Design Strategies For a Wetter World

Appendices

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Systems and Systematic Design Workshop
Fall 2005
Institute of Design

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Charter

Background

Global warming is now recognized as fact almost without question. Arguments to the contrary put forth twenty years ago are no longer credible, and only the most extreme critics still contend that the changes we see are natural, not caused by human activities. The question now is not whether global warming is taking place, but how serious its consequences will be.

Over the twentieth century, the Earth's average global surface temperature increased .6° Celsius (1.08° Fahrenheit). Estimates made in 2004 of the amount of warming we will experience in this century suggested a likely range of 2.4 to 5.4°C (4.3 to 9.7°F), but a more recent paper (2005) by a team of Oxford University scientists suggests a significantly hotter range of possibilities: 2 to 11°C (3.6 to 19.8°F), pushing the most likely value upward.

Darkening the picture further, the greenhouse gases already put into the atmosphere will have effects lasting centuries. The concentration of carbon dioxide and its greenhouse gas equivalents in the atmosphere before land-clearing and industrialization in the 18th century was about 265 parts per million (ppm). It is now nearly 400 ppm. To stabilize concentrations at 450-550 ppm will require major reductions in carbon emissions beginning immediately. And the 450-550 level is not safe; stabilization must be succeeded by reductions in concentration, which will take more than a century at natural rates of absorption. Warming at this magnitude is likely to be greater than any since the large and abrupt Younger Dryas event 11,000 years ago. "Warming as large and rapid as that projected for the twenty-first century might be expected to create severe problems for natural ecosystems and human societies. Indeed, evidence from past climate changes of similar magnitude point to major impacts, which, if humans had been present in numbers like today, would have been disastrous" (Pittock 2005, 21).

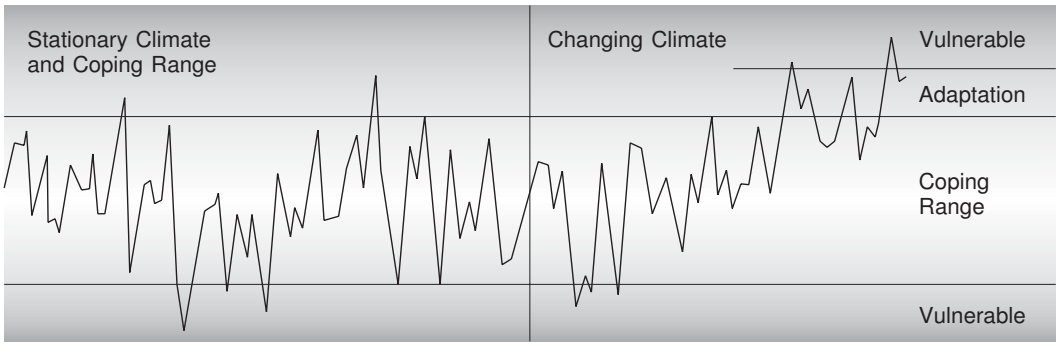

Figure 1. *Adaptation buys time by extending the coping range.* (adapted from Pittock 2005, 73)

It is too late to avoid the effects of global warming. But it is *not* too late to assemble and project strategies and tools to allow us to adapt (Figure 1). To be able to deal with the great challenges of emissions reductions that will be necessary on a global scale to mitigate the worst of the greenhouse changes—while improving or even maintaining our quality of life—will require that we rise above the widely diverse environmental challenges that now will confront local

regions and communities. Change will not be uniform. Some regions will be hotter and drier; some will be wetter. Around the world's coastlines, all habitats will experience rising waters (16 of the world's 19 cities rated as megacities in 2005 were on a coast). Weather events will become more intense and more frequent. And a host of induced plagues will follow on from these climatic disruptions. Our passport to survival will be our capacity to adapt.

A. Barrie Pittock. **Climate Change. Turning Up the Heat.** Collingwood, Vic., Australia: CSIRO Publishing, 2005.

Relevant Trends

Trends initiated by emerging technologies, changing environmental conditions, and evolving social change will have real impact on the situation. Among such trends are:

Population Growth
Population growth continues to soar around the world. Particularly in developing countries, but also in countries with significant immigration (such as the United States), rates of population increase are putting heavy demands on available resources. Although estimates for a final asymptote have decreased, world population is still expected to top 9 billion by 2050. It is now 6.64 billion.

Population Movements
A combination of forces is creating a movement of people from rural to urban environments. In the developing countries, it is the perception that better jobs are in the cities. In the developed countries, it is the renaissance of the city as a cultural center coupled with the progression of societies from agriculture to manufacturing to service to information economies. In 2005 for the first time, the world's population was more urban than rural.

Energy Resource Depletion
World petroleum resources are reaching the point where additions to reserves no longer equal reductions from production. Estimates for final peak production vary from 2005 to a just a few years from now. The world economy, deeply committed to petroleum as fuel resource, must meet its energy needs by other means in the near future.

Diminishing Water Resources
Water supplies are already becoming precious resources in many parts of the world. Today, one-third of the world lives in water-stressed countries; by 2050, two-thirds will be in similar circumstances—including significant parts of the U.S. As regions are strained by greater demand, new efficiencies in water distribution, use, purification and reuse will be mandatory.

Increasing expectations
The growing availability and capabilities of communications such as cellular telephones, satellite and cable TV, and the Internet are providing people with daily knowledge of living conditions, problems, products, threats and services everywhere. As the media create new and faster avenues of communication, they also raise levels of awareness and create expectations that both fuel demand and encourage willingness to change.

Internet Penetration
Computer use and Internet access grow exponentially every year. Information of encyclopedic detail can be obtained more and more easily, and complex, sophisticated processes can be used remotely. Access to high-quality communications and

sophisticated computer tools are increasingly available to individuals and groups anywhere. In the United States, Internet penetration reached 67% in 2005, and some Asian and European countries surpass that.

Emerging Technologies
The pace of technological change continues to accelerate, bringing new science to industrial, institutional and governmental uses at an ever quickening pace. Most notable among many promising fields, major technological innovations can be expected in the new disciplines of molecular nanotechnology, robotics and the biosciences.

New Relationships
Greater public mobility and access to information is changing the nature of association for many individuals and organizations. Organizations that once operated in isolation are now players in a common environment. Sometimes the emerging relationships are competitive, sometimes cooperative, and new forms of relationship can be expected to be created as conditions evolve.

Project Statement

Using Structured Planning methodology, conduct an advanced planning project to develop a portfolio of strategies, processes and system concepts that can be custom-tailored to threats of a wetter environment as they may massively affect a locality or region. The proposal should:
1. treat all concepts as adaptive tools, adaptive to site conditions at implementation, adaptive over time to changing capabilities and conditions.
2. consider the full spectrum of environmental planning from anticipation to preparedness to implementation to restoration.
3. collect and incorporate best practices as they are known to organizations, agencies and planning experts throughout the emerging global warming community.
4. anticipate and plan for networked operational cooperation among affected and spared communities locally, regionally and internationally.
5. seek out and favor concepts that maximize economic, social and/or environmental benefits beyond their primary function to alleviate the effects of global warming.

