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Towards a conceptual framework for understanding the challenges in refugee re-settlement

Upon arrival to a host community, refugees and asylum seekers face immense challenges to rebuild their social capital that is critical in the process of their resettlement. Developing a holistic understanding of these challenges can provide significant opportunities to inform designers and services providers working with this demography. We adopt the lens of social capital coupled with an inquiry in to the heterogeneity of refugees and asylum seekers to gain a holistic understanding of various challenges that they with. We accordingly present a conceptual framework that has been iteratively built based on our four years of engagement with refugee communities. The framework highlights three important aspects: cultural backdrops, displacement-related stressor, and social resources in the host community. We offer several implications for technology design, policies, and the theory of social capital that can support members from these communities in their resettlement. [1]

CCS Concepts: • **Human-centered computing ~ Field Studies** • Human-centred computing~ Ethnographic studies

1 INTRODUCTION

The current refugee crisis has been considered one of the worst humanitarian crises since World War II. According to the United Nations High Commissioner for Refugees (UNHCR) more than 68 million people have been forced to flee their home countries due to wars, persecutions, and human rights violations [109]. Among them 25.4 million are refugees and 3.1 million are asylum seekers [109]. Consequently, host governments in developed countries have seen a growing number of newly arriving forced migrants that has resulted in them hosting millions of refugees and asylum seekers (RAS). After the brutal conflict in the Middle East, Australia received the largest number of forced migrants (24000 refugees) in the financial year 2016-2017 since it started its humanitarian migration program. It has also allocated 18,750 visas in 2018-19 to refugees from Iraq and Syria [23].

Previous studies have confirmed that there are social and cultural challenges accompanying RAS resettlement [8,71,73,100]. Additionally, RAS in Australia have been identified to be at risk of post-traumatic stress [15] and poor wellbeing [23]. Some of these challenges can be attributed to RAS lacking social support [28] and access to services [95]. Furthermore, the social capital of RAS, usually built over decades in their home countries, is significantly affected as they move to new countries and communities. Social capital is defined as "features of social organization such as networks, norms, and social trust that facilitate coordination and cooperation for mutual benefit" [86, p. 2]. In our research we adopt Putnam's [86] theoretical lens of social capital to understand the challenges that newly arrived RAS face to resettle in the host community. Furthermore, we explore how RAS are a heterogenous group with multiple factors that interplay and influence their social capital and the technologies we may design to support them.

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Research in human computer interaction (HCI) proposes that technology has the potential to support underserved communities, such as low-socioeconomic-status communities [112], homeless people [90], and disadvantaged job seekers [31]. Such opportunities include supporting resilient strategies, sharing of space, and offline social networks[31,90,112]. There has been HCI research on technologies for RAS, but the literature tends to be challenge specific (e.g. focuses on designing technologies for health [103] or navigating new cities [62]). Additionally, research in HCI has yet to fully grapple with the diversity of RAS religious, gender, political and cultural backgrounds as there is a tendency to conduct research with only one group of RAS (e.g. women [101], refugees from one country [35]) or to not report on the variation in experiences of RAS in relation to the aforementioned factors. Therefore, without a deep understanding of how RAS diversity influences their social capital and use of technology in their everyday lives, technological solutions would be less effective.

In order to address the aforementioned research gaps and inform the design of technologies that strengthen RAS social capital all the while accounting for their diversity, we present a conceptual framework that contributes to a holistic understanding of the challenges faced by RAS that limit their social capital. The framework was developed through the analysis of qualitative results from four studies that took place over four years that involved 50 RAS that varied in country of origin, religion, and genders. We offer design implications for each element of the framework in the findings section that can inform designers working in RAS context that account for the diversity of the RAS population. In doing so, we challenge the homogenous representation of RAS in HCI research and in turn the technological design implications brought to the fore. In the discussion we present the practical implications for policies and theoretical implications for social capital in the RAS context. We also provide technological implications to rebuild bonding, bridging, and linking social capital.

2   RELATED WORK

2.1 Theoretical lenses

The theoretical lens of social capital [86] has been adopted in this research. The theory of social capital has been investigated in different areas of social science, education, health, and economics [38,39,59,83] due to its impact on supporting individuals to access a wide range of social resources that are available in their communities. Initially, the theory of social capital was developed by Pierre Bourdieu in the 1970s and early 1980s [96]. According to Bourdieu, the theory of social capital consists of three elements: social, economic, and cultural capital. He identified these elements based on the connection between social capital and socio-economic class [96]. These elements are considered important resources that "become socially effective, and their ownership is legitimized through the mediation of symbolic capital" [96]. Bourdieu [14]defined the theory of social capital as "the aggregate of the actual or potential resources which are linked to possession of a durable network of more or less institutionalized relationships of mutual acquaintance or recognition". Coleman [25]built on Bourdieu's work [14] by identifying the centrality of: (1) obligation and expectations, which depend on trustworthiness of the social environment, (2) information flow of capability of the social structure, and (3) norms accompanied by sanctions. Hence, such elements of class structure are considered as a resource for actors to accomplish their interests [21]. Both Bourdieu [14]and Coleman [25]considered the notion of social capital as a means to support an individual's resources, thereby focusing on individual-level outcomes [21].

Putman further developed the concept of social capital, "to date, Putnam's theory has been influential in policy initiatives and academic research in the United Kingdom and abroad, with its promise that increased voluntary associations between people will lead them to transcend difference and 'come together' as a cohesive citizenry" [20, p. 30]. In his research, Putnam [87, p. 8] distinguished three forms of social capital,: bonding, bridging, and linking social capital [60]. Bonding social capital or strong ties "is important for maintaining existing relations" [106]. Bridging social capital or weak ties "is crucial for extending social networks" and could be an important resource for facilitating mobility. Linking social capital includes capacity to leverage resources, ideas and information from formal institutions beyond the community" [106]. Putnam [87] states that bridging and linking social capital are valuable as they both allow individuals to communicate irrespective of ethnicity, culture, and race. Hence, he emphasized the collective action of social capital rather than individual action as presented by the Bourdieu [14] and Coleman [25]. The concept of social capital can be applied to RAS contexts since building their social capital may facilitate their access to

resources to support their health, housing, education, and employment needs and in improving their social inclusion and general well-being [56].

2.2 Designing for RAS in HCI

In recent years, there has been growing interest among CSCW and HCI researchers in investigating RAS contexts and developing technological solutions in response to the challenges they face. The research in this area tends to be challenge specific with some studies addressing challenges of lack of information, RAS health and accessing services. Lastly, specific to the context of Australia, research has been conducted to understand the challenges that they face in relation to building their social capital.

In the contexts of moving to a new land, RAS need valuable information to enable them to navigate new spaces and new communities. Brown and Grinter [16] designed a technology called "Rivrtran" to support newly arrived refugees in navigating their new bureaucratic environment of resettlement. Baranoff et al. [11] placed near field communication (NFC) tags around a city that refugees can use to learn and navigate their new environment. Weibert et al. [113] examined the challenges that RAS face in finding information related to language learning in Germany and accordingly designed a digital wizard that assists RAS in overcoming the administrative obstacles associated with accessing language courses. Within refugee camps, computer clubs [117] and design projects [36,37] have been used to explore how technology can enable refugees in gaining information, accessing resources, and supporting their community in order to address the daily challenges they face. Al-Ani et al. [2] in their study found that blogs played a significant role in creating a safe virtual place where individuals could communicate easily without fear of violence and persecution, during the Iraqi war.

Other studies have focused on the health challenges that refugees face. Talhouk et al. [104] examined the ICT opportunities in remotely supporting access to antenatal care services by refugee women in rural Lebanon. IVR enabled community radio shows [103] have been used to improve refugee access to healthcare services in a manner that addresses mistrust, refugee agency and privacy. In regards to mental health, Tachtler et al. [98,99] highlighted that social-ecological frameworks are needed to design technologies to support relationships between young unaccompanied refugee youth and the volunteer based support system in Austria.

Accessing services is another challenge faced by RAS. Coles-Kemp and Jensen [26] identified that RAS's precarity and need for accessing digitally mediated services is prioritized over RAS's privacy and security concerns; thus highlighting the everyday security threats that RAS face when interacting with government services. Furthermore, the need to be constantly digitally connected in order to engage with resettlement processes has been found to amplify pressures on RAS [53].

More specific to social capital, the topic of our paper, Almohamed and Vyas [3] examined the challenges that RAS face when resettling in Australia. They identified three main social issues that RAS face in Australia, namely, mistrust, cultural barriers, and displacement trauma. They also investigated the role of technology in supporting social capital through participatory workshops with refugees [4,5]. Despite the aforementioned insights, it is still unclear how to design technologies that can support this demographic group in fostering their social networks and dealing with everyday challenges in their new environment. Additionally, the research conducted has yet to holistically unpack the diversity of RAS communities and how that diversity interplays with social capital. Hence, our research attempts to fill this gap by investigating the challenges that diverse RAS face upon arrival to the host community and the role of technology in fostering their social capital.

Lastly, it is important to note that the aforementioned HCI studies focus mainly on specific challenges that RAS face and contribute to designing challenge specific digital solutions. Investigating specific challenges is not wrong or negative, however in this paper we aim to build on previous research and our findings to establish a holistic view for understanding and addressing the challenges that affect RAS in their resettlement into host communities. Understanding the challenges that RAS face could be valuable for designers to design innovative social tools that could help this demographic in the long term in rebuilding their social capital. By doing so, we seek to inform HCI designers and researchers about the challenges that RAS face in the host community.

