The Digital Camp

Navigating the Future of e-Participation in Refugee Camps

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Abstract

Throughout the 20th and 21st centuries, the number of refugees has continued to climb. In the last few decades, *refugee camps* have continued to grow in number, scale, and age. With camps lasting an average of 17 years, and some growing to sizes of over half a million inhabitants, these sites are becoming increasingly urban. However, despite their emergent urbanity, refugees are typically not afforded the same level of agency or participation in the planning processes which shape their lives. This is especially problematic due to the sub-standard quality of life most refugees face. Meanwhile, Information Communication Technologies (ICT) have been growing rapidly and shaping the world. In cities, digital participation platforms such as dedicated municipal applications and participatory geo-information systems (PPGIS) are being leveraged to transform how residents can engage with shaping their city and neighbourhoods. With growing affordability, and UNHCR plans to 'connect' camps, the widespread usage of ICT in refugee camps is likely in the near future. Access to ICT could make feasible the use of contemporary digital participation tools in refugee camps. This begs the question, what would happen if they were? How would this affect current challenges? Through two systematic literature reviews and a synthesizing framework design, this study theorizes the potential benefits and challenges in applying digital participation technologies and methods to refugee camp challenges.

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1 Introduction

1.1 Background

The UNHCR estimates that in 2022, there will be over 100 million *people of concern*. These are either people who are or may be displaced internally or internationally within the year. Despite massive humanitarian efforts on the parts of governments, and international agencies such as the United Nations High Commission for Refugees (UNHCR), the Red Cross, and countless NGOs, has continued to rise rapidly over the past two decades. Displacement may be the result of myriad factors – be it political persecution, lack of economic opportunity, war, or famine to name a few. Regardless of cause, displacement can be defined as persons' involuntary or coerced movement away from their home or home region. In other words, those who are displaced are forced to migrate, to become refugees elsewhere, as a product of factors which were outside of their own control.

The harsh consequences of having to migrate are countless. The journeys people take to try to survive in the wake of often traumatic expulsions from their homeland are often arduous and dangerous. Many refugees try to move somewhere safer indefinitely, burdened with the uncertainty of when, if ever, the conditions which forced them to leave will abate. Additionally, the regions which they may aim to take refuge in often put-up barriers to their entry – both figuratively and literally. In the wake of the Russian invasion of Ukraine, the international community has shown that it can make great efforts to welcome those who have been forced from their home. However, this response tends to be far from the normal response (UNHCR, 2021). Refugees face complex bureaucratic processes in gaining asylum in foreign nation states, leaving them in precarious states throughout their journey. Of the tens of millions of refugees around the globe, almost 7 million of them are currently residing in refugee *camps* (UNHCR, 2021).

The UNHCR (2021) does not view camps as one of its 'durable solutions' for refugees. This means that, unlike *voluntary repatriation (to a refugee's home country), integration (into the host country), or relocation (to a 3rd country),* refugee encampments are not considered resilient or long-term approaches to managing refugee situations. As a result, camps are, by design, supposed to be temporary. Despite the intended temporariness, refugee camps have been shown to last, on average, for 17 years (Tomaszewski et al., 2015). Many long-term camps grow into and function as de facto cities, reaching populations as high as 600,000 (UNHCR, 2021). These protracted large-scale camps have been described as a hybrid form of settlement, in other words, a sort of *humanitarian urbanism* (Jansen, 2015).

With sets of problems both similar to cities and unique to humanitarian settlements, life in 'camp-cities' can be exceedingly difficult. Refugees face a variety of challenges including but not limited to trauma; political, cultural and economic exclusion; isolation; malnourishment; insufficient shelter; insufficient water, sanitation and health standards; and exposure to violent crime (Karsu et al., 2019). Moreover, they also face challenges more akin and

typical to city life such as access to economic opportunities, mobility, access to energy, community, political representation, waste management and so forth.

As refugee situations grow in scale and number around the globe, many have gone through this process of quasi-urbanization. Meanwhile, the socio-technical landscape within which camps and cities operate has been rapidly changing since the dawn of the 21st century. As the global economy changes alongside the digital technological revolution, the face of service provision in cities has been rapidly transforming. Many cities now leverage the interconnectedness of its infrastructures and citizens in order to provide services in a fundamentally different process. Urban dwellers in many cities can now access transit through digital platforms, can vote in referendums via e-governance apps, can monitor their utilities remotely, can access policies and plans digitally, can organize community groups and events on social media, and so on. The ubiquity of telecommunications infrastructure and smartphone usage in cities has been facilitating this rapid transformation. Ultimately, civic life has been wholly affected. The COVID-19 pandemic of the past two years has ushered in this change more rapidly, as institutions and organizations were forced to find solutions to operate remotely. For better or for worse, this change has proven not to be a temporary one, as many processes have remained online well beyond the lifting of public health measures.

While cities and urban dwellers are well in the midst of this transformation of civic life, camps and refugees are behind (Dridi et al., 2020). Smartphone usage is significantly lower in camps than in cities around the world. Yet, it is on the rise rapidly (Fisher et al., 2019), and the UNHCR along with other organizations have been pushing for the infrastructural build-out required to facilitate the digitization of camps (UNHCR, 2021). Despite the current state of digital infrastructure and usage, this likely eventuality poses numerous questions in regard to the effect this transition may have on the current challenges in refugee camps.

The gap between their intended temporary transitory nature and the reality of their relative permanence is a major contributing factor to the quality of life within camps and the systems of governance within them. Jansen (2018) has described this as the *temporary permanence*, or *permanent temporariness* of camps. Despite this emergent form of *humanitarian urbanism*, the systems of governance of spaces and the people within reflect primarily the humanitarian nature of camps. These systems materialize in the form of humanitarian organizations being bestowed with the power and agency to provide for, and control refugee populations in a top-down manner. (Karsu et al., 2019). Despite the significant and established characteristics of urbanity that many camps take on, the *residents* of them are rarely afforded similar agency in the planning and governance of their settlements.

Participation of refugees in the planning, governance and management of their camps has been touted as a method for reducing aid dependency and building self-sufficiency amongst other supposed co-benefits (Albadra et al., 2021; Bishara et al., 2021; Guijarro et al., 2022; Jaradat & Beunders, 2021). However, in practice, as a product of lack of will, expertise or resources, or due to prohibitive policy environments, participation to a high degree of agency is rarely facilitated (Karsu et al., 2019). This comes, even though the UNHCR official *Camp Management Toolkit* has an entire chapter dedicated to participation. Amongst the problems with current efforts

at utilizing participation to reduce aid-dependency, is the political environment in which refugee camps exist. Duale (2019) points out, *"One of the most striking inconsistencies is between national policies which limit a refugee's access to the usual rights of civilian life and global policy prescriptions calling for refugee self-sufficiency and involvement in refugee programming".* So, while calls to use participation to empower refugees seems like an inherently positive force, it has been argued that participation to build 'self-sufficiency' can be futile – especially when the participatory processes do not grant enough agency, or policy conditions do not allow for refugees to thrive (e.g. limitations on economic or political activities).

Yet, participation in urban governance – in its many forms – is key to localizing municipal policies and giving voice to those whose voices are not being heard through representative democracy. In the last 20 years, the rise of Information Communication Technologies (ICTs) has facilitated transformation in the public engagement process in cities. Digital Participation or *e-Participation* can be defined as "the process of engaging citizens through ICTs in policy and decision-making in order to make public administration participatory, inclusive, collaborative and deliberative for intrinsic and instrumental ends". Digital participation has grown rapidly as a methodology for expanding the reach of participatory efforts of municipalities in the past two decades. From simple SMS survey systems to websites and custom municipal applications, smartphones, and the internet have facilitated broader and more expedited forms of participation. But these benefits are not without side-effects.

The UNHCR believes that connectivity can provide numerous alleviatory benefits to refugee challenges. But prior to the rollout of such infrastructure, it is crucial to take a critical look at what the risks and opportunities that come with digitization. It is also crucial to evaluate the lessons learned from digital participation in cities and theorize how those lessons could or could not apply to the context of large-scale protracted refugee camps.

Thus, the central problem being addressed is that while the digitization of camps is a likely eventuality, there is a gap in comprehensive understanding of the benefits and risks associated with digitization of urban participation, and how those benefits and risks might extend to a camp context.

There are few cases in which large-scale camps have the infrastructure or adoption of digital ICT technology such as cellular data networks and smartphone usage. There are even fewer academic sources analyzing the effects of such rollouts. Establishing how digital systems have changed the provision of services, governance, and participation in camps would thus be premature. However, given the state of the digitization of contemporary civic life, there exists a large body of academic literature on this topic. Likewise, there is significant literature on the specific types of challenges faced in refugee camps. This research aims to synthesize literature on the current state of digital participation in cities, with that of the current challenges in large-scale protracted refugee camps. In turn, the novelty stems from the systematic review of each of these related topics, thereby theoretically revealing the potential opportunities and conflicts in extending digital participation processes out of urban centres and into camp-cities.

1.2 Problem Statement

Ultimately, this research aims to build a framework by which future research and decisions can be made about the targeted rollout of digital infrastructure in refugee camps. At the core, the fundamental goal is to improve the livelihoods of refugees. While this research does not interface directly with refugees, nor is it actively being created for a specific organization or project, the intent is to be positioned as a clear steppingstone for more conscious, targeted future efforts. This research will be conducted through a via two concise, systematic literature reviews, and a subsequent framework design of how digital infrastructure could be leveraged responsibly in camps, this thesis aims to be a guide for rollout processes. Rather than being prescriptive or attempting to propose a novel plan/design for specific cases, the discussion and conclusions of this research will stand as learnings for how to *approach* planning the rollout of digital infrastructure in camps. I; in essence, an academic development of a process design. This comes from the acknowledgement of the limitations given on the current state of available cases and research to derive true 'best-practices' from.

1.3 Research Questions

RQ: What are the theoretical benefits and challenges of using digital participation technology in refugee camps to address critical planning issues?

SRQ 1: What is the current state of digital participation in urban areas?

- 1.1) What are the different forms of digital participation?
- 1.2) What are the major technical challenges in existing systems?
- 1.3) What are the social barriers and risks of digital participation?
- 1.4) What are the major benefits of digital participation?

SRQ 2: What are the major challenges affecting refugee *camp-cities*?

- 2.1) What are the typical challenges faced by refugees in camps?
- 2.2) What are the typical challenges faced by camp management?
- 2.3) What are the current approaches to solutions?

SRQ 3: How can the findings from SRQ 1 & 2 be extended to theorize systematic benefits and challenges in facilitating digital connectivity in refugee camps?

- 3.1) What does a framework look like which is designed to navigate the opportunities and risks of implementing digital infrastructure for solving key refugee challenges?
- 3.2) What are the key overlaps between digital participation benefits and refugee camp challenges? (i.e. what are the commonalities and logical connections shown in literature?)
- 3.3) What are the overlaps between barriers in digital participation and the refugee camp context? (i.e. where are the risks for exacerbation of issues

2 Theoretical Framework

Given the intent of this thesis to provide a theoretical extrapolation of the existing methods and outcomes of urban e-participation to a new context, it is necessary to provide a framework for such an interpretation. This analysis of e-participation seeks to understand the technical challenges of the widespread adoption of this relatively new technology and situate this process and its outcomes in relation to the context. In essence, in order to build a theoretical framework for how e-participation could affect a new context, there must be a consistent and analytical approach to build an understanding of its current contexts. As such, this research will frame its analysis through the *Media Use Behaviour Conceptual Framework* – a new framework built upon the notion of *affordances* (Parry & le Roux, 2020; Parchoma. 2014).

Affordances describe the relation between objects and users, rather than simply understanding a feature equating to a specific end-use (Parchoma, 2014). This allows us to consider users' capacities and needs as integral components to usage of a specific technology. For example, a doorhandle is designed to be turned in order to open a door. This is its central feature. This affords an adult, with prior knowhow and with strong enough hands to be able to turn the handle, the ability to leverage its intended feature – to open a door. However, a young child, who has never seen a door opened before or is too short to reach the handle, is not afforded the same outcome from the technology. Thus, *Affordances* provide a method to situate technologies in the context of user abilities and knowledge (Parry & le Roux, 2020).

To contextualize the larger rollout of a technology and relate its usage and outcomes to such, there is more that needs to be included within the notion of context than just the knowledge and capabilities of users (Parry & le Roux, 2020). Rather, there must be additional consideration for the social and environmental factors at play. This consideration serves as the basis for the inclusion of the *Media Use Behaviour Conceptual Framework.* This relatively new conceptual framework (Ibid, 2020) is built upon a combination of cognitivist and behaviourist frameworks, along with affordances theory.

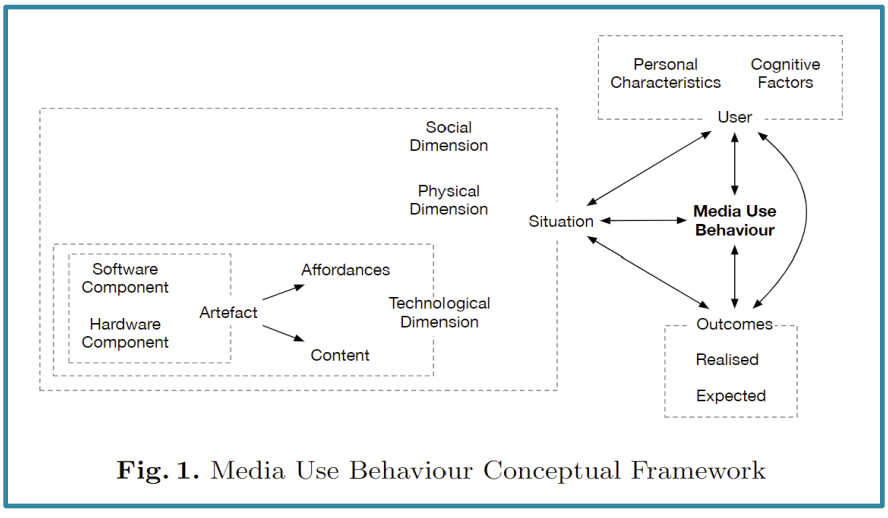

Fig. 1. Media Use Behaviour Conceptual Framework

Figure 1 – Media Use Behaviour Conceptual Framework (Parry & le Roux, 2020)

Within the framework, *Artefacts* refer to the technology in question. These often have some form of hardware and software behind them. These artefacts provide both *affordances* as defined above, and *content*. For example, social media platforms such as Facebook *afford* users the ability to organize events or instant message each other. But they also host a plethora of *content* which the user may or may not interact with. Together, these components constitute the technological dimension of media use behaviour.