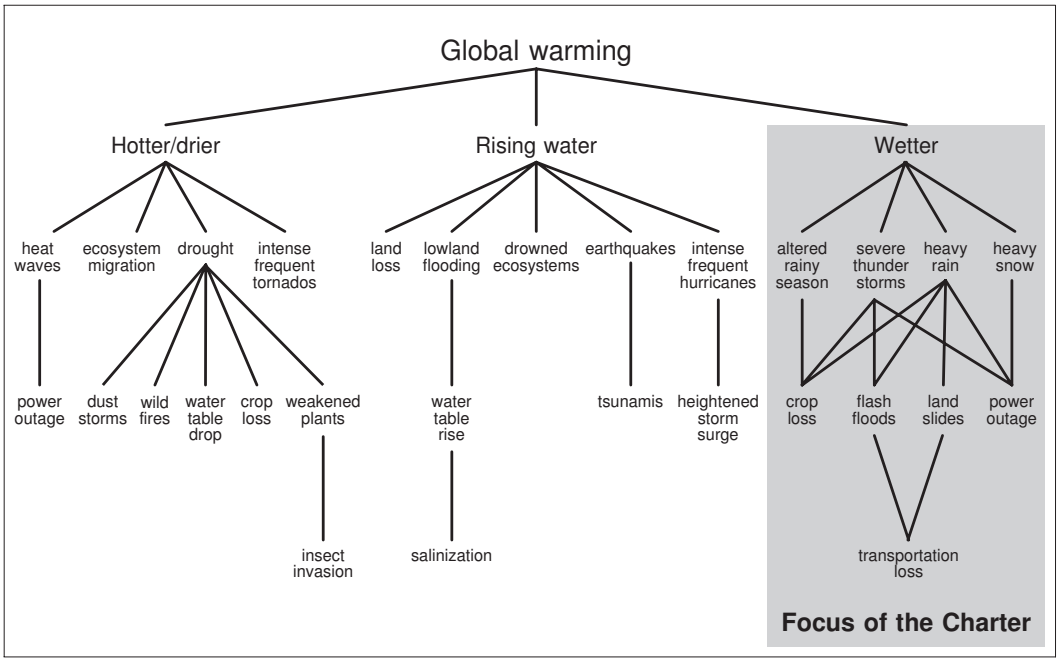

Figure 2. *Some of the local/regional events and consequences to be expected.*

Goals

As general guidelines the project should:

• Explore a full range of possibilities, paying especial attention to the products of emerging technologies successfully advancing through research and development.

• Include ideas for processes, tools, systems and products—including procedures, services, activities, organizational concepts and any relevant relationships among them.

• Explore revolutionary as well as evolutionary ideas.

• Plan for communication processes by means of which other localities, regions and states can learn of and implement successful procedures.

• Consider potential costs and funding thoughtfully; proposals should not incorporate unnecessary frills, but should not ignore perilous outcomes with low risk simply to avoid costs. Treat costs as you would treat those for catastrophe insurance; err on the cautious side and hedge your bet with ancillary economic benefits.

• Conceive the properties and features of the concepts as means to build trust and cooperation between communities. Some will be lucky; others will not; means for the support of others will need to be core tools for all.

Overall, the solution should:

• Assume that the proposal can be acted upon as it is conceived. Do not under-propose on the assumption that a concept might be politically opposed.

• Demonstrate what might be achieved. The value of the proposal is in its ideas, not its certain attainability. Ideas that might not be fully attainable or feasible today may be achieved tomorrow—*if they are known.*

Resources

Resources for the project will be:

Physical:

• The facilities of the Institute of Design, including Room 514 as general meeting space at the beginning of each class session, and 3rd and 5th floors for team activities.
• Computing support from the fifth floor computer facilities.
• Equipment as necessary from ID resources.

Financial:

• None

Human:

• Planning Team

Manoj Adusumilli	**Kristian Buschmann**
Andrew Buhayar	**Alex Cheek**
Jihyun Lee	**Mario Ruiz**

•Project Advisors:

Charles L. Owen	Distinguished Professor Emeritus
John Pipino	Adjunct Professor

Schedule

The project will be conducted from August 29 to December 8, 2006.

Week		Phase	Activity	Product
1	**Aug 29**	Introduction	Introduce project	
	Sep 1	Project Definition	Develop Issues & Defining Statements	
2	**Sep 5**			
	Sep 8		**In-Progress Review**	Issues DefStates 1
3	**Sep 12**		Develop Modes and Activities of Function Structure	
	Sep 15		**In-Progress Review**	DefStates 2 Fn Struc 1
4	**Sep 19**	Information Development *Action Analysis*	Generate Functions, Design Factors and Solution Elements	
	Sep 22			
5	**Sep 26**			
	Sep 29			
6	**Oct 3**		**In-Progress Review**	DefStates cmplete Fn Struc 2 DesFacs 1 SolnEls 1
	Oct 6	Information Development *Action Analysis 2*	Complete Functions, Design Factors and Solution Elements	
7	**Oct 10**			
	Oct 13			Fn Struc complete DesFacs complete SolnEls complete
8	**Oct 17**	Information Structuring *Interaction*	Score Soln Elements vs Functions	
	Oct 20	*Structuring*		RELATN input

Week		Phase	Activity	Product
9	**Oct 24** **Oct 27**	Concept Development	Means/Ends Analysis	Inf Structure
10	**Oct 31** **Nov 3**		Ends/Means Synthesis	Inf Struc named
11	**Nov 7**		**In-progress Review**	Initial System Elements
	Nov 10			
12	**Nov 14**		**Presentation**	Final SysEls
	Nov 17	Communication	Refine final SysEls; write report; complete illustrations	
13	**Nov 21** **Nov 24**	***Thanksgiving*** Holiday		
14	**Nov 28** **Dec 1**			
15	**Dec 5** **Dec 8**		**Final Presentation**	Illustrated Report

Methodology

The project will be conducted using Structured Planning (See articles on the subject by Charles Owen at ***http://www.id.iit.edu*** under the *Publications* section of *Research & Ideas*:
1. *Context for Creativity,* 1991.
2. *A Critical Role for Design Technology,* 1993.
3. *Design, Advanced Planning and Product Development,* 1998.
4. *Structured Planning,* 2001.

Also, see the book by Charles L. Owen available at the Institute of Design: **Structured Planning. Advanced Planning for Business, Institutions and Government. *Notes on the Process with Summary Pages and Examples,*** 2006).

Issues

Consider the following topics as initial issues to be investigated. Supplement them with additional issues as information is developed during the first phase of the project.

Technology. What approach should be taken toward the use of emerging technologies and advanced science and engineering concepts?

Adaptivity. How should elements of the system be prepared to respond to evolving environmental threats and emerging technological capabilities?

Networking. What provision should be made toward partnering with other cities, regions, suppliers of funding, technology, goods, etc.?

Time of Introduction. For what time frame should the portfolio's system of tools be planned for implementation?

Means of Introduction. How should the portfolio be introduced to facilitate acceptance and implementation?

Public/Private Sector Relationships . How should the portfolio be positioned with respect to authority/responsibility for implementation and operation?

Concept Communication. How should the idea of the portfolio and its individual strategies, processes and system concepts be brought to public and institutional attention?

Cost. How should expected costs of system elements be approached?

Disaster Contexts. What expectations should be set for extreme conditions to be withstood?

Self-Sufficiency. What level of self-sufficiency should be sought for communities and other political entities?

Defining Statement

ISSUE TOPIC
Technology

PROJECT
Design Strategies for a Wetter World

ORIGINATOR
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QUESTION AT ISSUE
What approach should be taken toward the use of emerging technologies and advanced science and engineering concepts?

POSITION
Objective — The system should actively seek and develop new technologies that can be applied effectively with a balanced application

SOURCE/S
www.businessweek.com

ALTERNATE POSITIONS
Directive — System should just accept new technologies if there is available.

BACKGROUND AND ARGUMENTS

In the future, technology should help overcome the negative influence of a wetter environment. Applying useful technologies to a changing environment is an important factor in learning to cope. Now, numerous technologies and advanced science are emerging and many old ideas are becoming obsolete in a shorter times.

Because technical needs are also changing with the times as well as the environment, there are already lots of valuable existing technologies available. To accept the technology without consideration can be beneficial in its efficiency and cost reduction. However to seek out and develop new technologies would require more time and effort.

In almost all instances, the introduction of new technology to the world, while it may have increased productivity, has increased costs. While new technologies could improve exploration and performance, under the right circumstances, the real potential of technology is to reduce costs and speed adoption.

A businessweek.com study found that even within industries, companies have found common paths to success. Samsung retains internal control on research of everything from initial product development to manufacturing. Their biggest investment is on R&D. They have invested the biggest portion (up to 30%) of their income to R&D. They develop a new technology and modify existing technology into applicable ones. Of course, it is a significant burden. But, It seems that Samsung gains from its significant investment. They are now one of the fastest growing companies.

Defining Statement

ISSUE TOPIC
Technology

PROJECT
Design Strategies for a Wetter World

ORIGINATOR
Jihyun, Lee

CONTRIBUTORS
Alex Cheek

SOURCE/S

QUESTION AT ISSUE
What range of technology should the system apply?

