tend to exhibit certain characteristics, including "extensive violence and loss of life; displacements of populations; widespread damage to societies and economies; and the need for large-scale, multi-faceted humanitarian assistance."[9] While humanitarian response is usually associated with short-term assistance and recovery support, many crises can be prolonged and span many years. For instance, research found that people who were refugees at the end of 2015 had been in exile for an average of 10 years.[10] Each crisis is context-specific, depending on the country where it occurs, the cause of the issue, the intervention required and the regulatory environment, among other variables.

Humanitarian assistance involves multiple stakeholders in a complex ecosystem, including policy-makers, humanitarian agencies, non-governmental organizations, MNOs, other technology providers, private sector stakeholders, and beneficiaries. More recently, there has been a shift from in-kind delivery to market-based programming, which has led to increased partnerships with the private sector. Further, with an increased number of prolonged crises, there has also been a shift towards finding longer-term solutions that address development outcomes beyond humanitarian assistance and recovery, such as improved livelihoods,—often through the support of non-traditional actors.

9. IFRC, "Complex/Manmade Hazards: Complex Emergencies," n.d., https://www.ifrc.org/en/what-we-do/disaster-management/about-disasters/definition-of-hazard/complex-emergencies/.
10. Xavier Devictor and Quy-Toan Do, "How Many Years Have Refugees Been in Exile? (English)." (World Bank Group, 2016), http://documents.worldbank.org/curated/en/549261472764700982/How-many-years-have-refugees-been-in-exile.

Key insights from each M4H theme

Gender and inclusivity

While limited data and research exists on digital inclusivity in humanitarian contexts, women, persons with disabilities (PWDs), and other vulnerable people are often more disproportionately affected during and in the aftermath of crises due to pre-existing cultural or social barriers and stigmas. This is true across all thematic areas the GSMA analysed, as exclusion does not discriminate and occurs in every humanitarian context.

Estimates indicate that more than 75 per cent of refugees and displaced people are women and children.[11] Women and girls are also particularly exposed to climate-related disasters—research found that they are 14 times more likely to die in natural disasters than men.[12] Additionally, the World Bank found that 20 per cent of the world's poorest people have a disability, and 80 per cent of people with disabilities live in developing countries.[13] Lack of clean water, safe environments and healthcare can further increase the risk of developing a disability.

While still a nascent area, digital technology may better prepare vulnerable populations for natural disasters and help alleviate some of the gaps in humanitarian assistance. This includes content-appropriate early warning systems, mobile-based learning that can facilitate informal education, and digital tools for aid workers that offer greater inclusivity and support.

Pre-existing barriers and emerging challenges affect women and PWDs in humanitarian contexts

While no one is immune from crisis, certain pre-existing barriers and stigmas can exacerbate the impact of humanitarian contexts, especially for women and PWDs. Cultural and social barriers may prevent women from accessing mobile phones, information, networks and transportation. For

example, 390 million women remain unconnected to mobile technology, and 184 million fewer women own mobile devices than men.[14] This can be compounded by language and digital literacy skills. Further, a lack of access to and control over resources (such as land, adequate food, savings and technology) can also constrain a woman's capacity to recover from a crisis. Women are more likely to be negatively affected by challenges and issues that emerge during crises, such as displacement, an increased burden of care, and increased gender-based violence and other abuses of their rights.

Similarly, PWDs face barriers that exclude them from participating fully in society.[15] This includes attitudinal barriers, whereby PWDs in middle- and low-income countries are more likely to experience shame or stigma. Physical barriers, such as travelling distances to certain resources or the availability of accessible devices, can also prevent PWDs from accessing information and services. Additionally, institutional barriers—including policies, laws or practices—can discriminate (inadvertently or otherwise) against PWDs because their needs are not recognised or included. In humanitarian contexts, these barriers may result in further exclusion from assistance.

Lack of data on gender and disability in humanitarian contexts

While limited data and research (to varying degrees) was a common thread across all the landscaped themes, a lack of data was particularly acute for women and PWDs. More accurate data is needed about women's digital inclusion in humanitarian crises. Gender-disaggregated data would allow for more effective communications planning in emergency situations and it would also ensure humanitarian stakeholders could better target the needs of women and girls in crises.

11. UNFPA, "Protecting Women in Emergency Situations," n.d., https://www.unfpa.org/resources/protecting-women-emergency-situations.
12. Senay Habtezion, "Gender and Disaster Risk Reduction" (UNDP, 2013), http://www.undp.org/content/dam/undp/library/gender/Gender%20and%20Environment/PB3-AP-Gender-and-disaster-risk-reduction.pdf.
13. UNDP, "Disability-Inclusive Development," n.d., http://www.undp.org/content/undp/en/home/democratic-governance-and-peacebuilding/rule-of-law--justice--security-and-human-rights/disability-inclusive-development.html.
14. Oliver Rowntree, "Connected Women - The Mobile Gender Gap Report 2018" (GSMA, February 2018), https://www.gsma.com/mobilefordevelopment/wp-content/uploads/2018/04/GSMA_The_Mobile_Gender_Gap_Report_2018_32pp_WEBv7.pdf
15. Centers for Disease Control and Prevention, "Common Barriers to Participation Experienced by People with Disabilities," August 22, 2018, https://www.cdc.gov/ncbddd/disabilityandhealth/disability-barriers.html..

Additionally, there is often no accurate data on PWDs in crises, and humanitarian stakeholders may not know how many PWDs are affected. This is likely due to the lack of standard definitions around disability, a lack of training of frontline workers in dealing with disability, and a general lack of resources and time during emergencies.[16] However, Humanity & Inclusion, a non-profit organisation focused on PWDs and vulnerable people in conflict situations, is working to improve the availability and quality of data with aims to increase its use by humanitarian organisations.[17] To achieve this, they are testing the Washington Group (WG) Short Set of questions in humanitarian contexts in the DRC, Jordan and the Philippines.[18] The WG questions are a set of questions designed to identify people with a disability (in a census or survey format).

Green shoots in how digital technology is closing the gap for women and PWDs

Despite the persistent lack of data for vulnerable populations, digital technology can alleviate or reduce some of the barriers currently faced by women and PWDs. For example, appropriate mobile content can better prepare women and PWDs for natural disasters. MANTRA, a mobile gaming app developed in Nepal aims to increase maternal and child resilience before, during and after disasters. They do this by providing women visual advice on health risks, and how to appropriately respond to natural disasters such as earthquakes (i.e. 'duck, cover and hold on' does not work in poorly

constructed homes).[19] Sahana Software Foundation has also developed a dictionary of pictographs that can be used by PWDs and those with low literacy in disasters.[20] Similarly, digital tools can help aid workers to better support PWDs. One example is the Humanitarian Hands-On Tool, a smartphone app and web-based tool that provides guidance on implementing inclusive emergency response efforts.[21]

Mobile-based learning can offer an alternative education to women and girls, who may be more likely to be excluded from formal education in recovery phases of humanitarian contexts. For women in particular, digital content offers a safe place to access information about health issues. For example, the Vodafone Instant Network Schools provides young refugees in seven camps in the DRC, Kenya, Tanzania and South Sudan access to internet and digital educational content—benefitting more than 43,000 refugee students each month.[22] Similarly, Aliim Smartphone Schools Program, while currently under development, will focus on refugee girls in Lebanon and Jordan to provide basic literacy, numeracy, English, entrepreneurial and survival skills.[23] For PWDs, digital content can increase accessibility. Namma Vaani, a service in rural India, allows PWDs to listen and respond to recorded voice messages about education, employment and life skills.[24] In Israel, NGO AlManarah has created the first virtual Arabic audiobook library, which can be accessed by mobile devices or web browsers.[25]

Women and humanitarian cash transfers: What we don't know and areas for future research

With the growing trend of cash-based programming in humanitarian response, more focus is being placed on how humanitarian cash transfers (HCTs) could benefit and impact women. Evidence suggests that well-designed cash transfer programs targeting women "can improve a woman's bargaining power, increase her decision-making capacity and reduce intimate partner violence."[26] However, in humanitarian contexts, the effects of HCTs and delivery modalities, including mobile money, require further research. Recently, UNHCR and WFP have launched a project focused on identifying and mitigating abuses of power in cash assistance.[27] Several humanitarian stakeholders also expressed concerns about safety and increased gender-based violence due to shifting power dynamics in households if women were recipients on HCTs.[28] The Cash Learning Partnership recently identified a few areas regarding women and HCTs in humanitarian contexts that require further research:

• How the size, frequency and duration of HCTs influence gender protection and empowerment outcomes;

• How best to link HCTs to complementary programming in different contexts to lead to greater gender-transformative change; and

• How using technology to deliver HCTs can improve gender protection and empowerment outcomes.[29]

16. Interview with humanitarian stakeholders; GSMA landscaping on gender and inclusivity.
17. Humanity & Inclusion, "Disability Statistics in Humanitarian Action," n.d., https://humanity-inclusion.org.uk/en/disability-statistics-in-humanitarian-action.
18. Humanity & Inclusion.
19. UCL, "MANTRA: Increasing Maternal and Child Health Resilience before, during and after Disasters Using Mobile Technology in Nepal," n.d., http://www.ucl.ac.uk/rdr/research/ongoing-projects/mantra.
20. Sahana Software Foundation, "Pictographs in Support of Disaster Information Communication for Linguistically Challenged" (Humanitarian Innovation Fund, August 2017), http://www.elrha.org/wp-content/uploads/2018/03/SahanaPictographs_HIF_ESI_FINAL_REPORT.pdf.
21. CBM, "Humanitarian Hands-On Tool," n.d., https://hhot.cbm.org/.
22. Vodafone, "Instant Network Schools," n.d., https://www.vodafone.com/content/foundation/instant-network-schools.html.
23. Aliim, "Smartphone Schools Program," n.d., http://aliim.org/smartphone-schools-program/.
24. Enable Academy, "A Social Networking Platform for Persons with Disability - Namma Vaani and Hamari Vaani," n.d., http://www.enableacademy.org/initiatives/district-networking-model/.
25. AlManarah, "AlManarah Unveils the International Library for the Print-Disabled," September 30, 2014, http://www.almanarah.org/eng/?mod=articles&ID=246.

26. Bastagli, F., Hagen-Zanker, J., Harman, L., Barca, V., Sturge, G., Schmidt, T. and Pellerano, L. (2016) 'Cash transfers: what does the evidence say? A rigorous review of programme impact and of the role of design and implementation features', Overseas Development Institute (ODI), London.
27. Andrew Harper, UNHCR and Kenn Crossley, WFP, "1st Steering Committee Meeting - Mitigating Risks of Abuse of Power in Cash Assistance," (September 18, 2018).
28. Interviews with humanitarian stakeholders; GSMA landscaping on inclusivity.
29. "Collected Papers on Gender and Cash Transfer Programmes in Humanitarian Contexts," September 12, 2018, http://www.cashlearning.org/resources/library/1242-collected-papers-on-gender-and-cash-transfer-programmes-in-humanitarian-contexts.

Digital identity

Being able to prove your identity is essential for accessing basic services, in addition to deepening socio-economic development. In humanitarian contexts, this is even more critical for vulnerable populations. More than one billion people globally are unable to prove their identity—the majority who are based in lower middle- and low-income countries in Sub-Saharan Africa[30] —preventing them from accessing life-enabling or life-saving services. In humanitarian crises, refugees may find themselves in an administrative dead end, oftentimes lacking the proof of identity from their country of origin and unable to obtain official identity credentials in their host country.

Digital identity credentials—whereby a set of attributes that uniquely identify a person are captured and stored electronically[31] — can provide an alternative in humanitarian contexts, as most refugees have access to at least 2G networks and 71 per cent of households having access to at least one mobile phone.[32] Additionally, Government-recognised digital identity solutions, such as digital identity cards and birth registration certificates, or mobile biometric verification solutions, can unlock a variety of other services, such as mobile money or mobile-enabled utilities. For example, digital identity credentials can be used to register for mobile money or pay-as-you-go solar products. Over time, continued mobile usage and repayment can build digital financial credit worthiness for beneficiaries, which could lead to greater access to loans or other services that can improve their financial profiles and identities.

Considerations and requirements for digital identity in humanitarian contexts

In humanitarian contexts, the issue of digital identification oscillates between two related but distinct areas: 'upstream' and 'downstream'. Upstream is focused on creating an official digital identification and balancing the conflicting needs of local governments, humanitarian agencies, MNOs and beneficiaries to ensure that everyone can access mobile technology for identification. Downstream is focused on authenticating the mobile-based digital identity, and how verification processes can provide access to a greater spectrum of aid services in addition to other services offered by the private sector.

Additionally, humanitarian contexts necessitate certain requirements that may make digital identification difficult. The first is an official entry point—either an ID provided by a government or an international institution, like UNHCR. This entry point is the pre-requisite to access and benefit from digital services. For mobile technology and services, this entry point is required for obtaining a SIM card and meeting KYC requirements. Research has shown that a lack of ID can be a persistent challenge for FDPs to access mobile services in certain contexts. FDPs often face a dual barrier as the requirements for SIM registration and KYC for mobile money account opening are very often different and therefore access to a SIM card does not guarantee access to a mobile money account in one's own name. An analysis of five countries found that certain policies prevented access to mobile services.[33] At the time of writing, refugees were unable to register for SIM cards in Bangladesh, while in the DRC, a UNHCR ID card was valid to register for mobile financial services, but not to obtain a SIM card. The second digital identification requirement is strong authentication processes, and humanitarian agencies are increasingly implementing biometric control approaches to reduce fraud and

30. VYJAYANTI T DESAI, "Counting the Uncounted: 1.1 Billion People without IDs," World Bank (blog), June 6, 2017, http://blogs.worldbank.org/ic4d/counting-uncounted-11-billion-people-without-ids.
31. GSMA, World Bank Group, and Secure Identity Alliance, "Digital Identity: Towards Shared Principles for Public and Private Sector Cooperation," July 2016, https://www.gsma.com/mobilefordevelopment/wp-content/uploads/2016/07/Towards-Shared-Principles-for-Public-and-Private-Sector-Cooperation.pdf.
32. UNHCR, "CONNECTING REFUGEES: How Internet and Mobile Connectivity Can Improve Refugee Well-Being and Transform Humanitarian Action."
33. GSMA analysis of Bangladesh, DRC, Iraq, Jordan and Uganda.

duplication. For instance, one technology provider explained that when the UNHCR switched to a biometric solution, they had discovered a 20 per cent rate of fraud in Syrian refugee camps due to paper-based IDs.[34] Finally, inclusivity mandates for aid delivery may limit the applicability of mobile based solutions in situations where network coverage is lacking or where only a minority of beneficiaries own mobile phones.

Humanitarian crises are very context-dependent, and digital identity solutions will need to consider some additional factors. The first is the status of beneficiaries—whether they are refugees or internally displaced people (who are likely already registered with access to mobile services). The second is the profile of beneficiaries, and whether mobile-based solutions can be tailored to their needs and capabilities. The third is involvement from governments—some governments may restrict access to refugees, as is the case in Bangladesh, where SIM cards cannot be purchased by refugees.[35]

Humanitarian agencies can benefit greatly from digital ID adoption and verification

While the value chain for digital identity evolves as new technology providers and services emerge, humanitarian agencies can benefit from digital ID authentication and verification where such solutions can enable the delivery of digital humanitarian aid in a faster and more efficient, transparent, dignified and robust way. Humanitarian agencies are structuring assistance, offering on-the-ground coordination, and advocating with governments. The Middle East is becoming fertile ground for digital identity innovations, as the UNHCR has implemented iris registration of 2.5 million Syrian refugees in Jordan, Lebanon, Iraq and Egypt with IrisGuard, which has developed a secured

delivery platform.[36]

Refugee camps offer a promising use case for now, as IDPs are harder to target

Almost 9 million FDPs live in camps and settlements, which oftentimes can grow to populations of hundreds of thousands.[37] Given this high concentration of people, these camps are most promising to implement digital identity solutions because they can foster the creation of an ecosystem equipped with point-of-sale software and/or wallets linked to biometric information which can be recognised as an official identification credential for the purpose of meeting proof-of-identity requirements. Internally displaced people, on the other hand, are harder to reach and assess, as they tend to be more dispersed within a country.

While refugee camps offer a viable location to implement digital identity solutions, it is still very much a nascent area and the business case is not yet clear. For the mobile industry, a wait-and-see approach may be best while further research and projects are needed to shed more light on the opportunities for MNOs.