3   WORKING WITH RAS

We conducted a long-term project, divided into 4 stages, for four years in collaboration with a non-profit organization that serves a large number of RAS in Logan city, Australia. The Australian government has two different protection programs for refugees. The first is the onshore protection program that is accessible to individuals seeking asylum under the condition of arriving to Australia on a valid visa (e.g. a student or tourist visa). Individuals on this program have the right to apply for a permanent protection visa which offers them the right to work and live in Australia as permanent residents [110]. However, since September 2013, the Australian government has changed the onshore protection program to exclude individuals who arrived to Australia by boat. According to this policy, any person attempting to reach Australia by boat is turned back to their country of departure or sent to an offshore processing facility in a remote area in Manus and Nauru Island in Pacific Ocean [42]. The term 'asylum seekers' (n=4) in this paper refers to people who arrived to Australia by boat before 2013 and they have applied for refugee status [22,110]. This group of people have limited access to services and resources in the host community.

The second government program is the offshore resettlement program that contains three categories: Refugee, Special Humanitarian, and Community Support Program (CSP) [110]. The Refugee category applies to people living in other countries who have been identified as refugees by UNHCR, as per the UN 1951 refugee convention [108] and referred to Australia for resettlement. All our refugee participants (n=46) have been granted permanent residency upon their arrival to Australia. Refugees have full access to all government services. Our research also involved engaging with activists (n=4) to gain more insights into the challenges that RAS face in the host community.

Our project aimed to investigate the challenges that RAS face in the host community and the role of technology in their daily lives. The four stages of the project were tailored to elicit data from participants regarding the multiple areas of their lives and were not restricted to investigating technology in relation to a specific challenge they are experiencing. Furthermore, due to the highly sensitive nature of this research, understanding RAS's culture and language was vital to engage them actively in this study. Engaging in such sensitive research was facilitated by the first author, who led the data collection in all stages of this project, also being a refugee since 2015. He comes from a similar Middle Eastern cultural background as participants and can speak Arabic, the mother tongue language of the majority of participants. Additionally, the lead author had volunteered for three years at non-profit organizations (NGOs) that help RAS. These factors gave the lead author an opportunity to engage with RAS, build a strong rapport with them, and recruit participants.

As previously mentioned, the project consisted of four stages that we detail below. At each stage we summarize the aims and data collection methods as well as provide a summary of findings while signposting how they informed the formulation of the conceptual framework that is presented in this paper. After the completion of the 4 stages of the project we then conducted a framework analysis on the data that was collected across all the project stages.

3.1 Stage 1 (S1): Exploring challenges

S1 aims: In this stage, we attempted to understand the challenges that RAS face in Australia and the impact of these issues on their communication with the host community. We also contacted activists, local churches and organizations that support RAS in the host community to learn more about how best to engage with RAS in our research.

Recruitment: 14 participants came from Iraq, Syria, Afghanistan, and Iran (see table 1 for detailed participant descriptors). To facilitate Snowball recruitment, the lead author volunteered to work twice a week with a specific organization that supported RAS. We also contacted different NGOs, local churches and activists to help us in the process of snowball recruitment.

Data Collection: Introductory interviews were conducted with RAS to identify general information about them. Questions were asked about refugee experiences pre- and post-migration, their lifestyle, social activities, and their interaction with technology. We were aware of the fact that we may not be able to get an insight into the everyday experiences of such demography by simply interviewing them. Hence, in addition to the interviews, we used cultural probes [41] to achieve a better understanding of the challenges that refugees face within the host community and to gain a deeper understanding of refugee experiences and practices. The cultural probes included: (1) A photo elicitation book with a set of photos and questions related to them. This was done to elicit experiences pertaining to certain life events such as the boat journey; (2)A disposable camera with instructions to take photos of specific objects, places and situations; (3)A logbook to record daily activities and communications with friends and family members and their reactions after these communications; (4) A sketchbook to draw a design idea that will help their existing situation;

(5) A map of the city for participants to highlight important areas of personal and social significance, with colored stickers; (6) An audio recorder for participants to express their feelings that complement any of the above material. All these materials were handed out to the participants individually along with verbal instructions of how they may use the cultural probes. After two weeks we collected the cultural probes and conducted interviews with participants to discuss their responses to the cultural probes. All the interviews were audio recorded, translated, and transcribed.

Data Analysis & S1 Findings: The interviews were coded and data, which included text, audio, and photos, was uploaded to NVivo 11 for thematic analysis [54]. The findings presented under four themes, which provide insights into how RAS managed their social capital. These themes were displacement related stressors, acceptance in the host community, access to social resources and technology use by refugees. Findings from this stage of the project contributed to the displacement -related stressor, cultural backdrops, and social resources in the host community elements of the conceptual framework (figure 1) that we present in this paper.

Table 1: Information of participants stage 1 (S1). I = Interviews; CP = Cultural Probes; V= Accompanying them in visits to refugees and asylum seekers' homes.

#	Participants (Gender, Age, Country)	Employment	Method
1	Refugee (M, 40, Iraq)	Taxi driver	I / CP
2	Refugee (M, 23, Iraq)	Hairdresser	I
3	Asylum Seeker (M, 28, Afghanistan)	Tiler	I
4	Refugee (M, 40, Iraq)	Student	I
5	Asylum Seeker (M, 31, Iraq)	Job seeker	I
6	Activist (F, 60, Australia)	Community Worker	I / V
7	Activist (F, 53, Australia)	Political Activist	I / V
8	Activist (M, 55, Australia)	Philanthropist	I / V
9	Asylum Seeker (F, 35, Iraq)	Job seeker	I / CP
10	Refugee (M, 26, Iraq)	Security Guard	I / CP
11	Refugee (M, 41, Afghanistan)	Job seeker	I / CP
12	Refugee (M, 59, Iraq)	Job seeker	I / CP
13	Asylum Seeker (M, 26, Iran)	Hairdresser	I / CP
14	Activist (F, 44, Australia)	Community Worker	I

3.2 Stage 2 (S2): Exploring concepts and design ideas

S2 aims: After gaining an understanding of refugees' challenges and contextualized experiences in Australia through the data collected in S1, we then transitioned to exploring how refugees use their low social capital in Australia and the role of ICT in supporting their use of that social capital. The goal was to seek design ideas that can help refugees in promoting their social capital in the host community.

Recruitment: Snowball recruitment was conducted. We started the process of recruitment by contacting different nongovernmental organizations (NGOs) and local churches that provided welfare services for refugees. We also contacted social workers and activists who had extensive experience of dealing with newcomer refugees. All our participants came from Iraq (9) and Syria (5); and had arrived in Australia in 2016 (See Table 2).

Data Collection: Three participatory design workshops were conducted. Each workshop involved three activities: 1) discussion of social capital; 2) engaging with three different personas focused on specific challenges; and 3) drawing activities focused on design ideas that could help to ease their difficulties.

Regarding the discussion on social capital, we first introduced and defined the concept of social capital to participants using accessible language. We explained to them that this concept meant social connections and relationships with family members, friends, local people, and accessing government institutions. Our questions in the discussion activity focused on the challenges that they faced when they arrived in Australia and their strategies to cope with these challenges. This helped us to understand which dimensions of social capital (bonding, bridging, and linking) are more important when they deal with obstacles in their daily lives in Australia. In the second activity, we presented to participants with three personas, which were developed using data from S1. The first persona focused on the problem of finding a job, the second on issues with neighbors, and the third one was about issues related to isolation. In this activity, we sought to understand

how RAS used their resources in the host community to find possible solutions for each persona. Lastly, we conducted the drawing activity as people's feelings, needs and preferences could be difficult to elicit through traditional methods, particularly for RAS who were exposed to very difficult experiences in their home country. Therefore, we choose the drawing activity to seek a better understanding about RAS social connections and how they accessed resources in the host community. In this activity, we handed out to participants a sketchbook and we asked them to draw things that would improve their lives in Australia. For instance, we asked them to draw a thing that would help them settle in the host community; to draw a thing that they believe would help them to reduce their stress; to draw a thing that would help them to find a job; and to draw any sort of technology that would help them to improve their lives. Discussions during the workshops were audio recorded, translated and transcribed.

Data Analysis and S2 Findings: Using thematic analysis [54] , we analyzed the data and considered how it feeds into the design of social tools that could meet refugees' needs such as cultural preferences, social support, finding information and creating new channels of communication with the host community. The analysis identified the ideas participants generated in response to the challenges they and the personas face. The ideas ranged from technological solutions to connect with NGOs to finding a job to accessing government services. Additionally, the analysis revealed three broad themes among participants: 1) Cultural adjustment, 2) Organizational support and 3) Social activity and social support. These themes contributed to the displacement -related stressor, cultural backdrops, and social resources in the host community elements within our framework.

One of the key themes from the analysis was the important role of non-profit organizations in supporting RAS and their access to various social resources such as social activities, finding jobs, and education. However, many of RAS do not know about these NGOs, thus connecting RAS with NGOs was identified to be a priority. As such the research team carefully reviewed the ideas generated by participants related to connecting RAS to NGOs and proceeded to develop a prototype that was explored in S3.