POSITION
Objective The utilization of technology should be maximized

ALTERNATE POSITIONS

Objective The utilization of technology should be minimized

Objective Technology should be limited to low tech solutions

BACKGROUND AND ARGUMENTS

The damage suffered by New Orleans from hurricane Katrina exemplifies the potential damage caused by a wet weather disaster. Emerging technology is a necessary strategy to support climate change adaptation efforts because we cannot be sure that all climate change can be mitigated. To improve the environmental situation itself is the most desirable, but often too costly.

Most technology to make people adapt to the environment is relatively feasible and cost-effective when compared to the effort for mitigation. But some insists human civilization shows to be highly adaptable to climate change in the past and therefore will likely be able to adapt to climate change in the future without a new technology.

But costs of adaptation now are much higher than in the past due to the greater investment in industrialized infrastructure. Cities in the past could be relocated simply by moving people with their possessions. Cities now cannot be relocated easily even with the use of car, air, truck and rail. Systems are far more advanced than were available in the past. At the same time, there is far more infrastructure to relocate. The costs of relocation could be much higher. We should prepare to the evolving climate change by following a strategy over time in response to observations of the climate. Such a strategy should be maximized to support the research and development of new technologies that could make any drastic action, if necessary, more feasible and less costly.

Technology has been sometimes rather harmful to our environment, but it also should be a necessary strategy changing practices. It will provide more gains than losses. But the utilization of technology can cause weak cooperation. So the direction for the maximized use of technology should be balanced in its use. The core and cost effective technology should be classified and executed in a systematic process.

Defining Statement

ISSUE TOPIC
Technology

DS-3

PROJECT
Design Strategies for a Wetter World

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QUESTION AT ISSUE
What are the required engineering technologies for our system?

POSITION
Constraint Both hi-technology and low-technology must be balanced and developed

SOURCE/S

ALTERNATE POSITIONS
Objective Hi-technology should be actively developed and used

BACKGROUND AND ARGUMENTS

Technology is driven by the desire to improve human life. It is difficult to get satisfactory definition of technology. Generally, the following distinctions can be made: Science, engineering and technology. Conceptually, technology contains science and engineering in its process. The use of technology would make the system more efficient in implementing scientific research.

And those range of technologies are also defined as low tech and high tech according to its utilization and level to implement. Hi-technology is generally considered a newly developed methodology and excellent result on its performance. However, this term means higher level to access. That is, it would be difficult to implement and apply to the real world by its high cost and learning curves. In comparison, low technology is often less reliant on its influence than hi-technology. And it has greater effect in some cases. There would be the dilemma if the system should select possibly between high technology and low technology.

For instance, windows are easily covered with dust as the environment gets wetter. We can easily wipe the windows with- 'Windex' that easily wipe out tough grease and grime as a low-technology. On the other hand, system apply hi-technology to clean windows. Self-cleaning glass prevents dirt build up. Self-cleaning glass breaks down organic dirt using 'Photocatalytic' Process (surface reacts with UV rays to disintegrate dirt) and washes dirt away by 'Hydrophilic' (rain does not form droplets but covers surface evenly and dries quickly). But it would be useless without sunlight because Self-cleaning glass requires sunlight for 'Photocatalytic' process. In that case, the low-technology is more reliable .Moreover low-tech would be far cheaper than hi-tech. But if considering time constraints and labor costs, Self-cleaning glass might be better in the long term. Low-tech and high-tech solutions should be balanced in their application and both should be developed and improved in a persistent manner.

Defining Statement

ISSUE TOPIC
Adaptivity

DS-4

PROJECT
Design Strategies for a Wetter World

ORIGINATOR
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QUESTION AT ISSUE
How should elements of the system be prepared to respond to revolving environmental threats?

POSITION

objective Elements of system should be prepared to developed to changing climate by planned, anticipatory adaptation

SOURCE/S

Climate Change 2001

http://www.grida.no/climate/ipcc_tar/wg2/049.htm

ALTERNATE POSITIONS

constraint System ought to more focus on autonomous, reactive way of adaptation.

BACKGROUND AND ARGUMENTS

There are two ways of adapting to global warming. One is reactive and autonomous way, and the other is planned, cautious and anticipatory adaptation. Societies and economies have been making reactive adaptation to climate for many centuries. Most regions, communities and systems can affordably adapt to changes in average climate conditions, and are effective if the changes are gradual.

But losses caused by unexpected climatic variations and extremes are significant. Moreover in some sectors, this damage is increasing. Associated with temporal variations in climatic condition, reactive adaptation has not been enough to compensate damages. Reactive ecological, social, and economic costs are substantial. But planned, anticipatory adaptation can covered.

Many anticipatory adaptations can provide benefits in the near and longer term. Planned adaptation has limits on its implementation and effectiveness. But well-planned implementation of adaptation policies, programs, and measures usually will have immediate and future benefits.

To what degree are societies likely to adapt autonomously to avoid climate change damages? Some studies show faith in market mechanisms and suggest considerable capacity of human systems to adapt autonomously (Ausabel, 1991b;

Mendelsohn et al., 1996; Yohe et al., 1996; Mendelsohn, 1998; Mendelsohn and Neumann, 1999). Other studies highlight the constraints on "optimal" autonomous adaptation, such as limited information and access to resources, adaptation costs, and residual damages; these studies emphasize the need for planned, especially anticipatory, adaptations undertaken or facilitated by public agencies (Smith et al., 1996; Reilly, 1998; Tol, 1998a; Fankhauser et al., 1999; Bryant et al., 2000; Schneider et al., 2000)

Anticipatory and precautionary adaptation is more effective and less costly than last-minute, emergency adaptation. So the system should be more anticipatory than just relying on reactive adaptation.

Defining Statement

ISSUE TOPIC

Adaptability

DS-5

PROJECT
Design Strategies for a Wetter World

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QUESTION AT ISSUE
What conditions should the system be prepared to adapt to?

POSITION

Constraint The system must be prepared for a range of possible conditions.

SOURCE/S

Interovernmental Panel on Climate Change (IPCC)
Wikipedia
http://en.wikipedia.org/wiki/Image:Global_Warming_Predictions.png

ALTERNATE POSITIONS

Objective The system should focus only on worst case scenarios (big changes in climate).

Objective The system should focus on the best case scenario (small changes in climate).

BACKGROUND AND ARGUMENTS

There is a high degree of uncertainty with regard to how much climate change we should expect in the future.

The IPCC has used eight different climate models to anticipate levels of global warming for the next hundred years. These models show a variance of 4.4 degrees Celsius (1.4 - 5.8 degrees Celsius). This variance represents a wide range of possible outcomes and associated climatic effects. Given that it is difficult for scientists to attribute specific weather events to global warming (the relationship between hurricanes and global warming is still in debate), and the fact that the advent of global warming is uncertain, it is necessary that the system have the flexibility to adapt to a wide variety of outcomes. Choosing one end of the spectrum or the other would likely result in adaptation methods that would not be appropriate for future weather conditions.

Defining Statement

ISSUE TOPIC

Disaster Contexts

DS-6

PROJECT
Design Strategies for a Wetter World

ORIGINATOR
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QUESTION AT ISSUE
What expectations should be sought for extreme conditions to be withstood?

POSITION

Objective The portfolio should include provisions for increasing expectations as regions adapt to, and learn from, weather events.

SOURCE/S

International Strategy for Disaster Reduction (ISDR)
"Disaster risk reduction begins at school"
2006-2007 World Disaster Reduction Campaign

ALTERNATE POSITIONS

Objective The portfolio should set a fixed expectation level for conditions to be withstood.

BACKGROUND AND ARGUMENTS

As different regions experience a wetter climate and its related effects, adaptation methods will raise the bar in terms of what is considered extreme conditions. Part of a strong strategy for adaptation will be to ensure that lessons from weather events do not go unheeded.

The portfolio should ensure that regions have systems in place to gather information about wetter weather on a historical and ongoing basis. This information can then be applied in anticipation of future weather events to reduce loss of life and property.