The *Media Use Behaviour Conceptual Framework* also proposes that within the *situation* that the user is in, there is an *environmental* dimension external to the user's own qualities, and the *artefact's* qualities. This is made up of the *physical* dimension and the *social* dimension. The physical dimension represents the location within which the technology is used. Different physical environments provide different barriers and enablers to the usage of a given technology. For example, a remote national park may constrain the usage of Google Maps due to lack of cellular coverage, whereas an urban core likely has high-speed data. Aside from the infrastructural components to location, there are a variety of rules and norms which also affect media usage. These constitute the social dimension. The usage of a certain technology is highly impacted based upon the social expectations within that space. For example, there are likely widely different expectations for a teenager using TikTok in their bedroom, versus at school, at the dinner table, or in a place of worship.

Finally, the individual's personal characteristics massively affect the use of a given technology. As described in affordance theory, the user has qualities that are both physical and cognitive which drive adoption or rejection of a technology. If an elderly user may not have the eyesight or the dexterity to use certain digital interfaces, this would be an example of physical characteristics. If a user did not have the desire, time, or know-how to use a mapping software, this would be an example of cognitive behaviours.

Ultimately, all these factors contribute to both *if* and *how* a user will leverage a certain technology. They shape the outcomes, which in turn affect the user's experience and opinion of the medium. Whether these outcomes were as expected (generally a reinforcing characteristic), or unexpected (either a failure or a positive surprise), they feed back into individual's future decision making (cognitive characteristics), and eventually shaping the social norms surrounding that technology.

While not deterministic, the *Media Use Behaviour Conceptual Framework* allows for the systematic categorization and comparison of contributing factors to media use behaviour. It provides a clear method for deconstructing (retroactively analyzing) socially, technologically, and environmentally situated behaviour regarding technology use. It is also valuable for constructing (theorizing) potential outcomes based on contextual analyses of given situations and their interactions with technologies and their associated affordances.

This framework will be used to analyze and answer the information gathered in the systematic literature review for SRQ 1. The different technologies will be categorized, with their identified contributing factors (social, technological, environmental, and personal [user]), as well as ultimate outcomes. For SRQ 2, which lacks the technological component, research will be categorized based on challenges and needs. These challenges will

constitute environmental, social and personal dimensions. Finally, the SRQ 3 will be answered by systematically comparing the situated use cases of digital participation tools in SRQ 1 with the *situations* in SRQ 2, to theorize potential outcomes and implications of implementation and facilitation of these technologies in refugee camp contexts.

The theoretical framework was identified through snowballing research related to digital participation. It was chosen ahead of Geels' Multi-level Perspective and other Socio-technical Systems Theory frameworks for its specificity in the interrelation between technologies, situations, and afforded outcomes. This gives it the advantage of being able to be used in full to derive key factors from the situational dimensions (e.g. participation in Mumbai), and then swap in a new situation (e.g. refugee camps) to compare how the other aspects may relate to a new context.

3 Methodology

3.1 SRQ 1 Methods

To answer the questions posed in SRQ 1, a systematic literature review will be executed. This will begin with an advanced query of the *Scopus* academic database. In order to retrieve results which pertain to cities or urban areas, the terms *urban* or *city* must be included in the title, abstract, or keywords of the articles chosen. This is critical to ensuring that the sources are not providing commentary on governance or technology in general, but in particular to local policymaking. To retrieve results that are explicitly about digital participation, or its associated synonyms, the titles, abstracts, and keywords will be queried for the inclusion of the terms *digital* OR *virtual participat** OR the common term for such practices, *e-participation. OR* conditions are used rather than *AND* in order to recognize that just one of those terms needs to be present, as authors typically stick to one version of the terms. To search for results which pertain to challenges and/or opportunities, the title, abstract and keywords are searched for the inclusion of the terms *challenge* OR *barrier* OR *limitation* OR *opportunit** OR *enabl**. This is done in recognition of the possibility that a given article may focus solely on barriers, or solely on enablers. Finally, to ensure that the article is *about* these digital forms of participation, the terms *digital* OR *virtual* OR *e-** must be present in the title of the article.

SRQ 1 Search Terms:
TITLE-ABS-KEY ((**digital** OR **virtual** AND **participat***) OR "**e-participation**" AND ("**challenge**" OR "**barrier**" OR "**limitation**" OR "**opportunit***" OR "**enabl***") AND ("**urban**" OR "**city**") AND TITLE ("**digital**" OR "**virtual**" OR "**e-***")

Following the initial search, the results will be filtered to English language results only and based upon their date of publication. This will be limited to within the last 10 years, as the ubiquity of smartphones and other connected devices has taken off in that time span. This will ensure that commentary on digital participation is relevant to the forms it currently takes. It is critical to do so, otherwise the research runs the risk of the identified challenges being resolved at this point in time. Finally, the results will be filtered by subject area. This will be done in order to filter out highly-technical or scientific results. Preliminary research has shown some results stemming from the computer science domain, where the research focuses on the engineering of the devices or software – rather than the usage of such technologies. This is not relevant to the scope of this project.

Screening

Beyond the initial filtering and querying of *Scopus*, the results will be downloaded with their abstracts. They will be read in order to narrow the included literature to that which is relevant to the sub research question. The guiding intention behind the manual screening is to validate or invalidate the article based on the above criteria

which shaped the search terms. The abstracts must express that the article does in fact pertain to the SRQ 2 sub questions. Firstly, the abstract must show that the article is about urban digital participation. Precedence will be given to research which specifically provides analysis on current challenges and opportunities in the usage of digital technology to facilitate participation. This means more generalized literature which compiles the results from multiple case-studies or from other literature, will be prioritised. Precedence will be given to articles with higher numbers of citations and downloads, though given the niche nature of the topic, this will used as a tie-breaker between articles of similar content in a similar timeframe. Literature which compares digital participatory processes to other forms of public engagement will be valued, as this can point to *advantages* and *disadvantages*, rather than looking at it in a vacuum.

3.2 SRQ 2 Methods

SRQ 2 data collection will be carried out with an advanced query of Scopus as my primary database. To retrieve results which pertain to refugee camps rather than refugees generally, the term "refugee camp" will be searched within quotations. This will be searched within the titles, abstracts, and keywords of each publication in the database. To ensure that there is a focus on challenges or the associated synonyms of *barriers, issues, and problems,* these will be included in an OR condition, within the Title-Abstract-Keywords search. In order to retrieve results which are *about* refugee camps rather than just referencing them, *camp* or *camps* must be in the title. Additionally, to focus the search upon issues of planning, design, management, and governance, a search of the body text to include one or more of these terms is included. This helps narrow the results towards the *urban* governance aspects of refugee camps, filtering out some types of articles such as purely scientific papers, for example.

SRQ 2 Search Terms:
TITLE-ABS-KEY (**"refugee** AND **camp"** AND (**challenge** OR **issue** OR **problem** OR **barrier**)) AND TITLE (**camp***) AND ALL (**planning** OR **design** OR **governance** OR **management**)

Following the initial search, the same filtering process will be used as in SRQ 1. Similarly, as the geo-political environment changes, and technology, logistics, and conflict morph over time, it is critical to maintain the relevance of the studies. As such, it is necessary that the challenges themselves are in fact contemporary issues. The SRQ 2 time-based filter will be matched to SRQ 1 to maintain consistency in the academic sources and opinions considered.

Manual screening
The first phase of manual screening will be executed in the same manner as SRQ 1. The abstracts must express that the article does in fact pertain to the SRQ 2 subquestions. In essence, the abstract must demonstrate that the research is about long-term refugee camp challenges or solutions. There should be a balance between challenges which are larger logistical issues (to answer the subquestion from the perspective of management), and challenges which are human-centred or experiential (to answer the subquestion from the perspective of refugees). The results

will be screened based on methodology used as well. Precedence will be given to articles that are comprehensive literature reviews on the subject (if any such articles exist), followed by research which includes immediate field work. Finally, the manual screening will allow me to prioritize research which pertains to protracted refugee camps.

3.3 SRQ 3 Methods

Sub research question 3 will be first approached through the design and building of a framework to synthesize the findings from SRQ 1 and SRQ 2. This will be done by adapting the Media Use Behaviour Conceptual Framework for the use of comparing a set of affordances and influencing situational factors, to different contexts with their own situational factors.

This framework will then be applied to categorize and analyze the findings from SRQ 1. SRQ 1 features and solutions will be categorized as affordances. SRQ 1 influencing factors will be categorized as environmental, social, personal and technological factors. In essence, these will define the situational factors which affect whether or not the affordances can be realized. SRQ 2 challenges will be compared to affordances, to determine matches between the potential benefits of using certain technologies. The situational factors will then be compared to situational characteristics of refugee camps, in order to identify potential barriers to adoption and realization of affordances in a new context.

The framework that is built will categorize all the findings, and then be explored in a case based on one of the identified major challenges from SRQ 2. Findings from this exploration will connect SRQ 1 and SRQ 2 in a structured, reproducible methodology, and illustrate the findings of key opportunities and challenges in utilizing digital participation technology for refugee camp challenges. The preliminary process of framework exploration will then be repeated for each of the major refugee camp challenges.

4 Results:

4.0 Database Search results

The two systematic literature reviews for this research were executed in the same manner. In accordance with the methodology set out, the search terms narrowed down results from the SCOPUS database. The queries of SRQ 1 **(n=233)** and SRQ 2 had similar numbers of results **(n=229)**. The results were downloaded in separate tabular (.CSV) format databases, including the following metadata: *Title, Keywords, Abstract, Author(s), Document Type, Date, DOI, Link, Year, Publisher, Source Title, Volume, Issue,* and *Citations.* The articles were then manually selected to be included in the study based on the two-pass filtering process described previously in the methodology section. The first pass, the reading of *Titles, Keywords,* and *Abstracts,* resulted in large reductions of articles. This process was exclusionary, focusing on ineligibility based upon scope. After the first pass, SRQ 1 had **77.7%** reduction in eligible articles **(n=52)**. The most common reasons for exclusion in SRQ 1 were a lack of focus on participation, too technical of a focus on software or hardware, or too abstract regarding the smart city. The most common reasons for exclusion in SRQ2 were that the article had too scientific of a focus on healthcare (mental health, sexual health, and epidemiology), was too technically focused on infrastructure engineering, or it did not have refugee camps as the central focus. Similarly, SRQ 2 was reduced by 77.3% in eligible articles **(n=52)**. The second pass included a re-read of articles labelled *yes* under the *keep* column which I created. This process was inclusionary, focusing on which articles had clear connections in content and focus based upon the sub-sub research questions. In essence, there was a direct comparison and consideration of overlaps between the article's gist and the research questions. Additionally, this second pass was used to filter out articles which were redundant. For example, if a study covered one case but a more in-depth analysis of the same or similar case was provided by another study. For SRQ 1 this produced a **58%** reduction in articles and the final selection of studies **(n=22).** For SRQ 2, this produced a **65%** reduction and the final selection of included studies **(n=18)**.

4.1 The Current State of Digital Participation in Urban Areas *(SRQ 1)*

Countless cities around the world are leveraging Information Communication Technologies (ICTs) to optimize operations and public service delivery, to improve communication channels, and to engage with citizens in various forms of participation (Galassi et al., 2021). It has been shown that digital participation, in certain contexts, has the capacity to increase the volume of participation, build trust between stakeholders, increase engagement and satisfaction in participation processes, and increase the likelihood of addressing citizen's needs and expectations amongst other observed benefits ; (Toukola & Ahola, 2022; Galassi et al., 2021; van Leeuwen et al., 2018) . Digital participation is however, comprised of a wide array of technologies and associated approaches to using them (Toukola & Ahola, 2022). This Literature review begins with an analysis of the types of digital participation tools – categorizing them based on the state-of-art technologies behind them and describing their key functionalities. This is followed up with an analysis of the factors revealed which can be classified as enablers or barriers to digital participation adoption and effectiveness. Finally, this review is concluded with a section on key outcomes of the usage of digital participation processes, analyzed in terms of the solutions they may provide as well as the risks that may pose.

4.1.1 Types (SRQ 1.1)

Toukola & Ahola (2022) provided the most comprehensive study found in this review, into the different *types* of digital participation platforms. They proposed the six categories of tools as follows: *Building Information Modelling (BIM), Games, 3D Visualization – Augmented Reality (AR) and Virtual Reality (VR), Social Media Platforms, M-Participation, and Public Participatory Geo-Information Systems (PPGIS).* In their meta-analysis of case studies, they provided generalized *Benefits* and *Sacrifices* of each of these categories for project managers, external consultants and stakeholders.

Building Information Modelling (BIM)

BIM is a type of software dedicated to collaborative, parametric, integrated 3D modelling and design of architectural and infrastructural projects. Its central features include cloud- or server-based collaboration, analytical tools for structural design and other engineering disciplines, financial analysis, automated architectural and structural drawing generation, and photorealistic visualization rendering of projects (Toukola & Ahola, 2022). BIM allows for efficient multi-stakeholder participation between disciplines such as planners, architects, and engineering consultants. However, it is a highly complex form of software which requires significant professional expertise. Given its lack of inclusion in participation literature – the term 'BIM' showed up in 4 of 234 articles retrieved, all of which were excluded due to a lack of focus on participation – and the author's experience using BIM in the architectural industry, BIM is not yet an effective tool for participatory processes involving citizens.

