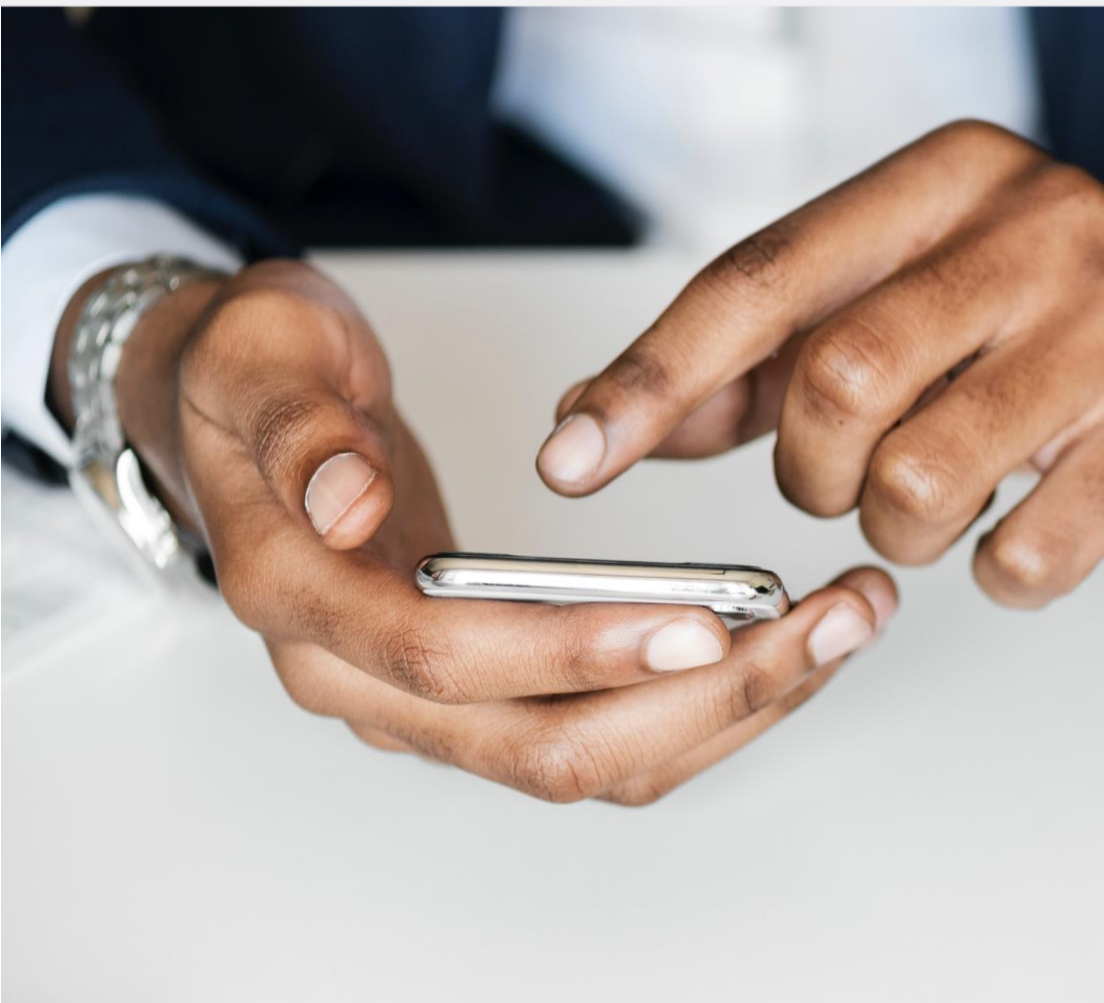# Centre for Frugal Innovation in Africa Working Paper Series

No.5 Exploring Refugees and ICTs: Innovating Towards Inclusion and Integration in Fragile Environments?

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Abstract

The growing phenomenon of migration and rising 'crisis' of refugee populations is the 'defining' issue of our time (Betts, 2015). In rethinking appropriate 'solutions' to refugees, the concept of 'humanitarian innovation' – new products or processes carried out by individuals or organizations (Bloom, 2015) - has stimulated global efforts into improving, and reimagining refugee assistance and support to promote refugee livelihoods and local integration. Alongside these initiatives, there has been mounting interest in the 'bottom-up innovations' of refugees themselves (i.e. 'creative problemsolving' by refugee populations). Yet whilst such strategies are viewed as instrumental to people's resilience and self-reliance (Jacobsen and Fratzke, 2016), there is little systematic attention for such processes.

In examining the scope of refugee enterprise, and 'bottom-up innovation' in fragile refugee settings, the role of Information Communication Technologies (ICTs) is of particular interest for spearheading grassroots change and development. If used effectively, ICTs have been described to be the ultimate 'game changer' in human development (The Earth Institute and Ericsson 2016). Globally, the growing use of ICTs is argued to be fostering a new 'social order', shaping the lives of individuals, organizations and society (Warschauer and Matuchniak, 2010). Indeed, the development of ICTs has the potential to positively influence the attainment of all of the Sustainable Development Goals (SDGs) (The Earth Institute and Ericsson, 2016).

Yet whilst potentially transformative, both access and the use of ICTs may be complex, particularly in uncertain refugee situations. In these contexts, concerns lie both in the physical 'digital divide', and the multi-layers of 'asymmetry' in ICT design, access, usage and adoption leading to the exclusion of marginalized groups (Tsatsou et al., 2011), and the potential reproduction of existing structural biases. Such digital divide and exclusion risks aggravating social inequalities that will hinder human security, integration and the achievement of the SDGs (The Earth Institute and Ericsson, 2016). Sustainable Development Goal 5b explicitly highlights the vulnerability of groups such as women. Innovations in ICTs are now being strategically leveraged for refugee assistance and support, with various degrees of success. But to date, institutional bodies and policy processes have tended to ignore (or not fully appreciate) the value of grassroots innovations by refugees themselves, and the use/adoption of ICTs for social and economic transformation.

In this discussion paper, I explore the growing focus on 'humanitarian innovation' and its potentially transformative role in opening up new pathways to refugee support and livelihoods. I take a special look at the expanding role of ICTs in this regard in 'digital humanitarianism', and the various tools that have been designed to improve refugee lives. At a grassroots level, I then turn to 'bottom-up innovation' in diverse refugee settings, and discuss micro-entrepreneurialism amongst refugees and links to ICTs. I highlight gaps in understanding the scope, usage and impact of ICTs for self-reliance and livelihoods, and deeper social dynamics, particularly risks related to (growing) digital exclusion in more fragile environments (Ritchie, 2018).

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1. Introduction

The *growing phenomenon* of migration and rising 'crisis' of refugee populations is the 'defining' issue of our time (Betts, 2015). A total of 244 million migrants[i] have been estimated globally (IOM, 2017), with 65 million forcibly displaced (including refugees and IDPs).[ii] Over half of UNHCR registered refugees are minors, under the age of 18.[iii] Described as the 'new normal', today two thirds of refugees are described to be in *protracted refugee situations* (i.e. over 5 years in displacement).[iv] Major geographical clusters of UNHCR refugees (host countries) are presently situated in Europe, the Middle East and North Africa, and Sub Saharan Africa. For the humanitarian community, the reality of long-term urban refugees poses specific challenges for the social and economic life of both refugee households and host communities *(see Appendix 1 for a background on global refugee dynamics and response).*

In rethinking appropriate 'solutions' to refugees, the concept of 'humanitarian innovation' – new products or processes carried out by individuals or organizations (Bloom, 2015) - has stimulated global efforts into improving, and reimagining refugee assistance and support to promote refugee livelihoods and local integration. Alongside these initiatives, there has been mounting interest in the 'bottom-up innovations' of refugees themselves (i.e. 'creative problem-solving' by refugee populations). Yet whilst such strategies are viewed as instrumental to people's resilience and self-reliance (Jacobsen and Fratzke, 2016), there is little systematic attention for such processes. Shedding light on often opaque 'refugee economies', Betts et al. (2014) have challenged basic assumptions around refugees: that refugees are isolated, a burden on host countries, economically homogenous, technologically illiterate, and dependent on humanitarian assistance. Refugees have been shown to be in fact apt in developing diverse coping mechanisms, but face many legal, economic and social restrictions in their attempts to make a living (e.g. Ritchie, 2014, 2017; Betts et al., 2015). Often in hostile contexts, refugees survive by navigating precarious and uncertain conditions on a daily basis.

Beyond refugee 'self-sufficiency', the development of economic activities in refugee settings is considered vital for fostering 'social and economic interdependence' in local communities, and rebuilding social networks (Jacobsen, 2002). In camp situations, refugees have been described as 'untapped' resources that can be potential 'entrepreneurs' and 'innovators', particularly if linked to commercial partnerships (Betts, 2013; Betts et al., 2014). Meanwhile, transnational migrants have been celebrated as entrepreneurs that can also be 'agents of social change'

(DeHart, 2010). To this end, 'entrepreneurship' is often perceived by humanitarian agencies as the silver bullet to promote refugee livelihoods, human security and resilience.[v] Yet the entrepreneurship literature suggests prudence in the extent that enterprise initiatives can contribute to local poverty reduction and development. Poor entrepreneurs may be either 'survival' or 'growth- oriented', with these factors influencing the scope of enterprise development and potential livelihood outcomes (e.g. Berner et al., 2009). In 'fragile settings'[vi] (Ritchie, 2018) – or situations of 'precarity' with institutional uncertainty and instability (Banki, 2013) - Naude (2007) cautions particular attention. Economic development can also result in the perpetuation of economic forms and institutions that may be negative, fostering unproductive and destructive enterprise.

In examining the scope of enterprise, and 'bottom-up innovation' in fragile refugee settings, the role of Information Communication Technologies (ICTs) is of particular interest for spearheading grassroots change and development. If used effectively, ICTs have been described to be the ultimate 'game changer' in human development (The Earth Institute and Ericsson 2016). Globally, the growing use of ICTs is argued to be fostering a new 'social order', shaping the lives of individuals, organizations and society (Warschauer and Matuchniak, 2010). In the context of both the West and developing countries, ICTs are being deployed to address various societal challenges, including for employment, climate, health and human migration (Majchrzak et al., 2016). The 2030 Agenda for Sustainable Development emphasises that 'the spread of information and communication technology and global interconnectedness has great potential to accelerate human progress, to bridge the digital divide and to develop knowledge societies'.[vii] Indeed, the development of ICTs has the potential to positively influence the attainment of all of the Sustainable Development Goals (SDGs) (The Earth Institute and Ericsson, 2016).

Yet whilst potentially transformative, both access and the use of ICTs may be complex, particularly in uncertain refugee situations. In these contexts, concerns lie both in the physical 'digital divide', and the multi-layers of 'asymmetry' in ICT design, access, usage and adoption leading to the exclusion of marginalized groups (Tsatsou et al., 2011), and the potential reproduction of existing structural biases. Such digital divide and exclusion risks aggravating social inequalities that will hinder human security, integration and the achievement of the SDGs (The Earth Institute and Ericsson, 2016). Sustainable Development Goal 5b explicitly highlights the vulnerability of groups such as women, with a pledge to enhance the use of enabling technology, including information and communications technology, to promote the

empowerment of women. Grappling with these various social dynamics, innovations in ICTs are now being strategically leveraged for refugee assistance and support, with various degrees of success. But to date, institutional bodies and policy processes have tended to ignore (or not fully appreciate) the value of grassroots innovations by refugees themselves, and the use/adoption of ICTs for social transformation. In so doing, local actors have overlooked the vital importance of ensuring an enabling environment in which such refugee innovations can blossom for equitable livelihoods and human security, and productive and creative policy development for refugee inclusion and integration. At a broader level, it is now critical for the humanitarian community and beyond to finally recognize and wake up to today's fast evolving space of ICTs, and online services, skills development and potential work through various digital platforms for unleashing and co-fostering 'innovative' refugee livelihoods.

In this discussion paper, I explore the growing focus on 'humanitarian innovation' and its potentially transformative role in opening up new pathways to refugee support and livelihoods. I take a special look at the expanding role of ICTs in this regard in 'digital humanitarianism', and the various tools that have been designed to improve refugee lives. I discuss the opportunities/risks that this presents and the indicative influence on local integration. At a grassroots level, I then turn to 'bottom-up innovation' in diverse settings, and discuss micro-entrepreneurialism amongst refugees. Drawing on emerging articles, I highlight the increasing use of technology and ICTs (mobile phones in particular), but the current dearth of higher-level ICT-linked innovations by refugee groups themselves (e.g. applications and online platforms). I highlight gaps in understanding the scope/impact of such innovations, and deeper social dynamics, particularly risks related to (growing) digital exclusion. I discuss key initiatives that are indicated to support an enabling environment for such entrepreneurialism, and the growing use of ICTs. Finally, I highlight interesting areas for research related to the process of refugee ICT-related innovation, the use and adoption of ICTs by different social groups, and the impact on evolving livelihoods, inclusion and integration, particularly in more hostile and volatile environments.