Table 2: methods information of Stage 2 (S2)

#	Workshop 1: Participants (Gender, Age, Country) & Previous Employment		Workshop 2: Participants (Gender, Age, Country) & Previous Employment		Workshop 3: Participants (Gender, Age, Country) & Previous Employment		
1	(M,65,Syria)	Chef	6	(M,38,Iraq)	Engineer	1 1	(F,35,Iraq)	Architect
2	(M,50,Syria)	Techer	7	(M,26,Iraq)	Builder	1 2	(F,44,Iraq)	Teacher
3	(M,55Syria)	Florist	8	(M,28,Iraq)	Tiler	1 3	(M,23,Iraq)	Decorator
4	(M,58,Syria)	Printers Repair	9	(M,24,Iraq)	Farmer	1 4	(M,32,Iraq)	Electrician
5	(M,70,Syria)	Chef	10	(F,35,Iraq)	Accountant			

3.3 Stage 3 (S3): Prototype Design

Based on data collected in S2, we developed a prototype of a website application (called Refugee Help Centre) to help refugees in their connections with NGOs. The prototype was made up of two parts: (1) an Online support system; and (2) a Noticeboard (Fig 1). The online support system consisted of five functions that RAS could choose when using the system. These functions are: Filling forms, applying for citizenship and/or a partner visa, family reunion and talking to volunteers. To view and respond to all queries made by refugees on the system while maintaining privacy, volunteers who work with the NGO are required to sign in on a separate dashboard. Once they decided to take a job, the job is then shown under the "my jobs" tab. For more social support, the notice board included many functions supporting social activities and raising awareness about the matters facing refugees in the host community. For instance, refugees can see new events, job opportunities, free English courses, free legal assistance, workshops, etc. With each new post, published by the NGO, users can write comments and interact with other users' comments.

S3 aims: In this stage, we aimed to evaluate and improve the initial prototype of the website application that had been designed to support refugee's social interaction with NGOs and, thereby, support their social capital.

Recruitment: In this stage we involved 14 Iraqi Refugees; two volunteers and one head of an NGO (See Table 3). We conducted the study in collaboration with a non-profit organization which serves a large number of RAS. One of the research team who worked with this NGO for more than three years organized the process of snowball recruitment and received assistance in doing so from the head of this NGO.

Data Collection: We conducted design workshops for initial evaluations with participants. Each workshop consisted of two sessions. The first session, titled refugees and technology, aimed to learn more about refugees' experiences of technology in Australia and how it is different from their home country. We asked them several questions related to technology (e.g. What type of technology do you usually use in your daily life? And why do you use it?) and their experience of using technology and social media. Additionally, we wanted to know how refugees use technology to access the government services and their knowledge about services provided by government and non-government organizations. We therefore explored with participants their experiences with government services and NGOs. The second session focused on prototype evaluation. To evaluate our prototype, we discussed with participants the functions of the website application and asked for feedback and more insights about refugees' needs. First, we presented the main functions of the notice board and online system. Then we asked participants for any suggestions and thoughts to improve the initial prototype.

We then conducted interviews with two volunteers and one head of an NGO to evaluate the initial prototype. After data collection was completed, we transcribed and translated the workshop data (audio recordings, observation notes, and pictures).

Data Analysis & S3 Findings: Thematic analysis [54] was conducted to identify common themes from the workshops. Data analysis revealed three broad themes: 1) the information-seeking problems; 2) job-seeking problems; and 3) connecting with the host community. Data from this stage informed the social resources in the host community element in our framework. Building on the results, we offered three main design concepts, namely, understanding cultural practices, Sharing space, and job connection with local businesses. These design concepts have the potential to improve our initial prototype in future work.

Fig 1: User interface of the prototype

Table 3: methods information of Stage 3 (S3)

	Workshop 1: Participants (Gender, Age, Country) & Employment		Workshop 2: Participants (Gender, Age, Country) & Employment		Workshop 3: Participants (Gender, Age, Country) & Employment		Interview Participants (Gender, Age, Country) & Employment
1	M,28, Iraq, Uber	6	M,36, Iraq, Electrician	11	F, 30, Iraq, Job seeker	15	M,65, Australia, The head of NGO
2	M,37, Iraq, Job seeker	7	M, 26, Iraq, Builder	12	F,46, Iraq, Job seeker	16	M,35, Australia, Social worker
3	F,42, Iraq, Job seeker	8	M, 28, Iraq, Job Seeker	13	M, 25, Iraq, Uber	17	F,60, Australia, Social worker
4	M,44, Iraq, Chef	9	F,29, Iraq, Housewife	14	M,34, Iraq, Hairdresser		

5	F,33, Iraq, Housewife	10	F,35, Iraq, Accountant		

3.4 Stage 4 (S4): Design opportunities

S4 aims: Taking into account the findings from stage 3 regarding challenges that refugees face in the host community in relation to using technology, namely: information-seeking problems, job-seeking problems, and connecting with the host community, we adopted a different approach to seek more design opportunities to deal with the challenges that were identified by refugees themselves as main issues.

   Recruitment: In this stage we recruited 12 refugees (See table 4). To recruit participants in this study, we contacted the leader of the Iraqi community in Brisbane who helped us in snowball recruitment. This process took two weeks to finalize. We later contacted the refugees and organized the date and venue of the workshops.

   Data Collection: A speculative design approach was adopted through two workshops with participants to design magic machines to explore design solutions. Magic machines workshops have been used in several as part of a speculative design approach that encourages participants to imagine future technologies. According to [6], it involves several processes of considerations, ingredient lists, and points of attention. It can be used to form a starting point for making the workshop fit into a particular context or set of concerns. Participants were given a range of materials (boxes, cardboard, stickers, shapes, playdough, color pens, etc.) and asked to assemble their magic machine. During these workshops, participants built a set of magic machines that dealt with specific challenges identified in the previous stage. The magic machine approach that we used with participants encouraged them to make a magic prototype that embodied their expectations of the future and their perceptions of the present and triggered nostalgic recollections about their past. Discussions during the workshops were audio recorded, translated and transcribed.

   Data Analysis and S4 Findings: All data, including transcriptions, photos from the workshops, researchers' notes and videotapes, were distributed among the researchers and investigated individually. Subsequently, cross-analysis was implemented to compare the results. In addition, discussions were conducted among the research team to deal with conflicting interpretations of data. Thematic analysis [54] was adopted to identify key themes. The outcomes from the analysis were the identification of information provision barriers, security and ethical challenges, and mistrust and cultural aspects. These themes inform the cultural backdrops, and social resources in the host community elements of our framework. Additionally, our magic machines approach with refugees revealed nuanced findings, not only about the limitations of current technology but also about the lack of policies and services for refugees in the host community.

Table 4: methods information of Stage 4 (S4)

Workshop 1: Participants (Gender, Age) & Previous and current employment			**Workshop 2:** Participants (Gender, Age) & Previous and current employment		
1	M,38	(Engineer)- (Job seeker)	**7**	F,35	(Teacher)- (Job seeker)
2	M,26	(Builder)- (Building worker)	**8**	F,44	(Teacher)- (Job seeker)
3	M,28	(Builder)- (Job seeker)	**9**	M,26	(Builder)- (Building worker)
4	M,32	(Electrician)- (Uber)	**10**	M,32	(Electrician)-(Uber)
5	F,35	(Accountant)- (Job seeker)	**11**	F,25	(Housewife)-(Housewife)
6	F,25	(Housewife)- (Housewife)	**12**	M,33	(Farmer)- (Uber)

3.5 Analysis for the Formulation of the Conceptual Framework

To gain a holistic view for the development of the conceptual framework presented in this paper, the data collected across the four stages were compiled into one corpus of data that was then analyzed using the framework method for the management and analysis of qualitative data [40]. The analysis method consisted of seven stages: (1) Transcription: Data from the four stages had been previously transcribed by the lead

author; (2) Familiarization with the data: Listening to audio recordings and reading the transcripts and notes; (3) Coding: In this stage, we reviewed the transcripts by reading each line to implement codes that refer to substantive things; (4) Developing a working analytical framework: To create comparisons and categories, we coded transcripts from each interview and workshop; (5) Analytical Framework: Codes and categories for the transcripts (indexing transcripts) were used to implement the analytical framework; (6) Charting data into the framework matrix: Charting was done at this stage by summarizing and categorizing each selection from the transcripts; (7) Interpreting the data: In this final stage, we used our separate notebook and computer files to interpret the data captured from the field study. Such notes included our thoughts, ideas, impressions and the early stage of data interpretation.
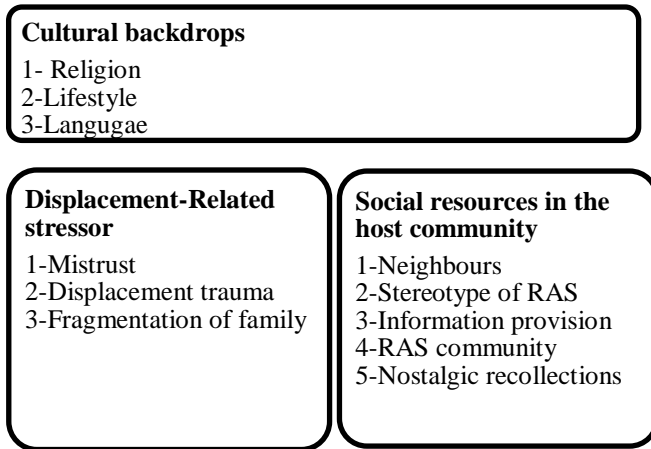
Cultural backdrops
1- Religion
2-Lifestyle
3-Langugae

Displacement-Related stressor
1-Mistrust
2-Displacement trauma
3-Fragmentation of family

Social resources in the host community
1-Neighbours
2-Stereotype of RAS
3-Information provision
4-RAS community
5-Nostalgic recollections

Figure 2: Conceptual framework of understanding challenges for RAS

4   THE CONCEPTUAL FRAMEWORK

Our analysis of data from the four research stages cumulated in a conceptual framework (fig 2) that provides a and holistic understanding of RAS's post-migration experiences and the challenges faced by RAS that limit their social capital. The framework offers technology designers working in and with RAS communities with a nuanced understanding that can guide them in designing technologies that can assist RAS in the process of resettlement in Australia. The framework also can be beneficial for government and non-government agencies as it is based on empirical data about the challenges that RAS face in the host community. Our conceptual framework consists of three key elements, namely cultural backdrops, displacement- related stressor, and social resources in the host community (see fig 2). In the next section we will unpack each of the three key elements in the framework using the primary data we collected, and we will discuss: (1) the diverse nature of RAS experiences and the challenges that they face and (2) potential of technologies that can contribute to addressing these challenges.