Games

Games in the context of digital participation, refer to role-playing games which have targeted goals and tasks to stimulate the creation of ideas and solutions for urban planning. Galassi et al. (2021) argue that games hold value in their ability to facilitate a sense of 'fun' for participants, thereby providing a more positive collaboration environment. However, Toukola & Ahola (2022) noted that there is insignificant literature pointing to clear benefits of building or organizing digital games for participation for any of the three stakeholder groups (municipality, consultants, residents) outside of 'fun'. Actual empirical evidence for benefits over other forms of participation have yet to be established. (Ibid., 2022)

Social Media

Social Media in the context of digital participation refers to the formal or self-organized use of social media platforms for the purposes of fostering dialogue and public discourse on urban planning topics (Williamson & Ruming, 2020). Social Media platforms include but are not limited to Twitter, Facebook, Instagram, LinkedIn, Tik Tok, Whatsapp and Viber (Toukola & Ahola, 2022) (Kaur-Gill, 2022). All these platforms have a variety of networking functions, primarily centred around information sharing and communication. *Social Media* can be leveraged formally for the purposes of reaching significantly wider audiences than typically structured participation processes, as well as at an earlier stage in the process. (Williamson & Ruming, 2020). For example, the City of Sydney launched a process centred on the hashtag #MySydney (on facebook, Instagram and twitter), asking residents to comment about what they like and what they would change in their districts, in advance of the development of new district plan strategies. In cases such as these, the typical way to leverage social media platforms is through *sentiment analysis* (Williamson & Ruming, 2020). A central feature of this form of digital participation, *sentiment analysis* relies on machine learning and AI algorithms to textually analyze the content on social media around a given hashtag, in order to derive aggregate sentiments and opinions about that topic. It can be defined as "the computational study of people's opinions, attitudes and emotions toward an entity. The entity can represent individuals, events or topics." (Münster et al., 2017). If the comments were geo-tagged, this process may be further analyzed geospatially (Ibid, 2020).

Informally, social media is widely used by communities to organize around a variety of topics (Kaur-Gill, 2022) . One case included in this review highlighted the self-organized, and highly political usage of TikTok to foster dialogue about the urban living and working conditions of Migrant Construction Workers in Singapore (Ibid, 2022). This type of activism will be evaluated in greater detail further on in this chapter.

Public Participatory Geographic Information Systems (PPGIS)

Geographic Information Systems (GIS) are the central technology to PPGIS tools. GIS software are tools for the visualization and analysis of spatial data. GIS becomes PPGIS when it is integrated into software or platforms which can receive input from the public (Galassi et al., 2021). PPGIS systems include Google Maps, where users can add businesses, reviews, photos and other information about locations. They also include 'crowdmapping' platforms such OpenStreetMaps in which all the features within are created and validated by the general public (Ibid, 2021). Aside from massive mapping platforms, dedicated PPGIS platforms are often developed in cities to

address specific challenges, allowing the public to view, modify and/or create spatial data (Tian et al., 2022) . For example, for a national slum-upgrading programme to assess the needs of various neighbourhoods, a platform was built whereby residents can add and validate infrastructural and amenity features on a mobile mapping app (Aditya et al., 2020). PPGIS platforms can also be built in an informal way to grapple with urban challenges, such as applications for crowdsourcing geotagged ratings of the safety of areas within a city (Manazir et al., 2019).

Mobile Participation Platforms (M-Participation)

Mobile Participation refers to dedicated platforms and/or websites for digital participation in cities generally accessible by mobile phone or computer (Toukola & Ahola, 2022). Cities often have developed their own platforms which may include or integrate with other forms of digital or analog participation (Tian et al., 2022). The central function of M-participation platforms is to facilitate broader, more efficient forms of participation. In contrast to physical participation, where organizing traditional participation events such as townhalls with 100 residents, M-participation may provide low-cost methods to serving more people. Central features of these platforms include the ability to connect with other stakeholders, receive and view proposals, make comments and interact with other comments, and to vote digitally and officially. M-participation can provide a portal for communication flows from the city to residents, from residents to the city, and from residents to residents. Many cities leverage M-Participation for public space management, and infrastructure or asset management. A municipal app may have an option for residents to take photos of broken streetlights or cracked pavement and submit the geotagged image to the city (Galassi et al., 2021). Additionally, similar functionalities can be utilized for quick, user uploads of suggestions in their public space (Ibid, 2021).

3D Visualization (AR and VR)

3D Visualization tools such as AR and VR rely on new digital software and hardware to provide immersive viewing of designs and contexts. As opposed to viewing a television screen with a photo or video on it, AR and VR immerse the viewer *into* the design. VR requires the usage of a headset such as Oculus, or one which a smart phone can be inserted into a special type of goggles. Users can then move their heads around normally, and view the digital surrounds above, below, and to the sides of them in 360 degrees, and walk around in it (provided their actual physical context allows. AR on the other hand provides a similar experience of immersion, except it is used to *augment* the user's environment, superimposing digital designs onto the surroundings of the user. For example, a team of people could stand around a table with AR headsets, and look at a digital model of a park superimposed onto the table. They would then be able to walk around or look closer as if the model were there in reality. AR and VR both have been shown to give a better sense of scale and more realistic rendering of a proposal than traditional videos, renders, and printed images (van Leeuwen et al., n.d.).

4.1.2 Factors affecting adoption and effectiveness of digital participation *(SRQ 1.2)*

Naranjo Zolotov et al., (2018) performed a meta-analysis of e-participation adoption and determined that the five strongest predictors amongst individuals are as follows: Perceived usefulness; Attitude; Social Influence; Trust; Effort expectancy on intention to use. Based on 17 years of publications about e-governance and 60 studies, these

factors were all present across the literature included in this review. Citizen adoption is a key metric for digital participation, as increasing the reach of the processes is one of the primary drivers for governments to try to leverage these technologies. *Effectiveness* is a measure of whether a process achieved what it set out to do. As the applications of participatory processes are varied, so too are the measures of success – from achieving greater representation of demographic groups (Aditya et al., 2020), to effectively managing a voting system on new urban renewal plans (Tian et al., 2022). The compilation of all factors identified in the SRQ 1 literature review can be seen in *Table 1* below.

Factors	Source(s)
Access to digital infrastructure	(Manazir et al., 2019) (Toukola & Ahola, 2022) (Praharaj et al., 2017) (Williamson & Ruming, 2020) (Aditya et al., 2020) (Sanmukhiya, 2019)
Support teams / official management of platforms	(van Leeuwen et al., 2018) (Tortzen, 2021)(Tian et al., 2022)
Internet penetration	(Janse Van Rensburg et al., 2019) (Horn & Rennie, 2018) (Chatterji, 2018) (Praharaj et al., 2017) (Manazir et al., 2019)
Budget / ICT costs: financial and human resources	(van Leeuwen et al., 2018) (Tortzen, 2021)(Tian et al., 2022)(Horn & Rennie, 2018) (Chatterji, 2018) (Praharaj et al., 2017)
Topography and landscape	(Toukola & Ahola, 2022)(Manazir et al., 2019)(Aditya et al., 2020)
Patriarchal societies: women's use of technology	(Praharaj et al., 2017) (Manazir et al., 2019) (Sanmukhiya, 2019)
Institutional willingness to take on new roles	(Tortzen, 2021) (Tian et al., 2022)
Self-selection bias	(Münster et al., 2017)
Organization of counter groups	(Williamson & Ruming, 2020)
Marketing	(Tortzen, 2021) (Williamson & Ruming, 2020)
Language	(Manazir et al., 2019)
Income / financial situation	(Toukola & Ahola, 2022) (Manazir et al., 2019) (Tian et al., 2022) (Janse Van Rensburg et al., 2019)
Safety / privacy	(Domingo et al., 2021) (Tian et al., 2022) (Kaur-Gill, 2022)
Familiarity with technology	(van Leeuwen et al., 2018) (Sanmukhiya, 2019) (Janse Van Rensburg et al., 2019)
Lack of information	(Tian et al., 2022) (Toukola & Ahola, 2022)
Trust and credibility	(Naranjo Zolotov et al., 2018) (Toukola & Ahola, 2022) (Manazir et al., 2019) (Tian et al., 2022)
Perceived utility	(Naranjo Zolotov et al., 2018) (Aditya et al., 2020)
Age	(Janse Van Rensburg et al., 2019) (Praharaj et al., 2017)
Literacy and education	(Chatterji, 2018)
Availability of detailed mapping	(Aditya et al., 2020) (Manazir et al., 2019)
Detailed imagery	(Aditya et al., 2020) (Manazir et al., 2019)
Inaccuracy	(Aditya et al., 2020) (Williamson & Ruming, 2020) (Manazir et al., 2019)
Data integration	(Tian et al., 2022)
Moderation	(Tortzen, 2021) (Williamson & Ruming, 2020) (Kaur-Gill, 2022)
Ease of learning	(Naranjo Zolotov et al., 2018) (Tortzen, 2021) (Toukola & Ahola, 2022)
Instructions on use	(Tian et al., 2022) (Naranjo Zolotov et al., 2018)
Attractive UX/UI	(Tian et al., 2022) (Toukola & Ahola, 2022)

Table 1 – Factors affecting adoption and effectiveness of digital participation technologies

The Digital Divide

The concept of *the digital divide* was originally developed to characterize groups with access to computer infrastructure and the internet versus who do not.(Horn & Rennie, 2018). The concept has since expanded to include the demographic factors which divide mobile, internet other ICT users from those who lack the capacity to use such technologies. The digital divide was highlighted in the majority of studies reviewed. Four of the factors above fit within the concept. From an infrastructural perspective, internet and mobile data penetration are key barriers to the facilitation of e-participation (Ibid, 2018). For example, Horn & Rennie (2018) analysed the situation in Sarawak, Malaysia, where "Villages may also lack other kinds of infrastructure such as connection to the electricity grid and sealed access roads. Inadequate electricity and transport infrastructure complicates the supply of ICT infrastructure" (Ibid, 2018).

As a result of such a situation, the authors noted that there are compounding impacts of the infrastructure deficit. As the region lacks consistent access to the electricity grid, there is the need for the use of generators. Given the scarcity of electricity, it becomes difficult to prioritize ICT usage. Even in cases where there is consistent access to mobile coverage and internet infrastructure, this does not guarantee participation in e-governance. In cities in India, despite widespread access to the necessary infrastructure, other factors played a role in lack of utilization of the internet, and by extension digital participation platforms (Chatterji, 2018). Only 18% of residents were found to use the internet, mostly higher educated urban residents. In terms of personal capacity, a low literacy rate was seen as a critical barrier – with low literacy effectively translating to low-digital literacy (Ibid, 2018).

Demographics

Interlinking with the *digital divide,* several demographic factors drive e-participation adoption. The factors identified include *age* and *gender. Young and active age* (less than 30) was shown to be an enabler for the likelihood of adoption (Praharaj et al., 2017). Conversely, *older age* (greater than 55) was shown to be a barrier to the usage of M-participation platforms. Age interlinks with the previously mentioned factor of *education*, as education in ICTs in schools, prepares children to make use of these technologies elsewhere, whereas older generations did not receive this same training (Ibid, 2017).

Beyond the personal capacity characteristics of *age*, *gender* plays a more socially reinforced role as a barrier to adoption and effectiveness. Sajdi et al., 2021 revealed some of the social perceptions towards girls' usage of cellphones in Azraq Camp in Jordan. One adolescent boy interviewed believed that phones should be illegal for girls. An adolescent girl believed that its wrong for girls to have cellphones and that they should feel shame. She believed that the technology and the social media on them contributed to deviance away from being good.

Trust and Credibility

Trust, was proposed by Naranjo Zolotov et al. (2018) as one of the most critical factors in adoption. In this review, this finding has been reproduced. *Trust,* in this context, represents an individual or collective's capacity to believe in the credibility of the process or government they are interacting with (Ibid, 2018). *Trust* has many facets to it. A number of factors which can stand as barriers or enablers to e-participation are highlighted in the literature. At

its most general, trust represents an overall faith in the political system within which the citizens reside (Tortzen, 2021). The capacity for governments to solve wicked problems, they argue, is something that has declined since the widespread adoption of neoliberal governance, thus necessitating participation in cities to re-establish credibility. Whereas mistrust of the government can be a barrier, several studies highlighted an enabler to work to counteract these effects.

While digital services such as m-platforms can be quite individual, dedicated facilitators of engagement programmes can help build trust. These facilitators can be from a non-profit third party as demonstrated by Tian et al. (2022), or as in the case of a slum-upgrading programme in Indonesia, make use of community representatives in the overseeing and management of the process.(Aditya et al., 2020)

Another key component of trust in digital participation programmes stems from the concept of digital privacy. Given the digital and public nature of submitting opinions on open portals, with attached personal information, data privacy is a barrier which was raised frequently in this review. In a study on a citizen-centred mobile application for e-participation, hacking is a genuine concern for any mobile platforms (Domingo et al., 2021). Mitigation of such concerns can be enabled through the development of strong data privacy systems. This can be overcome with a few strategies such as, building an authentication model with strong data and user information protections, anonymizing data where group sessions are unnecessary, and be *transparent* about precisely how personal data and opinions will get processed, used and shared (Tian et al., 2022).

4.1.3 Outcomes (SRQ 1.3)

Outcomes of digital participation technologies can be categorized into two categories. The first category includes all the expected outcomes, where the features of technologies (as described in 4.1.1) translate into functionalities as they were designed to do. The other category are the outcomes which are a product of unique use, combination with other technologies, or some form of appropriation of a technology. This section describes cases which fit into the latter.

Self-organized bottom-up participation

In a case analyzed by Kaur-Gill (2022), Migrant Construction Workers showed the potential of individuals to collectively push for change within an urban environment, by leveraging the communicative opportunities of the platform. The Migrant Construction Workers (MCWs) in Singapore are considered marginalized. This marginalization was characterized by substandard dormitory living conditions, extraordinary measures for confinement and surveillance during the COVID-19 pandemic, and working conditions (Ibid, 2022). The social media platform TikTok has not received much academic attention for its potential to facilitate digital activism, and especially not in the urban space (Ibid, 2022). TikTok offers its users a wide range of video editing options, the capacity to add music, and to respond to others' posts. Similar to Twitter and other platforms, TikTok relies heavily on hashtags. By making 'vernacular' content, MCWs managed to control the narrative and generate

discourse around their condition. The trend of MCWs sharing fragments of their lives and stories on Tik Tok was picked up by formal media as well and generated a lot of attention which would have otherwise not been given to a group who were particularly silenced. The free application created a low barrier to entry, and without moderation of the government or other media, MCWs were able to have agency in speaking out.