Looking ahead, the GSMA has begun to explore:

- the types of identification documents that refugees have and how they access them;

- the ID requirements set by regulators in UNHCR's top 20 priority countries for SIM card and mobile money registration and is working with UNHCR to jointly advocate for ways to mitigate ID related barriers;

- what level of trust refugees have with sharing personal information with various stakeholders in humanitarian contexts.

GSMA Summary of policy considerations for enabling access to mobile services for the forcibly displaced

In an effort to promote an enabling policy and regulatory framework, host-country governments and regulators (including central banks) should consider adopting flexible and proportionate approaches towards proof-of-identity requirements for forcibly displaced persons to be able to access mobile services, particularly in emergency contexts. Such approaches may include:

— 1
Providing clear guidelines on what identification is acceptable for FDPs to access mobile services, and ensuring that a critical mass of FDPs has access to an acceptable form of identity;

— 2
Allowing the use of UNHCR-issued identification, where available, to satisfy any mandatory SIM registration or 'Know Your Customer' (KYC) requirements for opening mobile money accounts;

— 3
Enabling lower, 'tiered' thresholds of KYC requirements to allow FDPs to open basic mobilemoney accounts, particularly in emergency contexts;

— 4
Harmonising identity-related SIM registration requirements with the lowest-tier of KYC requirements in countries where SIM registration is mandatory;

— 5
Establishing proportionate Risk Assessment processes that take into account the diverse types of FDPs when considering proof-of-identity policies;

— 6
Exploring the use of new Digital Identity technologies;

— 7
Promoting robust identity validation processes while adopting consistent data protection and privacy frameworks.

(GSMA "Enabling Access to Mobile Services for the Forcibly Displaced: Policy and Regulatory Considerations for Addressing Identity Related Challenges in Humanitarian Contexts", 2017, https://bit.ly/2Sg8rqE)

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34. Interview with technology provider for digital identity landscaping.
35. AFP, "Bangladesh Imposes Mobile Phone Ban on Rohingya Refugees," Yahoo, September 24, 2017, https://www.yahoo.com/news/bangladesh-imposes-mobile-phone-ban-rohingya-refugees-073911274.html.
36. More info: https://www.unhcr.org/596331dd7.pdf
37. For instance, Cox's Bazar in Bangladesh has approximately 670,000 residents, while Bidi Bidi in Uganda houses approximately 285,000 residents. Dadaab and Kakuma in Kenya house approximately 270,000 and 180,000 respectively.

Mobile financial services

In 2018, UN OCHA estimated that more than 135 million people will need humanitarian aid, at a cost of approximately USD 22.5 billion.[38] In response to this increasing number, mobile financial services (MFS) can be a viable channel for beneficiaries—both in terms of receiving remittances from family or friends and receiving cash transfers from humanitarian agencies. As of December 2017, there were 276 live mobile money deployments across 90 countries and even in countries where mobile money is less mature, it is often still more developed than the banking sector and therefore potentially the best digital payments mechanism available. In Uganda, research found that almost half of those surveyed in Kyangwali refugee settlement used mobile money, with nearly all respondents receiving transfers from friends and family.[39]

More recently, the sector has begun to distribute portions of aid as humanitarian cash transfers (HCTs). Decades of research have supported the belief that beneficiaries best know their needs and can be trusted to spend HCTs accordingly. Additionally, with the majority of refugees located in or near urban settings, HCTs also enable beneficiaries to support the local economies of host countries and communities—this is particularly true in countries with forward-looking policies for refugees, like Uganda.

With the availability of mobile technology and the rise of mobile financial services, especially in middle- and low-income countries, distributing HCTs digitally is increasingly seen as a likely mechanism for disbursement. Compared to cash, digital disbursements have the potential to offer many benefits to humanitarian stakeholders and recipients:

- increased transparency in addition to reduced fraud and theft;

- fast and flexible delivery (once the system is set up); greater linkages for financial inclusion;

- and greater freedom and dignity for recipients to choose when and where they receive their HCTs.[40]

Collaborative efforts and principles in the sector

While the evolution to cash-based programming in the humanitarian sector is very much in progress, collaborative efforts and principles in the industry are helping to signal the growing importance of this transition and of the role the private sector can play. For example, The Cash Learning Partnership focuses on policy, capacity building and research,[41] while the Electronic Cash Transfer Learning Action Network explored the use of payments technology in humanitarian contexts.[42] At national levels, cash working groups are also common. Two prime examples are the Lebanon Cash Consortium (LCC) and the Common Cash Facility (CCF) in Jordan.[43] Both the LCC and CCF coordinate with UN agencies and NGOs to disburse HCTs to beneficiaries. Interestingly, both also use a common payments platform to do so.

In the last three years, there's also been an increase in the number of principles and guidelines aimed to increase the amount of aid distributed by HCT. For instance, in 2015 ECHO released the *Ten Common Principles for Multi-Purpose Cash-Based Assistance to Respond to Humanitarian Needs*.[44] The following year, prominent humanitarian and private sector stakeholders established the *Barcelona Principles for Digital Payments in Humanitarian Response*,[45] and in 2017, the *Principles on Public-Private Cooperation in Humanitarian Payments* were released at the World Economic Forum.[46]

38. UN OCHA, "Global Humanitarian Overview 2018."

39. GSMA, "The Importance of Mobile for Refugees: A Landscape of New Services and Approaches," January 2017, https://www.gsma.com/mobilefordevelopment/wp-content/uploads/2017/02/The-Importance-of-mobile-for-refugees_a-landscape-of-new-services-and-approaches.pdf.

40. GSMA, "Landscape Report: Mobile Money, Humanitarian Cash Transfers and Displaced Populations," May 2017, https://www.gsma.com/mobilefordevelopment/programme/mobile-for-humanitarian-innovation/mobile-money-humanitarian-cash-transfers/.

41. "The Cash Learning Partnership," n.d., http://www.cashlearning.org/.

42. Note that ELAN dissolved in late 2018. The Cash Learning Partnership, "About the Electronic Cash Transfer Learning Action Network (ELAN)," n.d., http://www.cashlearning.org/elan/elan.

43. More info: https://odihpn.org/blog/cash-debate-lebanon/ and http://www.unhcr.org/596331dd7.pdf

44. ECHO, "Ten Common Principles for Multi-Purpose Cash-Based Assistance to Respond to Humanitarian Needs," March 2015, http://www.cashlearning.org/downloads/conceptpapercommontoplineprinciplesen.pdf.

45. "Principles for Digital Payments in Humanitarian Response," USAID, n.d., http://finance.digitaldevelopment.org/principles-digital-payments-humanitarian-response.

46. World Economic Forum, "Principles on Public-Private Cooperation in Humanitarian Payments," January 2017, http://www3.weforum.org/docs/IP/2016/FS/WEF_FI_Principles_Humanitarian_Payments.pdf.

Assessing digital payment options for HCTs

In humanitarian contexts, HCTs are generally distributed in three ways: e-vouchers, card-based systems, and mobile money systems. One of the primary reasons an humanitarian agency will prioritise one mode over another is whether sufficient infrastructure is in place and whether beneficiaries prefer a certain mode.

E-vouchers are restricted transfers which can be used at pre-approved merchants and sometimes for specific items only. It ensures the humanitarian agencies have some degree of control over what beneficiaries can obtain. E-vouchers can be enabled on mobile phones or linked to card-based systems. One of the benefits is that recipients do not need to go through know-your-customer (KYC) registration—important in situations where displaced people are unable to provide or obtain ID documents. E-vouchers can also enable humanitarian organizations reach programmatic outcomes such as helping beneficiaries improve their nutritional status. For instance, e-vouchers can ensure beneficiaries purchase fresh food (such as vegetables) at pre-approved merchants. Further e-vouchers are entirely digital, so there is no need to move cash.

Card-based systems and mobile money systems are more comparable. In markets where mobile money is prevalent, it may be the preferred mode, while in areas where mobile money is less prevalent, card-based systems may be preferred. Mobile money can offer many competitive advantages to bank-based systems: a lower cost basis per customer, more mass-market retail experience, a more established agent distribution network, and likely more customers registered for GSM (or even mobile money). Further, KYC requirements for mobile money are often less burdensome for customers and agents. Mobile money can also support a digital ecosystem, unlocking access to other life-enhancing digital products and services.