4.1 Cultural backdrops

Maintaining RAS's culture and integrating into a new culture is a long-term process that RAS experience in the host community. Here we found that participants' RAS cultural backdrops are heterogeneous in nature and constitute their cultural, religious and geographical backgrounds. Our findings reveal three sub themes related to cultural backdrops that affect social capital for RAS and interplay with other factors to pose challenges for RAS.

4.1.1   Religion

The 'Middle Eastern' region is home to various religions. Religion is considered as a psychological resource, which could strengthen or weaken individuals [61]. Our findings show that there were many instances where religion hindered RAS participants from socializing with their host community and accessing services such as housing and health. For practicing Muslims, eating only Halal food is vital for them as it is the dietary standard prescribed in the Qur'an (the Muslim scripture) [111]. The centrality of Halal food was identified

by participants to be key consideration when connecting with host community members. For instance, an Iraqi refugee P1(S1) who follows Islam said that: "I often bring some food with me when I am invited to a friends' house. I initially said that this is the tradition I follow, but I know that I can't do this all the time". Another Afghan participant P11(S1), also had similar experiences regarding food. He referred to instances where he was invited for picnics and could not share food because of his concerns around Halal food. He said, "Sharing food is part of my culture but the problem is if I share my food, I have to eat other food which may not be Halal". Several studies have emphasized the importance of sharing food and drink for supporting social connectedness and familiarity among refugee populations [71], however in our analysis we found that participants' religious backdrops may make such activities more challenging.

Another issue that newcomer RAS face upon arrival to the host community is accessing housing because of their faith. For example, an Iraqi refugee P14(S3) told us about his first experience upon arrival to Australia: "I spent 3 months looking for a good house share, and I wanted to live with local people to improve my English. A guy put a beautiful picture of his house on the Internet, but when I went there, I found out that they have a dog living with them inside the house which is not suitable for me or my faith and religion". Additionally, in regards to health we found that some RAS's Muslim faith interplayed their gender thus influencing their ability to access health services. Practicing Muslim women indicated that they found difficulties in finding a suitable healthcare provide: "Finding female doctors that understand our language and culture is very difficult and sometimes we have to travel far from our house to find female doctor" P3(S3) said. However, such implications were not only tied to the Muslim faith as Christian participants further identified technological considerations that need to be accounted for. For instance, through our workshops with participants (S4), P4 talked about implanting device idea, saying "placing a small device inside our body could be a good idea, which might help us for sharing information regarding important information such as how to find a job and getting a valuable information regarding accessing services available for refugees, or this device might help to monitor our health conditions". However, participants from Syria and Iraq who followed the Christian faith refused the design idea of implant technologies for religious reasons. These participants rejected the idea of an implant device, saying: "In our faith making change in our bodies that were created by God is prohibited but we can use a wearable device instead of an implant".

Technological implications: Technology has the capacity to improve the quality of life for marginalized groups and expand people's connection with each other [70]. However, the findings present above confirm that any technological solutions that aim to strengthen bridging social capital through expanding RAS networks in the host community should consider religion as a key factor. Furthermore, our findings highlight that technologies, services and social activities that are provided to Muslim RAS may not be transferrable to Christian RAS and vice versa. Considering religious factors in the design of technologies would support RAS in engaging with the host community, whether through sharing food or accessing services, and would rebuild their social capital. Such notions are gaining traction within the HCI community as researchers are exploring integrating understandings of Religion into the design of inclusive technologies [75]. Furthermore, researchers in HCI have used an activist design approach as a tool for facilitating dialogue and engagement regarding sensitive issues [72] and such approaches can be extended to supporting RAS communities in engaging with host communities in dialogue regarding religious backdrops.

4.1.2 Lifestyle

We found that for RAS, transitioning into an environment that culturally differs from the cultural milieu in their home countries can be a challenging process. Understanding the cultural norms that constituted participants' lifestyles is vital in supporting them to reduce the obstacles that they face during the process of adjusting lifestyles to their new environment. During our workshops with participants, P3 (S2) described their experience upon arrival to Australia and how they struggled to adapt to the Australian lifestyle: "In Syria we used to go outside every night, have Shisha with friends at a coffee shop and we stayed after midnight chatting and laughing with each other". In the same vein, an Iraqi refugee P9 (S3) described her frustration with the Australian lifestyle, she said "In Iraq we used to work during the day and spent time with family and friends during the night where most shops closed at midnight. Here in Australia, I wish to go to the park with my family at night, but most parks are dark at night and almost empty". In these instances, we see how RAS's lifestyles back home are not transferable to their new contexts of displacement that have drastically different cultural environments. Therefore, the lack of adaptation of the wider cultural milieu to the new lifestyles that RAS bring with them poses a challenge that marginalizes and isolates RAS. This is relevant to building social capital as Lee et al. [67] have stated that well-adjusted migrants have more opportunities to expand their social networks in their new environment, thereby supporting their bridging social capital which assists them to access various social resources in the host community. On the other

hand, migrants who are unable to adjust and in turn build rapport with local people and may become socially isolated. We found that the cultural norms of socializing with others held by RAS differ to the norms in their new country thus posing a challenge to building social capital.

Technological Implications: A possible technological avenue is through connecting RAS through ethnic groups and volunteers who are willing to help newcomer RAS to adapt with their new cultural milieu and maintain their own lifestyles. Another role the technology can take is through matching families from the host communities with families from the refugee community to visit each other and build a new rapport. Such practices can actively engage refugee communities with the mainstream of local people in Australia that leads to mutual trust and shared values and norms from both cultures, and thus fostering their social capital. In fact, RAS can better socially interact with the host community "by understanding the cultural meanings connected with places, history, and activities" [89].

4.1.3   Language

Language was found to be one of the main obstacles that reduced RAS's bridging social capital when they arrived in Australia. From our engagements with RAS participants, we observed that many RAS used dictionaries to learn the meaning of words, a notebook to write new words on and different digital dictionaries to improve their English skills. One of our Iraqi participants P1(S) used dictionaries to learn the meaning of words, a board to write new words and different digital dictionaries to improve his English skills (see Fig3). Additionally, participants used digital dictionaries as an integral tool to facilitate their interactions with others in certain circumstances. For instance, P2 (S4) said: "If I go shopping and I need to buy something, but I don't know its name in English, I write it in Arabic in my dictionary app to translate it to English and I show it to the shop staff". When asked to draw, in Stage 2, technologies that may support them, participants drew conversation apps, because they really wanted to build their conversational language skills (Fig 4).
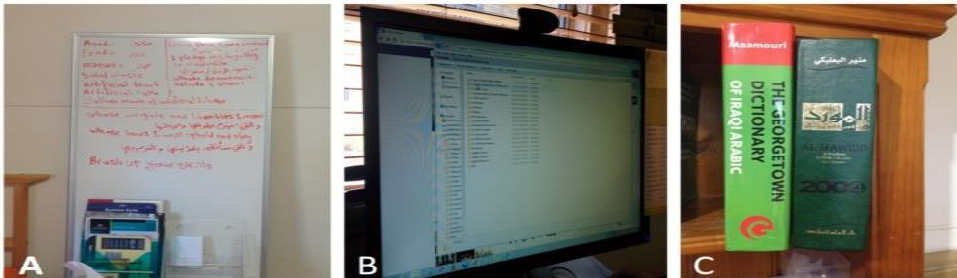

Figure 3: Different type of resources used by a participant to enhance his English skills

Additionally, most of our participants complained that the approaches that have been followed in the language learning classrooms they have access to focus on explicit grammar and vocabulary instruction. Additionally, participants identified that technology plays a key role in supporting them in building their language skills. The Australian Government funds free English language lessons for refugees who have resettled in Australia, as well as migrants, through the Adult Migrant Education Program (AMEP) [85]. However, we found that RAS communities have concerns regarding the support available to help them learn English through the Adult Migrant English Program [10]. While the Program is a good start, it is often not enough for people to learn the level of English needed to succeed in mainstream education or training, or to find a job. Furthermore, the program is made available only to refugees. Therefore, asylum seekers are not entitled to the Adult Migrant Education Program, until they are granted protection [10]. As this may take years, they find it challenging to learn English, although many take part in free or low-cost English programs offered in the community.
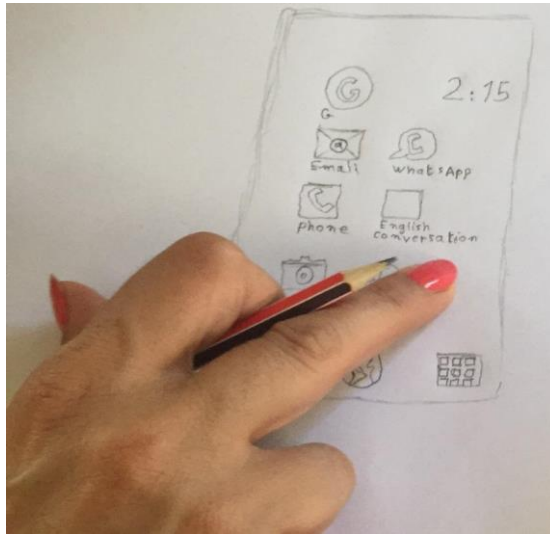
Figure 4: English conversation suggested by a participant

Technological implications: Through the aforementioned findings we identified that language is an important element within the cultural backdrop and language skills are considered by participants to be important as it enables them to hold conversations with members of their host community (bridging social capital). Technology can play a significant role in language instruction especially for asylum seekers that cannot access government language learning programs. For instance, Virtual reality (VR) can be used to support English learning as students' digital selves interact with each other and even with virtual characters that can maintain eye contact and communicate in English [19]. Virtual reality technology is capable of creating an environment for RAS to communicate with other people who speak English fluently. Another possible avenue to support RAS to learn English is sociable robotic learning technology. Such an approach has been successfully used to help children in using more diverse words and to learn new words [115]. Additionally, digital platforms such as the language wizard presented in [113] can be used to support asylum seekers in identifying other non-governmental language services.