2.   Humanitarian innovation - boosting self-reliance and integration?

With rising numbers of refugees and IDPs, old models of response have been perceived as both costly and inadequate. Two major shifts are occurring in refugee assistance with models firstly, adapting to urban refugees with less dependence on humanitarian aid, and orientation towards local services instead; and secondly, a move towards supporting refugee 'self-reliance' (Culbertson et al., 2016). Yet as strains build on host communities, with pressures on infrastructure, services and jobs, there remains a persisting disconnect to engage the private sector (ibid.), and better involve refugees in refugee response and integration. A key focus in evolving humanitarian models is the concept of *innovation*, and leveraging *technology* to spur more efficient and appropriate interventions. In earlier humanitarian discussions, innovation simply related to 'new' products or projects that humanitarian organizations were creating (Bloom, 2015:1). In more recent debates, the definition of innovation has been expanded to incorporate 'problem-solving, partnerships and the scaling up of new ideas' (ibid). Drawing from discussions from the private sector (Ramalingam, Scriven and Foley, 2009), there are described to be four 'p's' of innovation including, product innovation ('changing items of services'), process innovation ('changing processes by which these products are created or delivered'), positioning innovation ('changing the context or way that you communicate'), and paradigm innovation ('changes in the underlying models of an organization'). Further developing the concept itself, innovation is described as a 'process' that an individual or organization carries out that may not be linear, but includes four stages: 'problem definition, finding a solution, testing and iterating that solution, and then scaling it up' (Bloom, 2015: 2). This is moderated and influenced by the 'surrounding ecosystem' including political and socio-economic factors.

The evolving emphasis on 'humanitarian innovation' is argued to be playing 'an increasingly transformative role' (Betts, et al., 2015) across the humanitarian sector, opening up new pathways in particular to refugee livelihoods and sustainability, as well as enhancing people's well-being and mental health. Gathering momentum in recent years, the importance of humanitarian innovation has been recognized at recent global events and policy debates, for example at the World Humanitarian Summit (2016)[viii]. In urban refugee contexts, innovations in programming include those in micro finance with the 'Graduation Approach'[ix], a multi-tiered approach to supporting progressive economic self-reliance and entrepreneurial capacity of refugees (Easton-Calabria and Omata, 2016). Meanwhile, the World Food Programme (WFP) has piloted new Blockchain technology to facilitate the system of cash-based transfers

with integrated 'biometric scanning', initially in refugee camps in Jordan (WFP, 2017). At an organizational level, innovations include drawing on artificial intelligence in the development of online data analytic systems such as *Refugee Text* that streamlines refugee profiles and information, a 'chatbot management system (CMS)' for humanitarian organizations (Howden, 2016).

Several organizations and individuals have been cited as key 'experts to watch' in promoting 'innovative, long-term solutions' for refugee and displaced populations, and treating the phenomenon of refugees and migration as **'multilinked',** rather than as a 'crisis' (Gordts and Nallu, 2016). Firstly, from a research point of view, this includes the University of Oxford's *Humanitarian Innovation Project* (HIP), launched in 2012 to explore and better understand emerging refugee economies and innovation. Secondly, in terms of new 'humanitarian' products, the IKEA Foundation has designed 'revolutionary' refugee housing units. *Better Shelter*, a Swedish social enterprise (with funds from IKEA) has developed a portable flatpack refugee shelter (Alfred, 2017b), with major clients including UNHCR. Thirdly, in terms of approaches, the London-based not-for-profit design studio, *CatalyticAction* has focused on developing creative educational spaces in Lebanon, as well as promoting new refugee livelihoods through innovative urban-based agricultural initiatives in Kenya (Gordts, 2016b). The company is driven by the notion of fostering a new sense of home and 'belonging' for displaced people through 'knowledge-sharing' and 'participatory processes' with close relationships with target communities (ibid). Yet with the growing number of humanitarian players, CatalyticAction voices the perennial criticism of the 'lack of collaboration' between larger and smaller organizations and initiatives, with the latter able to build closer links to local communities (Gordts, 2016b).

Fourthly, and perhaps receiving the most attention, a number of organizations and institutions have endeavoured to leverage the energy and expertise of the technology community itself in facilitating competitions and events to accelerate the development of technology-related solutions. In particular, *Techfugees*[x] gathers members of the technology community through 'hackathons',[xi] events, meet-ups, courses and conferences to promote knowledge exchange and to collectively formulate new 'technology-related' solutions to (perceived) refugee social and economic barriers. With over 15,000 volunteers from the technology community, *Techfugees* now has chapters in approximately 30 countries across five continents (Foster, 2017). Other 'tech'-related initiatives have been organized by US groups such as the social innovation lab, *Ideation Worldwide* (based out of San-Francisco). For example, calls for proposals have targeted professionals in architecture and public administration to design a low-cost marketplace for refugees in diverse settings, including Jordan's Zaatari refugee camp,

Kenya's Kakuma refugee camp, and Berlin (Bode, 2017a).[xii] In contrast, *EmpowerHack* has explored technology solutions to support women and children in medical and health issues. Gathering mainstream institutional interest, in May 2017, UN Women also held a hackathon to explore ICT solutions for women refugees. Meanwhile, at a grassroots level, *the Massachusetts Institute of Technology D-LAB* has sought to bring the creative capacity-building mind-set of technology experts to the local work of the UN on refugees through a community-centred approach to design, situated within target populations themselves.

2.1   Technology-driven initiatives: the role of ICTs in refugee support

In exploring the evolving field of humanitarian innovation, this paper takes a special focus on *ICTs* and their growing use in refugee response and support for local integration. Whilst there is no universal definition of ICTs, the term is generally described to refer to 'all devices, networking components, applications and systems that combined allow people and organizations (i.e., businesses, non-profit agencies, governments and criminal enterprises) to interact in the digital world'.[xiii]

With the highly visible 'crisis' of refugees on European shores, especially since the summer of 2015, and refugee stories pervasive in the media, there has been 'an explosion of creativity and innovation' from technology entrepreneurs in efforts to develop 'quick fix' tech-related solutions, particularly through ICTs (Benton and Glennie, 2016). In exploring the influence of ICTs, **mobile devices** are fast emerging as 'centre of this story' (Pakzad, 2017: 8) as critical tools for connectivity, in supporting refugee migration, survival and integration. Amongst recent Syrian refugees, mobile (and internet enabled) devices have been shown to be used for a range of support, including identifying migration routes, staying connected with family and friends, learning new languages, finding aid services and supporting livelihoods (Maitland and Xu, 2015). The mobile may also be used by refugees to find physical 'security' in their new environments from authorities, or later to seek help or protection from abusive landlords (e.g. Harney, 2013).

In recognition of the growing importance of internet access through mobile devices, a global industry body of telecommunications providers has drafted the 'Humanitarian Connectivity Charter', to support emergency network coverage in areas with high refugee concentrations (PwC, 2017). The UNHCR (2016) indicates that an estimated 71 percent of refugee households is in possession of a mobile phone, and up to a third of their income may be spent on 'connectivity' (often compromising on food and healthcare to pay for phone credit or

charging). A total of 93 percent of refugees reside in an area that is at least covered by a 2G network (ibid). Drawing on GSMA research, Granryd (2017) now defines mobile technology as a fundamental 'lifeline' for refugees and those affected by humanitarian emergencies. Beyond basic connectivity, Granryd highlights the emerging use of mobile phones by refugees for receiving digital cash transfers through mobile money (in particular in Uganda); obtaining digital-identity solutions (being tested by UNHCR in Zaatari refugee camp in Jordan); gaining access to basic utilities including energy, water and sanitation; and supporting information and communications, enhancing refugee 'dignity' (ibid.).

In designing ICT-related support for refugees and local integration, *mobile phone applications,* or 'apps' are proving to be the predominant 'preferred' solution, particularly in Europe (PwC, 2017), addressing issues such as housing, communication, safety and surveillance, healthcare, information provision, and jobs matching and skills development. In recent empirical research, Hounsell (2017) indicated that half of the emerging ICT innovations identified were indeed based on smartphone 'apps', often with linked social media websites. This includes sites such as WhatsApp, FaceBook and Telegram with significant online communities. Research suggests that refugees within Europe draw heavily on such networks, although it is less clear for refugees in developing contexts such as Sub-Saharan Africa (ibid.). Worldwide, there is reported to be a growing use in particular of 'smartphones', with a predicted 70 percent of mobile phone users on smartphones by 2020 (Ericsson, 2015).

Established technology and ICT-related initiatives that are currently supporting refugee integration may be grouped under three general themes (Benton and Glennie, 2016): access to local services and housing, access to work or training, and access to communications and connectivity *(see also a summary list in Appendix 2)*. A fourth emerging area in the literature includes vital tools that may boost local refugee contexts through improved 'receptivity' towards refugees by host communities. This may be particularly critical in more fragile environments where rising levels of local discontent and misperceptions threaten social cohesion and local support for refugee integration.

Access to local services and housing

A broad range of digital and online tools has been created that link refugees to **local services and housing**, particularly in the European context. These have typically been in the form of apps, such as 'one stop shops' that provide information on local services and support (such as *Welcome App Germany* and *Ankommen*), simplify legal information, or meet immediate demand for specific

services such as healthcare (such as *HaBaby* for pregnant women) (Benton and Glennie, 2016). In addition to innovations by the technology community, institutional-level 'systems' innovations in Hamburg have aimed at 'unifying the delivery of services', including shelter, food, education, skills, language, health care, and legal advice—services, across multiple government agencies under the Central Coordination Taskforce for Refugees (Katz, Noring and Garrelts, 2016). Meanwhile, a joint public-private initiative known as *Finding Places* – a collaboration between MIT, Hamburg City University, the city government and Hamburg residents – has created an new 'open access' data system to permit citizens to review available land and buildings that are unoccupied for potential refugee housing. Complimenting systems-related initiatives, local government in Berlin has also used a strategy of 'modular housing', creating a series of container villages in designated communities. Yet a major concern for local authorities in Germany is to avoid 'patterns of segregation' (Gordts, 2016a).

Digital platforms have also been leveraged by emerging social enterprises, linking refugees with local people willing to offer goods and services in vein with the 'sharing economy'. For example, this includes local residents offering their spare rooms (e.g. *Comme a la Maison (CALM) and Refugees Welcome*) or even household furniture (e.g. *Ankommen*), with participants motivated by 'humanitarian obligation' as opposed to 'financial gain'. With a major housing shortage, in Germany, local authorities are now also compensating people for such services. The participation of communities in housing schemes can fill a gap in supporting refugee access to adequate, well-located accomodation. Such initiatives also links newcomers to local families that can provide advice on the city, and potentially support access to work and social integration (Benton and Glennie, 2016). At present however, these platforms are constrained by the time-intensive match making and vetting processes, with little support from the risk-averse public sector, and their impact has been low; although with systems' improvements the potential remains high for scale (ibid.).

Whilst still evolving, such sharing models in Europe warrant closer attention. Drawing on a community spirit, these initiatives present innovative ways to enhance 'community-led' links between refugees and local residents. In so doing, they harness 'community energy' and agency in promoting 'coproduction' (i.e. engaging local people in both the design and delivery of local services) (Benton and Glennie, 2016). In addition to building links between the communities, such relationships also break down possible negative perceptions and attitudes, and permit greater empathy for refugee households supporting their access to livelihoods and integration. These community-led models build on existing 'light touch' initiatives, such as linking elderly people with lodger students (or single mothers) that support basic shopping or cleaning in exchange for a low-cost room. [xiv] In Germany, the arrival of refugees has also led to other

innovative community-based initiatives and civil society action in the form of volunteering, leveraging local interest and support for refugees particularly amongst students and young people, fostering new dynamics of cross-community networks and inclusion (see Box 1).

<u>Box 1: Refugees, ICTs and volunteerism - Experience from Germany</u>

Beside traditional aid organizations such as the Red Cross, German cities such as Berlin and Hamburg have seen a great number of mostly young, independent volunteers emerging through 'structured efforts' drawing on online platforms to participate in refugee projects and formulate new creative responses and services - for example, the website *givesomethingbacktoberlin.com*. The volunteers are involved in a broad range of services including 'employment mentoring, homework aid, language training, visits to doctors and dentists, and other ad-hoc services' (Katz, Noring and Garrelts, 2016). Other successful cases of self-organized civil society engagement and innovation include: *Hanseatic Help*, a large clothing storage and redistribution system in Hamburg, and *Help here*, an app connecting volunteers and refugees (ibid).