Estimating potential earnings for mobile money providers

To better understand the business case for mobile financial service providers, the GSMA's research estimated the potential size of cash-based programming in 2018. This analysis looked at two variables: the expected annual growth rate of cash-based programming and the fees that MFS providers can earn from HCTs. If the growth of cash-based programming continues at the same trajectory as in the past two years, with an average rate of 45 per cent, estimates indicate that it is worth USD 5.89 billion in 2018. Assuming an average two per cent transfer fee as the proportion of the transaction value,[47] there is a potential market of USD 118 million in transfer fees for payments providers in 2018. However, it should be noted that this is not evenly distributed across crisis areas and does vary significantly from year to year. Further, when it comes to profitability, the research found that the most mature mobile financial services, which have built robust digital ecosystems, would likely generate a profit operating in these complex humanitarian contexts.[48] **The key to sustained profitability for providers will be enhanced coordination between humanitarian stakeholders, spreading the innovation of technologies and products, linking humanitarian cash transfers to other programmes like social safety nets and using HCTs as an entry point for customers to use a suite of mobile-enabled services.** If successful, an alluring business case can be achieved for the provider and as a result, more sustainable services will be available for people affected by crises.

47. Providers and humanitarian agencies generally reported transfer fees between 1.5 and 5 per cent, with most around 2 per cent. This is aligned with GSMA's finding that the average transfer fee across global mobile money operations is 2.06 per cent. Source: Nika Naghavi et al., "Success Factors for Mobile Money Services: A Quantitative Assessment of Success Factors" (GSMA, November 2016), https://www.gsma.com/mobilefordevelopment/wp-content/uploads/2016/11/GSMA_Success-factors-for-mobile-money-services.pdf.
48. For more on mobile money profitability, see Mireya Almazán and Nicolas Vonthron, "Mobile Money Profitability: A Digital Ecosystem to Drive Healthy Margins" (GSMA, November 2014), http://www.gsma.com/mobilefordevelopment/wp-content/uploads/2015/11/2014_Mobile-money-profitability-A-digital-ecosystem-to-drive-healthy-margins.pdf.

Mobile-enabled utilities

While energy, water and sanitation services are critical requirements for FDPs, many lack these basic utilities. For instance, just 11 per cent of refugees have access to reliable energy sources for lighting.[49] Mobile-enabled utility services have gained momentum in recent years in developing countries, yet most service providers have not considered humanitarian contexts. However, they could widen their customer base by servicing these affected areas while contributing to targets outlined by SDGs 6 and 7.

Historically, access to energy has not been a primary concern in humanitarian contexts. UNHCR does not make energy considerations part of the standard design of its refugee settlements, and the cluster approach in humanitarian response does not identify energy as one of its eleven clusters.[50] However, with mobile phones being an important lifeline and necessity for many refugees, being able to charge devices becomes even more critical. Most refugees rely on firewood or charcoal as energy sources, or trade food rations for cooking fuel, torches or candles.[51] Solar lighting is distributed in some camps, like the Kakuma camp in north-western Kenya, where 24 per cent of households have a solar lantern.[52] Most camp facilities are powered by diesel generators. In contrast, basic requirements for water, sanitation, and hygiene facilities (WASH) are clearly identified in humanitarian contexts. At a minimum, each person requires 15 litres of water per day, and one latrine per 50 people in emergency contexts.[53] Water is generally delivered to refugees through community taps, while pit latrines are used for sanitation.

Energy is increasingly seen as an important priority for humanitarian agencies

Despite the lack of focus in response efforts, humanitarian agencies and international organisations are increasingly prioritising energy access and the shift to cleaner sources through several recent collaborative initiatives:

- The Moving Energy Initiative seeks to achieve access to clean, affordable and reliable energy among displaced populations through data and research, an investment fund and pilot projects.[54]

- The Safe Access to Fuel and Energy working group has established a database of energy access resources and tools for the humanitarian sector.[55]

- The Smart Communities Coalition will address technology challenges that refugees and host communities face, by increasing connectivity, digital payment capabilities and energy access.[56]

- The Global Plan of Action for Sustainable Energy Solutions in Situations of Displacement recently launched a framework that will provide concrete actions for accelerated progress towards "safe access to affordable, reliable, sustainable, and modern energy services for all displaced people by 2030."[57]

49. Glada Lahn and Owen Grafham, "Heat, Light and Power for Refugees: Saving Lives, Reducing Costs" (Chatham House, November 2015), https://www.chathamhouse.org/sites/default/files/publications/research/2015-11-17-heat-light-power-refugees-lahn-grafham-final.pdf.
50. More about the cluster approach: https://www.humanitarianresponse.info/en/about-clusters/what-is-the-cluster-approach
51. Drew Corbyn and Mattia Vianello, "Prices, Products and Priorities: Meeting Refugees' Energy Needs in Burkina Faso and Kenya" (Moving Energy Initiative, January 2018), https://www.chathamhouse.org/sites/default/files/publications/research/2018-01-30-meeting-refugees-energy-needs-burkina-faso-kenya-mei-corbyn-vianello-final.pdf.
52. Drew Corbyn and Mattia Vianello.
53. The Sphere Project, "Minimum Standards in Water Supply, Sanitation and Hygiene Promotion," in The Sphere Handbook, 2011, http://www.spherehandbook.org/content/pages/en/6.minimum-standards-in-water-supply-sanitation-and-hygiene-promotion.pdf.
54. More info: https://mei.chathamhouse.org/
55. More info: https://www.safefuelandenergy.org/
56. More info: https://data2.unhcr.org/ar/documents/download/65108
57. More info: http://onlinelearning.unitar.org/global-plan-of-action/

Leveraging mobile technology for energy and WASH in humanitarian contexts

Mobile technology can be used in a variety of ways to expand or improve access to energy and WASH in humanitarian contexts. The GSMA has mapped six mobile channels to achieve this expansion or improvement, in addition to customer data, including:

- Mobile payments;
- Machine-to-machine (M2M) connectivity;
- Mobile services;
- Infrastructure;
- Distribution; and
- Branding.[58]

Consultation with industry experts found that energy access in settlements can be facilitated through mobile payments, M2M connectivity and infrastructure. Mobile payments could be used for purchasing clean fuel (using smart meters for liquified petroleum gas), for solar energy through pay-as-you-go solar home systems (providers Pawame and BBOXX are piloting projects in the Kakuma camp[59]), and for obtaining energy through community models. Here, a mini-grid would offer households energy credit on smart meters which could be combined with wi-fi connectivity (as Ubuntu Power is trialling[60]). Telecom towers could be used as anchor

loads for the mini-grids. Mobile energy vouchers could also be distributed in humanitarian contexts, allowing beneficiaries to access pre-paid energy or purchase solar energy products. This may encourage households to adopt cleaner and more sustainable energy options.

With WASH, mobile technology can improve the delivery lifecycle in refugee settlements, including mapping, assessing, maintaining and stimulating water and sanitation usage. For example, mapping WASH infrastructure is an important activity in humanitarian contexts and mobile technology can help map and monitor sanitation sites. mWater, an open access and free platform, allows humanitarian stakeholders to collect data in a standardised way.[61] Mobile surveys and images captured by humanitarian workers and residents can also be used to assess the hygiene levels at facilities and help prevent disease. Mobile apps can also be used for the maintenance of WASH services, offering real-time tracking of collection, transport and safe disposal. Waterless toilet providers Loowatt and Sanivation rely on these apps.[62] Mobile technology could be used to stimulate usage and better understand people's willingness to pay for water, such as through mobile pay-as-you-drink solutions (e.g. through a pre-payment smart tap such as eWaterpay offers[63]). Information campaigns and interactive SMS have been used to promote sanitation and hygiene, for instance, in Somalia with the m-WASH campaign.[64]

Encouraging beneficiaries to use mobile-enabled utility services

Certain incentives may encourage FDPs to adopt and use mobile-enabled utility services, such as offering extra financial services to financially reliable customers (based on repayment history). This in turn can build credit histories of FDPs which can help to improve their livelihoods and provide them with new opportunities. Some mobile-enabled utility providers are already offering customers mobile vouchers for energy or WASH services, while others envision offering smartphone and solar home systems kits which come with data bundles.