On the other hand, while the case of MCWs shows potential for ground-up urban activism via social media, the #MySydney campaign shows a different angle, with a different organization structure. The City Planning Council of Sydney wanted to engage residents early in the process of making new district plans. Using the hashtag, the council hoped to reach much wider audience (Williamson & Ruming, 2020) . The campaign asked users to respond to two questions 'why you love where you live?' and 'what would you change, if you had the chance?'. The campaign managers would respond to over 90% of the feedback given on Twitter, Facebook and Instagram. The solutions identified in this case were that the interaction of users, who likely had never participated in civic engagement prior, had an opportunity to interact directly with a government official, making the process seem more legitimate, and that they were being heard (Ibid, 2020). This in turn can foster a sense of legitimacy in the process and restore faith in the planning strategies. And finally, the government did manage to collect information to build place-making frameworks based on the input.

The risks of this social networking strategy were not carefully considered (Williamson & Ruming, 2020). First, while the intent was to 'start a conversation', the department limited responses to just one, standardized message thanking the user for their feedback. This could be seen as a form of placating or tokenism, given that there was an absence of any clear agency for the participants (Ibid, 2020). Losing control of the messaging was another key risk. With the public nature of hashtags, anyone can 'piggyback' on trending hashtags to push their own content. In this case, two groups opposing specific projects took over hashtag and pushed their narrative about what they wanted to see happen in Sydney. Rather than the municipal campaign receiving attention, complaints about bike lane removal and a controversial construction project gained visibility.

Combining digital participation media

While individual media have their functional limitations, there is also possibility to combine these technologies in valuable ways. The e-planning model which Tian et al., (2022) highlights combines a dedicated m-participation platform for digital participation, along with a PPGIS and survey system. The M-Participation platform allows residents to grapple with an urban design module, where residents can vote on the design and layout of public amenities. The PPGIS system allowed residents to view and visualize data pertaining to their neighbourhood and comment on it. The system provided clear calculations of costs and benefits. The urban renewal process was linear but involved. All stakeholders could voice their opinions at multiple stages, which eventually went to a vote after designs had been proposed, received mass feedback, and then redesigned. The process showed possibility to engage the public at a large scale, and internalize information received from it. The platform set up had co-benefits such as easy access to urban processes, other projects, and plans. The PPGIS system set up a crowdsourcing platform for making inquiries to the city, making suggestions, and uploading information.

In terms of risks, this project ran the risk of carrying a large financial implication. This scale of integrated, digital participation infrastructure requires servers, experts to maintain it, and experts to respond to and interpret the information gathered through it. Planning platforms such as this can become single-direction communication tools for informing and sharing plans, rather than genuinely facilitating participation. Like all digital platforms, this plan runs the risk of data protection and privacy breaches. This holds especially true in the predominantly authoritarian style of governance in the context of China.

By putting so much stock into the efficiency of a fully digitized system, the non-digital users run the risk of being excluded even more as the remainders of physical services digitize.

4.2 Planning Challenges in Refugee Camps (SRQ 2)

Refugee camps around the world are diverse spaces with unique contexts, challenges and people. The conditions observed in Za'atari camp in Jordan are quite different from those in Western Sahara or in Greece (Jaradat & Beunders, 2021) (Tomaszewski et al., 2017). However, the governance of almost all large scale, formal refugee camps is similar around the world, with host countries and the UNHCR or UNHWR sharing some balance of management of the camps. (Karsu et al., 2019). This review contains a range of articles that span across different camps, countries, and continents. The focus of the articles are all centred on formal refugee camps and their contemporary – though often protracted – challenges. The following sections will first address the question of how camps are managed, followed by what key challenges are being faced, and finally which solutions have been developed and with what shortcomings.

4.2.1 Typical Camp Planning Process (SRQ 2.1)

Refugee crises arise from numerous scenarios – though they are typically geopolitical in nature, causing the displacement of large numbers of persons from their homes. Fleeing for safety from war or prosecution, refugees typically have little other choice but to flee. While the UNHCR, nor the 187 countries who ratified the Global Compact on Refugees recognize camps as 'durable' solutions, that is, they are not considered solutions which are considered resilient and long term plans to resolve a humanitarian situation (UNHCR, 2020). Nonetheless, they are often a necessity given the host country's capacities and policies towards refugees. As such, there is an established process for the development and planning of camps from their inception (Karsu et al., 2019). Camp planning can be subdivided into two phases, as seen in Figure 2 and Figure 3 below.

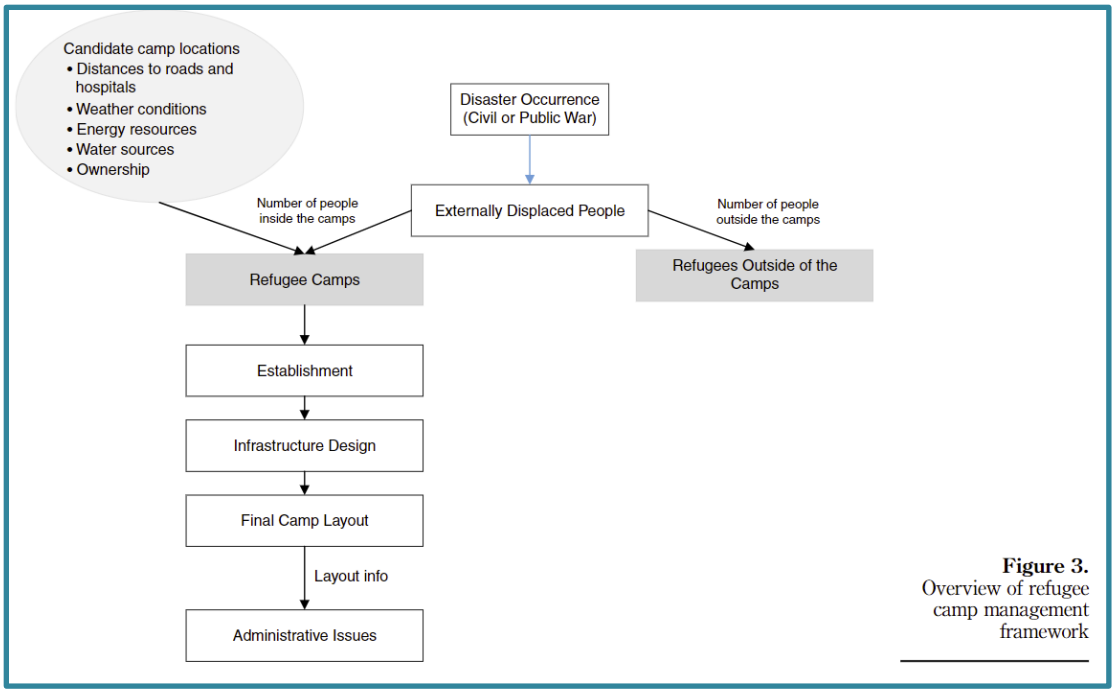

Figure 3. Overview of refugee camp management framework

Figure 2 – Camp planning 'establishment phase' (Karsu et al., 2019)

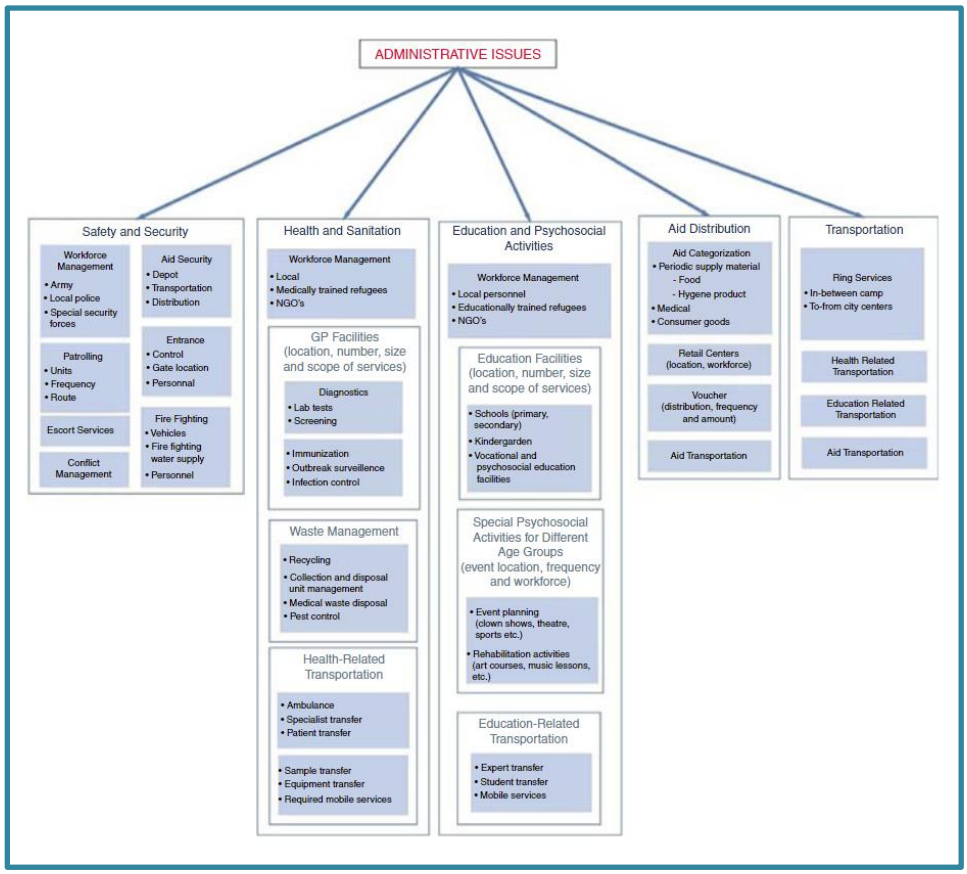

Figure 3 - Camp planning 'administrative phase' (Karsu et al., 2019)

The Establishment Phase

The establishment phase is characterized by involving strategic, one-off decisions, which are intended to remain relatively static throughout the lifetime of the camp. These decisions concern infrastructural design. The host country together with the UNHCR, typically controls this phase in a top-down manner (Albadra et al., 2021). Decisions are made about the layout of the camp, the designs of the road networks, and the infrastructural core such as the fresh and wastewater systems and energy systems. The layout of all these components must be done in parallel, as the layout of the tents and facilities dictates where infrastructural elements such as pipes and roads will go (Karsu et al., 2019). Major considerations are made based on the estimated demands of users to place the underground water network, well constructions (if necessary), supply points for the camp, and wastewater management.

The final layout is then proposed including communal facilities such as kitchens, toilets, bathhouses, and tent blocks. Financial constraints in this phase affect infrastructural decision-making (Jaradat & Beunders, 2021). For example, many refugee camps are located in remote areas without access to the grid, or the costs of building out the infrastructure are not entirely within the budget of this phase. As such, energy may be prioritized for security and access lighting, along with operation of water pumps to maintain sanitation and access to water. Only then would it be built out to be distributed to households if the finances permit (Albadra et al., 2021).

Administration Phase

Following the construction of the camp and inhabitation of the refugees, the role of the camp management changes from making the 'one-off' relatively permanent decisions, towards being responsible for "tactical and operational decisions that require periodical planning as long as a refugee camp serves." (Karsu et al., 2019) This 'phase' represents the ongoing cycles of responding to emerging challenges. Karsu et al. (2019) classifies these categories into 5 administrative issues: Safety and Security, Health and Sanitation, Education and Psychosocial Activity, Aid Distribution and Transportation. In this review, these challenges were identified as appropriate classifications. However, other literature challenges this distinct separation between the establishment and administration phase, suggesting that refugees *can* and *should* be included in the design and re-design of the camp – especially as crises drag on and the temporary settlement takes on a de facto permanence. (Albadra et al., 2021) (Matthey-Junod et al., 2022).

4.2.2 Refugee Camp Challenges (SRQ 2.2)

This section of the review focuses on the challenges which were identified to be most impactful on the livelihoods of refugees, and which fit within the 'planning scope' of the research. While there are myriad challenges affecting refugees in camps, including but not limited to education, safety, energy, sanitation, design etc., there are a number of challenges identified in the literature which stand out as both typical across many refugee camps and fall within the outlined scope. The research will follow up the previous section by analyzing the following topics:

Housing Design, Information Flow, Sanitation., and Safety / Security. Where solutions have been tested in the literature, an analysis of this will be included.

Housing Design

The most critical infrastructure in human lives is the home.

> "Urban homes are the most important part of the whole urban built environment [Gwebu, 2003], and their conditions reflect many issues of the community including socio-eco-nomic status, public health and the spatial environment" (Alnsour & Meaton, 2014)

Yet, as illustrated by (Karsu et al., 2019) the provision of housing in refugee camps is done in a top-down manner with little to no involvement of the refugees who will inhabit the shelters. The result of this disconnect is that mass-produced, one-size fits all solutions are provided to persons and families who have fled generally traumatic conflicts. Ultimately, shelters are often inappropriate or incompatible for the occupants, leaving refugees with high levels of dissatisfaction (Albadra et al., 2021). The dissatisfaction observed across the literature reviewed is due to unsuitability for long-term living, lack of space, ignorance of cultural values, thermal performance, misconceptions of user needs, low quality construction and low maintenance (Aburamadan, 2022) (Alnsour & Meaton, 2014) (Jaradat & Beunders, 2021).

Shelter types provided typically fit into two categories. The first is the standardized prefabricated shelter, which is mass-produced and then delivered to the camp. The second is built-on-site, which is built under the guidance of camp managers. Regardless of which approach, there is little evidence of customization or agency given to refugees in the design of their homes. (Albadra et al., 2021) Housing conditions in Palestinian refugee camps in Jordan reflected this dissatisfaction. While the size of the units were typically deemed okay, 53.2% of homes were classified to be of 'poor' quality (Alnsour & Meaton, 2014). Typical complaints included low-quality materials used, leaky roofs, cracking walls, and hot in the summer while cold in the winter.