In Pakistan, where an October 2005 earthquake killed over 16,000 children in schools, the International Strategy for Disaster Reduction (ISDR) responded with a program entitled "Disaster Reduction Begins at School." This program focused on learning from previous vulnerabilities in order to bolster the Pakistani school system against further casualties. Initiatives included building or retrofitting school buildings to withstand natural disasters and ensuring that disaster reduction was integrated into school curricula.

Defining Statement

ISSUE TOPIC

Disaster Contexts

DS-7

PROJECT
Design Strategies for a Wetter World

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QUESTION AT ISSUE
How much of the system should focus on disaster relief?

POSITION

objective The portfolio should devote substantial resources toward disaster relief.

SOURCE/S

USAID/OFDA
MIT Center for Transportation & Logistics
"The 2004 Tsunami Relief Supply Chains"

ALTERNATE POSITIONS

objective The Portfolio should limit itself to preparation and adaptation measures, leaving relief to disaster relief agencies.

BACKGROUND AND ARGUMENTS

While adaptation and preparation measures should be the primary focus of the portfolio, disaster relief represents two areas of benefit: The portfolio should capitalize on the information that can be gleaned from previous and ongoing relief efforts, and use this data to improve efforts in the future. Second, relief coordination has left a lot to be desired in the past. This suggests that the portfolio should meet the need for relief effort coordination and optimization.

A report from the MIT Center for Transportation and Logistics ("The 2004 Tsunami Relief Supply Chains") indicates that while many relief organizations responded to the disaster, help was difficult to get on the ground due to logistical reasons:

- 72% of organizations had a process to create a plan for the relief effort
- Only 28% stated that their plan met needs
- Only 33% confirmed that the plan of action was distributed according to established guidelines
- Affected the effectiveness of assessment, appeal and resource mobilization.

Defining Statement

ISSUE TOPIC

Cost

DS-8

PROJECT
Design Strategies for a Wetter World

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QUESTION AT ISSUE
How should the expected costs of the system elements be approached?

POSITION

Constraint System utilize a model to manage both immediate need and long term costs involved in maintenance and up gradation of the system.

SOURCE/S

Financial Management for Projects
www.worldbank..org
Wikipedia-United Nations
www.fema.org
Building to last-Jim Collins & Jerry I.Porpas

ALTERNATE POSITIONS

Objective Project costs should be allocated to phases with each phase's targets designed to attract and support further spending.

BACKGROUND AND ARGUMENTS

Large Projects usually are expected to have long enough lifetimes to be productive in return on investment . In the case of the "Adaptation into the wetter world," although the project may not directly give in returns, the return can be compared to the number of lives saved during a disaster. However these adaptation techniques -unlike other projects -will have to adapt frequently and, perhaps, massively to new technologies. This means that, as a fraction of total cost, initial costs may be relatively low-depending on how well the systems are designed to be adaptive. A system designed without regard for adaptation may be bargain initially, but will cost considerably more over its lifetime if major changes have to be made and cannot be made easily.

Projects expected to evolve over time - especially those in which the directions of evolution are uncertain-are best served with design and construction philosophy that maximizes the potential for adaptation. This means that more time, effort and money must be spent considering how elements of the system can be used in multiple ways and how configurations can be changed readily to accommodate new components, processes and missions. Extra funding spent early under this design philosophy will reduce funding that will inevitably spent later to make difficult changes. Overall, total costs, with the unplanned costs of future changes, will be lower under a policy that anticipates change and plans for it in the beginning.

Prioritization should be an integral part of the assessment process, using information derived from proposals and evaluating it against high-level criteria such as the number of direct beneficiaries, the number of secondary beneficiaries (Governments, Policy makers, NGOs), cross application of outcome, overall costs, time requirements, extent of management required, logistical feasibility, etc.

Defining Statement

ISSUE TOPIC
Introduction

DS-9

PROJECT
Design Strategies for a Wetter World

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QUESTION AT ISSUE
How should the sites of implementation be chosen?

POSITION

objective Sites for implementation should be chosen based on urgency of need and local ability to expand the system.

SOURCE/S

Gore, Albert Jr. "An Inconvenient Truth" 2006

ALTERNATE POSITIONS

objective Sites for implementation should be chosen based on willingness for local political participation in the system.

objective Sites for implementation should be chosen based on urgency of need.

BACKGROUND AND ARGUMENTS

It will not be easy to choose sites for implementation of the system to be developed. There is already much need for means of adaptation to climate change and a wetter world. In fact, the need is so great that there will be more need than there are resources. Thus, the system will need to use more criteria. One of the goals of the project is that it be a means of fostering trust and cooperation among communities. As a means of accomplishing this goal, a stipulation of implementation should be a commitment to expand the system locally from the local organizing body, be it governmental or not.

Basing the decision solely on urgency of need would set the system up for an early death. By choosing sites that are able to lead and commit to an expansion effort, the system can grow organically and avoid "putting all of its eggs in one basket." Similarly, basing the implementation decision solely on local politics will would not be fair to those in less politically stable regions, which, as stated in the film "An Inconvenient Truth," are also those at the greatest risk of environmental disaster.

Defining Statement

ISSUE TOPIC
Introduction

DS-10

PROJECT
Design Strategies for a Wetter World

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QUESTION AT ISSUE
How should the portfolio be introduced to facilitate acceptance and implementation?

POSITION

objective The portfolio should be introduced in stages including regional and global applications in order to work out problems of acceptance and implementation through iterations.

SOURCE/S

United Nations, http://unpan1.un.org/intradoc/groups/public/documents/APCITY/UNPAN009661.pdf

http://laptop.org/

TEDtalks

ALTERNATE POSITIONS

constraint The portfolio should be introduced en masse globally once all logistic issues have been pre-decided.

BACKGROUND AND ARGUMENTS

The two issues of acceptance and implementation are very closely related in that acceptance will hopefully motivate the human resources necessary for implementation. The system should be introduced in stages for a few reasons, one of these is expressed very clearly in the executive summary of the UN paper Community Based Approaches to Disaster Mitigation :

> The top-down mitigation programs in Latin America had serious flaws such as failure to involve people since community participation was often limited to provision of labor in self-help projects, failure to address vulnerability as a complex relationship between people and their social, physical and economic environment, and the susceptibility to political manipulation by powerful groups. In contrast, case studies on the piloting of the community based approach to disaster mitigation in the 1980s for drought, flood, and earthquake hazards highlighted the following benefits:
>
> • Principal responsibility and authority for the development of the program rested with the community-based organization (CBO)
> • Problems were correctly defined; responsive mitigation measures and strategies for recovery were worked out following disaster since people could express their real needs and priorities to the CBOs.
> • Existence of CBOs allowed rapid and effective response to emergencies.
> • The principal resource is people themselves and their local knowledge and expertise so programs had small financial inputs but produced large results.
> • Programs were multi-sectoral, combining different activities (housing and agriculture; health and agriculture); hazards (flood and drought) and disaster phases (emergency and recovery)

The MIT Media lab's $100 dollar laptop project is an example of a project that must wait for large scale acceptance and buy in before implementation. While this may be successful for this type of project that requires mass production of a piece of technology, a system of solutions to help humanity adapt to a changing world will necessarily effect their lives in different ways. First, the target audience for the $100 laptop project is children. This system will have impact on entire communities. It will mean asking people to change the way they do everyday things, and there is no way to get that right from the beginning.

A successful example of a staged introduction can be seen in the World Resources Institute's EMBARQ project that is expanding mass transit solutions to major world cities in an expanding network of NGO's that are established to build capacity and create government partnerships in diverse regions.

Defining Statement

ISSUE TOPIC
Communication

DS-11

PROJECT
Design Strategies for a Wetter World

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QUESTION AT ISSUE
How should the idea of the portfolio and its individual strategies, processes and system concepts be brought to public and institutional attention?

POSITION

constraint The idea of the portfolio must be communicated to people and institutions in a mix of universal terms and their many local and unique modes of communication.

