Creating Resilient Communities for Post-Sustainable Times

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Abstract

Resilience is a key factor in a community's ability to adapt to unexpected changes such as those caused by natural or hu(man)-made disasters. Resilient communities are characterized by strong social ties during emergencies, access to a wide range of resources, and availability of support. The least resilient communities consist of vulnerable populations such as the poor, the elderly, new residents, and those who are alone, or isolated as a result of homelessness. These populations often lack strong social ties as well as access to resources.

The purpose of this paper is to spark discussion around ways in which HCI can position itself to build resilient communities, especially among vulnerable populations during times of disaster. Drawing from existing literature around disaster recovery and planning, social science, and crisis informatics, this paper poses new research questions for "post-sustainable" HCI.

Author Keywords

Post-sustainability, crisis management, resilience, resilient communities, human-computer interaction.

ACM Classification Keywords

H.5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous.

Introduction

Coping with natural disasters, often stemming from climate change, is a key component of how human settlement and resource use have evolved [5]. This type of coping is a form of resilience. Resilience as a concept represents a deep shift in traditional perspectives that attempt to control changes in systems that are assumed to be stable. This new shift aims to have a more realistic perspective, focusing on adaptation to surprise and uncertainty [1]. RAND Corporation's community resilience website[1] defines community resilience as a *measure of the sustained ability of a community to utilize available resources to respond to, withstand, or recover from adverse situations.*

A key aspect of understanding how to create resilient communities is to understand characteristics of both resilient, and non-resilient communities. Another part of understanding how to create resilient communities is interpreting these characteristics into measurements, designs, and implementations. How can we create resilient communities and/or evaluate our designs without first knowing how to measure resilience? We must also recognize what HCI has already contributed to this area and ways to extend and improve upon our existing work.

Understanding community resilience

Given the emergence of disasters resulting from environmental issues, understanding and building community resilience is imperative. Knowledge, social connections, effective communication, strong social networks, easy access to information and a wide range

of resources are characteristics of resilient communities [2]. Much of the literature identifying and describing least resilient populations recognized the special needs of the poor. For example, [17] found that attention should be given to this population because after a disaster, it is the one most likely to reside in shelters or temporary housing and to remain there for longer periods. However, in a recent article in the *New Yorker*, Eric Klinenberg described how two relatively poor (demographically similar) neighborhoods fared differently in a severe Chicago heat wave occurring in July 1995 [12]. One neighborhood (Englewood) reported a fatality rate of 33 per 100,000 residents while the other neighborhood (Auburn Gresham) reported a death rate of 3 per 100,000 (better than many of city's rich neighborhoods) [12]:

The key differences between neighborhoods like Auburn Gresham and others that are demographically similar turned out to be the sidewalks, stores, restaurants, and community organizations that bring people into contact with friends and neighbors. The people of Englewood were vulnerable not just because they were black and poor but also because their community had been abandoned.

Resilience requires a certain set of characteristics such as social cohesiveness and access to information [12]. These characteristics are consistent across disaster recovery and planning, community and crisis informatics, and social science literature.

Now that we have a basic understanding of community resilience, my approach was to question and possibly address issues in our post-sustainability discussion.

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[1] http://www.rand.org/topics/community-resilience.html

HCI Post-Sustainability Research Questions

In our understanding of community resilience, we know vulnerable populations may be at higher risks of sustaining the greatest impact from disasters. Therefore, there may be more opportunities to bring about change within these communities. We also know that these populations are not incapable of achieving resilience. Given our understanding of risk factors affecting vulnerable populations in times of disaster, I have included three research questions to explore:.

Question 1: How do we incorporate measures of resilience into our experiments and long-term deployments?

In examining current disaster-related research both inside [18] and outside of HCI [19], and similar research in citizen science [3][10][11][22] as it relates to community engagement, very few studies measure—or include a plan to measure—the impact an intervention has on offline, or physical communities. Reports of resilience have often been limited to the number of survivors in a given area versus another area. However, if we as a community wish to use technology to build resilient communities, we must incorporate measures of resilience into our experiments and long-term deployments to accurately measure progress.

As described previously, characteristics of resilient communities include knowledge, strong social networks, access to a wide range of resources, effective communication, social connections, and information accessibility [2]. Can we define an HCI standard for measuring resilience before and after an intervention? By "HCI standard" I mean measures that

can be defined by our standard methods. For example, there are measures of community capacity and vulnerability in respect to resilience [8][20]. Can we incorporate these existing measures?
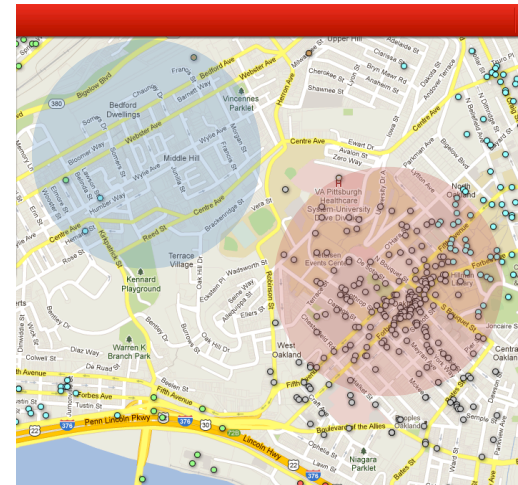

Figure 1 - Screen capture from Livehoods.org – Dots on the map represent check-in locations. The light blue region has a few number of check-ins, which may suggest a low rate of smart-phone usage and/or low-income communities [4]; the red region shows a cluster of check-ins, which could indicate a thriving neighborhood or resilient community.

Question 2: Can we use location proximity, and the frequency of being in the same location to predict communities with access to technology and resources versus those that don't?

One characteristic of resilient communities is that they have access to resources and knowledge. Presumably, this may not be true for non-resilient communities. One question we might ask is this: what can we learn about

those without access from those that have access? The availability of Google maps and data based on the use of location-based online social networks allow for some interpretation of a location's character, structure and "on-the-ground dynamics" [4]. For example, taking the LiveHoods image in Figure 1, one could easily guess which area has more access to technology than the other. As per [4], the lack of application usage and check-in venues may indicate a low rate of smartphone usage of and evidence of low-income populations.

Question 3: What information can be drawn from the use of technology in vulnerable populations?

Though access to technology may be limited to vulnerable populations, it is safe to assume that some form of technology may be available to these populations [6][14][21], or around them as shown in Figure 1. How can we leverage the infrastructure and the interaction with available technologies in vulnerable communities? Could we detect social ties, weaknesses, and/or relative strength of offline communities to identify areas that may need special interventions?

Conclusion
To summarize, this paper argues that a post-sustainable HCI research discussion in regard to resilience must start with an understanding of resilience. This paper poses three research questions for discussion. These questions are key in understanding how to begin implementing technologies that aim to increase resilience in communities, particularly among vulnerable populations.

In addition to holding discussions on the topic proposed in this paper, we should also discuss aspects of "crisis management" within HCI sub-domains. For example, we can look to existing work in crisis informatics[2] and social media to understand ways in which information is disseminated and retrieved at times of crisis, and how the information is filtered [18]; we must also look to social science knowledge around social networks and utilize ways to build social capital.

Given the increasing need for HCI sustainability to focus on more than just the individual [7] as well as the increase in world-wide disasters initiated by climate change [10][13], the workshop's focus on building resilient communities is particularly relevant and timely.

Acknowledgements

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[2] Crisis Informatics is an interdisciplinary field broadly defined as the interconnectedness of people, organizations, technology and information during crises [8]

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