58. Mobile for Development Utilities, "Achieving SDGs 6 and 7: The Promise and Impact of Mobile Technology" (GSMA, 2018), https://www.gsma.com/mobilefordevelopment/wp-content/uploads/2018/01/Achieving-SDGs-6-and-7-The-promise-and-impact-of-mobile-technology.pdf.
59. More info: https://www.pawame.com/ and http://www.bboxx.co.uk/
60. More info: http://www.ubuntupower.org/
61. More info: https://www.mwater.co
62. More info: https://www.loowatt.com/ and http://www.sanivation.com/
63. More info: http://www.ewaterpay.com/
64. UNICEF, "Mobile Phone-Based Hygiene and Sanitation Promotion in Somalia," November 2015, https://www.unicef.org/esaro/UNICEF-FN-Somalia-Mobile-low-res.pdf.

Food security and climate change

Between 2005 and 2015, 1.8 billion people in developing countries were affected by natural disasters, with the majority affected by climate and weather disasters.[65] Climate and weather disasters are interconnected with food insecurity—they can destroy agricultural infrastructure, assets and capacity. The most vulnerable are the 500 million smallholder farming households in developing countries, who primarily rely on income generated from agriculture, and who produce 70 per cent of the food consumed globally.[66]

Food insecurity is particularly acute in developing countries: 98 per cent of the world's 815 million hungry people live in them.[67] With food assistance already accounting for 40 per cent of humanitarian expenditure, this growing demand continues to put pressure on humanitarian agencies and government resources.[68] However, mobile and digital technology can strengthen interventions to prevent and respond to climate-related disasters and food insecurity, in addition to supporting humanitarian organisations to take a long-term approach to building community resilience.

Building climate resilience through recovery, response and adaptation

Given the protracted nature of climate-related disasters, building climate resilience in the long-term through adaptation is equally as important as disaster-related recovery and response is in the short term. In fact, evidence suggests that investing in disaster preparedness and management is much more efficient than responding during its aftermath. For every dollar spent on risk reduction, between USD 2 and 4 is returned in terms of reduced or avoided disaster impact.[69] Building climate resilience is no different, and the role of digital technology should be considered across three phases of the disaster lifecycle: recovery, response and adaptation. Recovery includes mobile solutions that primarily support humanitarian efforts in the short term following disasters, while response includes early warning solutions that increase preparedness to climate-related events and food insecurity risks. Adaptation is more long-term than recovery and response and focused on how farming communities can strengthen their climate resilience through mobile technology.

65. FAO, "Increasing Climate Resilience: Addressing the Impact of Extreme Events on Agriculture and the Way Forward," 2016, http://www.fao.org/3/a-i6408e.pdf.
66. Fairtrade International, "Powering up Small Holder Farmers to Make Food Fair," May 2013, http://mail.fairtrade.org.nz/sites/default/files/2013-05-Fairtrade_Smallholder_Report_FairtradeInternational.pdf; CGAP, "A Year in the Lives of Smallholder Farmers," February 25, 2016, http://www.worldbank.org/en/news/feature/2016/02/25/a-year-in-the-lives-of-smallholder-farming-families.
67. FAO, IFAD, UNICEF, WFP and WHO, "The State of Food Security and Nutrition in the World 2017", 2017, https://www.unicef.org/publications/files/State_of_Food_Security_and_Nutrition_in_the_World_2017.pdf
Based on 2016 estimates, almost 520 million people in Asia, more than 243 million in Africa, and more than 42 million in Latin America and the Caribbean did not have access to sufficient food.
68. WFP, "World Food Assistance - Preventing Food Crises", 2018, https://www.wfp.org/content/2018-world-food-assistance-preventing-food-crises
69. FAO, "Disaster Risk Reduction in Agriculture," n.d., http://www.fao.org/policy-support/policy-themes/disaster-risk-reduction-agriculture/en/.

How mobile technology supports climate resilience and food security, and responds to climate change impacts

With recovery, mobile technology can be used to support the delivery of humanitarian assistance, through supply chain solutions, identifying displaced populations (by tracking GSM subscriber movements) and facilitating cash transfers. In Jordan, Lebanon and Syria, Souktel developed a platform for the WFP to track food aid delivery across the supply chain.[70] In Northern Ghana, WFP works with MTN to send agricultural communities mobile money transfers during the dry season for building communal infrastructure for storing water (e.g. in wells or ponds).[71] Mobile can also monitor affected communities through surveillance tools.
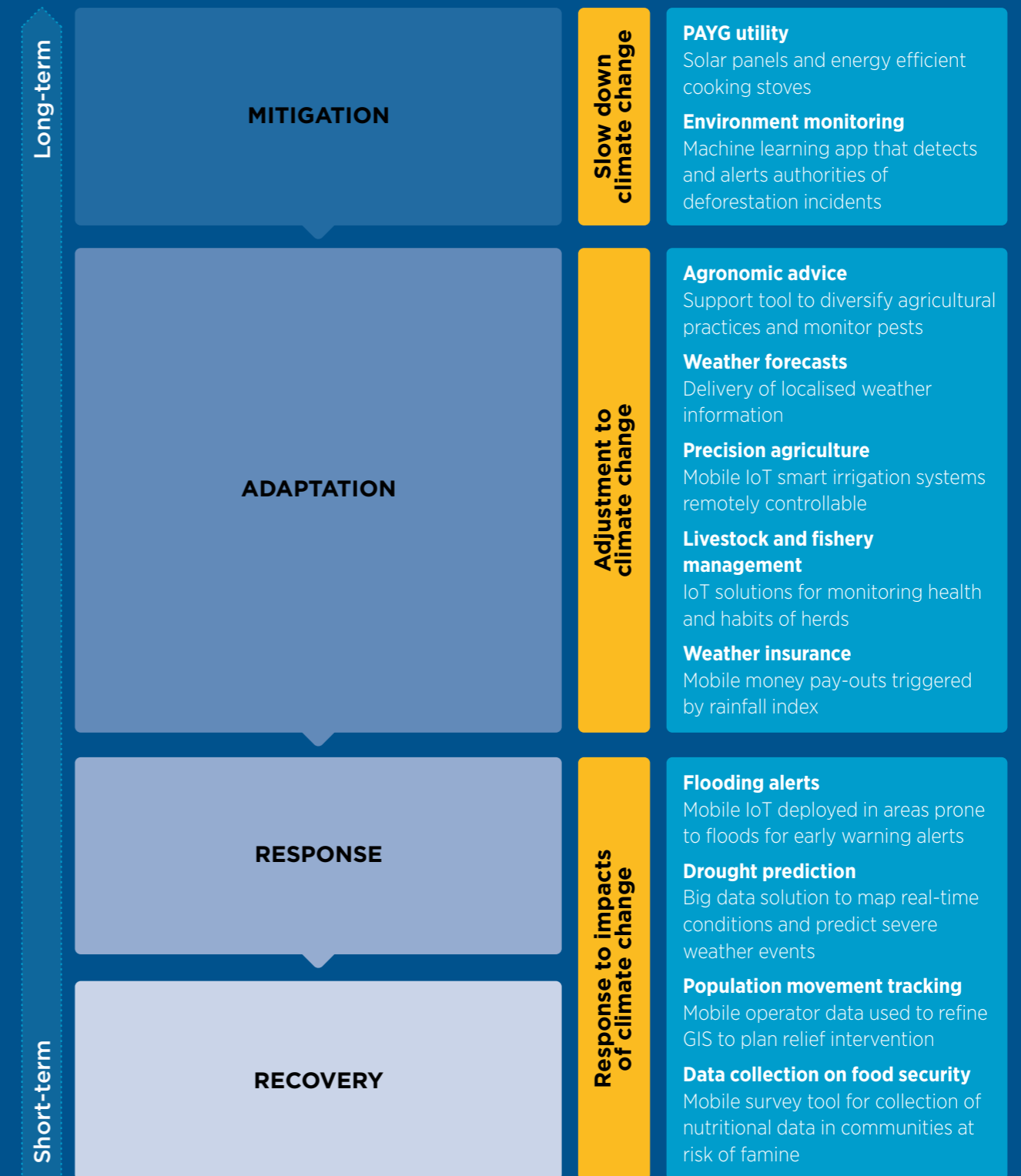
With response, mobile technology can be used as an alert system, as a surveying or collection tool, and to facilitate cash transfers. For instance, MNOs provided early warning systems for flood alerts in Nepal and Bangladesh.[72] The World Food Programme (WFP) uses a mobile Vulnerability Analysis and Mapping tool to survey the nutritional status of vulnerable communities.[73] MAM'Out provides seasonal and multiannual cash transfers to communities prone to food insecurity in Burkina Faso to prevent acute malnutrition in children under 36 months.[74]

When it comes to adaptation, digital technology can enable agricultural communities to become more informed, insured and productive against climate change in the longer term. This is achieved through services that offer agronomic advise (e.g. pest detection and management or crop management techniques); weather forecasts; index insurance (in Kenya, ACRE Africa offers a seed replanting guarantee service that uses weather data and matches this to the conditions required for maize[75]); and smart agriculture (e.g. equipment monitoring or precision agriculture).