Access to skills development and jobs

A second area of digital support includes access to **skills development and work**. Emerging technology innovations have centred on the provision of online skills training, and online/remote work opportunities. These have included digital learning programmes, intensive courses related to coding, and employment matching platforms (Benton and Glennie, 2016). There is a growing emphasis on skills valued in the digital economy, a sector experiencing major growth particularly in Europe (Benton and Glennie, 2016). In some cases, digital platforms may permit people to 'circumvent national laws' that exclude asylum seekers from local labor markets by linking them to online freelancing platforms or out-of-country business opportunities (Benton and Glennie, 2016).

In terms of education and skills development, a number of 'Massive Open Online Courses' (MOOCs), including for example *Coursera* and *edX* have been established in recent years opening up new learning opportunities for both refugees and non-refugees, although problems lie in their perceived value with employers (ibid). Initiatives such as *Kiron* that combine and link online provision with existing education programs, for example by universities, are reported as most useful. Such institutional linkages enable refugees to convert credits gained into university-approved credits once they gain asylum. Meanwhile in Kenya, in partnership with a local NGO and funding from UNHCR, *iLab Africa*, Strathmore University business school streams real-time

virtual classes into the Kakuma refugee camp to facilitate access to professional training such as Certified Public Accountant (CPA) courses. Key lessons learnt include the importance of an initial needs assessment related to basic ICT skills amongst students; the speed of Internet connectivity (in this case, resolved through negotiation with a local mobile service provider); the local conditions of the camps influencing physical accessibility; and the low rate of female participation (Alfred, 2017a). Outside of the camps, other educational innovations through private-NGO partnerships include the *Every Child Learning* initiative in Jordan, with Pearson a global educational publishing company and Save the Children providing support to educational centres with a range of teaching and learning services that draw on technology, for refugee children's re-integration into the Jordanian education system.

Other innovations focus on access to work including the *European Qualifications Passport for Refugees* that is being currently trialed in Greece. Developed by Norwegian and British qualification agencies, the 'passport' aims to provide a basic electronic profile and physical document of an individual's academic record and history.[xv] Meanwhile, *Workeer* in Germany is an online jobs platform connecting refugees to suitable local employment. Yet with a lack of documentation and permits, such employment-matching services are often constrained by legal challenges and 'highly determined by [the] local context' (BMZ, 2016). In many cases, worker laws bar refugees from labour markets whilst they wait for asylum applications to be reviewed (often several months or years). In Europe, several countries have relaxed their requirements with revised EU rules, although significant barriers still remain to work and set up businesses (Benton and Glennie, 2016). For online remote work, some apps have connected highly skilled Syrian refugees to work as Arabic teachers (Molana-Allen, 2017). In the Middle East and North Africa (MENA) region, an online platform *Work4Good* creates tailored packages that draw on MOOCs to facilitate access to the digital economy.

There have been various initiatives that have sought to boost refugee skills in software and computer programming for potential online work. Through coding training and on-site 'boot camps', initially in the context of Iraq but now across MENA, organisations such as *Re-Coded* have endeavoured to facilitate access to employment overseas or remote freelance online work, opening up the global market place and thus going beyond host countries and local competition in 'borderless' jobs (Pakzad, 2017: 10). Similarly *ReDI school* in Germany now provides coding training and distance-learning courses. In the less developed African context, coding projects for refugees are also emerging. Motivated by his own family's struggles, the son of a Libyan refugee in the US has initiated a *Refugee Code Academy* in Tanzania and Malawi, and facilitates workshops to support remote employment opportunities for newly trained refugee

developers (Sikorski, 2018). Whilst still in their infancy, such coding programmes are cited to be both popular and 'promising' in that they permit refugees to engage in the online digital economy, often where language is not so important. Yet coding courses themselves have been criticized for being targeted toward highly skilled and educated refugees, and reliant on independent learning, internet access and a certain level of English proficiency (Benton and Glennie, 2016).

Meanwhile, for migrant entrepreneurship, beyond institutional barriers to work, access to credit and banking remains a major problem (Benton and Glennie, 2016). Recent innovations such as the online banking platform, *Moni* provides new opportunities for refugees in Europe to open a bank account, and access to mobile money without credit history. This includes innovative options for 'peer-to-peer' lending. In more challenging refugee contexts, an emerging and highly innovative app created by a US financial technology company in 2016, headed up by a Somali American immigrant draws on blockchain technology to formulate an economic identity tracker (*BanQu*) to facilitate access to finance through logging individual informal credit history.[xvi] Capitalizing on 'community energies' to support refugees (Benton and Glennie, 2016), crowdfunding has provided a further alternative avenue for refugee finance, particularly for new refugee start-ups, as well as educational support for displaced students (*EdSeed)* (Bode, 2017b)*.* This is argued to remain a high potential area of growth, with scope for attracting larger funders and investors (Zhang et al., 2016).

Access to communications and connectivity

Thirdly, a number of initiatives have been launched to support basic communications and connectivity of refugees. In particular, large technology giants such as Microsoft Philanthropies have responded to the refugee crisis - notably after President Obama's (2016) global call to private sector action[xvii] - in the provision of Wi-Fi hotspots in refugee locations, and online links to facilitate employability (Alfred, 2016d). Yet private companies have faced unexpected political challenges, for example where institutional environments change, particularly in refugee camps, and there are subsequent clampdowns on communications and connectivity by local governments.[xviii] Bridging the language gap, global live translation apps have also been launched by technology enthusiasts, using the medium of FaceBook/Messenger and relying on (human) volunteer translators (*Tarjimly*) (Bode, 2017c). Meanwhile in the US, communications companies have sought to support local integration of refugees through Corporate Social Responsibility (CSR) efforts. Sparrow Mobile in the US has donated actual smartphones '*RefugeeMobile*' loaded with relevant apps to support banking, language and job searching (Alfred, 2016c). Initiative success has been measured in terms of indicators related to basic employment: the level of jobs and pay scales, as well as the 'quality of life' of refugees, such as the speed of integration (language

learning, networks and the reliability of contacts such as case workers).

Support to receptivity in host environments through refugee data

A final emerging area of digital support relates to improving local attitudes and support within host environments through **online refugee information**, a critical initiative for more volatile refugee situations. To combat rising misconceptions of refugees by host communities in the MENA region, and to foster more positive attitudes within local populations, a new digital platform - *Bayanat Box* - has been launched in Lebanon to 'visualise data about refugees' for greater public awareness and support (Kabalan and Garrote Sanchez, 2017). Similarly, public satellite data from Kenya's Kakuma camp has been strategically developed to demonstrate the positive impacts of refugees on (local) economic activity, in particular agricultural production. The refugee population is indicated to have boosted the local economy through increased employment and demand in agricultural/livestock markets (Alix-Garcia, Walker and Bartlett, 2017).

2.2   Digital humanitarianism: a 'double-edged sword' for refugees?

Whilst the proliferation of new ideas from the technology industry has generated much excitement, and been argued to be informative and supportive for refugees, particularly those based in Europe, the tools and initiatives have been criticized for being disorganized (with duplicate tools), and dislocated from actual refugee populations and their diverse needs (Hounsell, 2017). Often there may be several similar apps developed for similar services; or apps are out-of-date, vary in quality, and disconnected from their target groups (ibid.). There can be much 'hype' around ICT events but many emerging digital innovations are deemed not relevant or sustainable. Hounsell (2017) estimates that 'over half' of technological services for refugees are designed around the smartphone, and about 90 percent of mobile applications developed for host communities in Europe and the Middle East, with the development of apps for Sub Saharan Africa lagging behind *(see Appendix 3).*   The think-tank Samuel Hall has recently commissioned a number of studies to further explore gaps in understanding the status and emergence of technologically driven 'solutions' for refugees in different contexts (Hounsell 2017). Whilst two thirds of refugees are situated in Middle East/North Africa and Sub-Saharan Africa, over 50 percent of countries formulating technology-related solutions for refugees are based in Europe (for local refugees), home to just 14 percent of refugees (ibid). With attention and resources still concentrated in Europe, and other less understood dynamics, in the context of Africa, few mobile services are being designed and/or are emerging in these environments (Hounsell, 2017b).

Now a major trend in Europe, Hounsell (2017b) questions the suitability of apps for less developed refugee contexts such as in East Africa, with little research to support their impact or relevance.[xix] In such contexts, he highlights a 'knowledge gap' in how technology can best support refugees and IDPs with a dearth of available hard data relating to what apps and innovations are most needed by refugees in different environments. In part this knowledge gap is attributed to a lack of media and awareness of key issues, in contrast to the international media spotlight in Europe (ibid.). In countries such as Kenya, some refugees have been in a situation of protracted displacement for over 20 years. Yet new initiatives are now beginning to emerge in East Africa with the launch of Techfugees in Kenya in early 2017; although a key concern is that these initiatives are inclusive of refugee themselves to ensure that they address their particular needs (ibid). Hounsell underscores the growing importance of areas such as healthcare, education and financial services as possible key areas where mobile technology may be able to deliver 'cost-effective' access and support across different contexts.

Triggered by the tech-community (typically in 'hackathons'), as mentioned earlier, an increasingly common policy-lever for new technology-related 'solutions' is the holding of open technology competitions in the form of 'challenge prizes', now organised by governments, the private sector, and civil society (Benton and Glennie, 2016). Shortlisted individuals or teams are encouraged to develop their ideas (typically apps) to solve particularly refugee-related problems, with the potential to win a substantial amount of funding. Such competitions may generate a number of worthy ideas by social entrepreneurs, yet they are vulnerable to the 'pilot and crash phenomenon' with longer-term financial or business support lacking (ibid). In response to such criticisms over emerging apps, *Techfugees* is now working to promote quality over quantity, and good practice standards (Hounsell, 2017). In the European context however, such digital tools created often highlight the greater problem of disconnected, and difficult to access/navigate government services (Benton and Glennie, 2016).

In evaluating the overall impact of ICTs on refugee lives and livelihoods - in particular apps - the acceleration of digital humanitarianism is described to be a 'double-edged' sword. Whilst ICTs have facilitated access to information and services, there is both duplication within the sector and complaints of tools failing or inconsistent[xx], with refugees left vulnerable (Benton and Glennie, 2016). Technology interventions are also criticized for reaching only small numbers of refugees (Foster, 2017), and for the lack of exchange and learning between cities (Gordts, 2016a; Katz et al., 2016). It is further argued that **few apps were designed together with refugees**, and many therefore do not meet specific needs (ibid). From a technology angle, it may be more efficient to create improved government websites that are mobile-friendly, multi-lingual and responsive to

user needs than third party apps (Benton and Glennie, 2016). From a social and economic perspective, the actual influence of such digital tools – both apps and online sites - on refugee lives, and different social groups, remains unclear with a lack of rigorous academic studies.

It is clear that we are still at the nascent stages of technology-related solutions for refugees, and few studies exist that can demonstrate their impact. Yet as the technology industry matures, and apps can be more closely designed with refugees across different contexts, and better aligned with local governments to reach scale, they may play a crucial role in fostering integration, enhancing community cohesion and enabling self-reliance (Benton and Glennie, 2016). Appreciating refugee needs, and assessing the suitability of innovations, and critically, adapting such innovations to local contexts, is described to be vital, with refugee feedback fundamental to such analysis. For example, *Refugees Welcome* and *Comme a la Maison* can facilitate temporary settlement reducing immediate housing pressures (Benton and Glennie 2016). Other apps could better support refugee skills development - even as asylum applications are awaiting to be processed - such as the *REDI school* (coding school) or *Kiron* (distance learning). Freelance platforms such as *Workeer* could further support access to work and be 'disruptive' (ibid.). It is evident that whilst technology entrepreneurs are passionate, innovative and motivated to be involved, they need to now better respond to refugee needs, and to coordinate with NGOs, local government and policy-makers that have the necessary resources and networking power, and the ability to make policy changes (Benton and Glennie 2016) for effective design, targeting and impact.

Whilst the technology world is finding its feet and digital platforms and services are evolving, it is also worth considering studies that have pointed to the less positive role of ICTs and mobile phones in particular on refugee and migrant lives, such as when they are used for personal surveillance, for example of spouses (Archambault, 2011); for misinformation on social media such as Facebook (Wall et al., 2015); or for illegal activities such as smuggling (AbuJarour et al., 2016). For Syrians that have lived in a culture of distrust of authorities, wariness also persists in sharing personal information through online portals (Townzen, 2016). Meanwhile, in broader humanitarian contexts, Sandvik et al. (2014) recommend a more critical embrace of digital technology, and a careful assessment in the deployment of such technology in 'reflective humanitarian practice' to ensure that key humanitarian principles are not eroded. This is particularly vital in analyzing humanitarian space (safe operating areas), the generation of new partnerships, shifts in resource distribution, the transformations of human relationships, and new emerging vulnerabilities (ibid.).