4.2 Displacement-related stressors

Our research found that RAS have been through many stressful experiences that are associated with their experiences in their country of origin and their migration journey. These experiences were found to influence their interactions with host community members and service providers. Indeed, we found that their experiences as RAS resulted in mistrust, displacement trauma and family fragmentation as stressors that need to be accounted for in technological designs.

4.2.1 Mistrust

Murphy-Graham and Lample [74, p. 53] argue that "we are vulnerable because we depend on others, and trust allows us to take the risks associated with depending on others. In this way, trust is a solution to the problem of our vulnerability". Previous design research has shown that the RAS demography is hard to reach and build rapport with [17,102]. Participants identified that trust issues are common among RAS communities and this was also evident in our experience of engaging with this community. We began our research by contacting an activist P14 (S1) who had been working with asylum seekers for two years, she commented: "There is a challenge of mistrust when dealing with asylum seekers, they have temporary visas and want to get a Permanent Residency visa. But this government [and its policies] kind of says it will never accept them, and they could be deported at any time and that's why they don't have trust". However, the issue of mistrust was not only related to their experiences in Australia but also intimately tied to their experiences in their countries of origin. In an interview with an Afghan asylum seeker in P11 (S1) who had been in Australia for four years, he commented: "I can tell you nothing about my life in Afghanistan, not

just me but I think everyone from Afghanistan [can't]. The government doesn't have control over our country and armed groups are everywhere, and they can really hurt our relatives in Afghanistan''. We had the same experience with other Afghan refugees where they expressed concern that that information that they share would jeopardize their families back home. At the time of our studies, such forms of mistrust were not as prominent among RAS from other countries. Furthermore, in our study, we noticed that there was no connection between refugee and asylum seeker participants. In fact, asylum seekers want to become refugees who have more stability and rights in Australia.

Social capital concepts such as norms and trust can foster social connections that strengthen social capital [106]. However, as our data shows, mistrust among RAS communities is a challenge that must be accounted for when designing technologies. Furthermore, we found that some RAS's mistrust can be attributed to their experiences in their country of origin; thus, further highlighting the challenges that arise when we do not account for how RAS's experiences in their countries of origin.

Technological Implications: Previous HCI literature [49,51] have explored trust within the confines of sharing data through digital services. Our work extends this by identifying mistrust to be an issue that influences RAS interactions with members of their new environment. Technologies may have the potential to reduce the mistrust among RAS indirectly by encouraging them to build connections with the host community and by creating a sense of belonging in a group. Furthermore, given our observation that asylum seekers do not interact much with refugees, it may be beneficial to connect these two groups to support their bonding social capital where they can share ideas and provide advice in relation to their new environment.

We also suggest that any technologies intended to be used by and with RAS should be focused on privacy, to reassure this marginalized group about the confidentiality of their personal information not just when accessing services but also when interacting with others. Such a complex social issue can be effectively addressed by building on Coles-Kemp et al's [27] and Jensen et al's [53] work that highlights security implications of digitalizing refugee services that go beyond matters of online privacy and security.

4.2.2   Displacement trauma

RAS have been through many traumatic experiences that affect their mental health wellbeing as well as their social capital. This may include torture, as result of the war and persecution experienced in their countries of origin, and traumatic experiences during their journeys to Australia. Exposure to such experiences may cause post-traumatic stress disorder (PTSD). An Afghan refugee participant P3(S1) stated that his journey to Australia: "was the most dangerous journey in my life. The smuggler told us that a big ship will take you to Australia. But we were shocked when the boat arrived. It wasn't a boat; it was an object made from old pieces of wood. I got depressed for six months due to this journey". Displacement trauma is also compounded by feelings of isolation, for instance, an Iraqi refugee P12 (S1) attributed having a very small offline social network to his depression and ongoing displacement trauma. Living without any family or friends and feeling lonely and depressed were distinct characteristics expressed by all of our participants. One of our participants, an Iraqi refugee P9 (S1) that had lived in Australia for more than two years as an asylum seeker, recounted that she had often suffered from depression and feeling of loneliness. She commented: "Yes this [isolation] is the main reason; no one contacts us or asks about us". There is a correlation between trauma that is experienced by RAS, and social isolation within their host community [15]. Exposure to trauma may lead to negative impacts on RAS both physically and mentally that prevent them from engaging with both their RAS community and the host community, thus weakening their bonding and bridging social capital [47]. Therefore, it is important for technological designers to acknowledge and consider that oftentimes they are not only designing for RAS entering a new country but rather the experiences of RAS with PTSD.

Technological Implications: Technology can improve people's mental health and consequently their ability to build social capital both in an indirect and a direct manner. The indirect way is through building a new virtual spaces that encourage newcomer RAS to engage in different social activities. Indeed, within conflict zones technological platforms such as the blogsphere has been found to be active spaces through which social activities take place [2]. Such social activities can produce social trust, support, solidarity, reciprocity and a sense of belonging [84]. These factors have been considered a key role in decreasing the symptoms of PTSD [1]. In terms of more direct pathways to improving mental health wellbeing, virtual reality (VR) has been employed to treat people who suffer from PTSD. A study conducted in the US with veterans who suffer from PTSD, has confirmed that the use of virtual reality exposure therapy (VRET) decreases the symptoms of PTSD [12]. Through technologies addressing this element of the framework they would be also playing a role in enabling RAS in counteracting their experiences of isolation and consequently building their social capital.

4.2.3   Fragmentation of family

Participants highlighted that their experiences of being RAS interplays with their experiences of being fragmented from their family unit due to displacement. Here it is important to note that in the countries from which participants originate, living with nuclear and/or extended family is a cultural norm. Family separation is a factor that contributes to the fractured bonding social capital of resettled refugees [93]. Fragmentation of RAS families can be attributed to the Australian government implementing harsh policies that prohibit RAS from bringing their families to Australia [58, p. 12]. For instance, an Iraqi refugee P12 (S1) made an emotional comment that showed the pressure he was under due to the absence of his family: "I have two children and I haven't seen them for more than 4 years so I really miss them, and I can't think about anything else except my family. Unfortunately, I am not allowed to bring them here to Australia because I am an asylum seeker". In the same context, an Iraqi woman P10 (S3) said: "I think if I could bring my parents here to Australia, this would make me very happy and decrease my stress and I think many refugees have the same feelings". Even in cases where RAS can apply for family reunion, the bureaucracies pose a challenge. A Syrian refugee P1 (S2) and a father of six, talked about his efforts to bring his family to Australia: "The caseworker arranged an appointment with immigration to bring my sons here to Australia. They gave me forms to fill but the problem is these forms are in English, and I don't know how to fill them.". In this instance we clearly see the importance of maintaining their familial unit to participants and how efforts to do so are hindered by challenges related to language.

   Technological Implications: Technological solutions in this case cannot independently address this challenge in an effective manner. However, while technologies in such a context may not provide solutions they may be used as tools for advocacy and activism. Technology can help to address this issue by providing information and raising awareness regarding RAS rights and by supporting activists to put pressure on the government to change its family reunion policies [94]. Designers in HCI also can help by fostering their own social capital in a manner that connects RAS with activists. Such approaches have been called for by HCI researchers that have explored how their own social capital can be used "to address issues of social justice that ultimately influence the social determinants of health" [105] and support communities in meeting their needs [81]. In a similar vein, Tachtler et al. [99] argue that technologies can play a role in making activists more proximal to young unaccompanied migrant youth in order to advocate for changes in policies that negatively impact their mental health. Additionally, technologies that support language learning, as previously discussed, have the potential to support RAS in navigating the bureaucracies of reuniting with their families.

4.3 Social Resources in the Host community

The host community in which RAS live is also the place in which they interact with regional and national governmental, social and economic structures. In this section we present findings related to several of the social resources that are heavily influenced by RAS's cultural backdrops that have been previously presented in section 4.1 and how these backdrops are perceived by their host community.

4.3.1   Neighbors

Within literature on social capital, the neighbor is considered to be a family member whose greeting is returned, whose invitation is accepted and someone to express solidarity with in both sadness and happiness [80]. However, there were instances where participants commented about negative experiences with their new neighbors that were attributed to the societal challenge of Racism. For instance, a newcomer Syrian refugee P2 (S2) said : "We felt that we were not welcome here. If they [neighbors] see us, they turn their faces. This affects us deeply and we think that because we are coming from Syria and we speak in Arabic, they think that we are not good people". In the same vein, another participant from Syria P5 (S2) spoke about the difference between his neighbors in Syria and his neighbors in Australia. He said: "we used to be invited by our neighbors for lunch or dinner, as a sign of mutual respect and kindness...but here the situation is different. Our neighbors did not visit us and if they saw us, they would say Hi, and that's it". Other RAS participants recounted similar experiences where they felt unwelcome by their neighbors. These instances, similar to those presented in the section on cultural backdrop, also highlight the interplay between participants' cultural norms and their ability to harbor social resources.

