Promoting Participatory Community Building in Refugee Camps with Mapping Technology

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ABSTRACT
Mapping technology has the potential to be a helpful tool in community building. This paper explores its promise for this purpose in refugee camps. We posit such tools when used for participatory planning can be useful for building more sustainable living environments. This is especially true when a camp is transitioning from a site of crisis response into a stable location of recovery. In this note, we first discuss the current state of refugee camps and then examine the benefits and constraints of mapping technology in participatory planning and community building. This preliminary analysis identifies critical stakeholders and infrastructure constraints, and additionally makes recommendations for appropriate technologies. In particular, we propose the use of Public Participatory GIS and take the novel approach of applying the sociological framing of a Boundary Object. Drawing on data gathered while planning a field study of Za'atari Syrian refugee camp, we assess the feasibility of this framing for future analyses in the camp.

Categories and Subject Descriptors
K.4.m [Computers and Society]: Miscellaneous

General Terms
Management, Human Factors

Keywords
Maps, Mapping Technology, Refugee Camp, Syrian Refugees, PPGIS, Community Building, Boundary Objects

1. INTRODUCTION
By the end of 2013, 16.7 million people were forced to flee their countries. Out of these, 6.3 million still live in protracted situations, mostly due to ongoing wars in Africa and Middle East [17]. The average time they are expected to be in exile is seventeen years [4]. Using Syria as an example, over 3 million refugees have crossed the border to neighboring countries [18]. The population of Syrian refugees in Jordan specifically has reached more than 618,000 at the end of October 2014, and around 20% of those are temporarily living in refugee camps.

Refugee agencies and host countries view camps as a last resort for temporary shelter. Preferred are normal living environments, where refugees can access services alongside host country nationals. However, when cities become overwhelmed with asylum seekers, camps become the only option.

In protracted crises, refugee camps may evolve from a temporary transitional population center to a more complex and stable ecosystem. In camps, refugees can be stably settled and socially supported until the day they can go home or resettle in another country. Camps can quickly urbanize and grow to the size of a city, which creates the need for both time-critical on-the-ground humanitarian response and sustainable city-like service [11]. To this effect, United Nations High Commissioner for Refugees (UNHCR) and its partners are conducting simultaneous efforts for disaster response, recovery and urban planning. Building more resilient and sustainable living conditions for the refugees requires a planning mechanism that engages both refugee communities and humanitarian agencies.

In camp building activities, mapping technology can be used as a window to understand spatial information flows among various stakeholders and also as a platform to coordinate participatory activities. Ultimately, mapping technology can be used to inform decision-making on spatially-oriented issues such as Internet access points, camp security, and critical items distribution. However, since refugee camps are usually located in resource-constrained areas, the usage of mapping technology may not be efficient. In places where online mapping technologies are traditionally used, their development and use is largely restricted to managers in international organizations. To date, efforts to engage refugees in participatory mapping and community building have been limited. Refugee contexts call for participatory approaches, particularly because of their multi-cultural nature. The main conflicts between refugee communities and camp managers normally arise from a lack of common understanding. Participatory approaches enable all voices to be heard in order to build a more sustainable camp environment [5].

In the following sections, we first provide background information, discussing existing mapping technologies used in community building, the constraints associated with adopting these technologies and participatory mapping. Next, we examine how these technologies might be applied in the Za'atari Syrian refugee camp in Jordan, analyzing the potential and constraints. Finally, we close with recommendations for future research.

2. MAPPING TECHNOLOGY IN COMMUNITY BUILDING
The initial application of mapping technologies to refugee camp planning focused on using Very High Spatial Resolution (VHSR)

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imagery [2] to visualize spatio-temporal population dynamics and inform camp modeling. Later on, the spatial methods contained in remote sensing, Geographic Information Systems (GIS), and Global Positioning Systems (GPS) expanded the technology to wider applications, both inside and outside of refugee camps. To assist with planning, the maps will show overlying types of information for better informed decision-making in areas like resource allocation, planning and rapid camp assessment [7].