3. 'Bottom up innovation' of refugees

Beyond humanitarian innovation in organizational and civil society responses for refugee support and integration, there is a growing recognition in the 'potential' for change through 'bottom-up innovation' (Bloom, 2015). This relates to innovation in products and processes by 'crisis-affected' communities themselves. With the combined challenges of protracted refugee situations and a decline in funding available for humanitarian assistance programmes, there is a strong shift towards the promotion of 'sustainable livelihoods' in the evolving narrative of 'self reliance' of refugees (Easton–Calabria and Omata, 2016). Far from passive recipients of aid, refugees have been shown to develop diverse coping mechanisms, but face many legal, economic and social restrictions in their attempts to make a living in often fragile contexts. In displacement situations, the concept of 'precarity' was originally coined to describe ongoing unpredictability and insecurity experienced in such contexts, particularly related to violence (Butler, 2004; 2009). Banki (2013) has opened up this term to incorporate both state (formal) and socio-cultural (informal) processes, which may affect the vulnerability of refugees, and thus be useful in studying refugee lives. Whilst 'precarity' may be perceived as a 'disabling' phenomenon, Wall et al. (2015: 2) indicate that research has drawn attention to how such hostile conditions can also lead to collective action (Schram, 2013), similar to Ritchie (2018). In this vein, difficult conditions may open up new possibilities for transformation, yet this may equally trigger further 'state control' (Ettlinger, 2007). In refugee camps in Jordan, Wall et al. (2015: 2) look at how cells phones may be used creatively and resourcefully to cope with 'information precarity' (i.e. unpredictable and insecure information). This may be shaped by technology access and use, with usage further influenced by network access, social dynamics as well as trust (in cell networks).

In negotiating 'precarity', and in the context of a fast-changing refugee digital landscape, there is much interest in better understanding the nature and scope of 'bottom-up innovation', and related enabling and constraining factors in different refugee environments (Bloom, 2015; Betts, et al., 2015). With a focus on both individuals and groups, bottom up innovation has been further defined as the 'way in which crisis affected communities engage in creative problem-solving, adapting products and processes to address challenges and create opportunities' (Betts, et al., 2015). Drawing from the business management literature, there may be several steps in the innovation process including, defining the problem or identifying the opportunity, finding a possible solution, testing such solutions, and scaling the solution (Bloom, 2015: 2). Bottom-up innovations of refugees may affect refugee livelihoods, refugee governance, refugee care, and relations with host-populations. In this paper, I focus on the role of bottom up innovation for livelihoods, specifically income-generation activities and enterprise. This may include new types

of refugee business – services and products - or new ways of doing business. Refugee innovation may occur during the emergency phase through to protracted displacement contexts. In exploring such refugee-driven innovation, it is worth re-highlighting that 'refugees' comprise a broad range of people with different backgrounds and skill sets, and differing motivations and interests; and residing in diverse country contexts. Whilst bottom-up innovations of refugees are now cited as critical to understanding refugee livelihoods and resilience, they are still little understood or appreciated by policy makers (Betts, et al., 2015).

In this section, I explore the scope of bottom-up innovations in different refugee settings. I highlight the growing importance of ICTs (particularly mobiles) in refugee businesses[xxi], but the dearth of higher-level ICT-related innovations and the factors that may be constraining this, including digital access and digital literacy. I explore the enabling environment and key initiatives that are reported to support such entrepreneurialism.

3.1   Scope of bottom-up innovations in refugee settings, and ICT-linkages

Whilst refugees have been labeled as 'natural innovators' (Benton and Glennie, 2016), it may be more useful to consider 'innovation', or adaptation, as a common human response to crisis, with emerging refugee entrepreneurialism shaped by the cultural and country background of refugees, refugees' individual skills/characteristics and experiences, and local displacement settings. Still not fully appreciated by the humanitarian community, the *Humanitarian Innovation Project* (HIP) in Oxford has focused on gathering broad empirical (qualitative-based) evidence related to what such innovation looks like in different contexts, how it is enabled or constrained particularly by the international community, and how the voices of such communities may be better heard (Bloom, 2015: 2). HIP's research has explored local refugee 'innovations' in a variety of urban and rural settings from developing economies, to middle-income and advanced industrial economies, including Uganda, Kenya, Jordan, South Africa and the US.

Understanding the role of the private sector, technology and innovation from a 'bottom-up perspective' is argued to be a 'missing link' in promoting sustainable livelihoods for refugees (Omata and Kaplan, 2013). In particular, it may be crucial to appreciate the interaction between different actors, and evolving technological linkages in refugee innovation and enterprise. Across the various countries, HIP's research indicates that whilst there are many examples of 'creative adaptation' for tools and living by refugees both in and out of the camps (Betts, et al., 2015; Omata and Kaplan, 2013), 'innovation' in terms of income-generation may often be commonly-observed micro-enterprise in developing contexts, similar to low-income areas such as slum settings; although a few reported ICT-related businesses were emerging *(see Appendix 4).* The cases of

Uganda, Kenya and Jordan are expanded below, drawing on other similar qualitative research, particularly related to women (Ritchie 2014, 2017; Dijkhuizen, 2017).

In Uganda, the regulatory environment is described as 'open', and refugees have the right to work and set up businesses (Betts, et al., 2015). As in slum areas, small refugee businesses included skilled services (craftsman, welders, mechanics), petty trading of goods, electricity supply, restaurants, and water provision. There are also emerging ICT-related businesses including mobile repair, wi-fi provision, computer kiosks and entertainment/music streaming. Highlighting the importance of the micro-context however, the scope of such refugee business in Uganda is influenced by the local institutional environment. In refugee settlements such as Kyangwali, there may be support from international organizations but there may also be a limited market within the camp and access to key resources may be constrained. This contrasts to more 'free' self-settled communities in Kampala, the country capital, where aid support is less available and local business services are less accessible but markets are bigger and basic resources are easier to find.

In contrast in urban Kenya, refugee life is generally more restricted. The Nairobi suburb of Eastleigh is famous for its entrepreneurship and commercial growth however, and for the link of this growth to its long-term Somali refugee population – indeed, Eastleigh in some ways is an example of a 'refugee economy' (Ritchie, 2014; forthcoming). Betts et al.'s (2015) research elaborated on some of the larger businesses, and emerging start-ups in Eastleigh, including cyber cafes, and even a film and digital arts company, 'Eastleighwood' (with donor support). Yet whilst many (wealthier) Somalis have brought a steady platform for continued business (including the relocation of major businesses from Mogadishu), purchasing local business permits, and other well-connected Somalis have emerged as entrepreneurs; the majority of poorer Somali refugees struggle in a hostile and turbulent environment with no rights to work (Ritchie, 2014). Thus, beyond the 'big business' picture in Eastleigh, it is clear that prevailing Kenyan policies and attitudes have made it difficult for the majority of Somali refugees to lead a productive and stable life and fulfill their entrepreneurial aspirations (ibid). With restrictions on work, many refugee men seek migrant work in the region (often out of the country). At a micro level, many poorer Somali women tend to work as petty traders but face both risks from the local authorities (without formal business permits), and social uncertainty from cultural backlashes (Ritchie, 2014, 2018). Recent research by the Danish Refugee Council has further explored informal refugee economies across different refugee groups in both Nairobi and Mombasa (DRC, 2018). Often without permits (and thus vulnerable to bribes), typical refugee businesses may be small-scale but are diverse, and are observed in the service sector (salons, phone repair, motor vehicle

repair, electrical work), merchandising (retail kiosks, groceries) and manufacturing (handicrafts, detergents, briquettes). Other emerging businesses include entertainment (music production), and urban agriculture. Informal daily wage employment includes jobs as security guards, domestic work, construction, tailoring, teaching and work in small businesses.

Meanwhile, in the context of Jordan, refugees have faced even tighter restrictions on work. This includes barriers to formal work (until recently), with complex requirements around work permits, and challenges to informal work. Refugees have been permitted to engage in business activities within the camps however. Studies indicate that Syrian refugees have proved both entrepreneurial and creative within the main Zaatari camp, often building off past experience as businessmen trading, selling food, furniture making and provision of services (Betts et al., 2015). Whilst there was noted 'community innovation' in local shelters and the mobility of materials (Betts et al., 2015), ICT innovations in enterprise were not specially reported, except for the Zaatari Facebook page and new journalistic ventures related to the (digital) camp magazine.[xxii] Overall despite the appearances of a busy shopping street within the camp ('Shams-Elysee'), unemployment was actually described to be high in the camp, with less than 10 percent of Syrian men regularly employed either as shopkeepers or as skilled 'volunteers', including much coveted jobs as teachers or administrators (Ritchie, 2017). From a gender perspective, few formal businesses belonged to women due to 'cultural' restrictions'.[xxiii] For refugees outside of the camps, the situation was more fluid and complex, with heavy restrictions on visible work by refugees (e.g. men's work in construction and business), as well as cultural obstacles (for women). Yet recent research indicated interesting emerging socio-economic dynamics related to women's petty engagement in informal home-based work, including catering services, tailoring and beauty (Ritchie, 2017).[xxiv]

Ushering in a changing economic context however, after much international pressure, the much-heralded 'Jordan Compact' was finally agreed in 2016, mandating the Jordanian government to issue 200,000 work permits. Whilst jobs have now been opened up in certain sectors and industrial zones created[xxv], micro entrepreneurship is argued to remain constrained, with increasingly difficult local conditions, due to 'overcrowding' (particularly in service sectors), fear of visibility and a lack of appropriate support mechanisms (Dijkhuizen, 2017). The World Bank's president, Werner Hoyer maintains that despite such constraints, evolving possibilities for work and business in Jordan can dissuade refugees from onward travel. Yet Jordan is still perceived as a 'transit' country by refugees (Howden, Patchett and Alfred, 2017), and as such, refugees refrain from investing precious resources into temporary businesses. Beyond Jordan however, the 'Jordan model' is reported to have spurred a 'sea change' in government attitudes towards

refugees in work, with refugees beginning to be viewed as potential 'assets' in host countries, prompting countries such as Ethiopia to pursue a similar approach (ibid.).

Renewed efforts are now under way in Jordan to support refugees in work by ILO and others, with emerging job-matching services (Howden, Patchett and Alfred, 2017). A critical area of potential interest includes the rapidly growing 'gig' economy, particularly for Syrian women with possibilities for home-based work (Hunt, Samman and Mansour-Ille 2017).[xxvi] The 'gig' economy relates to labour-market activities that are facilitated through mobile/IT platforms, thus 'bringing together workers and purchasers of their services locally and globally' (ibid.). Such work may typically include 'on-demand' work, facilitated through mobile platforms related to local service work, for example ride-sharing and catering (*see Appendix 5 for examples in Jordan*); and online 'crowdwork', including tasks such as translation, web-design, copy-editing/writing, and data processing. Recent research indicates that Syrian refugees are participating in such opportunities in Jordan, particularly in on-demand work, with less need for English, higher-level education and sophisticated IT equipment (ibid.). For Syrian women, this work is perceived to be potentially attractive for fields in which they have existing skills, such as home catering, beauty, and domestic work (less common). Yet such work is described to be 'insecure and low paid', and lacking in 'protection'. Other major barriers are cited to be connectivity, and basic digital skills and access (see below).

Growing ICT 'driven' enterprise?

Mobile phones are emerging as a fundamental, all-encompassing 'tool' for refugee livelihood strategies, supporting the search for employment, running of small businesses and access to ancillary services (GSMA, 2017). Slowly evolving, ICT-related refugee businesses may include predominantly, mobile phone-linked businesses, for example, the selling/loaning of mobile phones, mobile phone repair, and the use of phones to send/receive money (mobile money); computer-linked businesses, for example, computer kiosks, and game/digital music provision; and digital journalism. In terms of other ICT-digital related innovations for business, this remains less understood. An unusual example of a refugee-designed app and website however is the popular *Gherbtna* (meaning 'exile' in Arabic) in Turkey, set up by a Syrian refugee.[xxvii] This site provides both information on job listings, and allows users to request assistance and make connections. By 2016, the app *Gherbtna* had been downloaded by over 50,000 people (Lepeska, 2016). Taking the app to a new level, *Gherbtna* is reported to have now partnered with the American Bar Association to provide translations of Turkish laws (ibid). Yet despite generating income from Google ad sales and Syrian advertising companies, a major constraint is staying up-to-date and covering costs, as a Syrian bookstore owner explained in Istanbul: "These apps are

good concepts, but they need to grow up, to mature, like any product…Developing apps like this requires a lot of time, a lot of money. I don't think any Syrians here are able to do this yet" (ibid).