Information Precarity

Information Precarity refers to the situation of uncertainty that refugees experience in gaining access to information, news, and connection to family and friend networks (Wall et al., 2017). This leaves them susceptible to misinformation, and a lack of control over the narratives that shape their lives in camps. Refugees arrive in camps with often few, if any connections, and often no cell phone. (Fisher et al., 2019). Information precarity can be understood through 5 components of the problem.

Social access to information is the first component. Technological access is often poor, even in Za'atari camp, one of the most infrastructurally developed camps in the world. Phone access can be a barrier for some (Wall et al., 2017).

Prevalence of irrelevant and/or dangerous information is the second component. Due to living in an information vacuum, refugees are not able to access information about unfolding events back home (with whatever crisis caused them to flee). This state is characterized by a lack of credibility in the information they do have access to. Official media sources are often derided by refugees as biased or untrustworthy in the context of their authoritarian political situation. Facebook and other social media on the other hand give refugees a chance to control which sources they follow, but these platforms are also rife with misinformation which can be difficult to navigate (Wall et al., 2017).

Refugee's lack of image control through the media is the third component. Refugees feel as though their lives are worth less. The fluctuation of media cycles can mean that their situation gets 'forgotten' about by the media, resulting in reductions in budget and other impacts (Ibid, 2017). Alternately, when there is media coverage, there is the concern of inaccurate or misrepresentations of the refugees themselves.

Surveillance is the fourth component. Refugees often lose their mobile phones at check points along their migration journey. Sending messages and having phone calls can be risky due to the potential for software systems employed by governments monitoring the content. Refugees in Za'atari communicating with friends in Syria use phrases such as "heavy rain" to indicate a bombing had occurred.

Disrupted Social Support Networks are the final component. Loss of family and community support networks through forced migration can be disorienting. Many refugees come from rural communities, and find themselves in dense unfamiliar settlements, with little understanding of the spatial conditions or how to wayfind (Ibid, 2017). This has a profound impact on perception of person safety. As one interviewee in Wall et al., (2017) characterized it:

> "'When you leave the house, you have to have the mobile phone because you don't know what will happen. You might be sitting in an area where nobody knows you. Maybe you have an emergency. With the mobile phone, you can ask for help'" (Wall et al., 2017).

Safety

Safety in camps is a primary challenge for ensuring the wellbeing of refugees. *Safety* encompasses many components of personal risk mitigation (Al-Najjar et al., 2022). In this study, safety challenges were analyzed through three studies. The first provided the general scope of safety, which includes domains reaching from fire safety to digital security and privacy (Karsu et al., 2019). Two unique studies focused on the experience of safety for adolescents in two separate refugee camps in Jordan. The first of these highlighted the perceived challenges teenagers and their parents have with their walk to school. Three primary themes of threats were put forwards. These include traffic collisions, animal attacks, and crime exposure. Factors which increase or decrease the likelihood of these themes affecting a teenager were considered, including but not limited to time-of-day, travel distance, internet availability, student age, gender, and infrastructure along route of choice (Al-Najjar et al., 2022).

Gender is explored more in depth in Sajdi et al., (2021). Teenager's *bodily integrity* is explored through the experiences and perceptions of their own safety in the Azraq Camp in Jordan. Child marriage, along with Gender-Based Violence (GBV) affect many young girls, ultimately affecting their psychosocial-wellbeing, and increasing the likelihood of poverty Sajdi et al., (2021).

The effect on mobility is significant too. Generally, teenage girls did not feel that public space in the camp was safe for them. Social norms also reinforce these patterns. While access to phones have been identified as a potentially liberating technology for safety, traditional beliefs shun women from using cell phones. This results in girls having a constellation of challenges: a lack of voice and agency to change the scenario, a lack of control of their own bodies, and a lack of mobility outside the home which decreases the likelihood of staying in school.

Waste and *Sanitation*

Waste and *Sanitation* here refer to control of human waste, food waste, trash, and wastewater. (Karsu et al., 2019). In many refugee camps, managing these flows presents a large challenge logistically and socially. Logistically, most refugee camps lack the infrastructure to manage waste in the way many cities do. This also combines with refugee's lack of implications of their behavioural practices. For example, wild defecation is a typical challenge in refugee camps, as many people practiced that in their home. However, with the density and fragile water systems that are typical of refugee camps, this presents a sanitation issue, as faeces poses a threat to contamination of drinking water. Water must be tested accurately and frequently to ensure safety of consumption as a result, either by camp management, NGOs or trained refugees. (Bishara et al., 2021)

Similarly, in Sahrawi Refugee Camps, waste management poses a similar threat. Accumulation of plastic bag waste, and its release into nature is a growing problem. Given that the plastics do not break down for decades, they pose a serious ecological threat. Plastic bag waste has reached a point where plastics are the cause for approximately 40% of the deaths of local sheep and goats. (Guijarro et al., 2022) Meanwhile, in the animals that do survive, the plastics are partially broken down in the stomach, releasing toxic chemicals – which are likely passed back to humans upon consumption.

Both of these cases represent situations which are highly technical, ecological and scientific – with serious detrimental impacts on ecosystem and human wellbeing. However, they both require significant individual and in turn social behaviour change in order to facilitate a solution.

4.2.3 Participatory solutions in camp planning (SRQ 2.3)

This section focuses on approaches to solving refugee camp challenges. The solutions featured are derived from case studies found within the literature. The majority of planning and management in camps is done in a top-down approach (Albadra et al., 2021; Alnsour & Meaton, 2014). These methods lack the transdisciplinary and

multi-stakeholder qualities necessary to solve the wicked problems found in refugee camps (Albadra et al., 2021). Addressing these complex socio-technical problems requires creative solutions which involve refugees at various phases in the process. Solutions such *as co-creation, focus groups, demand analysis,* and *socio-cultural adaptation* are a few of the approaches found in the literature which yielded effective results.

Co-Creation

Co-creation can be defined as the participatory process of designing and/or building of concepts and solutions for complex systems and environments(Ramaswamy & Ozcan, 2018). The participants involved are generally stakeholders with vested interests. Through processes of collaborative situation-analysis, ideation, and problem-solving, the value lies in its capacity to negotiate the often-divergent understandings and needs of various stakeholders involved (Albadra et al. 2021). Within refugee camps, co-creation has been explored to counter the top-down approach to problem-solving, and to give voice and agency to refugees in the solutions which are developed. The cases studied here include participatory design for housing and place-making, as well as co-designed energy systems for refugee camps.

Participatory Design

Whereas most refugee camp shelters and spatial layouts are designed in the establishment phase (Karsu et al., 2019), *Participatory Design* (PD) methodologies provide an alternative approach which involve refugees in the planning phase (Jaradat & Beunders, 2021). In a study of 16 workshops for the design of shelters, making use of different methods, Albadra et al. (2021) found that PD can be effective for building socio-cultural compatibility and resident satisfaction. Additionally, it has been shown that PD can facilitate the longevity, maintenance and cultural appropriateness of camp shelters (Jaradat & Beunders, 2021). Other co-benefits of the process include facilitating communication and trust between refugees, host communities, and camp managers, as well as inspiring refugees themselves to be more engaged with future projects and decision-making in the camps.

In execution, given that most refugees are not experts in design or construction, it has been shown that a combination of expert-crafted base designs with various forms of workshops can be effective in engaging refugees on what their needs are (Ibid, 2021). In comparing workshops where refugees design shelters from the ground up, versus modifying preconceived designs, the latter was found to be more fruitful. Specific visualization and design workshop methods affect the success of the process. Physical prototypes are tangible and allow refugees to creatively modify. Virtual reality can help give refugees a sense of scale and interior material qualities. 3D models, with the aid of technical experts has the potential for realistic, immediate iteration of designs (Albadra et al., 2021).

By engaging refugees, and in considering refugee shelters a process rather than a product, there is greater potential to find balance and compromises between technical challenges, financial resources, and individual and community needs.

Community Energy Systems

Energy systems are key to many functions of refugee camp life, ranging from pumping water and street lighting to telecommunications and commerce. With the increasing affordability of solar energy microgrids, access to electricity is now more financially feasible in remote refugee camps (Nixon et al., 2021). The operational efficiency of such systems is contingent on maintenance, which is in turn reliant on the capacity of the camp. Matching production of the energy systems to demand is also a key consideration for high efficiency systems (Nixon et al., 2021; Matthey-Junod et al., 2022).

In order to facilitate the implementation of these energy systems, co-design with refugees can provide many benefits. From an operational standpoint, co-creating the systems allows for a more accurate analysis of needs and electricity demands (Matthey-Junod et al., 2022). Training refugees to operate the systems can ensure long-term maintenance in the absence dedicated NGOs. From the standpoint of refugee wellbeing, this process can provide opportunities for self-reliance and income generation, as well as access to electricity for various appliances and communication (Nixon et al., 2021).

Cultural Adaptation

Cultural aspects of socio-technical challenges are often outside of the expertise of camp management. Sanitation and waste-management practices are contingent on the behavioural practices of refugees. As (Guijarro et al., 2022) revealed, the sustainability of a technical solution to such problems is highly dependent the cultural acceptance of the intervention. CLTS – Community Led Total Sanitation has been shown as an effective, and adaptable method to sustainable behavioural change (Karand & Milward, 2011). CLTS was originally developed as a methodology for eliminating the practice of open defecation, for sanitary purposes. It is centred upon three steps which build towards collective responsibility (Ibid, 2011). Pre-triggering is the first phase in which the issue is analyzed in the field and the group is selected. Triggering follows this, where the selected group of participants is exposed to the confrontational facts of the situation. Through facilitation of a new understanding which may elicit newfound shame and disgust, this phase is intended to activate desire to take action. Finally, the Post-triggering phase is a hands-off support phase where the facilitators of the programme function as support to community leaders, giving encouragement and advice where necessary (Guijarro et al., 2022).

This method has been effectively adapted to the Sahrawi refugee camp challenge of waste reduction – where open defecation was not the focus, but rather plastic waste and its impacts on livestock and human health. (Ibid, 2022). CLTS-style approaches can bridge the gap between top-down agenda setting and cultural barriers by empowering community members to act as leaders in effecting change (Karand & Milward, 2011).

Focus Groups and Community Workshops

Complex issues such as safety, design, sanitation, energy, and information precarity, have two sets of challenges. The first set includes all the observable challenges from the perspective of camp managers and empirical research. The second includes all the perceived challenges from the perspective of the refugee (Al-Najjar et al., 2022; Wall

et al., 2017). Likewise, there are solutions which may be derived from best-practices and research, but there are also solutions which may seem most appropriate to refugees themselves. Community workshops and focus groups have been used as methods to find solutions within the community of refugees from the bottom-up, rather than analyzing challenges from the top-down and developing solutions externally(Albadra et al., 2021; Al-Najjar et al., 2022; Sajdi et al., 2021; Tomaszewski et al., 2017). For example, it was shown that the set of safety challenges in Jerash Camp, Jordan, were considerably different from the perspectives of refugees, than that from camp managers. This was assessed to likely be a gap in data and information gathering about the experiences of life from within the camp. As such, the solutions proposed to safety challenges were widely different as well (Al-Najjar et al., 2022).

4.3 Digital Participation Technology for Refugee Camps (SRQ 3)

This section of the results leverages the Media Use Behaviour Conceptual Framework in order to develop a novel framework for synthesizing the results from the SRQ 1 and SRQ 2 literature reviews. This framework can then be applied broadly across the results. In doing so, the information derived from the literature is categorized according to the modified MUBCF, building a relational database from which SRQ 3 can be answered.

4.3.1 Building a framework for synthesis (SRQ 3.1 & 3.2)

Building on MUBCF, the findings from the previous sections can be classified and categorized based on its key components. See figure 4 below. Features and solutions from digital participation qualities are akin to *potential affordances* (Step 1). The challenges found in refugee camps can be broken down into desired *outcomes* (Step 2). *Potential affordances* and desired *outcomes* can be compared, in order to identify the technology type with most opportunity (Step 3). The factors affecting the adoption and effectiveness of digital participation technologies can be categorized into the four situational dimensions defined in the MUBCF (Step 4). These factors can then be compared to the new *situation,* i.e., the refugee camp, to identify barriers and enablers (Step 5). These barriers and enablers can be compared back to the *potential affordances*, in order to determine what the theoretical likelihood of successful implementation would be (Step 6). *Potential risks* should be weighed based on the situational barriers identified with the technology chosen in the given context (Step 7). Finally, the findings of this process can be aggregated to develop an implementation strategy (Step 8).

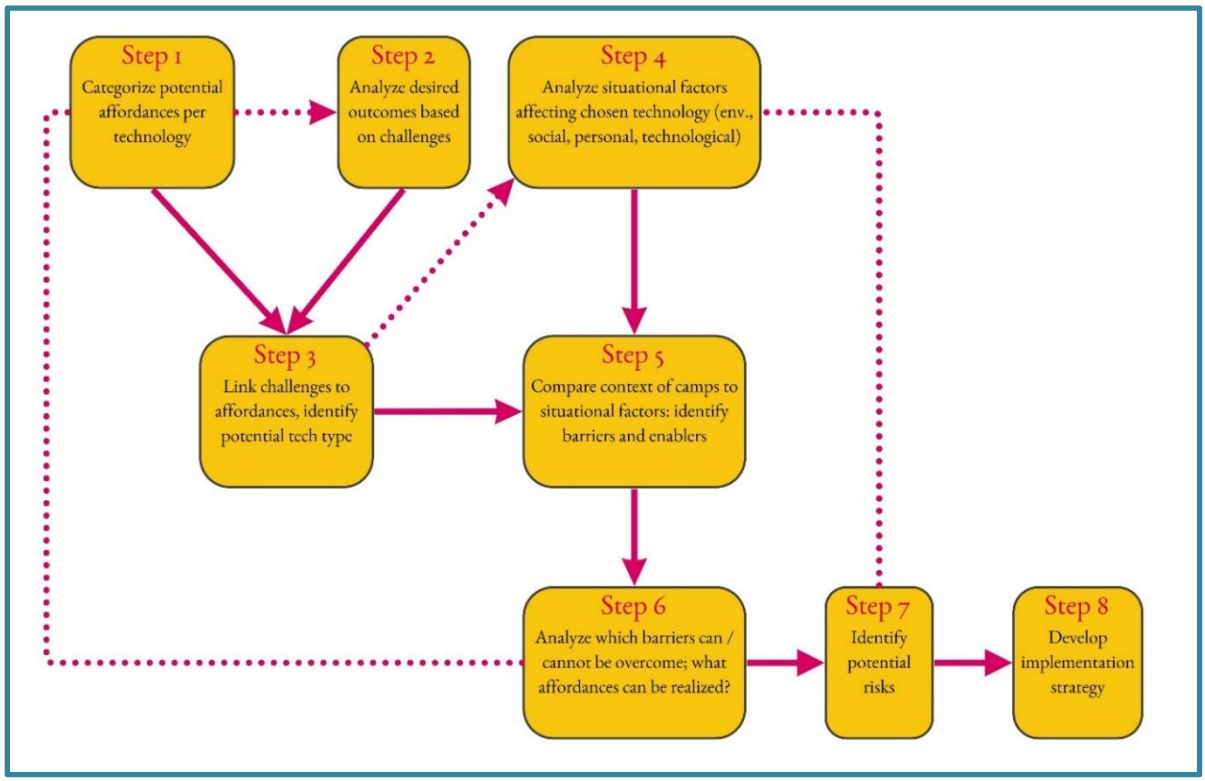

Figure 4 – Digital Camp Framework

Each of the first 5 steps were executed across the entirety of findings in this research. This was first done in basic relational tables, and then combined in a mind map of a synthesized relational database.