In humanitarian refugee and camp planning contexts, mapping technology is seen as a tool for the early stages of disaster response. Typical usage might include location selection by the hosting government or UNHCR, rapid assessment of the camp's population using geo-coded data, and core relief items logistics. For instance, UN Operational Satellite Applications Programme (UNOSAT) provides basic satellite images [21] and creates a standard for Rapid Mapping Service in partnership with the international humanitarian community [22]. Mapping service providers, like REACH Initiative, add additional layers of camp information, with multiple languages and useful symbols, to inform humanitarian actions [12].

While the discussed uses of mapping technologies are good examples, there remain numerous ways refugee camps could make more effective use of mapping technology, such as camp planning, implementation and long-term maintenance. This is particularly important to help foster collaboration and coordination.

2.1 Mapping Technology Benefits to Refugee Community Building

There are several benefits mapping technologies could bring into community building, collaboration, and coordination activities in refugee camps. Paired with other technology, like mobile technology, mapping activities become more accessible to a wide array of actors, such as camp officials and the refugees themselves.

Camp managers and organizations can use maps created from data on refugee populations and movements, water and food distribution, and camp security to help assess the situation in real-time. Additionally, they can use these maps to generate a common operating picture that takes into account the long-term evolution of the camp. Coordination among organizations on various daily activities could also be enhanced. Observations from camp planning visits and online photos of camp planning meetings suggest most camp managers make extensive use of physical base maps for camp strategizing. However, camps experience rapid change such as new structures, different places for the distribution of resources such as food and water, and new buildings for refugee-run businesses. With the rapid pace of change, paper maps quickly become obsolete.

Maps, whether physical or online, could also be useful for *refugees*. They could use maps to increase their awareness and familiarity of the overall camp situation and to negotiate with service providers. Evidence from Lima suggests positive outcomes of map use by low-income residents. There, 3D mapping enabled by drone pictures is helping favelas residents address community issues [13]. Even where refugees' online access is limited, high resolution pictures could encourage greater attention to camp development by community members and to foster higher levels of commitment to collectively agreed upon camp and building plans.

Thus, the use of maps can help support the degree of order desired by camp managers without ignoring the self-organized leadership of the refugees. This can potentially reduce conflicts between the camp's two main stakeholders. However, these results depend on the degree to which mapping technology can help bring greater transparency into decision-making activities by integrating various data sources. Further, mapping may also improve relations with another important stakeholder - the local communities with proximity to the camp. By increasing the understanding of the wider environment, maps may have a positive experience with interaction and integration with such communities.

2.2 Refugee Camp Mapping Technology Adoption Constraints

History. The Handbook for Emergencies by UNHCR [20] provides a guideline for camp planning based on the belief that basic human rights and human needs are identical. Many camp designers and planners use the standard layout by default, which can be useful in disaster response but may also seed potential long-term problems. An important limitation of a default layout is that it fails to adequately take into account the situated cultural and socio-economic context.

Infrastructure. Due to constraints in the availability of critical infrastructure, mapping technology, which is supported by both a stable power system and Internet access, is seldom active in a camp, particularly at the outset. However, online tools can be used to process data collected both in the camps and via satellites to generate useful paper maps. Still, the static nature of these maps is a big constraint for time-critical humanitarian relief. For digital maps, like OpenStreetMap, there are limited efforts to add publicly available information, despite their open and cost-effective nature. Individuals and volunteer organizations can play an important role in increasing effective use of maps by contributing real-time data. While such efforts are thus far missing on the ground, refugees themselves could form a community of contributors, especially with the condition of infrastructure gradually improving.

Concept. Current efforts put into humanitarian relief activities in refugee camps are to protect refugees in the short term and to help them resettle as quickly as possible, a long-term vision on infrastructure and community building is generally missing. However, the current international environment is forcing service providers to think differently and act innovatively to battle new challenges such as refugees integrating with local communities and camps turning into cities. Maps can help refugees engage in their development through active participation. However, it is first necessary to identify the most suitable tools to coordinate and promote this vision.