SOURCE/S

Wikipedia, http://en.wikipedia.org/wiki/Esperanto

United Nations, http://unpan1.un.org/intradoc/groups/public/documents/apcity/ unpan009661.pdf

ALTERNATE POSITIONS

constraint The idea of the portfolio must be communicated to people and institutions in their many local and unique ways.

constraint The idea of the concept must be communicated in one universal way that all people of all nations should be able to understand.

BACKGROUND AND ARGUMENTS

The goal of communication is the sharing of ideas. When Dr. L.L. Zamenhof attempted to spread the idea of global tolerance and communication in the end of the 19th century, he decided to create one universal language called Esparanto that would be spoken by everyone. As can now be plainly seen, this mission was largely a failure. After more than 100 years, the language has only managed to foster a very small community of dedicated people who must actively seek out language experiences to compensate for a lack of real interaction with unfamiliar people.

The system can learn much from the existing good examples of universally understandable communication (i.e. the international sign for choking and public bathroom door signs), but these applications should be well reasoned. Communication is on of the most fundamental elements of culture and people are very reluctant to give up there cultures. Furthermore, there is no reason that they should. To the benefit of the project, the concept would be best communicated if people could understand it in their own terms and languages.

"While resilience is a relatively new concept in CBDM, it is easily grasped and appreciated by communities when illustrated by the example of the bamboo, which sways with the battering of strong winds but stays rooted and weathers the typhoon." this quote from the United Nations' Community Based Approaches To Disaster Mitigation paper shows how an abstract idea conceived of by an organization, can be effectively and evocatively conveyed to people in terms that they can understand and own.

Defining Statement

ISSUE TOPIC
Networking

DS-12

PROJECT
Design Strategies for a Wetter World

ORIGINATOR
Mario Ruiz

CONTRIBUTORS

QUESTION AT ISSUE
What provision should be made toward partnering with other cities, regions, suppliers of funding, technology, goods, etc.?

POSITION

constraint Technology and the internet must create an open-source knowledge, communication, and distribution ecosystem that is global, real-time, and multilingual.

SOURCE/S

The Winds of Change, Eugene Linden
Jimmy Wales, Founder, Wikipedia
Richard Baraniuk, Professor, Rice University (Connexions)
Bruce Mau, Massive Change (Institute without Borders)
Hans Rosling, Karolinska Institute
Cameron Sinclair, Architecture for Humanity
Think Cycle, www.thinkcycle.com
World Summit Award, www.wsis-award.org/

ALTERNATE POSITIONS

constraint Technology and the internet must create a closed-source knowledge and communication ecosystem that is global, real-time, and multilingual.

BACKGROUND AND ARGUMENTS

A major cause of the fall of the Maya civilization was due to an extreme drought with no water to help maintain the cities. Tikal, an ancient Mayan city, fell into internal strife with its water-blessed neighbors. Help was available to the city of Tikal, but there was not a process to acquire the help.

Wikipedia proves that a large-scale, multi-lingual collaborative system is effective and feasible. Wikipedia has embraced the advantages of open-source and community to create the first free encyclopedia. Wikepedia has managed to monitor the system of contributors and editors through software and differing amounts of democracy, aristocracy, and monarchy.

Wikipedia model is flexible and adaptable with a group of diverse races, political views, religious views, and languages all contributing. Social chaos is not apparent among users, there is a social concept of collaboration.

The Wikipedia model is cost effective. Cost of management is marginal, volunteer base manages content, editing, servers, and even has technical standby 24hrs/day. No commercial corporation can compete with this - Wikipedia 's total bandwidth is US$5K.

Conexions is another open-source model that is effective and feasible. More than one million people from 157 countries are tapping into the 3398 modules and 174 courses developed by a worldwide community of authors in fields ranging from computer science to music and from mathematics to biodiversity. Other examples of collaborative systems are Thinkcycle.org and the World Summit Award.

Globalization and technology can aid in distribution model. Michael McDonough created the eHouse by purchasing everything with a credit card and shipping them overnight to a building site.

It is impossible to create a utopian system, solutions should be localized by economy and environment.

Defining Statement

ISSUE TOPIC
Timing

DS-13

PROJECT
Design Strategies for a Wetter World

ORIGINATOR
Mario Ruiz

CONTRIBUTORS

QUESTION AT ISSUE
For what time frame should the portfolio's system of tools be planned for implementation?

POSITION
directive — Foundations of the system should be implemented with a knowledge, distribution, and communication ecosystem, practical design solutions, and network within 5 years.

SOURCE/S

Jimmy Wales, Founder, Wikipedia
Richard Baraniuk, Professor, Rice University (Connexions)
Bruce Mau, Massive Change (Institute without Borders)
Cameron Sinclair, Architecture for Humanity
http://en.wikipedia.org/wiki/Global_warming#Climate_models
http://www.census.gov/ipc/www/worldpop.html
http://www.bbc.co.uk/climate/evidence/uk_change.shtml
IPCC Reports, Chapter 1, pg. 91

ALTERNATE POSITIONS

BACKGROUND AND ARGUMENTS

Carbon dioxide levels will continue to increase even if they are dealt with now in 2006. With carbon dioxide levels currently around 381 ppm and rising by 2ppm per year, without such action greenhouse gasses are likely to reach to reach 400ppm by 2016, 450ppm by 2041, and 550ppm by around 2091.

The world population continues to increase, more lives are at stake. The next fifteen years, the world population will increase by 1 billion people. World population estimates from the UN are as follows for the years. 2006 (6.5B); 2010 (6.8B); 2020 (7.6B); 2030 (8.2B); 2040 (8.7B); 2050 (8.9B).

Increase in precipitation will continue to happen. In the UK, by 2080, the increase is predicted to range from between 10% and 20%, depending on the area of the country, for the 'low emissions' . For the 'high emissions' scenario, the range increases to between 15% and 35%.

The weather is nonlinear and unpredictable, it's more beneficial to begin early rather than wait. "Nonlinear systems, when rapidly forced, are subject to unexpected behavior.

Despite small changes to average temperature through the years, it could be more costly to stay idle. Economists have suggested the transient stage of moving from one equilibrium to another has great economic impacts, even if the static impacts of the new equilibrium were small.

Defining Statement

ISSUE TOPIC
Organization

DS-14

PROJECT
Design Strategies for a Wetter World

ORIGINATOR
Mario Ruiz

CONTRIBUTORS

QUESTION AT ISSUE
What is the legal entity and structure of the organization driving the system?

POSITION

objective — The organization should utilize a model to manage the strategic intent of the organization and leverage resources for tactical execution through an open-source model.

SOURCE/S

Cameron Sinclair, Architecture for Humanity
Robert K. Shaeffer, Understanding Globalization

ALTERNATE POSITIONS

objective — The organization should be a single entity working on the strategic intent and tactical execution of initiatives.

BACKGROUND AND ARGUMENTS

An open-source environment creates economies of scale and grows the experience curve. Open-source models, like Wikipedia and Conexions, when managed thoughtfully, create leverage and growth without depending on internal resources.

It's possible to have a smaller group working with and multiple projects by creating leverage. Cameron Sinclair and the Architecture for Humanity team oversee design in their open-source model. The central team gives direction and design is outsourced globally. Wikipedia employs different levels of monitoring for their system.

The organization can leverage expertise from the IPCC, an established group of scientists looking at global climate change. The IPCC was established in 1988 by the UN as a panel of scientists to assess the global warming issue.

A larger centralized organization requires more funding to manage and is likely to be less adaptable and flexible to change.

A note on non-governmental agencies. There are tax benefits for people donating to non-government organizations, which is an incentive for funding. Non-government organizations in the US do not have to pay taxes based on their legal entity. However, funds are harder to appropriate in NGOs versus for-profit entities, restricting efforts somewhat.

Defining Statement

ISSUE TOPIC
Timing

DS-15

PROJECT
Design Strategies for a Wetter World

ORIGINATOR
Mario Ruiz

CONTRIBUTORS

QUESTION AT ISSUE
Where in the world should the system be first initiated?

POSITION

constraint — The system must prioritize and address issues first with flooding among the consequences of heavy rainfall.

SOURCE/S

http://en.wikipedia.org/wiki/Flood
Bruce Buckley, Edward J. Hopkins, Richard Whitaker. Weather: A Visual Guide.