   However, another participant P7 (S4) expressed that in order to overcome the barriers to engaging with her neighbors she used food as a vessel to share with her neighbors her cultural backdrop. She described her experience saying: "I used a special strategy to be close with my neighbors. I approached them through food. At first, I sent them a plate of Iraqi cuisine, then I invited them to have dinner in our house. When they

visited us and saw how our house is clean and organized, they started trusting us more. Now if they go on holiday, they ask us to watch the house while they are away...The shortest road to make a good relationship with neighbors is food".

Technological Implications: Engaging with the local neighborhood has been found to be vital in supporting bridging social capital of refugees in their new environment [94]. Neighborhoods are important social resources that support social connection of RAS due to the nature of their cultural norms [69]. Therefore, if neighbors are not interacting with newcomers, this may hinder the efforts of RAS in integrating into their host community. Our findings show the negative experiences of some RAS with their neighbors and how they are intimately tied with their RAS, language, and cultural backdrops and that such negative experiences can be countered through creating spaces for dialogue (e.g., inviting neighbors over for dinner). NGOs can play a significant role in supporting newcomer RAS in their new lives. In fact such an important role has been followed by a non-profit organization in the USA that founded an initiative called "Hello Neighbors" to match newly arrived RAS with caring neighbors to support them in their new environment [77]. Such an approach could be implemented in Australia to support RAS in their new lives. Technology can also play a part through encouraging neighborhoods to communicate and engage in dialogue around culture with newcomer RAS through social interaction tools that are configured in a manner that accounts for 'place' as a space for online and offline interactions [13].

4.3.2   Stereotype of RAS

Experiences of RAS participants with neighbors can also be attributed to the wider stereotypes propagated by the media regarding RAS and their cultural backdrops. Negative messages and stereotypes about RAS in social media and news in Australia may hinder efforts to involve refugees in the host community. An activist P14 (S1) who has worked with asylum seekers and refugees for years, said: "A lot of people have objections especially to Muslim asylum seekers, they said they [Muslim RAS] will never integrate [in to Australia] because they come from a country where if their sisters are raped or is adulterous the [RAS] family will kill her. So, we don't need [people] like this in Australia". Such stereotypes were also compounded by perceptions of RAS using their native languages in Australia. An Iraqi refugee participant P10 (S4) spoke about his experience of talking in the Arabic in a public area. He recounted: "I noticed that when we are speaking in Arabic in a public area, many people feel uncomfortable, and they think that we aren't good people. Our conversation in Arabic is also different. We usually speak loudly with each other".

Technology, in particular, social media platforms, has contributed to spread the hate of speech and extreme ideas such as islamophobia and anti-Semitism that target refugee and migrant communities in the host community [68]. Our findings show that RAS's experiences are not only influenced by their own cultural backdrops, as in section 4.2.1, but also by how these backdrops are perceived and treated by Australians.

Technological Implications: Thousands of people are following Facebook pages that post anti-refugees content that can lead to adopting violence against refugee communities [50]. However, previous studies have shown that social media, in particular Facebook, can foster bridging social capital for users [34,55]. That being said, such studies have focused on non-marginalized populations who already have a high level of social capital. Hence, social media could not be considered as an appropriate solution to foster social capital in vulnerable people such as RAS as it is a space that does not safeguard them from negative experiences and interactions. It is extremely timely for the HCI community to encourage researchers to adopt new approaches to counter the violent content in social media platforms to protect people and raise awareness. Technology can also raise awareness about refugee communities and their cultural backdrops among people in the host community to emphasize the inappropriateness of existing stereotypes. The UNHCR actively produces media that highlight refugees' educational success and refugee narratives that counter negative stereotypes [82]. However, such videos strengthen the narrative of 'good immigrants'. Rather we argue that technologies have a role in raising awareness regarding the harmful misconceptions held by host communities [65].

4.3.3   Information Provision

Information provision is essential in improving social inclusion of RAS [18]. In S3 the participants focused on their need to see more information in the initial prototype. For instance, they suggested adding in a new feature that would connect them with the refugee community with the aim of accessing and sharing peer-to-peer information. An Iraqi P10 (S3) refugee who has been in Australia for more than two years, said: "I want to work here as an accountant as I have 7 years related experience in my home country. The problem is that I have to enroll in an accounting course in Uni in order to get the job. Unfortunately, I cannot find

the information for a free course". Another participant P6 (S3) commented: "every time I went to Centrelink [government services] to ask about something, I got different answers!! Each employee gave me a different answer and I was really confused which answer I have to follow?". P4 (S3) talked about his disappointment in getting the information he needed, saying: "Finding information about childcare or health services is really difficult. You have to search online, make phone calls to Centrelink, and visit Centrelink and talk with the staff face-to-face to solve your issues". One Iraqi refugee faced the same problem with accessing information P13 (S3): "The problem is that the government service provider sends the same email to local people that are fluent English and to refugees who usually have basic English skills and some terms are really hard to understand!! We prefer that this system can help us in this matter through a new feature that allows us to ask questions".

Technological Implications: These findings identify that information availability and accessibility is a key factor in social inclusion. However, as previously highlighted in our framework, mistrust is common within this community. Our engagements with newcomer refugees identified that they, as a subgroup of RAS, are very sensitive about their situation and they avoid getting information from untrusted sources. For instance, they do not use social media to ask questions and get information due to privacy reasons. They prefer to get the information they need through trusted sources where trust is established by knowing the real name and personal information of the person that they communicate with, which can be endorsed by the admin of NGO run websites. Additionally, our findings show that there is a gap in information provided and the information needed by RAS that participants suggested can be filled by peer-to-peer knowledge exchange. Grunfeld [45] suggested that ICT is a powerful tool for social connection by improving information accessibility for individuals. Technology can play a significant role in making connections between refugees with limited social networks and those who have extensive social networks. Creating online communities similar to other social networks would be able to help to connect newly arrived RAS with those who have been in Australia for a longer time and have faced the same problems that newcomer RAS face. This will help RAS in communicating and meeting their informational needs based on their transitional stage. This approach has been used in supporting people experiencing homelessness [90]. Additionally, through sharing and gaining this knowledge RAS communities can work together to expand their social network with their new communities and thus supporting their bonding and bridging social capital.

4.3.4   RAS community

As identified in the previous section, newly arrived RAS indicated that they would like to connect to other RAS to meet their informational needs. Indeed, the RAS community was identified as a crucial social resource that newly arrived RAS rely heavily on upon arrival to support them in their new life. In this section we will discuss two groups that we found to constitute the RAS community: Ethnic groups and NGOs & volunteers.

4.3.4.1 Ethnic Communities

During our studies participants identified that they often felt isolated because they were having problems adjusting to a new country and a new environment. Given their capacity to understand what RAS need in their new environment and to understand their cultural backdrops, ethnic groups that are registered as non-profit organizations can play a significant role in supporting RAS. There were instances where participants commented about the role of the wider ethnic community. For example, P9 (S1) answered our question about how to deal with difficulties in the new host community without English skills by saying: "Actually I am relying on the Iraqi community and the Arab community to get a job because it is easy to communicate with them without English and the cultural barriers. I usually cook Iraqi food for delivery to Iraqi and Arab families. I am also working as a mobile hairdresser for Arab families. Large numbers of Arab women follow Islam, and under the Islamic religion, the women have to cover their hair if they go outside. They cannot get their haircut in a hair salon and expose their hair in front of strange men. I also gain some money by helping the Arab community when they organize a party. So, my job is helping housewives cook". It is important to note that in these instances we observe how RAS community members strongly engage with members of ethnic groups that share similar cultural backdrops. Another example showed us how RAS rely on their close friends from the ethnic community to find jobs. We asked P3 (S1), who works as a tiler, about his experience in finding a job. He said: "I decided to work as a tiler, but the problem is I didn't have any skills for this job. Therefore, I joined my friend from Afghanistan who has worked as a tiler for a long time. I asked him if I could work with him as a volunteer to learn the job. After two months, I learned the main skills of this job and I got my licenses. Now I have designed my website for advertising, and I am happy with my job". Both examples provided by participants highlight that the country of origin is an important element

that influences which ethnic subgroups that RAS rely on as a social resource, with the majority seeking support from groups from their country of origin thus countering the challenges presented as part of RAS cultural backdrops.

In our interviews, we asked participants that were part of ethnic groups registered as non-profit organizations about how they support other RAS. P6 (S3), an Iraqi refugee who had been in Australia for six months, said: "We try to teach them about the law and the system in Australia. Another thing we do is strengthen their spiritual power and I think that this is a significant factor. For example, we give them hope that they will integrate quickly into the Australian community and that they will learn English and that their life will improve". Such examples show us the role of ethnic groups in building rapport and generating trust inside the RAS community. These factors in turn support the bonding social capital of RAS. However, from our observation, we noticed that most of our RAS participants did not know about these ethnic group associations and services and were more dependent on their own networks within the ethnic communities they are culturally identify with.

Technological Implications: In terms of technologies, Facebook and other SNSs can't bring people together if they do not trust each other [34]. Creating a social space for the refugee community to meet, get to know each other and to build new connections may help to generate trust between them. This is consistent with research [90] which argues that benefits could be gained through sharing space between homeless people who have low social capital and those who have high social capital. Community associations are environments where people can trust each other and meet each other without fear, as most people who join these organizations have been endorsed by the same organization. We believe that technology can contribute to making more effective connections between RAS who come from different backgrounds and refugee communities and ethnic group associations. Designing social tools such as digital notice boards, similar to that presented in our prototype, that show the social activities, social support, and job opportunities that are provided by these associations would be beneficial.