Looking ahead, mobile-enabled interventions will continue to support time-sensitive response and recovery efforts addressing climate-related disasters and food insecurity, in addition to longer-term strategies to strengthen climate resilience, particularly for those reliant on agriculture. The GSMA expects to see a greater number of mobile services targeting rural populations with climate information, a greater number of examples of mobile data applied to weather monitoring and food security, and a greater number of governments using mobile channels to optimise preparedness and food security initiatives. M4H will predominantly be focused on exploring digital use cases in the response and recovery phase.

70. Souktel, "How Mobile Phones Can Help Solve East Africa's Food Crisis: Our Thoughts," n.d., http://www.souktel.org/media/news/how-mobile-phones-can-help-solve-east-africa %E2%80%99s-food-crisis-our-thoughts.
71. Vera Boohene, "Mobile Phone-Based Cash Assistance Goes a Long Way towards Reaching Zero Hunger in Rural Ghana," April 20, 2016, https://www.wfp.org/stories/ghana-mobile-money-transfers-increase-impact-wfps-work.
72. In Nepal, through Ncell and NTC and in Bangladesh, through Grameenphone and Teletak.
73. WFP, "Vulnerability Analysis and Mapping Food Security Analysis at a Glance," 2015, https://documents.wfp.org/stellent/groups/public/documents/communications/wfp252355.pdf.
74. Audrey Tonguet-Papucci et al., "The MAM'Out Project: A Randomized Controlled Trial to Assess Multiannual and Seasonal Cash Transfers for the Prevention of Acute Malnutrition in Children under 36 Months in Burkina Faso," BMC Public Health 15, no. 1 (December 2015), https://doi.org/10.1186/s12889-015-2060-3.
75. ACRE Africa, "Replanting Guarantee," n.d., https://acreafrica.com/replanting-guarantee-rpg/.

Climate change and food security: digital use cases

Long-term	**MITIGATION**	**Slow down climate change**
		PAYG utility — Solar panels and energy efficient cooking stoves **Environment monitoring** — Machine learning app that detects and alerts authorities of deforestation incidents
	ADAPTATION	**Adjustment to climate change**
		Agronomic advice — Support tool to diversify agricultural practices and monitor pests **Weather forecasts** — Delivery of localised weather information **Precision agriculture** — Mobile IoT smart irrigation systems remotely controllable **Livestock and fishery management** — IoT solutions for monitoring health and habits of herds **Weather insurance** — Mobile money pay-outs triggered by rainfall index
	RESPONSE	**Response to impacts of climate change**
Short-term	**RECOVERY**	**Flooding alerts** — Mobile IoT deployed in areas prone to floods for early warning alerts **Drought prediction** — Big data solution to map real-time conditions and predict severe weather events **Population movement tracking** — Mobile operator data used to refine GIS to plan relief intervention **Data collection on food security** — Mobile survey tool for collection of nutritional data in communities at risk of famine

The M4H programme will primarily be focusing on digital use cases in the response and recovery phase.

Benefits, challenges, and enablers

The M4H landscaping reports identified the benefits that digital technology facilitates, the challenges that need to be addressed, and the enablers that can be leveraged to overcome these challenges.

Benefits

For humanitarian stakeholders and non-government organisations (NGOs) involved in crises, digital technology can offer increased overall efficiency and operational benefits which positively impact their response efforts. This can include smoother aid delivery. For instance, humanitarian agencies can use mobile supply chain management systems to ensure aid deliveries reach key stages of the supply chain. Technology can also reduce logistical issues and centralise processes, especially where cash-based programming is digitised. It also offers a fairer process for beneficiaries, by reducing duplication and fraud.[77] Further, mobile technology can provide effective monitoring and near real-time tracking—including the movement of displaced communities or the spread of agricultural pests to prevent food insecurity—which can lead to better coordination.

For the private sector—including MNOs and other organisations who use mobile and digital technology—there is an opportunity to widen their customer footprint by providing products and services to people affected by humanitarian contexts, help achieve targets outlined by the Sustainable Development Goals as well as missions for social inclusivity and responsibility. For example, Bidi Bidi settlement in Uganda hosts approximately 224,000 refugees, while the Dadaab and Kakuma settlements in Kenya host 270,000 and 180,000 people, respectively. Further, these settlements can contribute to an increased level of digitisation and usage among customers, the NGOs and humanitarian organisations that operate within them. In protracted displacement contexts, HCTs distributed via mobile money can enable access to a larger suite of digital financial services (such as insurance, credit and dedicated savings).

Beyond the recovery, response and adaptation tools that digital technologies offer beneficiaries, over the longer term these tools can also accelerate self-sufficiency, dignity, community resilience, and financial inclusion. Moreover, mobile-based services can improve informal education for women and girls and can increase accessibility for PWDs.

77. See also: https://reliefweb.int/sites/reliefweb.int/files/resources/reach_uga_factsheet_bidi_bidi_gap_analysis_13jun2018_0.pdf; http://www.unhcr.org/ke/dadaab-refugee-complex; and https://data2.unhcr.org/en/documents/download/62199

Challenges

To realise these benefits, stakeholders will need to address certain challenges which persist in humanitarian contexts. Some of these apply more generally to crises and response efforts, while others are more specific to certain stakeholders.

More generally, when it comes to humanitarian crises, context greatly influences the types of interventions and solutions required. This includes the cause of the issue, the countries involved (including the political will of the government and the regulatory environment), the type of intervention needed, and the various stakeholders involved. As each crisis is unique, it can be challenging for stakeholders (especially the private sector) to standardise response strategies and plans. Every crisis needs to be evaluated within the characteristics of its specific context. Interventions also tend to focus more on vertical solutions, whereas an ecosystem approach towards digital humanitarian assistance is necessary to create a lasting positive impact on a forcibly displaced person's life. Additionally, mobile and digital connectivity has to be in place in order to facilitate digital humanitarian assistance.

Challenges arise when network infrastructure is less than ideal, including weak GSM signal, a lack of liquidity or digital finance agents (especially for HCTs) or where inadequate customer awareness or education persists. To ensure sufficient connectivity infrastructure, systems and partnerships need to be set up in advance; however this can take several months to build and be a strain on time-sensitive humanitarian contexts. Challenges also go beyond technological and operational in these contexts: issues of trust, data security and ownership, as well as privacy will also need to be considered among stakeholders.

Humanitarian agencies

Humanitarian contexts can be fragmented and complex, characterised by many different stakeholders, each with different focuses, capabilities and agendas. This may be further exacerbated by increased competition for donor funding, or an unwillingness to share and adopt alternative approaches towards assistance. Together, this leads to siloed efforts, making harmonisation and standardisation within the sector difficult. **The GSMA's industry consultations identified two recurring challenges: a lack of available data and a lack of coordinated information sharing.** For example, the lack of data included limited (or no) accurate data on gender and PWDs to limited information on refugee spending patterns, preferences, and their willingness to pay. This prevents each stakeholder from working effectively, and dissuades new players from entering the market, which in turn impedes user-friendly solutions.

For humanitarian agencies, limited familiarity with and awareness of technology, as well as a lack of understanding of private sector organisations' operating procedures, priorities and terminology used can create challenges. While larger agencies may have dedicated teams who look at how technology can benefit the sector, there may be a disconnect between head office agendas and understanding, and the realities on the ground. Likewise, technology providers often have a limited awareness of the humanitarian sector, leading to a breakdown of sharing useful and effective learning from tech innovators. Additionally, there may be a mismatch between the protection mandates of humanitarian agencies and using technology to generate customers' digital footprints by capturing sensitive personal information—this can potentially put vulnerable populations at risk and will need to be addressed.

Further, while humanitarian agencies have a real incentive to employ digital solutions in humanitarian contexts, they must also deal with legacy ways of working. The landscaping report on digital identity outlined that agencies themselves recognise that they tend to be followers rather than drivers of innovation, and that they are composed of large bureaucracies with a massive staff, often working in silos. **More generally, these agencies may also require a mindset shift, both in terms of building understanding and trust for working with the private sector and with thinking about how a digital ecosystem can support long-term development impacts, rather than focusing solely on one-off deployments for immediate response.** Shifting behaviours and ways of working can be challenging in large, entrenched organisations.