Luckily, efforts are under way to revise camp design and planning processes. For example, Ennead Architects and Stanford University are working with UNHCR on providing a flexible design toolkit that could support contingency planning processes on camps and insert features for future improvement[3]. Generally speaking, the camp planning and community building will benefit from participatory activities with all stakeholders engaged.

2.3 Participatory GIS and Refugee Community Building

As previously discussed, both the use of mapping technology in the design of new refugee camps and the general use of geographic information (both digital and analog) for the coordination of camp activities is well documented (c.f. http://data.unhcr.org/)

Despite these advances, less research has been conducted on combining the ideas of public participation Geographic Information Systems GIS (or PPGIS) and the use of PPGIS to support community building among camp-based refugee populations and camp officials. PPGIS describes when GIS technology is used to involve various stakeholders in planning, policy making and the advancement of goals [15]. PPGIS ideas are often incorporated into post-natural disaster community rebuilding activity [1], and community perceptions of risk and risk reduction [8][6]. Refugee camps and natural disaster situations are closely connected in that they both follow a sequence of response and recovery from an unfortunate event. This makes the ideas of PPGIS applicable to the refugee camp environment. For example, refugees need to rebuild their lives in a camp after the conflict that displaced them. As camps evolve to permanent settlements, refugees are important stakeholders whose voices, opinions, and positions can be captured and negotiated for in community building using PPGIS. The inherently visual nature of maps can also facilitate access to participatory discussions for a range of people, from those with high tech literacy who can add digital annotations to maps [14], to those who might be more comfortable with low-tech approaches, such as post-it notes and colored stickers that annotate ideas on paper reference maps[16]. To the best of our knowledge, PPGIS for community building in refugee camp environments among the camp populations is a relatively unexplored area.

2.4 A Framework for Public Participatory GIS (PPGIS) as a Boundary Object in Community Building

To better understand the role of PPGIS in community we propose the lens of Boundary Object Theory, which facilitates analyses of a specific object and the various relevant social groups using it [10]. PPGIS in refugee camps inhabits different stakeholders' practices and satisfies certain of their informational requirements. Thus, it serves as a means of translation across these stakeholders. To fulfill this translation role the object must be sufficiently flexible to speak for all of them. However, the object is also likely to have certain limitations that are reflected in the conflicts that arise among stakeholders when defining and using the object. In general, framing the study of PPGIS as a Boundary Object (see Figure 1) facilitates investigation of these conflicts, as well as identification of ways to improve and predict their future in order to more effectively resolve community conflicts through participatory actions. While various groups with different interests all using PPGIS shows the common ground it provides, creating a standard and ideal type of PPGIS requires more effort, which is what we are hoping to accomplish.

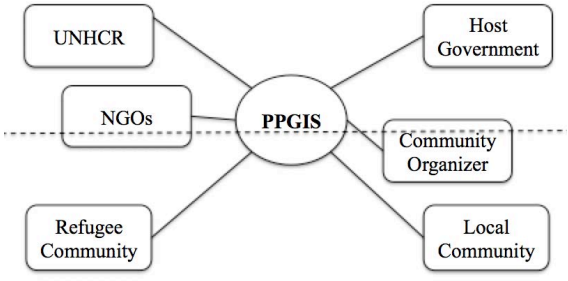

Figure 1 Framework of PPGIS as a Boundary Object.
The thin dashed line represents the gap of current use of PPGIS between the community itself (bottom part of the line) and the service providers (upper part of line)

3. ZA'ATARI REFUGEE CAMP

Guided by the proposed framework, we aim to create a deeper understanding of participatory mapping technology in community building through a case study of a Syrian refugee camp. Located in a desert region near the border of Syria and Jordan, the Za'atari Refugee Camp is one of the world's largest camps, hosting nearly 80,000 Syrian refugees and served by a network of 26 humanitarian service providers [19].