4.3.4.2 NGOs and Volunteers

Our analysis found that other than ethnic group associations there are other organizations that play a vital role in supporting RAS in Australia. Most of these NGOs are established by local people to support newcomer RAS. These organizations receive funds from different sectors such as the Australian government, churches and local people. There were instances where RAS commented on the support provided by such organizations, for example P11 (S1), a refugee who came to Australia by boat in 2012, described his experience in his first year in Australia, commenting that: "I suffered a lot in the first year in Australia. I was thinking about my family in Afghanistan - my wife and my children. I left them to look for a better future, so I got depressed. Then I got in contact with an organization in Brisbane that helped a lot to reduce my depression. I worked with them as a volunteer to help RAS and that gave me a good feeling and a sense of belonging in the host community". P3 (S1) commented further highlighted the importance of engaging in NGO activities to improve RAS mental health: "From my own experience if you feel isolated, the only thing that can help you is to go outside and make new friends and engage in [NGO] activities so that you will meet a lot of people and develop friendships". In S3 we also engaged with a social worker (P17) who volunteers to help asylum seekers to engage with the host community and to help them to deal with issues that they face in Australia. In her effort to help this group she works to match RAS with families from the host community, she said: "Many of asylum seekers felt isolated, scared , [they] stay at home , [they are] scared to go out and are scared from everything... I successfully matched 10 Australians with asylum seeking families and 8 of them are still visiting these families but that wasn't enough because there are many asylum seekers that need to be visited, [and that are] lonely, sad and confused".

Support provided by NGOs also enabled some RAS to interact in their wider community, thus opening opportunities to build bridging social capital. P4 (S2) talked about his first days in Australia; he commented: "The caseworker came to us for the first two days and also a translator and they taught us how to go shopping by train and how to use a Go Card [A card used on public transportation] and how to top it up. Now we can go to Woodridge [a suburb of Brisbane City] by train for shopping". P2 (S1), an asylum seeker, spoke about his experience after he got released from a detention center, he said: "When I was released from the detention center ...the Red Cross helped me a lot. They contacted me and they provided me with furniture and many things and even blankets.".

Technological Implications: Non-government organizations play a significant role in supporting RAS. These organizations make people feel welcome and valued and try to ensure that RAS feel part of the local community [52]. This may lead to building trust between the refugee community and the host community, which is considered a vital factor in fostering bridging social capital [78]. To open a new

connection between RAS and the host community, we must identify an appropriate environment that can be trusted by both sides. NGOs could be the best environment for RAS and the host community to meet each other in an atmosphere of trust and common interest. Additionally, HCI research on designing technologies for forced migrants with NGOs has highlighted the importance of existing practices of care within those environments that support the sustainability and maintenance of initiatives and technologies [63]. Accordingly, we suggest designing volunteer help center apps to further support the bridging of the social ties of RAS with NGOs and volunteers. The volunteers, who are members of NGOs, can help RAS to communicate with other members of these organizations. Additionally, enormous efforts are required to facilitate the resettlement process of RAS. Despite the government's efforts to allocate caseworkers, they still are not sufficient due to the vast number of RAS. Designing an application to facilitate the connection between RAS and volunteers may help the refugee community to access different resources and make them feel they are welcomed in the host community; thus, building their bridging capital. It may also support their sense of belonging and generate a feeling of trust between them and the host community.

4.3.5   Nostalgic recollections

Trumble and Pearsall [107] define nostalgia as "a sentimental longing or wistful affection for the past". In fact, there is a wide range of evidence arguing that nostalgic recollection is an important psychological resource as most of these nostalgic memories are positive and show high levels of social connectedness [91]. Assmann and Czaplicka [7] examined the concepts of collective and cultural memory and their impact on individual identity. Wertsch and Roediger III [114] stated that collective memory can be described as a body of knowledge shared by a ''culture of individuals''. Moreover, based on [7], "Cultural memory preserves the store of knowledge from which a group derives an awareness of its unity and peculiarity. The objective manifestations of cultural memory are defined through a kind of identificatory determination in a positive ("We are this") or in a negative ("That's opposite") sense. Accordingly, Assmann and Czaplicka [7] identify how collective memories transition to cultural memories once they become part of "objectivized culture" taking the form of cultural artifacts. Similarly, Kansteiner [57] describe how "cultural memory comprises that body of reusable texts, images, rituals specific to each society in each epoch, whose cultivation serves to stabilize and convey that society's self-image, illustrating how recording similarities contributes to the participants' social image of place". Wertsch and Roediger III [114] highlighted the significant implications of nostalgia from a psychological perspective through making possible control and reflection when dealing with and overcoming traumatic events. As mentioned in Harber et al. [48]: "victims must consciously confront the memories and emotions associated with their traumatic ordeals. This confrontation is best accomplished by translating the chaotic swirl of traumatic ideation and feelings into coherent language". Gupta and Ferguson [46]state that "immigrants use memory of place to construct imaginatively their new lived world". Refugees' memory of their home countries included nostalgic feelings of their "homeland configured as a place where dominant norms and values provided an environment of trust and social support that suffused everyday life and social relations" [71].

For RAS, such memories provide meaning to their lives through connecting their past with their present. A Syrian RAS participant P5 (S2) explained how his community provided social support to solve issues that may happen between Syrian refugees, he linked his past in helping each other in Syria with his present in Australia, he said "As a Syrian we are used to helping each other, we used to do this in our country, so when anyone from the Syrian community face an issue in Australia we help them immediately". Common characteristics of nostalgic recollections have emerged through our research such as spirituality, family unity, reciprocity and social support. For instance, a Syrian refugee P4 (S2) talked about how they miss the aspects of spirituality "In Australia we miss aspects of spirituality. In our country we used to hear the voice of bells for churches and the sound of mosques but here it is very quiet". Another participant from Iraq P4 (S3), said that he just brought two things with him as resources from Iraq, his old mobile phone and his prayer rug (Fig 5.b). Nostalgic recollections also took the form of engaging with music and imagery that reminded them of home, for example, P4 (S2), said: "I listen to Fayroze (a famous Arab singer) more than one hour every day in the morning on YouTube". When we asked participants to draw something that could help them in Australia, A participant drew his recollection of his shop in Syria (Fig 5.a). A Syrian refugee P3 (S2), still kept a photo from his job in Syria as a florist and he hoped that he will get the same job in Australia (Fig 5.c). Such findings highlight the centrality of participants' nostalgic recollections in relation to their aspirations in Australia. Understanding how RAS think about their pasts, and how those pasts interplay with social connection in the present is an important resource to support bridging social capital with the host community.

Technological Implications: In terms of technology, nostalgic recollections can inform designers about what the RAS population value about their previous lives that they hope to maintain in their new environment and host communities. Previous literature has explored how design and technologies may support RAS in channeling their nostalgic recollections towards shaping their new homes [76,92]. However, by looking at nostalgia through the lens of social capital we identify how nostalgic recollections can support RAS in engaging with their host community. Social media such as Facebook and Google photos play a significant role in supporting nostalgic recollections through reminding users about past events. Studies have found that individuals who remember specific events shown in photos expressed more positive affect than negative affect [43]. However, such applications do not account for the interplay between nostalgic recollections and RAS's traumatic experience. We propose that accounting for displacement trauma may improve such applications in tailoring support for of RAS and thus supporting their social connections in the host community. More research to support such a proposal is necessary to investigate how designing for nostalgia in RAS contexts can help them in building their social capital in the host community.

(A)   (B)   (C)

Figure 5: Nostalgic recollections of participants

5   DISCUSSION

The framework has been developed based on the findings from four studies presented above that has focused on varying challenges that RAS face in the host community and in building their social capital as they relate to their cultural backdrops, displacement-related stressor and social resources. Due to our engagement with a diverse group of refugees and asylum seekers, our framework also highlights the influence of cultural backdrops on RAS experiences and the considerations that need to be accounted for.

5.2 Theoretical Implications

In this study we used the theoretical lens of social capital as presented by Putnam [86]. Putnam's theory emphasizes that the dimension of bridging and linking social capital is more important than bonding social capital. However, based on our empirical findings we found that for RAS resettling in Australia, bonding social capital is as important as bridging and linking social capital- as presented in the "RAS Community" theme. Indeed, we highlight the opportunity to build bonding social capital in RAS contexts. This result can be explained by the fact that RAS, with limited language skills and social networks, could not communicate easily with the host community and therefore without addressing the language barrier bridging and linking social capital are harder to achieve.

Additionally, previous studies conducted to investigate the impact of ICTs on social capital, in particular the social media such as Facebook, have found that social media can support bridging and linking social capital for those with high levels of social capital [34,118]. However, our findings have found that social media has the potential to support bonding social capital but may be ineffective in building bridging and linking social capital given the harmful stereotypes propagated through the platforms and the mistrust experienced by RAS. Commercially available social media tools may not be able to facilitate the connection between refugees and the host community. The difference in language and cultural backgrounds of RAS as well as stereotypical narratives in the media make current social media tools possible spaces of vulnerability. Therefore, more investigation is necessary to demonstrate how social media tools may be reconfigured to

support bridging and linking social capital for marginalized people with little social capital, such as refugees and asylum seekers.

Lastly, throughout our findings we highlight the heterogeneity of RAS experiences. Within the conceptual framework we bring to the fore the interplay between the cultural backdrop and the other elements of the conceptual framework. In doing so we provide HCI researchers and designers with a nuanced understanding of RAS experiences that can be used as a starting point for intersectional design inquiry and the design of holistic technological systems that counter social and structural barriers [88] that limit RAS's ability to build their social capital. The analysis highlights that RAS are not a homogenous group that is defined by their presence in a new country but rather they are a diverse group in which each individual's cultural backdrop shapes who and how they engage with other members of the RAS community and their host community. Therefore, our findings call for designers and researchers to confront the notion that RAS are a homogenous demographic and begin actively engaging in design processes that unpack variations of RAS experiences.

