advance innovation

Proposed research for Lifeline project:

June 18, 2009

In the wake of a disaster, victims may find themselves homeless without an address, phone, transportation, identification, money, clean clothes, or a way to access a computer to fill in emergency forms.

For decades, relief services have been inconsistent in providing solutions to assist victims with reintegration into society during the aftermath of major disasters. Although assistance is necessary to those displaced during the months and sometimes years required to reconstruct demolished infrastructure, many individual relief groups provide effective support with only a narrow focus or short time span.

To eliminate gaps and overlaps, we propose a simple, modular, scalable, centralized support system utilizing innovative technologies rather than a difficult to use, distributed, and sporadic assortment of relief services.

Goals and Original Contributions

Our goal is to research, design, and document a scalable, emergency urban environment plan by creating a fractal-like recursive algorithm. We expect the plans to handle from 1,000 to 100,000 people per instance and to be rapidly deployable across the nation. We envision this plan as encompassing four primary structural layers.

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The first layer is the framework or footprint, including elemental factors such as urban policy; master plan; site feasibility and costs; and climatic considerations. We will explore ancient communal compounds as well as Renaissance and contemporary planning concepts. For example, a circular plan with concentric rings may be a starting point as a master plan layout.

The second layer is the infrastructure which includes elemental factors such as communication; public safety; transport methods and accessibility; distribution of energy & water; and waste management. We will explore integrated energy reusability and sustainability.

The third layer includes the architectural plans for distributed resource centers and compartmentalized housing. The distributed resource centers are larger structures and provide a focal point for groups to gather and assist others in need. The compartmentalized housing will be smaller linkable structures. We will explore innovative materials, building plans, rendering techniques, green architecture, integrated furniture, and small, collapsible building structures.

The fourth layer is the management system including deployment; setup; maintenance; provisioning (such as food, clothing, counseling, childcare, education, health & policing services); teardown leaving no trace; and cleaning & storage of the system components between uses.

We will explore the improvements necessary to operate such a system efficiently and effectively. Working with existing subsystems like American Red Cross, the Federal Emergency Management Agency, Hopelink, Goodwill, and others will provide the necessary ingredients to fully develop a useful management system. It is important to include the leaders of these agencies to gain cooperative collaboration.

Mission

We scientifically research interactive communication through the investigation of alternative paradigms and through collaborative innovation. We are working to make technology more transparent, to accelerate the collaborative discovery process.

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Emergency environment structures need to be reusable, quick to assemble, light weight to transport, and scalable to handle the capacities of a wide-spread disaster. The public's comfort level should be sufficient for survival but not comfortable enough to become dependent. The resource center plans will include computer access points, postal services and mailboxes, high-definition communication centers, exercise facilities, and animal services. In addition, we will be exploring the management of large-scale crowds, such as those used in airports or Olympic Games and other large-scale venues.

Our research objectives begin with understanding the vocabulary, history, and current trends in emergency assistance. Next, we will explore potential directions of designing the algorithm. We will then research and design plans for an innovative temporary system which can be quickly deployed and expanded, depending upon the needs. The emergency urban plan will include a flexible site layout and infrastructure, distributed management structures, and a modular housing system. The distributed management structures will be planned to accommodate the deployment of public services. The housing system will be designed using stackable, optimized, efficient, compartmental units to accommodate families and pets. For instance, we will explore the use of existing compact designs used in submarines and jet airliners. The development of such plans will integrate new technologies to meet the elemental requirements defined above.

We expect our research will lead to enabling technologies for further discoveries. We intend to orchestrate a proof-of-concept system through collaborative innovation including existing rescue organizations, government officials, urban planning engineers, and top-level architects with experience in developing public spaces such as airports, parks, museums, and malls. The algorithm we develop can have future applicability to assist displaced war veterans, homeless people in general, and can be adapted to assist other cultures around the globe.

Timeline & deliverables

In 2009, under advisory guidance, we will conduct a reading program, create an interview plan, and formulate a complete proposal. We will establish a more detailed timeline encompassing specific, measurable, achievable, realistic, and timely objectives.

In 2010, to better understand the existing systems, we intend to research and interview FEMA, Red Cross, Hopelink, Goodwill, and other providers of emergency assistance. We will outline our concepts and compile a draft of the embodiment direction.

In 2011, we will refine our findings and designs, incorporate feedback, and complete the study. We will then present the results to the participating organizations and advisors and begin investigating the feasibility of building a proof-of-concept environment.