Step 1 – Categorize potential affordances per technology

Each affordance is compared to the different technologies which hold the potential to facilitate such opportunities for the user. This is based upon their features or observed uses in literature. Table 2 shows the comparison below. The Y-axis contains the array of affordances while the X-axis shows each e-participation type. If an affordance is attributed to a given technology, then corresponding box will contain an 'X' and be filled in. Otherwise, it is left blank.

Affordances	M-participation	Social Media	PPGIS	BIM	Games	VR/AR
Cloud-based multi-stakeholder design			X	X		
Fun, play-based design process					X	X
Massive networking		X				
Metropolitan or regional participation	X	X	X			
Free information sharing	X	X	X			
Data Analysis of shared information	X		X	X		
Unstructured, bottom-up organization		X				
Visualization of spatial data	X	X	X			
Visualization of designs			X	X		X
Crowd-mapping (Collection of env. or social data)	X	X	X			
e-Voting	X	X				
Review of proposals	X	X			X	X
Asset management	X		X	X		
Immersive experience of designs						X
Long-term, iterative participation	X	X	X			
2-way co-creation	X			X	X	

Table 2 – Affordances per digital technology type

Step 2 – Analyze desired outcomes based on challenges

Breaking down a specific challenge into its desired outcomes requires a specific case. This will be explored in more detail in section 4.3.2 in a theoretical case study. For the purposes of building a generalized database, the 5 categories of challenges found in the SRQ 2 literature review are used. These include: Housing Design, Information Precarity, WASH (water, sanitation, and hygiene), Safety, and Infrastructure Management.

Step 3 – Link challenges to affordances, identify potential technology type.

This step focuses on comparing the results of Step 1 and Step 2. The affordances found are linked to the challenges. First, this is done in a similar table / matrix format as Step 1, shown in Table 3 below. On the X-axis are the same affordances as in table 2 above, but the Y-axis shows each of the five camp challenge categories. Where there is potential for the affordances to contribute to solving a given challenge, the corresponding cell contains an 'X' and is filled in light blue.

Affordances	Housing Design	Information Precarity	WASH	Safety	Infrastructure Management
Cloud-based multi-stakeholder design	X				
Fun, play-based design process	X				
Massive networking		X			
Metropolitan or regional participation		X		X	
Free information sharing		X			
Data Analysis of shared information			X	X	X
Unstructured, bottom up organization		X	X		
Visualization of spatial data				X	X
Visualization of designs	X				
Crowdmapping		X		X	X
e-Voting	X			X	X
Review of proposals	X		X		
Asset management			X	X	X
Immersive experience of designs	X				
Long-term, iterative participation	X		X	X	X
2-way co-creation	X		X	X	X

Table 3 – Affordances benefit to key refugee camp challenges

Step 4 – Analyze situational factors affecting chosen technologies

All the factors identified in the literature review which contribute to the adoption and effectiveness of e-participation technologies are categorized by their *situational dimension*. They are grouped as Environmental, Social, Personal, and Technical. The factors are also tied to the technological use-case from which they were derived, to identify key considerations for employing that technology type. The factors which affect certain technology types have their corresponding cells marked with an X and filled in. This can be seen in Table 4 below.

Step 5 – Compare context of camps to situational factors – identify barriers and enablers

Based on the factors identified in Step 4, the context in question is analyzed for corresponding situational characteristics. This step is shown in Table 5 below. If these appear to contribute negatively to the identified factor, they are filled with red to denote the existence of a barrier. If the situation in the camp contributes positively to the factor, it is considered an enabler and is filled in green. If there are competing characteristics for

the same factor, they are both included, and the cell is filled in yellow. Factors where there is no information within the literature analyzed shows an *n.d.* for 'no data'.

Steps 6, 7, and 8 were not carried out in the construction of the framework, as they require more detailed information about the specific tool, camp, stakeholders, and situational conditions.

Dimension	Factor	M-participation	Social Media	PPGIS	BIM	Games	VR / AR
Environmental	*Access to digital infrastructure*	X	X	X	X	X	X
	Support teams / official management of platforms	X		X	X	X	X
	Internet penetration	X	X	X	X	X	X
	Budget / ICT costs: financial and human resources	X	X	X	X	X	X
	Topography and landscape			X			
Social	*Patriarchal societies: women's use of technology*	X	X	X	X	X	X
	Institutional willingness to take on new roles	X	X				
	Self-selection bias	X	X			X	
	Organization of counter groups		X				
	Marketing	X	X				
	Language	X	X	X	X	X	X
Personal	*Income / financial situation*	X	X	X	X	X	X
	Safety / privacy						
	Familiarity with technology	X		X	X		X
	Lack of information	X					
	Trust and credibility	X		X			
	Perceived utility	X		X			X
	Age	X	X	X	X	X	X
	Literacy and education	X	X	X	X	X	X
Technological	*Availability of detailed mapping*			X			
	Detailed imagery			X			
	Inaccuracy		X	X			
	Data integration	X		X	X		
	Moderation	X	X				
	Ease of learning	X		X	X		X
	Instructions on use	X					X
	Attractive UX/UI	X					X

Table 4 – Participation Technology Types and their key situational factors

Dimension	Factor	Scenario in Refugee Camp
Environmental	*Access to digital infrastructure*	Limited ICT infrastructure -- often in remote areas
	Support teams / official management of platforms	Capacity building frameworks within humanitarian organizations
	Internet penetration	Home internet generally non-existent; limited to communal spaces & cellular data
	Budget / ICT costs: financial and human resources	Financial resources of UNHCR and camp management is almost always stretched thin
	Topography and landscape	Plots chosen for refugee camps are typically relatively tree-free and flat
Social	*Patriarchal societies: women's use of technology*	Gender roles within many camps are typically conservative
	Institutional willingness to take on new roles	Specified roles within management; fear of losing control
	Self-selection bias	n.d.
	Organization of counter groups	n.d.
	Marketing	n.d.
	Language	Many displacement scenarios force diverse cultural and linguistic groups together
Personal	*Income / financial situation*	Most refugees are well-below poverty line
	Safety / privacy	Fear of government oppression and retribution causes privacy concerns
	Familiarity with technology	Many refugees have no experience with niche ICT tools
	Lack of information	n.d.
	Trust and credibility	Trauma, poor-living conditions do not positively affect trust in management of camps
	Perceived utility	n.d.
	Age	n.d.
	Literacy and education	High % of refugees are under-educated and illiterate, training programs exist in some camps
Technological	*Availability of detailed mapping*	In early stages of camps, there often exists no mapping
	Detailed imagery	Detailed satellite imagery not up to date
	Inaccuracy	n.d.
	Data integration	Data integration between NGOs and management domains likely non-existent
	Moderation	n.d.
	Ease of learning	n.d.
	Instructions on use	n.d.
	Attractive UX/UI	n.d.

Table 5 – Comparison of key situational factors with related refugee camp contexts

In joining these tables, a relational database is created which connects information found in the SRQ 1 and SRQ 2 literature reviews. This can be visualized to show the interrelations of the components being considered, as is done in Figure 5.

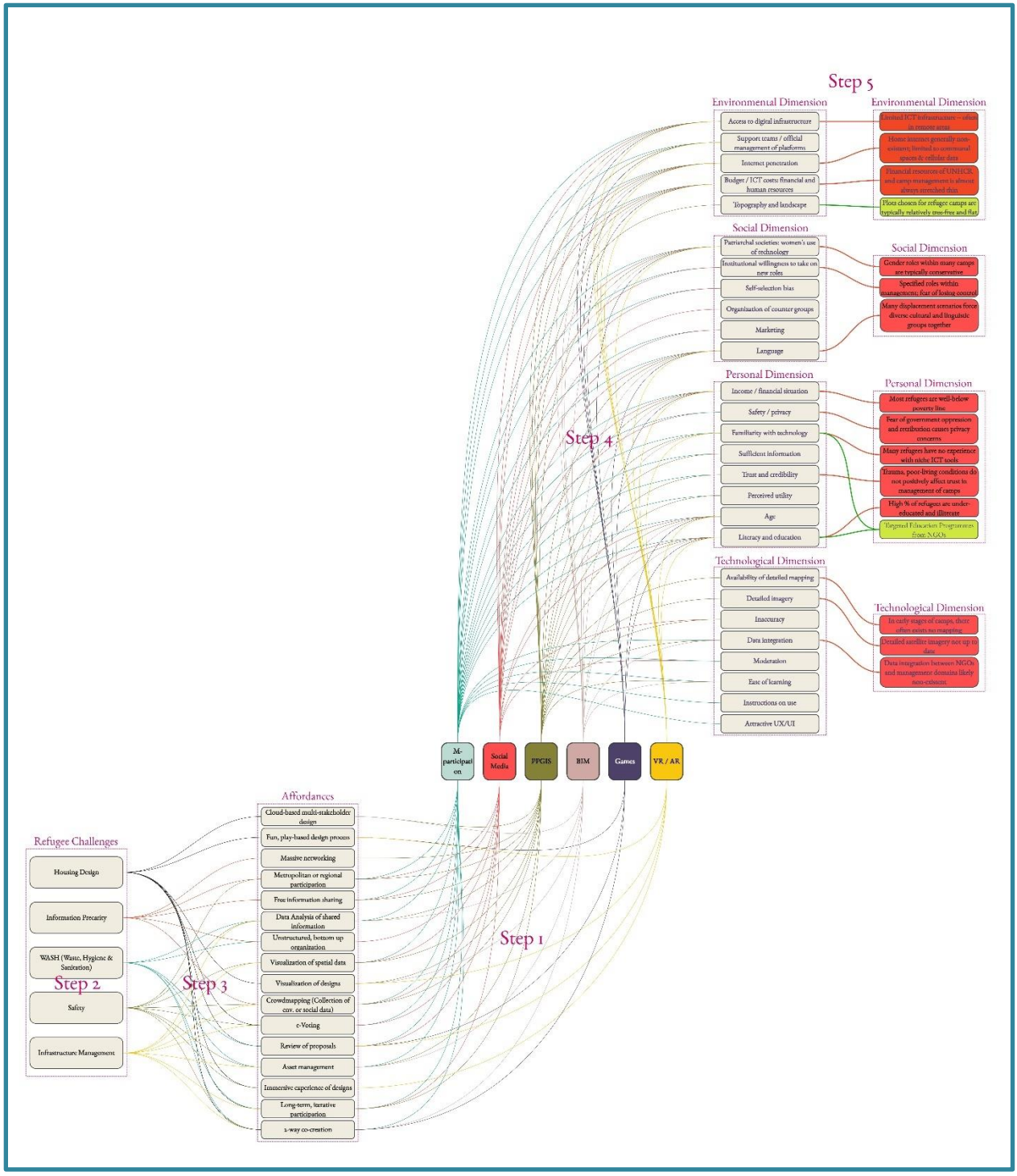

Figure 5 - Diagram of the Digital Camp Framework applied: relational database of steps 1-5

4.3.2 Application of 'Digital Camp Framework' to determine opportunities for e-participation (SRQ 3.2 & 3.3)

This section applies the database to isolated refugee camp challenges. It focuses in detail on one case, namely *Housing Design.* The four other typical challenges are diagrammatically explored in Appendices A-D. Since Step 1 has been fulfilled by building the database, the process begins at Step 2. As the steps of the framework are carried out for the given case, unrelated elements are deleted, isolating the affordances and factors which are connected.

Case 1 – Housing Design

In isolating for housing design, there are several affordances which relate to the challenges identified in Section 4.2.2. The affordances which theoretically could be beneficial to refugee camp challenge include the following: *Cloud-based multi-stakeholder design*, due to the collaborative and interdisciplinary nature of camp housing design. *Fun and play-based design processes*, as design workshops can benefit greatly from engagement. *Visualization of designs*, because of the need for communicating expert-led and community-led architectural designs. *Review of proposals,* as design proposals require feedback, and digital review systems can reach wide audiences without the need for personal delivery and collection. *E-Voting,* due to the need for deliberation on finalized options. *Immersive experience of designs,* because of the challenges for refugees understanding scale and interiors. *Long-term, iterative participation,* as it has been identified that refugee housing should be considered a process, rather than a product. *2-way co-creation,* due to the necessity of interaction between refugees and camp management, who will ultimately procure the resources and likely build the shelters.

With the identified needs, no single technology was shown as being capable of providing all of the affordances. Nor was there a combination of two technologies which could. However, combining M-participation and VR/AR visualization technology could provide for all the affordances except for cloud-based multi-stakeholder design. Thus, these two technologies were carried forward into Step 4. Step 4 returned 17 factors to consider; 4 in the broad environmental domain, 5 in the social domain, 8 in the personal domain, and 5 in the technological domain. These factors, and the process for Case 1 can be seen in Figure 6 below.