Through a pre-planning visit in February 2014 and an exploratory research conducted in January 2015, we were able to assess the major sub-systems in this multi-organizational and multi-cultural human system and to identify key issues that could be coordinated through the employment of mapping technology. Throughout these systems a dominant theme is constant change.

Through interviews with UNHCR and various NGOs and their publicly available information, we classify activities in Za'atari into the following sub-systems: communication, security and protection, food, WASH (water, sanitation and health), education, the job market and coordination. In two and half years of existence, Za'atari has been stably recovering from the chaos brought by the huge influx of refugees. At its current stage, more than 90% of the households, hosted in caravans, are connected to electricity, part of which is powered by solar energy. UNHCR and its implementation partners are able to use wireless technology, which connects to the Internet, and share real-time information with each other. Additionally, refugees can use cellular services from both Syrian and Jordanian operators to communicate with their family who are in war or in exile or to get on Facebook to read about the conflict in Syria. Various organizations are distributing core relief items, enabling refugees to settle with their basic needs met. However, unexpected behaviors and innovations spring up every day. Refugees are seeking additional resources; for instance, they rewire the public electric grid cables and they try to connect their own water pipes to public water tanks. Additionally, they undertake creative livelihood activities; for instance the camp hosts approximately 3000 refugee owned and operated shops generating more than 10 million euros a month [9].

As Za'atari evolves into the fourth largest city in Jordan, its demands, and consequently its development strategy, should be altered into building a more sustainable society. One potential mechanism is to engage stakeholders, especially refugee communities, to make collaborative decisions using maps. In Za'atari, the UNHCR coordination unit has been working with REACH Initiative to conduct rapid camp assessments via analytical maps. In fact REACH characterizes Za'atari as the most mapped camp in the world. But the engagement of refugees themselves and also collaboration between camp management and refugees through mapping technologies for decision-making are not commonly found. However, in the future some functions, such as planning, within UNHCR are interested in using mapping to support collaborative decision making about issues such as where to build a new school and other infrastructure or how to maintain security during civil unrest. Using the boundary objects framing, we can explore further on how stakeholders interact, how much capacities different stakeholders have in terms of spatial reasoning, internet and appropriate device access, and how much they contribute.

Three initial observations suggest the boundary object framing has merit. For example, the online mapping technologies currently used in Za'atari consist of OpenStreetMap and the satellite images from UNOSAT in Za'atari. Comparing these maps we can find inconsistencies and thus possible inefficiency in the Boundary

Object itself. These inconsistencies will likely hinder coordination among organizational users and the participation of the refugee community, and suggest the need for an improved design consisting of a standardized platform for mapping refugee camps. Second, for stakeholders, current camp development activities are mainly considered as the responsibility of camp managers, excluding the largest group - camp residents. Balancing the input from these various groups on community building through a boundary object could benefit the long-term development under the protracted situation. Third, the modification and upgrade of camp sub-systems is not seen as necessary unless there is an urgent need, which obviously excludes daily participatory community building. However, sub-systems are the granular participatory units for stakeholders to engage in, and these systems are highly connected with each other. These connections are often most visible on a map. In summary, identifying major conflicts among stakeholders and building a practical model that engages communities and links sub-systems through online mapping are the main goals of our future research.

4. FUTURE STUDY

Mapping technology provides a platform to expose and solve problems and conflicts. Future efforts could be put into other refugee camps and other similar situations, such as the management and development of slums and favelas, which are also experiencing rapid change, encouraging the participation of all stakeholders, and seeking a more sustainable living environment.

Although situations in different refugee camps vary significantly, a baseline of using PPGIS to coordinate sub-systems and engage all stakeholders is necessary to build a more collaborative and sustainable human system. We are hoping to further test our proposed framework of PPGIS in community building under other camp contexts and to generate knowledge on building a standard model of PPGIS that empowers organizations and refugee communities to make collaborative decisions within and across sub-systems in the camps.

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