While ICT-related refugee businesses may still be limited, most refugee business activities rely to *varying degrees* on ICTs for their basic business operations, in particular the mobile phone, for example, in linking to possible clients and customers, and in coordinating the supply of goods. For example, a study in South Africa indicates that the usage of mobile phones permits refugees to find and retain customers and be 'contactable' (Bacishoga and Johnston, 2013: 7), and thus be part of the 'economic system' (Gough (2005: 1) in ibid.). With the proliferation of online business platforms however, the extent of the use of the web or apps by refugees for conducting business remains a key space to watch. **Facebook and other social media groups** (and linked platforms) warrant particular attention in this regard. At present, there is a still very little information related to the experience of different refugee groups, and their interaction with technology in entrepreneurial endeavours. A growing area of interest is the scope of access to mobile money for facilitating refugee business. In Kyangwali settlement in Uganda, a total of 48 percent of those surveyed used mobile money services (GSMA, 2017: 31).

3.2   Evolving use of ICTs: embedded in complex social dynamics

 To better understand ICTs in evolving bottom-up enterprise of refugees, it is critical to explore and interrogate deeper social and context-related trends related to the emerging use of ICTs, particularly in light of the explosion of digital platforms for refugee support. In particular, there remains a gap in understanding the specific use and adoption of ICTs by various refugee groups, and the growing influence of ICTs on enterprise in diverse refugee environments.

Described to be as important for refugees as 'water and food' (Syrian refugee in Wall et. al 2015; Luci and Liharska, forthcoming), the mobile phone has become the most critical possession of migrants, with connectivity a basic need (Bailey, Hannides and Kaoukji, 2016). Such 'unprecedented reliance' on technology has led to increasing interest by academics and researchers in this topic[xxviii], with smartphones in particular cited to be instrumental in both guiding refugees on their migration journeys and aiding them to rebuild their lives in host countries (AbuJarour et al., 2017). Earlier studies had shown mobile phones to be crucial for 'social connectedness'[xxix] (Metcalf et. al, 2008; AbuJarour et al., 2016) in maintaining linkages with family in situations of 'conflict, displacement and resettlement' (Leung et al., 2009) and 'transnational ties' (Vertovec, 2009: 61), and hence a vital tool for refugees' emotional well-being. With the recent evolution of the smartphone, and related apps and e-services, the mobile phone is now increasingly critical for connecting with government and local services (particularly in

Europe); for access to information, language and knowledge enhancement (through e-learning); and for interaction with businesses and economic activities. The latter relates mostly to 'self-employment' through (informal) micro-entrepreneurial endeavours, with frequent restrictions on formal employment. In camp situations, Currion (2016) argues that the increasing availability of information through new digital technologies is 'challenging existing power relations', and camp administrative systems. Yet in contexts such as South Africa, refugees were reported to face 'digital' restrictions on the types of mobile phones that they could use, particularly smartphones (due to registration procedures), and thus faced barriers to accessing services such as mobile money.

The multi-layered 'digital divide'

ICTs are often associated with mobile and internet access. The term 'digital divide' was coined to describe the gap between those who had access to and use of digital technology, and those who did not have access (van Dijk, 2006), or the disparity between technological 'have' and 'have nots', often between geographical locations. In exploring refugee connectivity, UNHCR emphasise the 'availability' of networks; 'affordability' of devices and Internet access; and 'usability', including digital literacy (UNHCR, 2016). Whilst over 70 percent of refugee households possess mobile phones (ibid.), exact figures on the use of smartphones are not known, although the level of connectivity often indicates the type of phone used (smartphones are often linked to 3G networks). A total of 40 percent of refugee phones use 3G globally (ibid.). In less developed regions such as Sub Saharan Africa, the use of 3G connections is still low but growing rapidly, with a total of 20 percent of connections. The shift to smartphones is linked to the increasing availability of low-cost devices. However, many refugees may still be unable to purchase a device without the necessary documentation with 'proof of identity' remaining a serious issue for refugees (GSMA, 2017: 4).

In recent years, the notion of digital divide has been further elaborated to differentiate between physical access and practical use (Alam and Imran, 2015). Digital inclusion – access to and use of technology - is argued to be intricately linked to social inclusion (Lloyd et al., 2013; Clayton & Macdonald 2013; Selwyn 2004). Social inequities in usage are described to be a *'second level'* digital divide (Van Deursen and Van Dijk, 2013), or later, the 'deepening divide' (Van Dijk 2005). Meanwhile, a *'third level'* has been described to refer to varying skills levels, or digital literacy, creating new inequalities, associated with knowledge gaps (e.g. Wei and Zhang, 2006). Such social and human factors shape 'access to information', and ultimately aggravate social exclusion (Caidi et al., 2005).

Trends in social inclusion and digital literacy

Ultimately, digital use and inclusion is influenced by access and affordability, and both the ability to use ICT ('e-skills') and adopt it (Bowles, 2013). Further examining social access and digital literacy, it has been shown that specific groups such as women, older people and disabled may be disadvantaged in this capacity, with lower levels of digital literacy as well as social barriers to engaging in this area or even receiving training. In a study in New Zealand, younger, higher educated refugee men were more likely to be adopters of ICTs in contrast to older females with little or no education (Kabbar and Crump, 2006). Yet immigrants were also influenced by their peer group, and the wider community in their decision to adopt or reject ICTs (ibid). Adding to this, as people get older, the digital gender gap is reported to increase substantially (World Wide Web Foundation, 2016). Such research indicates that people's access to/use of the Internet may be shaped by 'multiple identities', with a 'poor older woman in a rural area from a marginalised community' being particularly disadvantaged (IDS, 2017).

A focus on social inclusion shifts the discussion of the 'digital divide' from gaps in physical access to the appropriate integration of technology into communities, institutions, and societies (Warschauer, 2003). Whilst there has been significant study of transnational migrant use of ICTs including the internet (e.g. Karim 2003; Parham 2004; Bernal 2006), and mobile phones (e.g. Horst, 2006), refugee access and use of technology is a more recent field of study (e.g. Leung et al., 2009; Leung 2010). Trauth and Howcroft (2006) contend that use of ICTs can in fact facilitate social inclusion for refugees. Refugees are described to encounter 'challenging information landscapes' that can affect their participation in new communities, often related to language, and access and abilities to use technology (Lloyd et al., 2013). Alam and Imran (2015) argue that digital inclusion and social inclusion are thus 'inter-linked' with broader implications for refugee assimilation, and social integration. [xxx] Social inclusion through technology is specifically linked to broader community participation (Clayton et al., 2013). ICTs may also support self-motivation for more vulnerable migrant groups, through online support from family and friends in transnational networks (Cuban, 2016). ICTs may further impact a community's 'collective capital' in the formation of social ties and networks (Broadbent and Papadopoulos, 2013).

There is now growing appreciation that barriers to information and communication can lead to social and economic challenges (Leung, 2010), and inhibit refugee participation and integration in their host environments. Yet often, digital learning initiatives may demand a higher level of technological literacy hindering access by some groups of refugees (BMZ 2016). For younger groups, ICTs – the use of the Internet in particular - have been shown to play a

central role in facilitating intra and inter community connectivity, thus strengthening social inclusion of refugee groups (Alam and Imran, 2015). More vulnerable groups included those that were financially constrained, newly arrived refugees, and older people (ibid.). In their extensive study of the use of technology by asylum seekers and refugees in Australia, Leung et al. (2009) highlight critical issues around technological access and use during asylum, including restrictions in detention, and distrust around usage due to fear of surveillance. In early resettlement, usage was influenced by cultural perceptions, with some refugees placing a higher value on face-to-face communication. Usage was also influenced by the scope of technological literacy of refugees (including limited exposure due to gender or age-specific constraints (influenced by cultural norms), as well as levels of technology (or restrictions) within their country of origin[xxxi]).

Gender divide

Taking a special look at the digital **gender divide**, globally, 12 percent fewer women than men have access to the Internet, a figure that has increased over recent years (ITU, 2016b). This stood at 16.8 percent in developing countries, with the largest gender gap in the world's Least Developed Countries (LDCs) - at 31 percent. The highest regional gender gap is found in Africa (23 percent). Across poorer areas in major cities in the developing world, including Lagos, Nairobi, Jakarta and Bogotá, research has shown that women were reported to be 50 percent less likely than men to be online, and were 30-50 percent less likely to use the Internet for 'economic and political empowerment '(World Wide Web Foundation 2017). Reasons given were high costs, lack of digital literacy, lack of relevant content, and obstacles to 'speaking freely and privately' online (ibid.). In developing contexts such as Africa, there is also a concerning trend of 'cyber-bullying' of young women (Sow, 2014) and 'hostile' online environments for women (HRBDT, n.d.). Globally, there is need to increase the 'frequency' of evidence-based research related to the gender digital divide in terms of access to and use of ICTs (BMZ, 2017).

In further examining the digital gender gap for refugees, age and location are two important factors to consider, yet the nature of exclusion may also be embedded in more complex social and cultural issues related to women's roles and nature of work (Ritchie, 2018), and perceived household and family responsibilities (World Wide Web Foundation, 2016). This may enable a better appreciation of trends and dynamics, especially critical in more fragile refugee contexts. Indeed, the gender gap in access to technology has been argued to be 'accentuated by refugee environments' (Foster, 2017). For example in Zaatari refugee camp in Jordan, family men and boys had more control of mobile phones, and access to information than family women and girls, excluding them from developing vital technological skills and capacities (ibid). This is also inhibiting women's participation in online spaces leading to their 'double marginalization'

(Alhayek, 2014). In designing new apps, hackathon events - such as those by Techfugees - are now deliberately including male and female refugees. Besides infrastructure and services, a key area of attention for the technology volunteers is 'economic inclusion and integration' (ibid.). Studies have pointed to the importance of 'intermediaries' (including family members) in using and adopting ICT (Diaz Andrade and Doolin, 2016). In paying closer attention to gender dynamics, sex-disaggregated data is argued to assist in programme impact monitoring for interventions that are linked to education, women, and their access to and use of ICTs (BMZ, 2017).

Today many types of digital divides are recognized and 'co-exist' (Alam and Imran, 2015), including across age, income, and employment (e.g. Lengfeld, 2011), and further shaped by gender and geographical locations (e.g. Hargittai and Shafer, 2006). For refugees in a given context, the practical use and adoption of technology may thus be influenced by broad social factors including 'culture and language, education level, age, language proficiency, socio-economic conditions, communication preferences, familiarity with technology' (Alam and Imran, 2015). With the growing importance of ICTs in fostering livelihoods, further research needs to better understand the evolving barriers and opportunities in different contexts, and the impact on broader processes of community integration (Alam and Imran, 2015).

3.3   Support to 'enabling' environment: push and pull factors?

Towards a deeper appreciation of the local environment, there may be a number of 'push and pull'[xxxii] factors that influence refugee livelihoods, and the scope of bottom-up innovation by refugees and technology linkages. Depending on the institutional context, refugees may have varied access to formal and informal employment. Micro-enterprise initiatives such as petty trading may be both influenced by dynamics within the host country including the political and policy context, and the market opportunities available. They may also be influenced by the refugees themselves, their social background and skills (Ritchie 2014, 2017), and their 'capacity and willingness' to invest in livelihood opportunities, with many refugees keen to return to their country of origin or move onwards to a third country (illegally or through resettlement). In developing countries, as is typical in poorer environments; refugees may emerge as a range of survivalist to growth-oriented entrepreneurs (Berner, Gomez, and Knorringa, 2009), influencing potential livelihood outcomes.

In assessing the formal institutional environment, it is necessary to appreciate the nature of the local policy and legal context for refugees. Lessons from post World War II East Africa refugee settlements are also useful here (Easton-Calabria, 2014) in highlighting the influence of formal restrictions, and camp authoritarianism as shaping choice and flexibility in

livelihood strategies and local innovation. In a recent assessment of Kakuma refugee camp in Kenya, with restrictions on refugee movement, the lack of manufacturing opportunities, and limited agricultural initiatives (due to water shortages), the main source of (informal) livelihoods was reported to be in services, including sale of food/non-food items (including higher end goods such as electronics) or operating restaurants (Samuel Hall, 2016). A total of 38 percent of respondents relied on aid; and almost 60 percent of men, and 75 percent of women were cited to be 'unemployed' (ibid). Urban environments pose different and varying conditions for refugee livelihoods. In Nairobi, Kenya UNHCR refugees are not formally permitted to work without a series of documentation. In contrast in Kampala, Uganda, UNHCR refugees may seek formal employment and set up businesses[xxxiii].