ALTERNATE POSITIONS

objective — The system should look at heavy snow at the same level as flooding.

BACKGROUND AND ARGUMENTS

Floods are the most frequent type of disaster worldwide. Thus, it is often difficult or impossible to obtain insurance policies which cover destruction of property due to flooding, since floods are a relatively predictable risk. (Wikipedia)

Floods alone account for 40 percent of casualties from natural disasters. Many of the world's largest settlements have been built on riverbanks and when a major flood hits, thousands can suddenly be left homeless when the banks break. Less rain can be absorbed in asphalt covered streets - drains overflow and water can rapidly fill the streets.

Landslides are also caused with heavy rainfall, destroying large cities. In May 1998, Naples had a landslide that killed 20 people after a torrential rain of 24 hours. Another large landslide was in Vargas State, Venezuela.

Java, Indonesia epitomizes the tropical monsoonal regions where rainfall is highest. Highest annual rainfall recorded was at Mawsynram, Meghalaya, India.

In Europe, floods are the most common natural disaster. Between 1975 and 2001, 238 major floods were recorded in the region. Since 1990, 2000 have died and more than 400,000 have been left homeless.

The biggest and most elaborate flood defences can be found in the Netherlands, where they are referred to as Delta Works with the Oosterscheldedam as its crowning achievement. Also, the Thames River barrier took 10 years to construct and cost 534 M pounds.

The tropical, subtropical, and temperate regions of the world are those that experience the most rainfall.

Defining Statement

ISSUE TOPIC
Organization

DS-16

PROJECT
Design Strategies for a Wetter World

ORIGINATOR
Mario Ruiz

CONTRIBUTORS

QUESTION AT ISSUE
What kinds of resources are necessary to deploy the system?

POSITION

constraint — A combination of internal management resources and an external expert/tactics must be instrumented to achieve global scale.

SOURCE/S

Cameron Sinclair, Architecture for Humanity
Jimmy Wales, Founder, Wikipedia
Innovation Discipline Model, Doblin Inc. (http://www.doblin.com/ideas/InnovationDiscipline.pdf)

ALTERNATE POSITIONS

objective — A single organization should be instrumented to manage and implement initiatives at a regional or local scale.

objective — A network of organizations sharing common tools should be instrumented to manage and implement initiatives at a regional or local scale.

BACKGROUND AND ARGUMENTS

Specific domain expertise can be identified based on research or through a communication infrastructure. Research resources are needed to identify and manage relationships with experts.

Leadership is required to communicate the concept and strategic intent to various audiences from heads of state to local city level. In addition to that, other resources may be required to work on communication and relationship management. A knowledge base is required to provide input and document practical design solutions and their evaluations. This can come from various disciplines and languages. Such as in the Architecture for Humanity work and Wikipedia, employing an open-source model creates this knowledge base.

Some level of design management and design planning is required to author initiatives. Implementation and tactics resources are required to design, manufacture, and implement initiatives.

Technical resources may be required to manage any infrastructure as in the case with Wikipedia. In order to achieve more leverage, common tools should be used. (Social network systems like blogger, typepad provide tools).

Defining Statement

ISSUE TOPIC

Public/Private Sector Relationships

DS-17

PROJECT
Design Strategies for a Wetter World

ORIGINATOR
Andrew Buhayar

CONTRIBUTORS

QUESTION AT ISSUE
How should the portfolio be positioned with respect to authority/responsibility for implementation and operation?

POSITION

constraint Responsibility must rest with the world's population to implement and sustain adaptation to a wetter, more inclimate world.

SOURCE/S

Economist, "A Coat of Green" September 9, 2006

Ashoka - www.ashoka.org

ALTERNATE POSITIONS

objective The private sector or the public sector should solely be responsible for climate change adaptation.

directive Authority ought to be held by those sector(s) mos capable of initiating change.

BACKGROUND AND ARGUMENTS

Climate adaptation will occur through a myriad of tasks, including infrastructure development, legislation, and communication. The scope of these tasks is beyond the private sector and public sector individually. Adapting to these changing conditions will require the approval and cooperation of many. However, initiated and led by informed and proactive individuals or groups, the task of adapting must be owned by the world.

Authority over adaptation ought be held by the collective. It is not the responsibility, nor the authority of the public or private sector to sustain adaptation; their role should be to aid in facilitating change. Authority ought to rest at the local level where adaptation changes are highly specific. As a problem faced by the entire world should a group or government want to initiate change in advance of others the system should allow for their contribution. The system should be flexible enough to handle a mix of public, private, and entrepreneurial relationships.

The greatest improvements will take place from collaboration across borders. Ashoka, founded in 1980, empowers the "citizen sector" to initiate societal change. With support, these entrepreneurial changemakers network and become the driving force for infrastructure change and development. The success of these people and their networks has been well documented in activity from preserving natural resources to securing human rights. The system should utilize social networking to invigorate climate adaptation with the help of public and private sector relationships.

Defining Statement

ISSUE TOPIC
Policy

DS-18

PROJECT
Design Strategies for a Wetter World

ORIGINATOR
Andrew Buhayar

CONTRIBUTORS

QUESTION AT ISSUE
How does the system work with policy?

POSITION

objective The system should work with existing policy measures and existing policy channels, but should a solution necessitate a policy change, the system should enact one.

SOURCE/S

Wired Issue 11.11 | November 2003
"Open Source Everywhere"

The Institute for Liberty and Democracy (ILD), based in Lima, Peru
www.idl.org.pe

ALTERNATE POSITIONS

objective The system should develop new policy channels.

objective The system should substantiate a need for new policy.

BACKGROUND AND ARGUMENTS

While it is the role of the system to adapt humankind to a wetter more inclimate world, it is not a primary function of the system to enact policy change, nor the ability to navigate the channels by which policy is enacted. Instead, what the system must do is adapt to policy change that may take effect and at the same time create the best possible opportunities for adaptation from those policy measures.

The system may not need to develop new policy channels, nor may it need to seek new policy. To do so would might mean heavy involvement in international governments. Doing so would require significant resource allocation and prevent the system from operating most efficiently. At the same time, the system can be more flexible if it is not bound to a particular nation's policy. It can change depending on the level of adaptation required, relying on the public and private sectors when necessary. In the case of the The Institute for Liberty and Democracy (ILD) the organization interacts primarily with the head of state. "...[T]he nation's leadership must be our interlocutor. Otherwise, major reform will be doomed at the outset. Only the head of state and his or her immediate entourage can command the attention of resistant elites and garner the overwhelming political support required to wipe out the willful inertia of the status quo. Also, it is only the head of state that has the power to prevent the bureaucratic infighting that inevitably paralyzes legal reform."

The system would flourish more easily by disassociating itself with government policy and exist on an international self-regulating level. Policy for the system would be defined by its participants on an ongoing basis. However, the system will rely on governments and the private sector to participate in the system even if they operate under specific policy themselves. The success of the open source, self regulating structure is evident in the rise of wikipedia as well as in Architecture for Humanity, which "creates opportunities for architects and designers from around the world to help communities in need." Additionally, the success of the Linux operating system provides another example of a new way of thinking about international policy making.

PROJECT
Design Strategies for a Wetter World

ORIGINATOR
Andrew Buhayar

CONTRIBUTORS

QUESTION AT ISSUE
How does the system work with government entities?

POSITION

constraint The system must work with government entities at all levels local, state, and federal

SOURCE/S

FEMA - www.fema.gov

United Nations - http://www.un.org/issues/civil-society/

ALTERNATE POSITIONS

constraint The system must work only with federal entities.

constraint The system must ignore all government entities.

BACKGROUND AND ARGUMENTS

The system must rely on other groups and organizations for adaptation. However, the limit and need for involvement depends on the system's real time demand. To have the greatest impact on adaptation the system must be able to access many organizations at all levels to create a comprehensive collection of resources. Working with governments at only a national level will ignore resources at local levels that have significant impact on mitigating global climate change. Local governments play a key role in uniting people. On the FEMA website, local governments of the US post best practices on disaster preparedness and disaster mitigation. Federal governments may have macroscopic view of their nations, but adaptation will often be implemented locally on a case by case basis. It is necessary that adaptation solutions fit the specific region.