MNOs and the private sector

For the private sector, and particularly for MNOs, the regulatory environment creates challenges. For example, MNOs must comply with know-your-customer (KYC) requirements, which can be unclear and change frequently. Further, crises may have a significant shifting political dimension, requiring that telecom regulators (and central banks, in the case of digital financial services) coordinate with other institutions to determine KYC requirements in these contexts.

The accessibility of camps and settlements can be an additional challenge for the private sector and can impact the decision to expand or improve infrastructure and increase connectivity in these areas. **Depending on their location, weak mobile network infrastructure or limited availability of agents or other service providers may make it difficult or not financially viable to offer solutions to these camps and settlements. Further, a lack of an obvious business case, or a limited short-term view on the opportunity for ecosystem development may hinder the private sector's willingness to invest.** Despite this, there are examples where the private sector has worked together with humanitarian stakeholders to build infrastructure and expand businesses into challenging locations. For instance, in Uganda's Bidi Bidi refugee

settlement, UNCDF, UNHCR and other humanitarian organisations provided MNOs with critical information to help inform their decision to upgrade and expand coverage in the settlement, in addition to offering extra operational and financial support.[78]

Further, the private sector has a limited focus on humanitarian contexts or misperceptions about settlements. For instance, they may look at contexts as a solely corporate social responsibility (CSR) opportunity, or may apply a technology-first perspective without understanding the beneficiaries or the context. For mobile-enabled utility service providers, misperceptions have been shaped by market distortions through distributing free products or because people are more mobile (making them appear riskier). As an industry expert explained, "Refugee camps are seen as a place where you deliver aid, not as a place where things can happen [and] where people can learn and contribute to the local economy."[79]

Additionally, there are not yet proof points and strong business cases for implementing digital technology in settlements—this was the case for HCTs and mobile-enabled utilities. More quantitative evidence is needed but until then, the private sector may be reluctant to invest. Further, providers of more nascent technologies, such as blockchain applications for digital identity, may still be developing underlying data management and structures, and find it difficult or inappropriate to start pilots with humanitarian agencies.

Finally, digital technology solutions are best suited in specific contexts and at different phases of humanitarian response; these are not necessarily blanket solutions that are applicable across all crises. For instance, early warning systems for natural disasters are a relevant use case for MNOs, while in more prolonged displacement situations, mobile money offers beneficiaries more enhanced services and deeper financial inclusion. While there are benefits of shared platforms to improve efficiency and scalability of solutions in the longer-term, humanitarian agencies and the private sector will need to work together to assess the suitability of certain solutions in specific contexts.

Beneficiaries

For beneficiaries, challenges in using digital technology tend to arise around availability, access, literacy, and other pre-existing barriers. While the challenges are not specifically unique to humanitarian crises, they can be intensified during recovery and response efforts. Foremost is the availability and affordability of mobile phones and mobile enabled devices. Whether beneficiaries can gain access to and afford these technologies greatly impacts the types of solutions that are considered. For example, the landscaping report on climate resilience noted that with agricultural advisory services, the cost of mobile data for rich media services remains challenging for smallholder farmers.

Another challenge is around access to identification and whether beneficiaries can prove their identities. This is especially critical where verifying KYC requirements are necessary, such as obtaining a SIM card or opening a mobile money account. Low levels of digital literacy can also be a challenge, and solutions will need to ensure they don't inadvertently exclude vulnerable people by not considering this. For instance, 43 per cent of adults surveyed in Vanuatu said they were unable to read SMS messages—leaving them excluded from an SMS-based early warning system.[80] Finally, pre-existing social and cultural barriers, as well as stigmas, may be exacerbated in humanitarian crises, especially for women and PWDs. Solutions will need to consider these barriers and stigmas to ensure that digital services and tools are as inclusive as possible.

78. GSMA, "Humanitarian Payment Digitisation: Focus On Uganda's Bidi Bidi Refugee Settlement," 2017, https://www.gsma.com/mobilefordevelopment/wp-content/uploads/2017/11/Humanitarian-Payment-Digitisation.pdf.
79. Stakeholder interview, GSMA consultative study on mobile-enabled utilities.

80. CBM and Nossal Institute Partnership for Disability Inclusive Development, "Disability Inclusion in Disaster Risk Reduction: Experiences of People with Disabilities in Vanuatu during and after Tropical Cyclone Pam and Recommendations for Humanitarian Agencies," July 2017, https://mspgh.unimelb.edu.au/__data/assets/pdf_file/0011/2567576/WEB-DIDRR-Report-14112017.pdf.

Enablers

Despite the aforementioned challenges, industry experts identified a series of enablers which can help drive digital humanitarian assistance forward. Foremost is the development of a digital ecosystem for humanitarian assistance: a connected digital environment, where a range of accessible and sustainable mobile-enabled services are available to those responding to and affected by humanitarian crises. Not only does an ecosystem increase the utility of digital technology in humanitarian contexts, but it also improves the business case for private sector involvement by increasing the addressable market. Further, it increases the availability of life-enhancing products and services for beneficiaries, which leads to enhanced humanitarian outcomes.

Effective partnerships is fundamental in humanitarian contexts, given the variety of stakeholders involved. Digital humanitarian assistance will require strong partnerships with the private sector, and these require time, trust, and a shared long-term vision to develop. Once achieved, these can help streamline response efforts. For example, partnerships amongst humanitarian organisations can lead to aggregated demand for digital solutions across the thematic areas, while partnerships between humanitarian stakeholders and the private sector can better inform and strengthen the business case for digital identity solutions. Further partnerships in the private sector— particularly between MNOs—can also bolster the business opportunity and better justify the capital and operating expenses required in building the infrastructure to enable HCTs.

As previously mentioned, the political will and regulatory environment of a country can be a challenge, but it can also be an enabler. One example is Uganda, where at the time of writing the government has been welcoming to refugees, ensuring they can access certain services.[81]

Additionally, regulation that permits tiered KYC or lower registration thresholds in humanitarian contexts can also be an enabler in some countries, particularly for digital identity and mobile financial services.[82] Alternatively, in countries where policy changes to KYC for FDPs are frequent, biometrics registration (which is more homogenous and doesn't tend to allow for tiered thresholds) leads to a more standard approach to registration, which in turn enables the private sector (including MNOs) to leapfrog traditional paper-based systems to on-board customers to new products and services. Further, governments with centralised digital databases can enable them to be increasingly involved in aid delivery.

Lastly, each stakeholder and partner comes with different expertise, which should be capitalized on in humanitarian settings. For example, MNOs have several core competencies which enable digital humanitarian assistance, which includes: network coverage and connectivity; network intelligence (infrastructure and mobile phone data); delivery channels (SMS, IVR, USSD); mobile services (such as location-based services or mobile money services); in addition to their wide customer reach and large sales and distribution networks. Together, these core competencies can support response efforts across the five thematic areas.

Finally, given their depth of experience and their leading roles in structuring assistance and on-the-ground coordination, humanitarian agencies are best placed to champion digital solutions for humanitarian assistance. Large humanitarian agencies, like the UNHCR and WFP, are implementing new digital technologies in a variety of humanitarian contexts, especially where the size of settlements provides an opportunity to create a digital ecosystem. These large agencies are in the best position to interact with governments and advocate for digital solutions for FDPs.

81. Khaled Hosseini, "Despite Its Poverty, Uganda Is Welcoming Refugees. The Rest Of The World Should Do The Same," Huffington Post (blog), August 18, 2017, https://www.huffingtonpost.com.au/khaled-hosseini/despite-its-poverty-uganda-is-welcoming-refugees-the-rest-of-t_a_23080030/.
82. GSMA, "Enabling Access to Mobile Services for the Forcibly Displaced: Policy and Regulatory Considerations for Addressing Identity-Related Challenges in Humanitarian Contexts," September 2017, https://www.gsma.com/mobilefordevelopment/wp-content/uploads/2017/09/Policy-Note-FDPs-and-Mobile-Access.pdf.

Recommendations

The findings from the landscaping reports point to a series of recommendations that the industry can take to accelerate the delivery and impact of digital humanitarian assistance. Some are relevant to all stakeholders within humanitarian contexts, while others are tailored to specific stakeholders.