Beyond formal barriers to innovation and enterprise, there may also be more subtle social or religious obstacles, for example related to women's participation (Ritchie 2014, 2017). Women may be constrained from working outside of the house, or engaging in certain gender-biased sectors (such as electronics, often dominated by men). More labour intensive work may also be off limits to women (culturally) due to its visibility, long hours and heavy nature. Such socio-cultural dynamics may be exacerbated in the camps as indicated for Syrian refugees in Jordan (Ritchie, 2017). There may be further ethnically linked barriers, with certain contingents of refugees controlling particular sectors particularly out of the camps. In Kampala, Uganda, for example, research has shown that Congolese refugees dominate in tailoring businesses and are involved in the construction industry, Ethiopian refugees dominate in restaurant businesses, and Somali refugees are mostly involved in trading (Omata and Kaplan, 2013). There may also be more subtle actor-driven barriers, around both resource scarcity and a sense of uncertainty in the temporal nature of refugee status, influencing socio-economic behavior and investment in assets (Byrne, 2016). Finally there may be 'stratifications in the self-sustainability' levels' of refugees and degrees of 'self-reliance', linked to wealth and social networks, particularly those whose networks extend to non-refugee groups (Omata and Kaplan, 2013: 14).

Innovating refugee livelihoods

'Refugee livelihoods' is described to be a fairly new field and area of intervention, with programmes typically designed by UNHCR in line with donor preferences and host government frameworks, and often implemented by partner NGOs (Jacobsen and Fratzke, 2016). Such programmes may be divided into 'supply-side' strategies including interventions to boost refugee employability such as skills building, or support to entrepreneurship through business training and microfinance; or 'demand-side' strategies including interventions to create jobs or connect refugees to employers. Going beyond NGO 'low-skilled' training in vocational skills such as

tailoring, handicrafts and carpentry (or links to low-waged factory jobs), there is now an emerging recognition of diverse refugee populations and skills, and a call to 'think bigger' (Weaver and Russell, 2017). From a humanitarian aid perspective, three key sets of initiatives are highlighted that may impact on the prevalence of refugee innovation and enterprise, implemented by local and international organizations (Betts, et al., 2015). This includes the UNHCR '*Community Technology Access (CTA) Centres',* established with Microsoft and HP, now in refugee camps in East Africa and beyond. [xxxiv] Such centres provide computer training and facilitate internet access. In Nakivale settlement, Uganda, refugees were using the Internet at the centre to trade products and source market prices, and others were starting up electronic businesses, including digital music and computer services. The second set of key initiatives relates to *microfinance*, and the provision of small business grants critical for enterprise start-ups (Betts, et al., 2015; Hakiza and Easton-Calabria, 2016). Thirdly, Betts et al. (2015) highlight the importance of 'social innovation' and collective action, often encouraged by aid groups, but led by refugees themselves. This includes *Community Based Organizations* (CBOs), for music, education, sport and psycho-social support; as well as joint enterprise. The establishment of such groups may depend on the context however, with countries such as Jordan, prohibiting 'foreigner' social organisation (Ritchie, 2017).

Whilst aid approaches are evolving, Easton-Calabria (2014) argues that it is also pertinent to keep in mind history when discussing 'new' or innovative practices towards refugees, especially in the promotion of refugee livelihoods: vocational training and micro-finance support have been facilitated in settlements since the 1920s. In terms of technology and innovation, CTA centres stand out as a new frontline effort to boost IT skills, and digital literacy. Rated positively, such centres have been described to foster relationships between refugees and host community (Anderson, 2013) but the real 'added value' remains unclear. Further, there are clear gender dimensions to consider, with male participants reported to outnumber female participants despite UNHCR efforts (ibid.). Another related initiative, *UNHCR Exchange* provides refugees with online learning tools and support to design courses in subjects of their choice (Jacobsen and Frantze, 2016). Other emerging digital aid initiatives include the establishment of an 'online market' for refugees in Kenya ('Sparkbay Online Marketing') by the Norwegian Refugee Council with support from DFID, alongside *Kuza Biashara*, a digital micro learning and community platform for entrepreneurship and business development.[xxxv] Across the literature, there is an absence of a rigorous discussion of the impact of such initiatives on, and across refugee groups, with 'weak' evidence to date (Jacobsen and Frantze, 2016), or deeper insights into the process of refugee innovation (Bloom, 2015), including the engagement of actors or influence of local conditions.

Beyond the traditional aid community, it is also increasingly necessary to appreciate the changing ecosystem of refugee support, including the proliferation of digital-based platforms, training and services, described earlier in the paper. For example, small-scale, important initiatives in digital literacy are boosting refugee skills through computing and coding (e. *Refugee Code Academy*). Meanwhile, in Europe, there are several new efforts around start-up business support, and incubator/accelerator platforms for refugee businesses and projects (e.g. Finkela by SINGA in Paris[xxxvi], and MigrationHub in Berlin). In the context of MENA and Lebanon, many new 'social enterprises' are emerging to support refugees, yet there is little or no established government support for such ventures, and little information on 'incubators and accelerators' (Salamoun and Azad, 2017).

3.4   Appreciating the micro context and obstacles

From the HIP study (Betts et al., 2015), in vein with other research (e.g. Ritchie, 2018), qualitative findings point to the need to better understand the **community micro-context** (opportunities, barriers and scope of services/resources/regulatory environment) and 'pre-existing' local capacities. In so doing, international agencies can complement local initiatives, and existing skills and creativity (Betts, et al., 2015). In addition, an appreciation of the local business ecosystem can be gained, and innovative partnerships and technological linkages can be identified. **At present, bottom-up innovation is more often supported by the local market or by other refugees, than by the support of the international community** (ibid), **or by local formal services**. For example, YARID, a refugee-led community-based organization set up in Kampala mobilized young people for football matches to foster community interaction and joint problem solving (ibid.). The organization now facilitates classes in English, and has set up a women's centre. With civil society support, YARID operates *Tamuka Hub*, a physical space where refugees may meet, and use the internet for free, and receive training courses in social media, business skills and distance learning online (Hakiza, 2014).

A major persisting constraint highlighted by refugee innovators is the challenge in finding **appropriate funding and credit** to support new businesses or social ventures (Betts, et al., 2015). Emerging crowd funding facilities may be suitable for larger ventures and particularly more educated refugees in the context of Europe, but are less accessible for refugees in Sub Saharan Africa. Meanwhile new instruments such as the DFID-funded Humanitarian Innovation Fund support larger scale, visible projects[xxxvii], but grassroots initiatives are often over-looked by humanitarian groups (ibid.). Typically, refugees cannot access formal bank accounts or loans. Microfinance projects have endeavoured to support poor refugee communities through savings and lending groups, with current best practices adapting models to the local context and needs

(i.e., micro grants versus micro loans) (Jacobsen, 2004); and a more gradual approach pursued in financial capacity building (Calabria-Easton and Omata, 2016). There is a gap however in better understanding local innovation in credit systems by refugees themselves, including the scope of such innovation, financial structures and strategies (Calabria-Easton and Omata, 2016). For refugees with established transnational networks - such as Somalis in Kenya - initial capital may be received in the form of overseas remittances. Meanwhile in contexts such as Uganda, a number of (protracted) refugee communities have set up their own micro savings and lending groups, often in their own ethnic groups (Hakiza and Easton-Calabria, 2016; Betts et al., 2014). Beyond overseas family links, Omata and Kaplan (2013) argue that in considering approaches to refugee 'self-reliance', there needs to be a stronger appreciation of social networks at local, district and regional level, and partnerships with the private sector that may increase 'self-sufficiency', and play a key role in emerging economic strategies.

4.   Concluding remarks and gaps for research

A fast-changing landscape, 'humanitarian innovation', particularly through ICTs, is revolutionising every aspect of refugee lives through access to online information, services, skills development and new work opportunities. This is described to be fostering a new 'agency' amongst refugees, influencing the nature and scope of refugee integration (Smith, 2016). With this backdrop, refugee enterprise is equally adapting as ICTs open up new avenues for mobile and digital services, web-based networking and marketing, and new business partnerships. Yet online access and opportunities remain uneven. Hounsell (2017) maintains that 'bridging the technical divide' and identifying appropriate ICT solutions can support refugee livelihoods and community development, generate local revenues, and ultimately 'help break the cycle of aid dependency'.

In forging a deeper perspective on the emerging role and impact of technology and innovation in refugee lives, this paper has explored the growing use of ICTs in refugee support and integration in different contexts, drawing on often 'grey' literature, as academic studies struggle to catch up. At a grassroots level, the discussion looked at the specific scope of refugee bottom-up innovation and enterprise, and links to ICTs. Bottom-up innovations may be diverse, but are small-scale and inhibited by the formal context, with legal barriers around refugee work and business. The innovations themselves may also not be automatically inclusive and sustainable. Often men dominate higher-skilled or digital sectors, such as electronics and computing. Whilst ICT-related business is increasing, there is a dearth of more sophisticated ICT-based enterprises by refugee groups in refugee settings. This appears to be strongly related to high-speed Internet access and relevant skills (coding), social networks and finances. C*ognitive factors* should also not be overlooked; in particular the role of 'uncertainty' in refugee lives, influencing socio-economic behavior, investment in assets (Byrne, 2016) and enterprise scale.

Despite various obstacles, it is clear that across refugee settings, there is an increasing *use* of ICTs in building and sustaining livelihoods, although such usage (and adoption) may vary across contexts, with differing levels of connectivity and access; as well as across social groups, with men often controlling and managing devices in refugee households. In particular, refugees have been shown to rely on mobile phones in evolving microbusiness, for finding and retaining clients and customers, linking to suppliers, and increasingly, for access to mobile money. Whilst the importance of connectivity is beginning to be recognized by the humanitarian community (UNHCR, 2016), there are now calls for UNHCR to increase both access to smartphones and Internet for refugees (Evans et al., 2017; Levin et al., 2017).

The notions of *digital literacy* and *digital inclusion* are central to understanding the current uptake and usage of ICTs by different refugee population groups, and are intricately linked to 'social inclusion', but also refugee background (context, education and experience). Social inclusion may be multi-layered, and affected by geography, gender, culture and age amongst other factors, with ICT use thus affected by 'multiple identities' (IDS, 2017). This is influencing the participation of refugee groups in ICT design, and ICT access, use and adoption. It also shapes individual access to services/information, skills enhancement, social networks and online work. In fragile and socially conservative environments, it is argued that social inclusion and exclusion may even be exacerbated by the growth of ICTs (Foster, 2017), without institutional support or intermediaries (Diaz Andrade and Doolin, 2016). Going beyond the refugees themselves, the usage of ICTs has been argued to influence potential social interaction and integration in host communities.

In further assessing the nature and scope of refugee innovation and enterprise, a greater appreciation of the diversity of refugee populations and their related engagement in enterprise is now needed. The treatment of refugees as a homogenous group of people that become 'innovators' in displacement is still a common narrative (Betts et al), with little discussion of refugee backgrounds or even the nature of enterprise innovation, more often just survivalist business (Ritchie, 2014, 2017). Meanwhile, the impact of current (often disconnected) tech-related initiatives (either in terms of apps, or support facilities such as UNHCR Community Technology Access Centres) on refugee livelihoods is unclear, both across contexts and social groups. In general, the emerging importance of the ICT space for potential bottom-up work and enterprise - and obstacles faced by different refugee groups - is still not fully recognized by the mainstream humanitarian community.

To better understand the current and potential role of ICTs in refugee economies, innovation and micro-business, it is necessary to appreciate the growing dominance of the **mobile phone** in particular, and the *rapidly changing online landscape* of mobile phone applications, influencing basic service provision and protection, access to skills and remote work, and mobile money. It is also necessary to explore the *dynamic nature of the micro-context* and enabling environment - or push and pull factors - both institutionally and socially. Taking this further, the *process of innovation* itself requires elaboration, and the influence of actors, conditions and emerging facilities, including access to technology-related facilities and resources (e.g. UNHCR Community Technology Access Centres). In such processes, the emerging role of *networks and partnerships* requires attention in co-designing local apps and technology-related solutions to promote the development of ICT-related solutions that are

appropriate, inclusive and can reach scale.