The United Nations once dealt only with Governments. By now we know that peace and prosperity cannot be achieved without partnerships involving Governments, international organizations, the business community and civil society. In today's world, we depend on each other." --Secretary General Kofi Annan.

Government is important in accomplishing the global climate change initiatives. The world's governments have vast amounts of resources to contribute. Refusing the help of government entities could potentially cause greater difficulties in adaptation. A government once snubbed has no reason to give the system access to its resources. While many governments may be slow to give aid, there are resources worth accessing. In the case of the recent Hurricane Katrina Disaster, the local, state and federal US government have all had a role in rebuilding the affected area. Work has been done in stages from a variety of government and non government groups.

Local, State, and Federal entities if motivated have a great ability to advance change. They have great control over existing resources, and have channels of communication and distribution that must be tapped in order to move forward with change.

Defining Statement

ISSUE TOPIC

Public/Private Sector Relationships

DS-20

PROJECT
Design Strategies for a Wetter World

ORIGINATOR
Andrew Buhayar

CONTRIBUTORS

QUESTION AT ISSUE
How should the public and private sector contribute to the system?

POSITION

constraint The public sector should contribute to the system through an open source network, while the private sector should position itself to carry out some of the operations indicated by the system.

SOURCE/S

Larry Brilliant, 2006 TED Conference, Three wishes to sve the world

GPHIN-Global Public Health Intelligence Network (GPHIN)

Economist, "A Coat of Green" September 6th, 2006

ALTERNATE POSITIONS

objective The public sector should have the ability to plan and initiate adaptation on its own.

directive The private sector should ignore adaptation in favor of maximizing profits in other areas.

BACKGROUND AND ARGUMENTS

Climate change adaptation with require vast resources. The system must determine what involvement the public and private sectors play in contributing resources.

The public sector is not equipped, nor specialized enough to handle the numerous adaptation responsibilities on its own. In the case of rebuilding Iraq, the United States government has spent billions of dollars in private contracts to develop an infrastructure that both fails accomplish its aims and is wasteful. The means by which the public and private sectors initiate adaptation projects must be checked and balanced by the system.

While the private sector can participate in open source channels, it will provide for better adaptation by remaining for profit. By aligning itself as for profit, the actions and ideas that the system initiates will be carried out quickly and efficiently. In remaining for profit the private sector will also stay current with developing trends and legislation and often be party to changes. This adds up to a more responsible private sector. In the case of CO2 emissions trading, companies have rallied around the idea, creating a more operable system, after seeing how much money can be made.

By combining the abilities of both the public and private sectors, resources will be shared and a amazing response rates can be achieved. However, without a challenge, the public sector by itself will not rise to the occasion. The creation and success of GPHIN, the Global Public Health Intelligence Network has spurred national governments to participate in a global knowledge network aimed at controlling disease outbreaks as quickly as possible. However, the private sector could not exist without the public, and the profits to be made from adaptation come with every legislative change.

Defining Statement

ISSUE TOPIC

Centralization

DS-21

PROJECT

Design Strategies for a Wetter World

ORIGINATOR

Alex Cheek

CONTRIBUTORS

QUESTION AT ISSUE

To what degree should the system seek centralization versus implementation of dispersed resource models?

POSITION

constraint The system must pursue a decentralized model for resource organization.

SOURCE/S

SmartGrid News. http://www.smartgridnews.com/artman/publish/article_182.html

ALTERNATE POSITIONS

constraint The system must create a centralized resource architecture.

BACKGROUND AND ARGUMENTS

From a security standpoint alone, decentralization is widely regarded as the most effective means of organizing resources. Today with the information technology available for managing physically separated resources, the traditional problems of management are no longer the barrier that they once were.

Decentralization minimizes waste by allowing each region or location to manage stocks independently, preventing the duplication that is common in large central resources. Rather than a case of feast or famine, resources are more evenly distributed.

Flexibility is another of the great benefits of decentralization. Rather than creating a rigid supply structure that is difficult and costly to maintain, a decentralized structure, like a city street grid, can easily be rerouted in order to maintain supplies.

As pointed out in Smart Grid News, one problem that decentralized networks face is standardization. Surmounting this issue is very important to the success of a decentralized resource system.

Design Strategies for a Wetter World

Function Structure

November, 2006

Adaptation to a Wetter World

Preparation

Preparing People

F.01 Relocate people

F.02 Relay emergency plan

F.03 Assess availability of stocks of critical items

F.04 Get directory of emergency phones

F.05 Inventory of resources

F.06 Reinforce structures

F.07 Implement proofing methods

F.08 Train response personnel

Preparing Environment

F.09 Identify vulnerable areas

F.10 Manage run-off

F.11 Manage erosion

F.12 Identify vulnerable areas

F.13 Safeguard crops

Preparing Infrastructure

F.14 Monitor road/bridge conditions

F.15 Identify location for relief centers

F.16 Monitor drainage systems

F.17 Coordinate shutdown of utilities

Preparing Region

F.18 Understand available resources

F.19 Alert region

F.20 Create consensus

F.21 Construct policy

F.22 Distribute resources

Response to Disaster

Rescuing

F.23 Assess situation

F.24 Alert region

F.25 Mobilize rescue workers

F.26 Prioritize and communicate goals

F.27 Locate victims

F.28 Provide medical care

F.29 Remove victims from immediate danger

F.30 Anticipate secondary disaster

F.31 Communicate to relief agencies

F.32 Assess ongoing situation

Securing

F.33 Assess damage

F.34 Prioritize areas to rescue

F.35 Remove debris

F.36 Identify lost victims

F.37 Maintain civil order

F.38 Secure food and water

F.39 Control secondary disasters

F.40 Communicate progress

F.41 Conduct ongoing situation assessment

F.42 Bolster structures, roads, bridges

F.43 Secure utilities

F.44 Locate/remove corpses

F.45 Communicate secure areas

Sustaining

F.46 Provide sanitation

F.47 Reconnect lost families

F.48 Provide medical care

F.49 Provide food/shelter

F.50 Communicate with concerned

F.51 Provide transportation

F.52 Provide energy/utilities

F.53 Provide psychological counsel

F.54 Coordinate incoming aid

F.55 Conduct ongoing situation assessment

F.56 Salvage reusable goods

F.57 Coordinate volunteer efforts

Disaster Recovery

Reconstructing

F.58 Assess damage

F.59 Applying land-use evaluation

F.60 Evaluate spontaneous adaptations

F.61 Demolish/remove debris

F.62 Conduct policy research

F.63 Plan reconstruction

F.64 Repair/build infrastructure

F.65 Find/locate resources

Rehabilitating

F.66 Create feeling of safety

F.67 Generate regional empathy

F.68 Provide financial relief

F.69 Create job opportunities

F.70 Provide psychological services

F.71 Rehabilitate economy

F.72 Provide conservation courses

F.73 Determine vegetation plan

Evaluation

Researching

F.74 Establish global research network

F.75 Evaluate current toolkits

F.76 Understand changes in climactic conditions

F.77 Discover emerging technologies

F.78 Gather disaster research data

Improving

F.79 Develop new strategies

F.80 Update/create new tools and processes

F.81 Collaborate with local communities

F.82 Communicate new tools and processes

F.83 Define and collaborate with external partners

F.84 Share and distribute regional solutions

Applying

F.85 Evaluate new tools and processes

F.86 Assess local vulnerabilities

F.87 Apply solution to local vulnerabilities

F.88 Build local capacity

Collaborating

F.89 Identify public and private sector resources

F.90 Facilitate multi-party exchange

F.91 Support regional resource exchange

F.92 Assess and expand network capabilities

F.93 Design and validate adaptation solutions

F.94 Build forum for research experts

F.95 Prototype new research methods

Activity Analysis

ACTIVITY

Preparing People

AA-1

PROJECT: Design Strategies for a Wetter World

MODE: Preparation

ORIGINATOR: Kristian Buschmann

CONTRIBUTORS

SCENARIO

People are made ready for the coming effects of global warming

USERS	SYSTEM COMPONENTS	ENVIRONMENTAL COMPONENTS
Local populations	Transportation systems	Vulnerable regions
Local government entities	Communication tools	Environmental conditions
Aid organizations	Implementation tools	Rural areas
Response personnel	Population census	Urban areas
Contractors	Resource database	