Step 5 connected the typical factors which affect the adoption of M-participation platforms and VR/AR to the situation in refugee camps. Based on the SRQ 2 literature review, not all the factors had identifiable typical situations in refugee camps, but 13 had contextually related pre-conditions. The majority – 12 out of 13 – were negatively affecting situations. The one potential enabler was targeted education programmes within refugee camps.

Within the *environmental dimension, limited ICT infrastructure, lack of internet penetration,* and *financial resources* are barriers to effective rollout. Without ICT infrastructure, the internet access – upon which digital participation is reliant – will not be possible. The financial and human resources may be a limiting factor for the use of VR and AR technology, as the hardware required is expensive, and requires expertise to operate. Similarly, the use of M-participation platforms is often contingent on the development of a customized system for the

specific challenges and context. This can be costly, though the UNHCR has been developing systems which could be used (UNHCR, 2021). The literature used does not provide context on the capacity of refugee camps to organize support teams and management for these technologies.

In the *social dimension*, *gender roles, institutional status quo,* and *linguistically diverse communities in camps* are barriers to effective utilization of M-Participation platforms and VR / AR. Some communities in refugee camps have been shown to shun women and girls' usage of technology, and in particular ICT. This could result in the processes involved only being leveraged by one half of the population. The transition from a top-down decision-making role to one of facilitating co-creation has been shown to be met with resistance by camp-managers. As languages within refugee camps are often diverse, platforms must be accessible to all, or else interpreters are required.

Within the *personal dimension, poverty amongst refugees, fear of government surveillance, lack of literacy and education, inexperience with ICT tools,* and *mistrust of management in camps* are barriers to adoption of these digital participation tools. Poverty prevalence amongst refugees means that there the likelihood of refugees having access to a cellphone or laptop is low. Fear of government surveillance and mistrust in camp management can stoke fears of misuse of data, spying, and ultimately reduce willingness to participate. Lack of literacy and education, and inexperience with ICT can make reading and using digital interfaces very difficult, thereby limiting usage to only those with specific educational backgrounds. Again, *targeted educational programmes* can be an enabler, facilitating the usage of mobile or web-platforms.

In the *technological dimension*, only one contextual factor is identified as a barrier. While data-integration amongst interdisciplinary teams is critical to effective decision making, camp management is often operated in siloes, separating the host-government, UNHCR, and various NGOs.

The remaining factors of age, perceived utility of platforms, sufficient information on the process, moderation of platforms, ease of learning, access to instructions on use of platforms, and attractive user interfaces / experiences, are not addressed in the literature. In a specific context, these could be enablers or barriers.

Steps 6, 7, and 8 require specific, situated knowledge about a specific refugee camp in question. This knowledge must include detailed information of the management structure, the refugee population, the host country, and the camp itself. This does not exist in the literature analyzed and is therefore outside the scope of this paper. Nonetheless, utilizing M-participation and VR/AR to facilitate participatory design of housing in refugee camps can provide numerous affordances, so long as the barriers are addressed sufficiently.

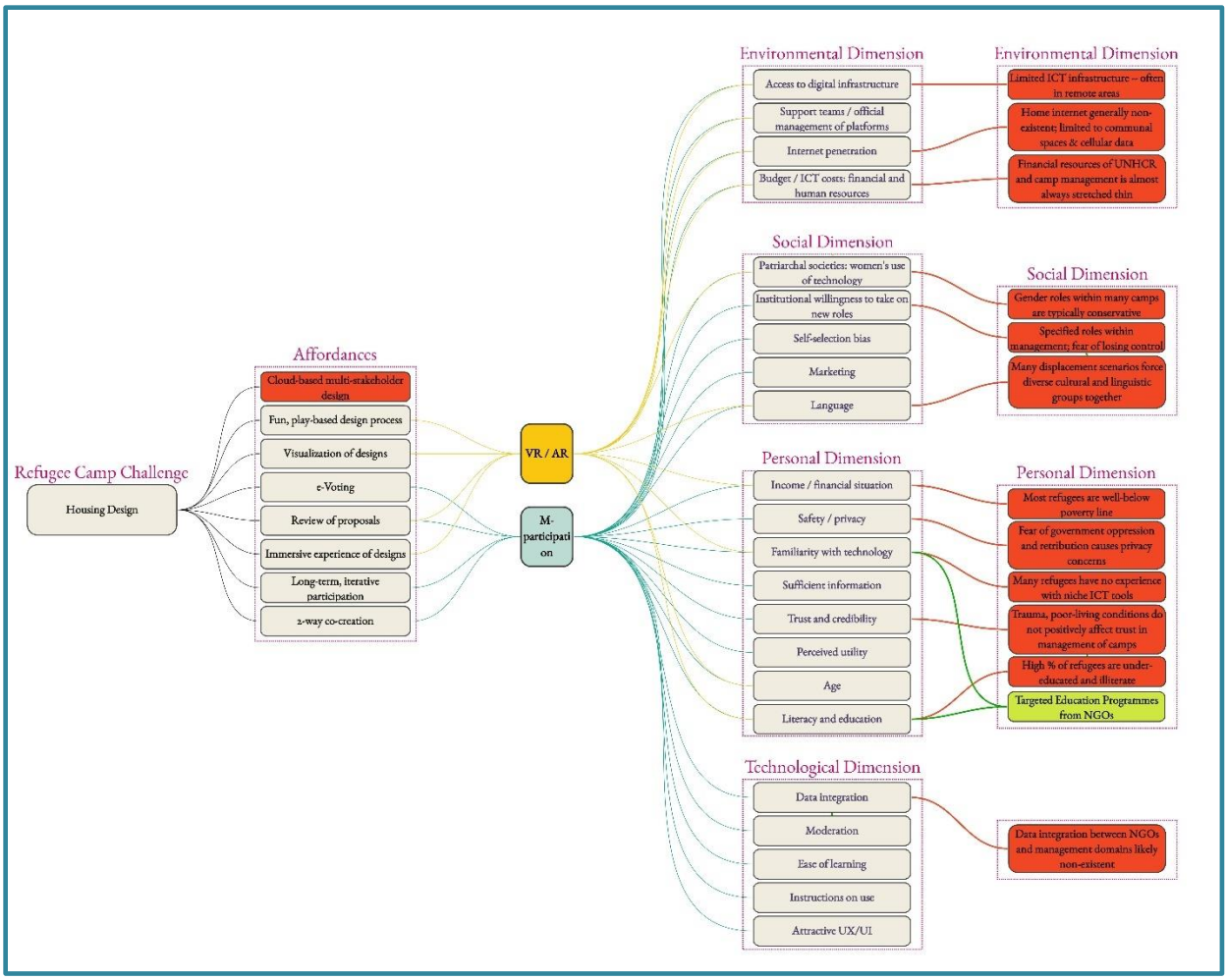

Figure 6 – Application of Digital Camp Framework to Housing Design challenge

5 Conclusions

Through two systematic literature reviews, and the extension of the Media Use Behaviour Conceptual Framework (MUBCF) to synthesize them, this study answered the following subresearch questions: SRQ 1 – What is the current state of digital participation in urban areas? SRQ 2 – What are the major challenges affecting refugee camp cities? SRQ 3 – How can the findings from SRQ 1 & 2 be extended to theorize systematic benefits and challenges in facilitating digital connectivity in refugee camps?

In answering SRQ 3.1, the 'Digital Camp Framework' was developed, by extending the MUBCF and integrating it with the information gathered in SRQ 1 and SRQ 2. This ultimately yielded the results for SRQ 3.2 and 3.3, and in turn the overall Research Question.

What are the theoretical benefits and challenges of using digital participation technology in refugee camps to address critical planning issues?

The theoretical benefits of using digital participation technology in refugee camps can be summarized as such: In addition to the general benefits of digital participation such as facilitating *wider reach and volume of participation, building trust,* and *increasing engagement*, there are numerous affordances from digital participation technologies which link well to refugee camp challenges. In contributing to challenges such as *housing design, information precarity, safety, W.A.S.H. (water, sanitation and hygiene),* and *infrastructure management,* the most promising technologies such as *M-participation apps, PPGIS,* and *Social Media*, may afford refugee camps significant opportunities for co-created solutions. Some of these potential benefits could empower refugees to share information and their stories freely via the *massive networking, free information sharing,* and *unstructured, bottom-up organization* affordances of Social Media. This could contribute greatly to the *information precarity* challenge. *Long-term, iterative participation,* online *reviewing of proposals, e-Voting,* and *2-way co-creation* are affordances of M-participation platforms which could actively contribute to many refugee challenges, such as housing and infrastructural design as well as WASH, by allowing refugees to have a direct, official, low-cost opportunity to communicate with camp management. *Safety* in refugee camps may be in part be addressed by combined PPGIS and M-participation platforms, such as the *My-Safetipin* system being used in India. The affordances of such a system are *crowdmapping, bottom-up organization, asset management, long-term, iterative participation, free information sharing, analysis of shared information,* and *visualization of spatial data.*

These potential benefits are considered conditional. The potential benefits will only be afforded to refugee camps if many barriers are to be overcome. Answering the second half of the research question, the challenges of using digital participation technologies are wide-reaching across *environmental, social, personal* and *technological* dimensions of refugee camps. Across most technologies analyzed via the novel 'Digital Camp Framework' the situational factors of refugee camps functioned predominantly as barriers, rather than enablers. Some of these barriers are non-starters for effective application of digital participation technology. In particular, the

environmental barriers of limited ICT infrastructure, internet penetration, and poverty – which can be seen as a proxy for lack of cellphone ownership and/or lack of time to participate. Simply, if there is no infrastructure and there are no cellphone or internet users, there is a very low capacity for any other benefits to be derived from the implementation of these systems. Similarly, budget and resources are a major environmental factor which presents a challenge. Most refugee camps are underfunded and given the costs of managing certain technologies such as BIM and VR/AR, there may not be enough money or highly trained staff to facilitate the process properly – especially to overcome other barriers which can add costs. *Social* and *Personal* characteristics, such as *gender roles, age, language, literacy, education, income,* and *experience with ICT* can all function as barriers to accessibility of the tools. They contribute to widening the *digital divide*, in essence, running the risk of including people with certain demographic traits, while excluding large swaths of people at the same time. Some institutional risks such as *integration of data* and the lack of *willingness to transform role* are potential barriers which pose cultural and technical challenges to camp managers.

In sum, the 'Digital Camp Framework' has helped synthesize numerous benefits of application of digital participation in refugee camps for solving critical planning issues, but has highlighted the many environmental, social, technological, and personal factors which stand in the way as barriers to effective rollout and adoption.

6 Discussion

6.1 Interpretation and Contextualization of findings

This research set out to analyze the potential for application of digital participation technologies in refugee camps. It did so within the broader notion of responsible digitization. Cities around the world are following paths towards the *smart city* and leveraging the tools studied here as the backbone of their new digital planning methodology. This research connects to a broader trend in the literature, which critically assesses optimism surrounding the adoption of new technologies for planning and municipal governance. In essence, the results here point to the interpretation that implementation of new (i.e., digital) strategies of municipal governance must be assessed for their ability to deliver on strategic planning objectives. It is not a given that using these technologies will help solve urban problems. Participatory planning, at its core is, is centred upon giving agency and voice to those whose interests are overlooked or unrepresented in the top-down governance of elected and representative democracies. This very idea is central to the societal context of this research. If we are to consider refugee camps urban contexts – which given their protracted nature and scale is a theoretical assumption in this study – then refugees in camps are amongst the most vulnerable and voiceless urban residents in the world. So, while this justifies the exploration of leveraging new participation technologies to try to ameliorate some of the wicked problems associated with camps, it is thus of utmost importance that the implementation of these technologies' functions to better the lives of refugees – and not compound their challenges further.

Some of the core barriers found in the potential rollout of digital participation included environmental barriers. The research was predicated on the premise that ICT infrastructure and devices is becoming increasingly accessible around the globe. While access to ICT infrastructure and internet were identified as key barriers, it is likely that these will be overcome as costs go down. Za'atari Camp in Jordan is an example of where this is already beginning to happen, and where many refugees arrived having already owned a mobile device. It can be reasonably expected that this trend will continue. The funding challenges are likely to continue to be an issue. Most humanitarian situations managed by the UNHCR are critically under-funded and are therefore less likely to spend money on testing new participatory strategies, if they are more focused on getting water and food to refugees. This is particularly relevant for technology types such as M-participation, VR/AR and BIM, which all require sizeable investments in hardware or software development. It could be argued then, that the bottom-up driven technology types such as social media and PPGIS hold more potential for use in situations where the budget is prohibitive to other forms.

Beyond the environmental non-starters, the social and personal dimensions are the dimensions where implementation barriers can run the risk of exacerbating existing challenges, or even creating new ones. On one hand, digital participation technologies can make it more efficient to give voice to groups of people who have never had a say in shaping their surrounds. However, if some social or personal barriers are left unaddressed, digital

participation technologies can create inequalities amongst a community or make existing ones worse. For example, in the context of camps where the social norms relating to women's and girl's usage of technology could limit their ability to leverage new participation opportunities, their voices could be further subjugated in relation to the agency then given to boys and men.

6.2 Implications and contributions of research

Many cities see the efficiency and outreach of digital participation technologies and are keen to test them or adopt them into their gamut of participation strategies. This testing however comes at a cost. With refugee camps a couple of decades behind cities in regards to access to ICT infrastructure and its widespread usage, it can be argued that they will become sites of testing as well. Some of the same basic appeals to cost-efficiency and broad participatory outreach fit within UNHCR camp management goals. However, the adoption of these technologies, as the research has shown, does not necessarily afford all their potential benefits to the refugees themselves. As such, these results give warning to some of the considerations camp managers must make when determining the suitability of using them. Given the lack of research (due to lack of implementation of digital participation technology) on the topic, there is very little guidance for future camp managers. As such, this research holds value in its novel approach to synthesizing existing experience found in the literature in traditional urban contexts, with the literature describing the challenges and contexts of refugee camps around the globe.