In fragile refugee settings, there may be several interesting avenues for research into ICTs, innovation and enterprise, including:

- **What does the process of refugee innovation in enterprise look like?** *What is the influence of different actors and conditions at different stages? How does this vary across contexts? What is the emerging role of networks and partnerships in such innovation?*

- **How do different refugee groups realize the potential of ICTs in supporting different aspects of their livelihoods** *(e.g., access to banking services, setting up entrepreneurship ventures and trading online)? How does this influence entrepreneurial endeavours and innovation?*

- **How does the current landscape of digital humanitarian innovation support emerging refugee innovation and enterprise?** *What are the opportunities and challenges of leveraging technology in participating in income-generation opportunities?*

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Appendix 1: Global refugee dynamics and response

At present over 55 percent of (UN identified) global refugees are from three countries: Syria (5.4 million), Afghanistan (2.5 million) and South Sudan [xxxviii] (1.4 million). [xxxix] Looking closer at refugees, over 88 percent of refugees reside in low- and middle-income countries (Huang and Ash, 2017), often in developing contexts with 'serious protection, human rights and governance weaknesses' (Crawford, Cosgrave, Haysom and Walicki, 2015: 1). Currently, top hosting countries are centred around include Turkey (2.9 m) [xl], as well as Pakistan, Lebanon, Iran, Uganda, Ethiopia and Jordan. Lebanon is indicated to host the largest number of refugees relative to its national population (1 in 6 people are refugees). The character of refugee crises may differ, with some building up over time e.g. Sudan, and others exploding suddenly e.g. Syria (Crawford, Cosgrave, Haysom and Walicki, 2015: 11). Even where refugee crises are resolved quickly [xli], refugee cases may extend over several years. Described as the 'new normal' however, today two thirds of refugees are described to be in *protracted refugee situations* (i.e. over 5 years in displacement). [xlii] The average length of displacement is in fact 10 years. For those that have been displaced already for 5 years, the average length of displacement is 21 years (Huang and Ash, 2017). Refugees may remain in *single locations* over long periods.

Drawn up in 1951, the United Nations Refugee Convention envisaged refugees as a predominantly temporary phenomenon, with refugees either returning home or integrating into new environments. Today's reality is very different, with many refugees spending decades in that status often in poor countries (Jones and Teytelboym, 2017). Refugee crises are not often short-term with most refugees thus finding themselves in protracted displacement (ongoing for five years or more). In such situations, there may be two possible 'durable solutions' for refugees: settling in the first asylum country, 'integration'; or moving to a third country context 'resettlement' (estimated at less than 1 percent of refugees (UNHCR, 2015)). This is heightening the need to better explore local integration, and settlement in the 'first' countries of asylum (Jacobsen and Fratzke, 2016: 1). However, many such regional host countries have been resistant to refugee settlement with a lack of policies permitting local integration, with the result that refugees are unable to gain local citizenship and rights and are 'forced to settle for a provisional existence' with weak market ties, and poor access to education and local services (ibid: 3). Such barriers to refugee self-sufficiency are critical challenges for humanitarian agencies as well as refugees and their host communities.

Moving away from the camp model post Second World War era, increasingly, IDPs and refugees are 'an urban and dispersed' phenomenon (Crawford, Cosgrave, Haysom and Walicki, 2015: 1),

with two thirds of refugees and IDPs living in towns and cities (International Rescue Committee, 2017)[xliii]. In the Middle East and North Africa region (particularly Lebanon, Jordan and Turkey), up to 90 percent of Syrian refugees reside outside of refugee camps, in urban areas in pursuit of employment and social networks (IISS, 2017)[xliv]. The UN argues that this tended to contribute to their 'invisibility' (UN, 2011) in terms of recognition by humanitarian actors, and local protection and support. In recent times, the deluge of Syrian refugees has awakened the plight of urban refugees.

In working towards appropriate, sustainable and efficient responses for refugees, preserving the well-being and dignity of the refugees and enhancing their 'self-reliance' is critical particularly through access to livelihoods - without which refugees remain vulnerable and dependent on humanitarian assistance. At present, humanitarian agencies struggle to provide 'open-ended' humanitarian assistance that offers little to support the lives and livelihoods of refugees in the longer-term (Crawford, Cosgrave, Haysom and Walicki, 2015: 5). Whilst there have been calls for longer term investments in self reliance and livelihoods from the aid community, a lack of rigorous assessment of evidence and impact has slowed down a shift away from traditional models (ibid). However, both the increased pressures of refugees, and the introduction of new technology and innovation are accelerating a shift towards new ways of doing things and a greater demand for results.
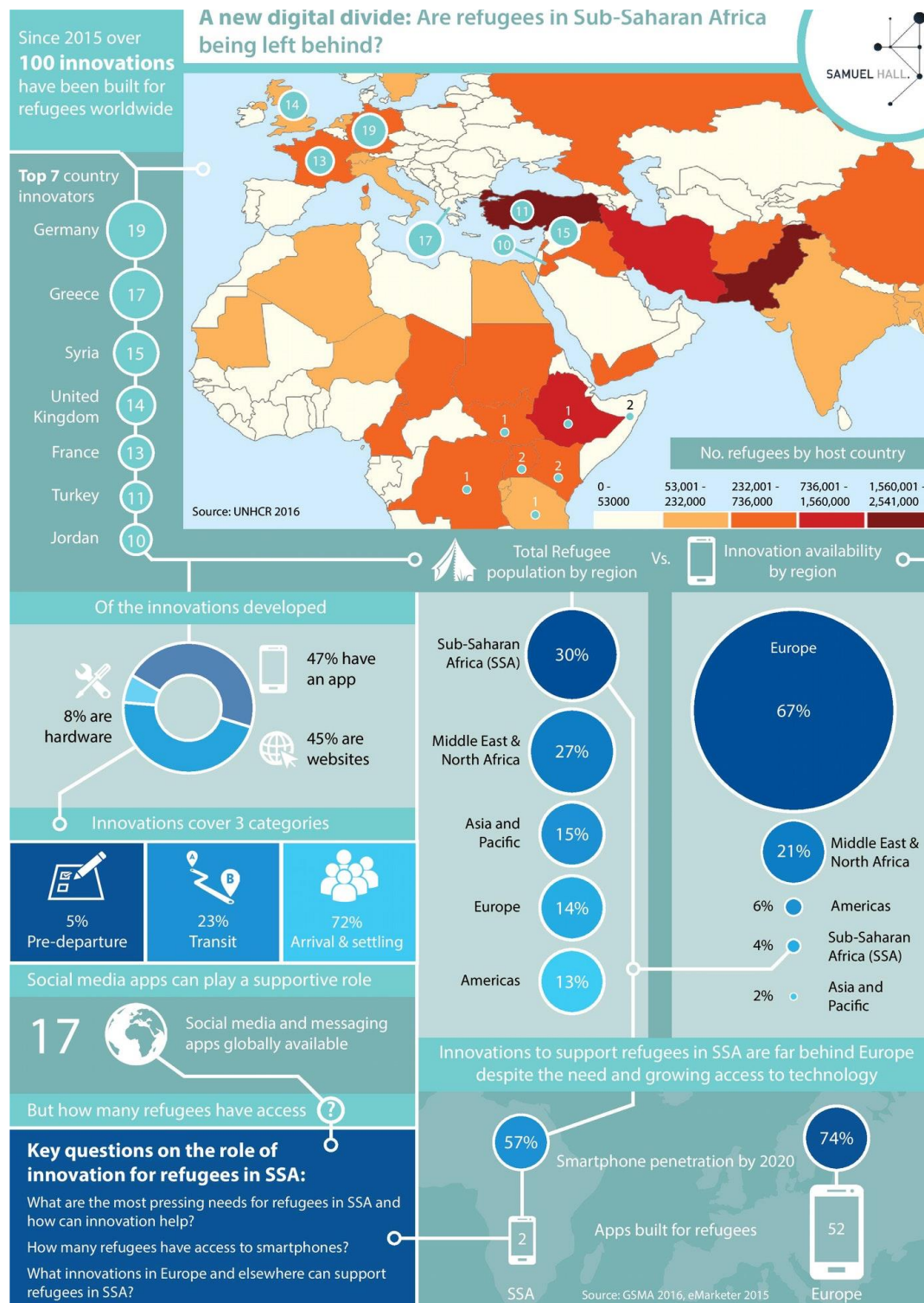
Appendix 2: Selected emerging 'digital' humanitarian innovations for refugee support and integration

Name	Description	Type	Location
I Housing and local services			
Ankommen	<u>Language and services</u>: Provides basic German language course, as well as information on the asylum application process and how to find jobs or vocational training. Also provides information on German values and social customs *http://appsforrefugees.com/ankommen/*	Web App	Germany
CALM	<u>Housing support</u>: Temporary accommodation for refugees in 'spare rooms' in private homes (3-12 months), initiative spearheaded by French organization/movement SINGA *http://calm.singa.fr/en/*	Web	France
Finding Places	<u>Housing support:</u> Open access data system to permit citizens to review available land and buildings that are unoccupied (Collaboration between MIT, Hamburg City University, the city government and Hamburg residents)	Project (Hamburg)	Germany
HaBaby	<u>Maternal health:</u> Information and support for pregnant refugee women *http://www.alessandrocrimi.com/hababy/*	App	Global
Tarjimly	<u>Language support</u>: Real time translators/interpreters through Facebook for refugees/immigrants *https://www.tarjim.ly/en*	App Web	Global
Welcome App Germany	<u>General Services</u>: One stop shops' providing information on local services *http://appsforrefugees.com/welcome-app-germany*	App	Germany
II Access to skills development and jobs			
Coursera for Refugees	<u>Skills</u>: Massive Open Online Courses (MOOCs) *https://www.coursera.org*	Web App	Global

Name	Description	Type	Location
edX	*https://www.edx.org*		
EdSeed	Credit: Crowdfunding app (*EdSeed*) supporting the continued education of displaced university students *https://edseed.me*	Web App	Global
European Qualifications Passport for Refugees	Education profile: Physical document (and e-profile) of an individual's academic record and history *https://www.coe.int/en/web/education/recognition-of-refugees-qualifications*	Project (Greece)	Greece
Gherbetna	Jobs: job listings and services in Turkey for Syrian refugees *http://www.8rbtna.com*	App	Turkey
*iLab Africa (*Strathmore University Business School in Kenya)	Skills: Real-time virtual classes streamed into Kenya's Kakuma refugee camp (currently includes professional training such as Certified Public Accountant (CPA) courses) *http://www.ilabafrica.ac.ke/index.php/elearning-projects/*	Classroom training	Kenya
Kiron	Skills: Links online MOOCs educational provision with existing educational programs at designated universities for approved credits *https://kiron.ngo*	Web App	Global
ReCoded	Skills: Facilitates access to employment overseas or remote freelance online work through coding skills *http://www.re-coded.com*	Classroom training (various/ MENA)	MENA
ReDI School of Digital Integration (Dalili)	Skills: Networking, mentoring and distance learning courses ICT solutions: supports digital platform development for refugees e..g. *Dalili* for links to local services/organisations *https://www.redi-school.org*	Web Online Classroom training	Germany
Refugee Code Academy	Skills: coding and programming	Classroom training	Tanzania Malawi

Name	Description	Type	Location
Work4Good	Skills: Tailored packages that draw on MOOCs to facilitate access to the digital economy *http://work4good.strikingly.com*	Web	Global
Workeer	Job support: Online jobs platform in Germany to match refugees to suitable employment *https://workeer.de*	Web	Germany
III **Access to communications and connectivity**			
NetHope	Wifi/ICT skills: ICT NGO Training, Wifi provision *https://nethope.org*	NGO ICT support	Global
Sparrow mobile - RefugeeMobile	'Refugee' Smartphone: Smartphones loaded with relevant apps loaded to support banking, language and job searching in USA *https://sparrowmobile.com/affinity/refugee-mobile/*	Phone with Apps	USA
IV **Access to banking and credit**			
BanQu	Banking support: Blockchain technology to formulate an economic identity tracker *http://www.banquapp.com*	Web App	Global
Moni	Online mobile banking and Mastercard for those in Europe (with physical address but no banking history required) – saving, lending and borrowing *https://moni.com*	Web App	Europe
Prosper	Credit: Peer-to-peer lending platform *https://www.prosper.com*	Web App	Global
V **Public awareness tools**			
Bayanat Box	Info/Data: Visual data about refugees in MENA region for greater public awareness and support (*https://bayanatbox.info*)	Web	MENA

Appendix 3: Infographic: Digital innovations in different geographical regions, and gap in Sub Saharan Africa

A new digital divide: Are refugees in Sub-Saharan Africa being left behind?

Since 2015 over **100 innovations** have been built for refugees worldwide

Top 7 country innovators

Germany	19
Greece	17
Syria	15
United Kingdom	14
France	13
Turkey	11
Jordan	10

Source: UNHCR 2016

No. refugees by host country

| 0 - 53000 | 53,001 - 232,000 | 232,001 - 736,000 | 736,001 - 1,560,000 | 1,560,001 - 2,541,000 |

Of the innovations developed

47% have an app

8% are hardware

45% are websites

Innovations cover 3 categories

5% Pre-departure

23% Transit

72% Arrival & settling

Social media apps can play a supportive role

17 Social media and messaging apps globally available

But how many refugees have access

Key questions on the role of innovation for refugees in SSA:

What are the most pressing needs for refugees in SSA and how can innovation help?