General recommendations

More data and research are needed on how digital technology is accessed, used and improves outcomes in humanitarian contexts.

To better understand the opportunities for digital technology to impact humanitarian crises, relevant stakeholders must generate more evidence. At a more general level, this includes more research into sustainable business and partnership models, in addition to a greater understanding of the impact of policy environments on delivering digital humanitarian assistance. Across the five themes, this data and research includes: better assessments of vulnerable people in crises situations, especially persons with disabilities and women; a greater understanding of beneficiary needs and preferences, as well as their willingness and ability to pay for digital products and services; and more data to quantify the addressable market in settlements and camps, such as for mobile-enabled utilities; among other evidence.

Humanitarian and private sector players should seek to share information and coordinate efforts/ interventions in humanitarian settings.

There is currently little to no information shared between the relevant stakeholders. This includes information sharing between stakeholders in crisis situations, such as humanitarian agencies, NGOs and the private sector, in addition to information sharing between sectors, such as between humanitarian and private sector stakeholders.

Do not underestimate the importance of human-centred design in meeting the specific needs of vulnerable populations in humanitarian contexts.

Customer centric research, more specifically human-centred design, enables digital service providers to understand the specific needs of vulnerable populations and thus tailor products for them in humanitarian contexts. Employing human-centred design and accessibility standard sensures that vulnerable people, including women, PWDs and others who may struggle with digital accessibility or literacy, are not inadvertently excluded by these solutions in times of crisis.

Explore the use of mobile channels and tools to enhance digital literacy among crisis-affected populations.

Mobile technology can prepare vulnerable people for crises and support informal learning in protracted displacement contexts, especially for women and girls. MNOs and other stakeholders should utilise appropriate digital content, local languages and mobile-based training to accommodate those with limited access to mobiles and lower literacy levels.

Recommendations for humanitarian stakeholders (agencies, NGOs, and others)

Implement and advocate for digital solutions with governments and the private sector.

As the primary stakeholder structuring assistance and coordination, humanitarian stakeholders are best placed to promote digital humanitarian assistance. This includes working with the private sector to trial and implement new digital technologies and advocating with governments on the positive impacts that digital technologies can have in humanitarian contexts.

Standardise and improve data collection during humanitarian contexts.

Humanitarian stakeholders would benefit from developing standardized data collection platforms for use in crises. Where agencies are already doing so, they should continue to deploy mobile surveying tools to collect end-user data. This data is not only critical in increasing the efficiency of aid delivery, but it can also provide the evidence needed for the private sector to better understand the opportunity. Further, by sharing standardized data collection platforms, stakeholders can reduce duplication, both in partnerships with the private sector and in aid delivery to end users.

Increase the digital capacity of frontline workers to better support vulnerable people.

Humanitarian agencies can increase digital training and technology use of their frontline workers to better deal with PWDs in crisis situations. This can include a needs assessment on the use of digital technology to provide and collect real-time practical information, in addition to preparedness and disaster response for PWDs.

Have a coordinated approach when engaging with MNOs.

In the aftermath of disasters or crises, humanitarian agencies would greatly benefit from coordinating their engagements with MNOs. In some cases, multiple agencies may approach MNOs with similar requests, which can be overwhelming and counter-productive in time-sensitive situations. Instead, a coordinated approach would reduce fragmentation and maximise the potential for commercially sustainable partnerships with the mobile industry. The Cash Working Group in Somaliland provides a good example of such an approach as they standardized the transfer fee with Somaliland's mobile money operator, Zaad.

Help the private sector better understand humanitarian contexts and how they could get involved.

Evidence from the landscaping exercise shows that inaccurate perceptions about crises and settlements discourages the private sector from offering services to FDPs. However, humanitarian agencies could work to reframe these perceptions and help the private sector to better understand this opportunity.

Recommendations for MNOs and the private sector

Identify areas where government involvement can support the reach and adoption of mobile services.

In humanitarian contexts, this may include regulatory reform for tiered registration thresholds, or approving content to be disseminated through mobile advisory services. Similarly, MNOs can consider working with governments on large digital identity programs by leveraging geographical footprint and customer base.

Formalise agreements for pre- and post-disaster strategies with humanitarian agencies and governments.

Effective partnerships are critical in humanitarian response; yet building those partnerships takes time, which can slow down response efforts in the aftermath of disasters. Instead, formalising partnerships and strategies in advance can lead to rapid intervention and increased preparedness and response.

When targeting refugees or the most vulnerable, MNOs can design services in partnership with humanitarian agencies and together define clear business ownership and responsibilities.

Given their expertise, partnerships with humanitarian agencies can ensure that products and services can meet the needs and requirements of refugees and vulnerable populations. To ensure success and sustainability, MNOs and humanitarian agencies should clearly define business ownership and responsibilities early in the process and have a shared long-term vision of success.

Explore incentives which stimulate development and encourage the private sector to enter humanitarian contexts

Helping the private sector to better understand and invest in these contexts can stimulate development in settlements and camps. This could include facilitated access to market data, grants to help companies manage upfront costs, results-based incentives such as subsidies for making connections, or default guarantee mechanisms. These and other incentives could be explored further.

The GSMA's role in accelerating digital humanitarian assistance

With a mission to accelerate the delivery and impact of digital humanitarian assistance, it was recommended that the GSMA's Mobile for Humanitarian Innovation programme work to:

Generate further insights and build evidence

The GSMA should collate existing evidence, invest in pilots to trial and scale solutions or partnership models, and build more evidence specific to humanitarian contexts. In 2017, the programme launched the Disaster Response Innovation Fund to test solutions and catalyse ideas for communities affected by humanitarian crises, and in 2018 launched the M4H Innovation Fund to promote innovation in the use of mobile technology to address humanitarian challenges. More recently, the programme is undertaking research on understanding digital ecosystems in humanitarian contexts; building a handbook on the deployment of mobile money-enabled cash transfers; as well as exploring the feasibility of mobile-enabled utility services in humanitarian contexts.

Continue to advocate with key stakeholders

The GSMA should continue to advocate with governments, MNOs and the private sector, and humanitarian agencies on enabling digital humanitarian assistance. Following a policy note published in 2017, the GSMA has partnered with UNHCR to better understand the regulation of identity documentation for refugees.

Facilitate collaboration and knowledge-sharing opportunities

The GSMA should foster discussion between stakeholders and establish clear incentives for stakeholders to collaborate in humanitarian contexts. To facilitate this, the GSMA convenes key stakeholders at landmark events, such as Mobile World Congress, in addition to actively participating in key forums, such as Davos World Economic Forum and the United Nations General Assembly. Further, GSMA facilitates regional working groups, convening MNOs and humanitarian and preparedness organisations.

Future considerations

Looking ahead, as mobile and digital technology continues to spread, and as humanitarian crises become more complex and prolonged, the GSMA expects to see greater integration between mobile technology and humanitarian assistance. Though not exhaustive, some considerations for future research and activities that the GSMA Mobile for Humanitarian Innovation programme and wider sector could look to address are outlined below.

More generally, these overarching research questions are guiding the GSMA's learning in this topic area:

- Which digital services could play the most transformational role in humanitarian contexts – in which stage of assistance?
  What is the path to scale?

- What is the business case for greater investment in digital humanitarian services for the mobile industry and what sustainable business models and new partnership models will unlock this? What are the biggest barriers?

- How will increased digital transformation in the humanitarian sector impact end-users and humanitarian organisations themselves?

- How will the overarching policy environment affect the rollout of digital humanitarian services and how can different actors come together to advocate for more enabling environments?

Additionally, industry experts across the five thematic areas yielded specific considerations that all stakeholders could address to better enable a digital ecosystem for humanitarian contexts:

- What access to information (both digital and non-digital) do women utilise during natural disasters? How do women adopt and use mobile money in humanitarian contexts?
  How do digital assistive tools better support PWDs in humanitarian contexts?

- What are the regulatory best practices and recommendations that enable digital identity in humanitarian contexts?

- What are the most important variables for the HCT business case, and how can it be extended to adjacencies (resilience)? How can HCTs unlock digital and financial inclusion for people affected by crises?

- What is the ability and willingness of refugees to pay for energy and WASH services?
  How do subsidies and incentives impact this?

- What is the role of mobile technology in climate change response and recovery strategies?

For further information please visit
the GSMA website at www.gsma.com