5.3 Practical and Technological Implications

Our conceptual framework that accounts for cultural backdrops and their interplay within everyday experiences of RAS highlights that challenge specific technological interventions for RAS are not enough. We found that we cannot design technologies without accounting for varying religions and genders which are common elements identified within intersectional computing [64]. We also identified that mental health issues such as PTSD, country of origin, culture, familial status and language are elements that need to be holistically accounted for in technological designs for RAS. Through our framework we bring this knowledge to the forefront to support designers in accounting for the multiple factors that influence RAS's experiences in building their social capital. For example, we cannot design for improving RAS access to healthcare without acknowledging the considerations needed for female Muslim RAS that prefer seeing female healthcare providers due to their religious beliefs. Similarly, Christian RAS highlighted how some technologies are not be in line with their faith. We cannot design technologies to support social activities for bridging and bonding capital without accounting for religion (the importance of halal food), language, mistrust, PTSD, and cultural norms and lifestyles previously held by RAS.

Furthermore, our findings emphasize that technologies alone are not sufficient. Changes in policies that result in the marginalization of RAS in Australia is needed such as making language classes accessible to asylum seekers rather than only open to refugees. In regards to the challenges we found that are associated with cultural backdrops, the government needs to support associations that promote social events for RAS and ethnic groups. Without such support these associations cannot work in an effective way to organize social activities, and events that bring local people and RAS together. Such activities are important for RAS to maintain their cultures and at the same time share their culture with locals, thus generating mutual trust, reciprocity, and feelings of belonging to the host community. However, NGOs which support such social activities for RAS struggle because of limited funding from the government [9, p. 36].

With regard to displacement-related stressor, we have seen in our findings the impact of the Australian policy on asylum seekers which prevent them from accessing different resources such as bringing their family members to Australia as we presented in "fragmentation of family theme", and accessing English classes as presented in "language theme". Such policies can lead to devastating effects on asylum seekers, in particular, on their mental health and in turn negatively impact their integration into the host community [10].

Recently, a growing number of HCI studies have started to focus on tackling social challenges through design [33] as well as informing government policies [97]. For instance, to support practical solutions to address a complex social issue – such as food insecurity, homelessness, abortion, and domestic abuse [24,32,72,116] – researchers in HCI have collaborated with NGOs in addressing social issues. Designing for social justice in the RAS setting would be a constructive approach to support their rights that contribute to rebuilding their communities [29]. Finally, the government can facilitate the process of information flow, which is essential for social inclusion by improving the accessing, sharing, and using of information as we presented in "information provision theme". Providing more training sessions about how to find the information important to RAS is one possible solution for this issue. Another practical solution is more financial support for NGOs that provide vital services for RAS to resettle in Australia.

Lastly, throughout the findings section we have identified technological implications that may support RAS in addressing the challenges that they face. In the section below, we further delve in to how technologies may support in building social capital.

5.3.1   Technologies for supporting bonding social capital

Our findings show the significant role that ethnic groups play in supporting RAS. Such ethnic groups are considered important resources for newcomer RAS to adapt to their new environment and to access services. In our findings (ethnic communities subtheme), participants shared with us experiences that highlighted the role of ethnic groups in supporting their new lives in Australia. For instance, P5 from S1, spoke about how she received support from her own community in finding a job as a hairdresser for Muslim women and a cook for the local Arab community. In the same vein, p12 from S1 shared with us his experience of learning a new skill from a friend in the ethnic community and finding a job as a tiler. Our finding also show the crucial role of ethnic groups in   strengthening spiritual power and teaching RAS about the law. These findings have been supported by a previous study which showed that in Australia 21.4 % of newly arrived RAS received significant support through their ethnic groups [44]. Thapa, Sein and Sæbø [106] state that bonding social capital can be supported by social interaction through an individual's engagement with their own community and this can lead to collective action, "First, it can promote income generation and resource sharing, and encourage poor people to participate in local decision-making. Second, it can influence the formulation of values and beliefs, as an outcome of a social context" [106].

However, we also identified that in some instances, asylum seekers do not engage with refugees due to trust issues. Rebuilding bonding social capital by creating spaces where people from the same culture and background can meet during events can lead to generate trust, reciprocity, and the feeling of belonging. Opening channels between all stakeholders including government, service providers, RAS communities, and designers would also be a constructive approach.

5.3.2   Technologies for supporting bridging social capital

Bridging social capital is referred to as a relationship among distant groups [87]. The findings from our study demonstrate that all RAS communities have issues in connecting with the local community. Given the ability of bridging social capital in supporting RAS in obtaining accurate information and finding jobs [66], leveraging ICTs to engage RAS with the host community would be constructive. To open a new connection between RAS and the host community, we must identify an appropriate environment that can be trusted by both sides. Putnam [87] states that voluntary associations are environments where people can learn how to collaborate and trust each other to develop norms of reciprocity. Some of the NGOs in Australia do have essential resources to support RAS, but the problem as we noticed from our observation, is that many RAS are unaware of these associations and the services NGOs provide. Moreover, bridging social capital is a two-way process which is not only dependent on RAS but also on the host community. Local people and NGOs can work together to establish a new space for cultural and language exchange. In such a space, RAS and local people can meet and share their traditions, cultures, and values which can lead to mutual understanding and develop trust among RAS and local people. In this study, we suggested that an online network couldn't help RAS to expand their networks without being associated with face-to-face communication to develop trust which is vital for building bridging social capital as we presented in "ethnic communities" theme.

5.3.3   Technologies for supporting linking social capital

It is not unusual that during displacement, most people face a lack of access to institutions and people in power, which has a deep impact on their social life and experiences. These can include public institutions, activists, government services, and authority gradients in society and the lack of access to these actors may contribute to RAS loosing their sense of belonging in their new environment. The strengthening of linking social capital may allow RAS to access more information and resources that are not available in their community. Designing technologies that facilitate the connection between RAS and activists can open up new channels for information, thus supporting linking social capital, and could be an effective approach that leads to long term action. Activists can play a role in giving RAS a voice within the Australian society. They also have the ability to raise awareness within their networks about RAS rights including the right to reunite with their families, equal job opportunities and education. Many studies in HCI have adopted an activist approach for design to address issues of social justice that ultimately influence sensitive social issues in vulnerable communities [72,105] that we view is needed in RAS contexts.

Additionally, In Australia, access to formal institutions and government services that are provided by the Australian government such as health, education, transportation, welfare, and housing is digitized to make it easier for people to access such resources. However, most of such digital services are not designed to account for the difference in cultural components such as (language, religion, norms and values) of RAS.

We suggest that more consideration is needed when designing technologies to support RAS to access such services without obstacles.

6   LIMITATIONS

During the research study, we faced several limitations that need to be taken into consideration in future work. Firstly, we invited participants through an NGO that served refugees and asylum seekers. We usually contacted the head of the organization and ask them to refer RAS that would be interested in participating in our study. Therefore, we did not have a choice to decide who will participate in this research in terms of gender, qualification, and refugee status. This is evident in our participant tables that show that the participant pool was skewed towards men and refugees. Additionally, The RAS community in Australia is diverse and they come from different cultures and backgrounds. However, in this research, we engaged only with participants from four countries, namely, Iraq, Syria, Afghanistan, and Iran. Hence, it is difficult to claim that our findings provide a complete picture of the challenges faced by refugees and asylum seekers in the host community. However, we do highlight the diversity in cultural backdrops among RAS from these countries. Future work should further interrogate and challenge the normative homogeneity of RAS from the perspective of RAS from other countries.

Furthermore, the RAS community includes two main groups, refugees who have been granted permanent visas and asylum seekers who have ongoing legal cases. The first group is more engaging as they are considered permanent residents accessing almost the same resources available to Australian citizens. Hence, it is not difficult to invite them to participate in research , especially if the researcher shares their language and culture. In contrast, Asylum seekers are harder to reach and engage with as they are worried about revealing any information that may risk their ongoing legal cases. This difficulty is reflected in the demography of participants as most of them are refugees, and a small number of asylum seekers agreed to participate in our research.

Lastly, one of the key challenges of designing technology, that is not explored in our studies but is important for future work with this demography, is the sustainability and maintenance of the technological designs. Most research in HCI that focused on refugees gained temporary grants from public funds offered by institutions or ministries. Therefore, the question that needs to be answered is how to sustain technologies informed by our conceptual framework beyond the research project life cycle. Krüger et al. [63] investigated this issue of sustainability and maintenance of codesigned artefacts and highlighted the importance of care [30,79] in ensuring the ongoing success of technologies for RAS. The research demonstrates the importance of building on and supporting volunteers' care practices which are crucial for sustainability of the designed project. In our future work we will follow this approach by working with volunteers and NGOs to make sure that our designed artefacts and their benefit for RAS will be maintained.

7   CONCLUSION

In this paper, we have presented a conceptual framework for understanding the challenges that RAS face, which undermine their social capital in the host community. We developed this conceptual framework based on empirical data from the field that illustrated RAS practices in their daily activities and how they deal with such challenges in the host community. We have offered several theoretical, practical and technological implications that can contribute positively to rebuilding social capital for RAS upon arrival to the host community and that account for the heterogeneity of RAS. Rebuilding social capital is a very complex issue especially in RAS contexts. Identifying radical solutions for these barriers is not expected in the short term in HCI research. However, innovative ICT tools may play an essential role in creating an appropriate environment to support rebuilding social capital within refugee communities, activism, and advocacy; thus, creating spaces for systemic change.

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