How many refugees have access to smartphones?

What innovations in Europe and elsewhere can support refugees in SSA?

Total Refugee population by region **Vs.** Innovation availability by region

Sub-Saharan Africa (SSA)	30%
Middle East & North Africa	27%
Asia and Pacific	15%
Europe	14%
Americas	13%

Europe 67%

Middle East & North Africa 21%

Americas 6%

Sub-Saharan Africa (SSA) 4%

Asia and Pacific 2%

Innovations to support refugees in SSA are far behind Europe despite the need and growing access to technology

57% Smartphone penetration by 2020 74%

Apps built for refugees

SSA 2

Europe 52

Source: GSMA 2016, eMarketer 2015

Source: Hounsell/Samuel Hall (2017), based on UNHCR data

Appendix 4: Emerging 'bottom up innovations' of refugees in enterprise

Business	Urban Environments	Refugee Camps	Potential investment
Conventional micro-enterprise			
Services and trading			
Accommodation: running a guesthouse or lodge	☐		Medium-high
Restaurants and catering	☐	☐	Medium-high
Craftsman/furniture production	☐	☐	Medium
Retail kiosks - Food/non-food items trading	☐	☐	Low
Tailoring	☐	☐	Low
Beauty and hairdressing	☐	☐	Low-medium
Car mechanic	☐	☐	Low-medium
Welding	☐	☐	Low-medium
Car or Motorbike taxi	☐		Medium
Manufacturing and production			
Handicrafts, detergents, briquettes	☐	☐	Low-medium
Urban agriculture	☐	☐	Low-medium
ICT-related enterprise			
Provision of wi-fi	☐	☐	Medium
Provision of electricity / charging of devices	☐	☐	Medium
Loaning of mobile phone	☐	☐	Low-Medium

Business	Urban Environments	Refugee Camps	Potential investment
Use of phones to supply airtime or send money	☐	☐	Medium
Entertainment: Gaming and digital music provision	☐	☐	Medium

Appendix 5: Platforms with 'on-demand' work in Jordan

Company	Launch date	Business	Dominant gender of workforce
Bilforon	July 2016	Catering: Connecting users with people who make food and sell it from their homes. Users can view the list of home cooks, the food they make and order directly from the application. The platform also offers 'daily dishes' offering ready-to-go meals. Food products: Pre-prepared food products such as home-made condiments (organic jam, pickles, peanut butter etc.) are available through the platform.	Female
Mrayti	December 2016	Beauty: Freelance makeup artists, manicurists, hairstylists etc. provide services to clients at their homes.	Female
3oun (English only)	June 2016	Utility services: 3oun is a platform for utility services, where users can reach service providers easily. Review service providers. 3oun provides a variety of services such as towing, plumbing, water tanks and many more.	Likely to be male
Uber	April 2015	Ride-sharing	Male
Careem	2015	Ride-sharing	Male
Daleelak (English only)	2017	Freelance labour: (per the website, this could be 'a tutor, maid, beautician, handyman or a waiter')	Likely to be mixed

Source: Hunt, Samman and Mansour-Ille (2017)

Endnotes

[i] IOM defines a migrant as any person who is moving or has moved across an international border or within a State away from his/her habitual place of residence. https://www.iom.int/key-migration-terms

[ii] Of these approximately 40 million are internally displaced (IDPs), and 22.5 million defined as refugees forced to physically flee his or her country because of war, persecution or violence, the highest numbers ever recorded (UNHCR 2017), with 17.5 million under UNHCR mandate. http://www.unhcr.org/globaltrends2016/

[iii] http://www.unhcr.org/figures-at-a-glance.html

[iv] UNHCR formally defines a protracted refugee situation as 'one in which 25,000 or more refugees from the same nationality have been in exile for five or more years in a given asylum country' (UNHCR 2016).

[v] Human security may be understood in terms of 'creating structures and enabling environments that provide building blocks for survival, dignity and resilient livelihoods' (Christoplos and Hilhorst 2009).

[vi] 'Fragility' has been used to describe situations where the state 'cannot or will not shoulder responsibility to protect the lives and well-being of the population within its borders' (Christoplos and Hilhorst, 2009). Building on more recent definitions (Rijper, 2013), fragile settings may refer to contexts where the state is weak, unwilling or absent, influencing local security and the provision of basic services, as well as access to work (Ritchie 2017).

[vii] https://sustainabledevelopment.un.org/post2015/transformingourworld. The February 2016 version of the IAEG-SDGs report highlights specific ICT indicators covering seven targets under Goals 4, 5, 9, and 17: https://unstats.un.org/unsd/statcom/47th-session/documents/2016-2-IAEG-SDGs-Rev1-E.pdf

[viii] One of the key thematic areas was 'Transformation through Innovation'.

[ix] Promoted by the World Bank's Consultative Group to Assist the Poor (CGAP) and Bangladesh Rural Advancement Committee (BRAC), this Approach supports clients in building assets through specific stages of assistance, with initial training in financial literacy and managing savings, graduating to support to livelihood skills, micro-grants (if appropriate) and finally micro loans (Easton-Calabria and Omata 2016).

[x] *Techfugees* is a social enterprise that has mobilized the international technology community to explore innovation and ICT solutions for refugees.

[xi] https://en.oxforddictionaries.com/definition/hackathon

[xii] A key finding for a team in Berlin was the reality of the background/needs and ambitions of refugees in that setting, with many refugees with educated backgrounds or holding vocational skills as indicated by sources such as the *Refugee Rights Data Project*. The team designed a skills exchange platform, with refugees learning German in exchange for coding, cooking or universal skills.

[xiii] http://searchcio.techtarget.com/definition/ICT-information-and-communications-technology-or-technologies

[xiv] For example, Homeshare in the UK: https://homeshareuk.org/about-homeshare/homeshare/what-is-homeshare/

[xv] https://www.newsdeeply.com/refugees/articles/2017/07/31/why-a-refugee-education-passport-is-being-tested-in-greece

[xvi] http://www.banquapp.com *BanQu* facilitates a 'personal digital identification profile' with their linked network including family, friends, small businesses, and associated NGOs. Through the development of a transaction history on the BanQu blockchain, individuals can develop a 'tractable, vetted financial and personal history'. This economic identity provides a 'baseline for the unbanked to participate in the global economy'.

[xvii] https://obamawhitehouse.archives.gov/blog/2016/06/30/heres-how-U.S.-businesses-are-stepping-up-to-aid-refugees

[xviii] Support has also been channeled to support data protection. Through their partner *NetHope*, Microsoft Philanthropies have helped to reduce digital data risks to refugees through tightening the security of NGO refugee databases.

[xix] Samuel Hall's new research with REFUNITE funded by DFID's Humanitarian Fund aims to better explore refugee actual needs, access to phone/smartphones and confidence in using such mobile-driven services. They intend to look closer at refugee movement in East Africa.

xx For example, the app *Migreat* provided up-to-date asylum information by legal experts, reaching 2 million users at its peak. Yet it failed to find sufficient funding and by 2016 it was suspended (Benton and Glennie 2016). At the time of this current paper, it appears that the site is up and running again.

xxi According to the World Bank, the ICT sector itself includes those jobs 'which are directly created through the production of ICT and through the intensive use of ICT' http://documents.worldbank.org/curated/en/290301468340843514/pdf/809770WP0Conne00Box379814B00PUBLIC0.pdf. This includes IT-specialists and advanced users of software tools (such as graphic designers, statisticians, data scientists), as well as more basic users that utilize generic ICT-tools, but excludes 'ICT-enabled' work (work that is generated from the digitization of the job search process and of work itself) (World Bank 2013 in BMZ 2017).

xxii In the author's research in January 2016, whilst not formally assessed, ICT businesses were indicated to remain simple, and were mostly linked to mobile phone services, e.g. charging and repair of phones, the selling of phones and phone credit etc (Ritchie, 2017).

xxiii The author's research estimated that less than 2 percent of businesses in the camp belonged to women, including beauty services and sweet making.

xxiv The author's research estimated that over half of Syrian refugee women in urban centres were now engaged in micro-economic activities, often from the home. Such work has been prompted by economic pressures, compounded by men's work exclusion. Syrian women refugees traditionally face restrictive social norms related to their public mobility and participation in work (choice of work, scope of work etc) (Ritchie, 2017).

xxv At the end of 2017, the Jordanian government reported issuing 70,000 work permits to date to Syrian refugees but this is cited to include expired permits and renewals (Howden, Patchett and Alfred, 2017). Women were limited recipients of permits (Hunt, Samman and Mansour-Ille 2017), with a reported only 5% of permits issued to women as of May 2017 (Katta ,2017). Obstacles around the issuing of permits include a lack of information, the challenge of identifying sponsors (or an aversion to a single employer), and legal restrictions in some sectors, as well as fears over losing UNHCR/WFP cash transfers and possibilities for resettlement (Hunt, Samman and Mansour-Ille 2017). From a business point of view, efforts to bring Syrians into factories were 'not a success', with greater interest by men in work with more flexibility including jobs in construction and restaurants (Howden, Patchett and Alfred, 2017). Meanwhile, expected interest by women to work in the garment industry was limited, with women unused to such work from southern Syria (ibid.).

xxvi It is estimated the value of the GIG economy may reach $63 billion by 2020 (Goh, 2017 cited in Hunt, Samman and Mansour-Ille ,2017)

xxvii Interestingly, this was the only refugee-designed mobile application reported in online sources.

xxviii In particular, there has been great interest in this exploding phenomenon by the field of Information Systems (IS). A number of recent panels have been organized at various European and International conferences (AbuJarour et. al 2017, AbuJarour et al. 2016).

xxix This term relates to an individual's sense of well-being, which act as a buffer in coping with stressful life events (Baumeister and Leary 1995)

xxx The concept of 'social integration' can be complex (e.g. Ager & Strang 2008). The UN (2009) describes social integration as a 'dynamic' process whereby all people in society may participate in social, cultural, economic and political life 'on the basis of equality of rights, equity and dignity'. http://www.un.org/esa/socdev/egms/docs/2009/Ghana/inclusive-society.pdf

xxxi Interestingly, refugee youth were described to catch up quickly in the Australian context.

xxxii This concept was drawn from a PwC report (2017) that discussed factors around migration and the refugee crisis, in particular related to the 'openness' of government policies to receive refugees, and the degree to which (host) societies can absorb and integrate refugees, and provide opportunities ('open societies'); or be hostile with a lack of opportunity ('closed societies).

xxxiii The 2006 Refugees Act in Uganda recognises the right of refugees to work, to move freely within the country and to live in the local community, rather than in settlements (Dathine 2013 in Omata and Kaplan 2013).

xxxiv Piloted in Rwanda and Bangladesh, CTA programs are now present in 29 countries with a total of approximately 60 CTAs worldwide (Jacobsen and Frantze, 2016).

xxxv https://www.capitalfm.co.ke/business/2017/12/online-market-products-refugees-host-community-unveiled/

xxxvi https://www.singafrance.com/finkela

[xxxvii] Further to this, offering some support towards potential social initiatives, a DFID-funded project called Amplify, in partnership with a design company IDEO, encourages refugee CBOs to submit small project ideas under specific themes (e.g. refugee education). https://www.ideo.org/programs/amplify

[xxxviii] This group is the fastest growing population of refugees, with the majority of whom are children.

[xxxix] http://www.unhcr.org/figures-at-a-glance.html. Approximately 10 million people have been described as 'stateless', not considered as nationals by any State under its law. They often live 'on the margins of society', making it difficult to assess the extent of the problem. Often referred to as 'an invisible problem', stateless people remain less easy to detect but frequently live in a 'precarious situations'. With no identity cards, they may unable to send their children to school, access medical help, enter the job market, open a bank account, buy a house, or even get married (UNHCR 2017: 48).

[xl] http://www.unhcr.org/figures-at-a-glance.html

[xli] i.e. reduced to '10 percent of its peak' (Crawford, Cosgrave, Haysom and Walicki 2015: 12).

xlii UNHCR formally defines a protracted refugee situation as "one in which 25,000 or more refugees from the same nationality have been in exile for five or more years in a given asylum country". (Global Trends 2015, UNHCR 2016)

[xliii] *IRC 2017, Integrated livelihoods and protection for displaced persons in urban humanitarian response* June 28, 2017. Accessed online, 11 January 2018: https://www.rescue.org/report/integrated-livelihoods-and-protection-displaced-persons-urban-humanitarian-response

[xliv] http://www.iiss.org/en/publications/strategic percent20comments/sections/2017-6df9/urban-refugee-crisis-2451