In developing the 'Digital Camp Framework', a novel methodology was created for analyzing the potential performance of a given digital participation technology in a new, untested context. This framework allows researchers to systematically compare situational factors and assess how they may affect what benefits may be gained from utilizing a new technology, and which risks are present. This may be a key step in developing strong implementation strategies which are built off of specific desirable outcomes, previous use-cases of a technology, and the contextual factors in a new setting. These results fundamentally show that there must be careful consideration of environmental, social, personal, and technological barriers before rolling out a new digital participation technology, and these must be included in strategic implementation strategies to mitigate risks to the affected refugees.

The application of the 'Digital Camp Framework' in this research, contains relational data specific to refugee camps and digital participation technology. The synthesis between these topics, in an operable framework is a novel contribution. This framework design, however, could be adapted to other technological applications in cities. Adaptation of the MUBCF – a relatively new framework itself – to an urban planning context may also provide value in the growing context of smart cities developments and political transformation.

6.3 Limitations

Due to the subject matter – digital participation technology in refugee camps – there has been limited testing in the field. As such, the data for this research was built entirely off existing literature. With a focus on research which analyzed the usage of specific technologies – often across many years and contexts, there are several limitations. With more established usage of M-participation, PPGIS and increasingly Social Media, these technologies were significantly more present in the literature review. It also follows that the information that could be synthesized about BIM, VR/AR (specifically for the purpose of participatory planning), and Games is limited in comparison. Carrying this limitation through the research, the affordances from these technologies were not as detailed, and it is unclear still whether this is due to the more niche nature of their application, or due to the lack of included literature which comprehensively highlights all the opportunities. As such, these technologies may not appear to be first choice approaches, while they may well be in some contexts.

On the side of the refugee camp analysis, one key limitation is the breadth of the research. This research aimed to determine general opportunities and risks of the application of digital participation technology for refugee camps. In doing so, however, the detailed situational factors are not present for analysis – making steps 6, 7 and 8 of the 'Digital Camp Framework' impractical in its theoretical application.

This research aims to utilise general findings about technology types, in comparison with general findings of refugee camp challenges, to build the framework and provide a start. This generalization however should be critically considered, as given M-participation platforms or PPGIS methodologies may function vastly differently in one refugee camp from another. As such the results of this research should be understood as a proof-of-concept for the framework and synthesis methodology, rather than comprehensive best practices.

6.4 Recommendations for future research

Building off the limitations above, opportunities for application of the Digital Camp Framework exist. The framework could be applied in cases where more detailed ground knowledge of the context is available to the researcher. This should be done in conjunction with greater specificity in the technologies available and the challenges at hand. Research into this topic would be greatly strengthened by field work focused on the social and personal dimensions of refugees to get a more accurate, bottom-up perspective. As ICT infrastructure becomes increasingly available in refugee camps, testing of the framework could be done in order to validate its efficacy in predicting affordances within applications of technologies in new situations / contexts. The content (findings) of this research should be validated against future applications of digital participation technology in refugee camps.

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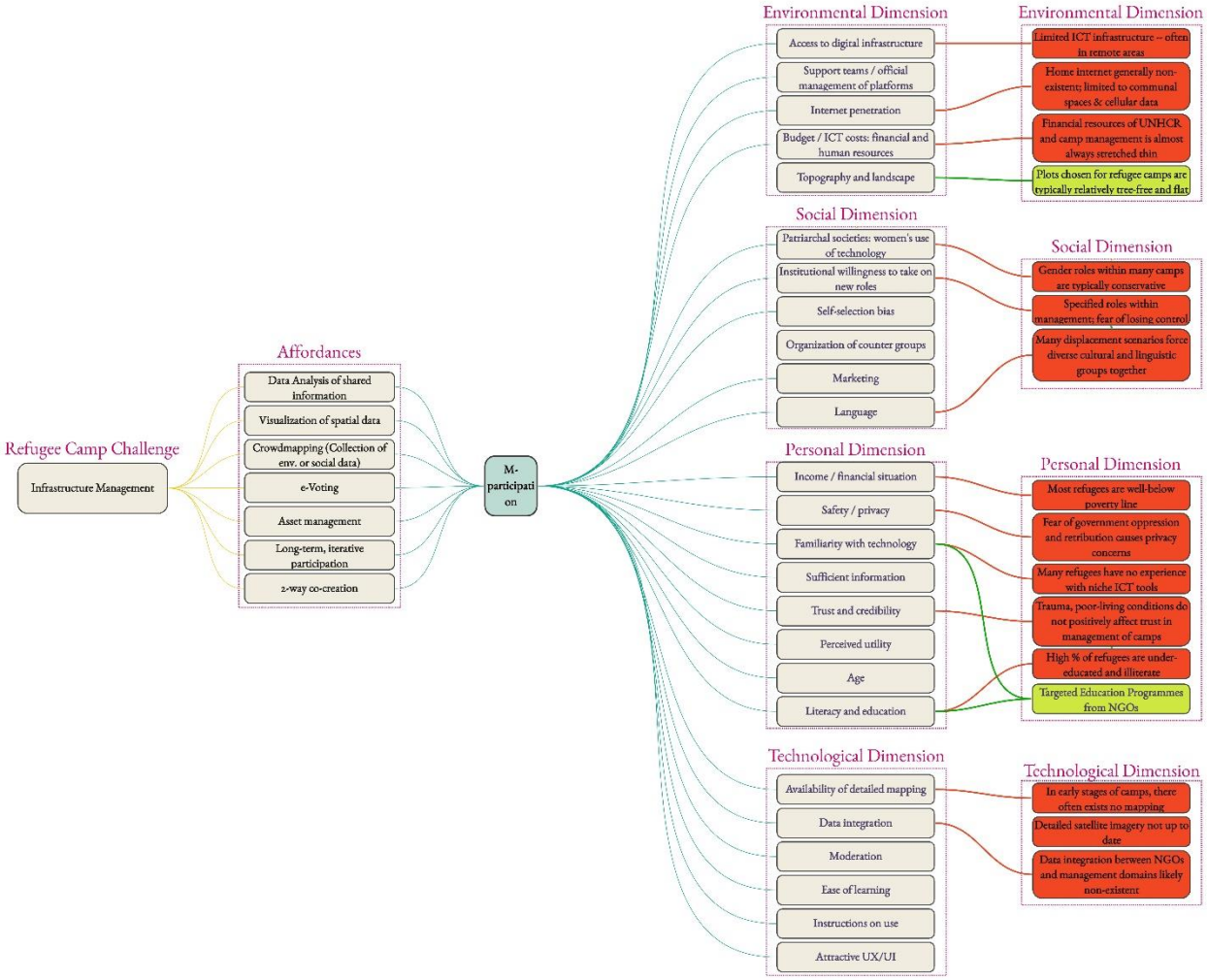
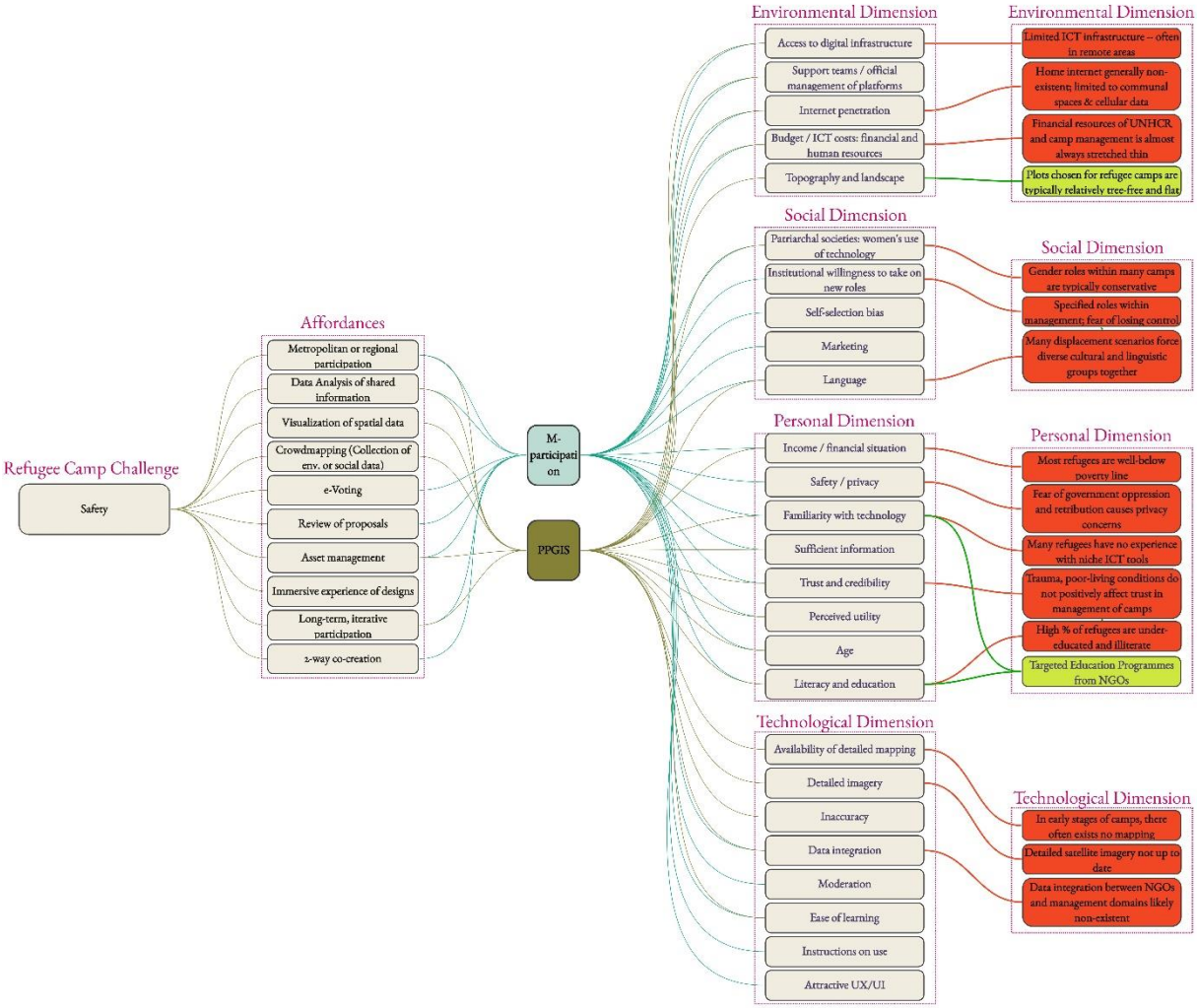
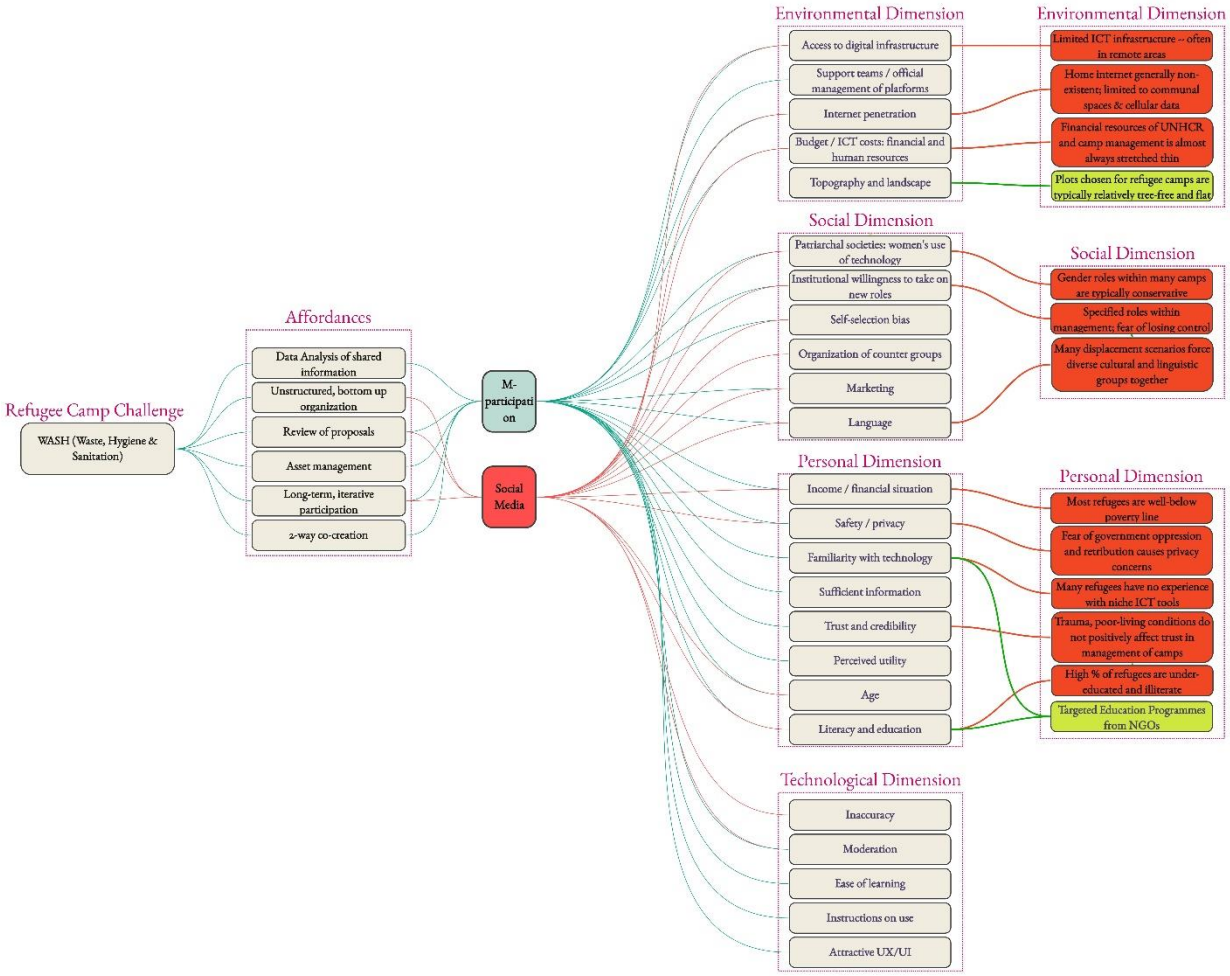
Appendix A: Infrastructure Management Framework



Appendix B: Camp Safety Framework



Appendix C: WASH Framework



Appendix D: Information Precarity Framework