SYSTEM FUNCTIONS	ASSOCIATED DESIGN FACTORS
F.01 Relocate people	People don't want to move People don't know where to go
F.02 Relay emergency plan	Instructions not understood Instructions not widely distributed
F.03 Assess availability of stocks of critical items	Lack of resource database Resource database not maintained
F.04 Get directory of emergency phones	Lack of phone number database
F.05 Inventory of resources	
F.06 Reinforce structures	Vulnerable structures not identified Lack of skilled labor Lack of funds Lack of materials
F.07 Implement proofing methods	Proofing methods unknown Proofing methods don't apply to specific area
F.08 Train response personnel	No training program Training program doesn't apply to specific area

Activity Analysis

ACTIVITY

Preparing Environment

PROJECT: Design Strategies for a Wetter World

MODE: Preparation

ORIGINATOR: Kristian Buschmann

CONTRIBUTORS

SCENARIO

Environment is made ready for the coming effects of global warming

USERS

Local populations
Local government entities
Aid organizations
Response personnel
Contractors

SYSTEM COMPONENTS

Climate change data
Communication tools
Implementation tools
Resource database

ENVIRONMENTAL COMPONENTS

Vulnerable regions
Environmental conditions
Rural areas
Urban areas

SYSTEM FUNCTIONS

F.09 Identify vulnerable areas
F.10 Manage run-off
F.11 Manage erosion
F.13 Safeguard crops

ASSOCIATED DESIGN FACTORS

Vulnerable areas not readily apparent
Lack of assessment tools
Lack of personnel
Lack of funding
Lack of skilled labor
Lack of materials

Activity Analysis

ACTIVITY

Preparing Infrastructure

PROJECT: Design Strategies for a Wetter World

MODE: Preparation

ORIGINATOR: Andrew Buhayar

CONTRIBUTORS

SCENARIO

A comprehensive set of tools that can be used interchangeably to prepare an infrastructure for wetter world adaptation.

USERS

Local Populations
Private and Public Sector Groups
Research Teams

SYSTEM COMPONENTS

Sensory Equipment
Databases
Computer Networks
Industrial Equipment

ENVIRONMENTAL COMPONENTS

Internet
International, State and Local Governments

SYSTEM FUNCTIONS	ASSOCIATED DESIGN FACTORS
F.14 Monitor road/bridge conditions	Too many roads and bridges to physically monitor
F.15 Identify location for relief centers	Centers selected now may not be the best places for relief during and post disaster due to changing weather patterns
F.16 Monitor drainage systems	Drainage systems can fail without warning
F.17 Coordinate shutdown of utilities	Extremely disruptive to shut down utilities during non and pre-disaster periods
	Requires advanced communication between large organizations

Activity Analysis

ACTIVITY

Preparing Region

AA-4

PROJECT: Design Strategies for a Wetter World

MODE: Preparation

ORIGINATOR: Andrew Buhayar

CONTRIBUTORS

SCENARIO

Select strategies and tools needed for preparing a specific area for adaptation and preparation to a wetter environment.

USERS

Local Populations
Private and Public Sector Groups
Volunteer Organizations

SYSTEM COMPONENTS

Media Channels
Warehouses
Transportation Equipment

ENVIRONMENTAL COMPONENTS

Geographic Regions
Cities
Towns
Communities

SYSTEM FUNCTIONS	ASSOCIATED DESIGN FACTORS
F.18 Understand available resources	Difficult to know what is needed and where it is available.
	Difficult to determine what items are critical
F.19 Alert region	Requires multiple channels and message customization to be effective
F.20 Create consensus	Determining what to do requires the work of research networks and then agreement on findings
F.21 Construct policy	Policy is not aligned with research findings
F.22 Distribute resources	Distribution networks can break down

Activity Analysis

ACTIVITY

Rescuing

AA-5

PROJECT: Design Strategies for a Wetter World

MODE: Response to Disaster

ORIGINATOR: Mario Ruiz

CONTRIBUTORS

SCENARIO

Ensuring the safety of people immediately after a disaster strikes.

USERS	SYSTEM COMPONENTS	ENVIRONMENTAL COMPONENTS
Rescue Workers Coordinators Victims	Communication tools Transport services	Flooded areas Debris High wind

SYSTEM FUNCTIONS	ASSOCIATED DESIGN FACTORS
F.23 Assess situation	
F.24 Alert region	
F.25 Mobilize rescue workers	Need a group of defined rescue workers
F.26 Mobilize rescue resources	Need specific types of rescue resources
F.27 Prioritize and communicate goals	Coordination of resources is critical
F.29 Provide medical care	Requires immediate access to medical supplies
F.28 Locate victims	No way for victims to communicate their whereabouts
F.30 Remove victims from immediate danger	Normal transport vehicles won't work in flood water
F.32 Communicate to relief agencies	Need way to coordinate between relief agencies
F.33 Assess ongoing situation	Rescue workers too busy to assess situation while rescuing
F.31 Anticipate secondary disaster	

Activity Analysis

ACTIVITY

Securing

AA-6

PROJECT: Design Strategies for a Wetter World

MODE: Response to Disaster

ORIGINATOR: Mario Ruiz

CONTRIBUTORS

SCENARIO

Ensuring critical infrastructure is secured and safe (after people have been rescued) immediately after a disaster strikes.

USERS	SYSTEM COMPONENTS	ENVIRONMENTAL COMPONENTS
Rescue Workers Relief Agencies Volunteers Doctors, Engineers Victims	Structures Communication methods Utility/Industrial vehicles Water Supply, Sewage, Electricity, Disposal, Gas, Telephone, Cable.	Flooded areas High Wind Debris

SYSTEM FUNCTIONS	ASSOCIATED DESIGN FACTORS
F.33 Assess damage	No defined criteria for what to assess
F.34 Prioritize areas to rescue	Need way to communicate and coordinate prioritized areas
F.35 Remove debris	Debris large and heavy
F.36 Identify lost victims	Victims will be in shock
F.37 Maintain civil order	
F.38 Secure food and water	
F.39 Control secondary disasters	Need alert of secondary disaster
F.41 Conduct ongoing assessment	Will require working in harsh weather conditions
F.42 Bolster structures, roads, bridges	
F.43 Secure utilities	Need prioritization of utilities to secure
F.44 Locate/remove corpses	Requires ways to locate corpses amid destruction
F.45 Communicate secure areas	Difficult to communicate amid the chaos
F.40 Communicate progress	

Activity Analysis

ACTIVITY

Reconstructing

PROJECT: Design Strategies for a Wetter World

MODE: Disaster Recovery

ORIGINATOR: Jihyun Lee

CONTRIBUTORS

SCENARIO

System tries to reconstruct facilities and infrastructure that have been destroyed or badly damaged. The system builds and repairs them as needed.

USERS	SYSTEM COMPONENTS	ENVIRONMENTAL COMPONENTS
Constructors	Assessment tools	Construction site
City Planners	Local material database	Affected community
Evaluators	Recycling plants	Project Site
Volunteers	Networks	Research institutions
Researchers	E-mail	
	Telephone	

SYSTEM FUNCTIONS	ASSOCIATED DESIGN FACTORS
F.58 Assess damage	Skills and experience to assess damage are often not found in one organization or community.
F.59 Applying land-use evaluation	Current land use differs from ideal land use.
F.60 Evaluate spontaneous adaptations	No knowledge about previous state (adaptation).
F.61 Demolish/remove debris	Debris is dangerous to handle.
F.62 Conduct policy research	Law varies from location to location.
F.63 Plan reconstruction	Hard to implement utility lines under ground with existing plans.
F.64 Repair/ Build Infrastructure	Hard to maintain heritage (New Orleans).
F.65 Find/locate resources	Resources are decentralized.

Activity Analysis

ACTIVITY

Rehabilitating

AA-8

PROJECT: Design Strategies for a Wetter World

MODE: Disaster Recovery

ORIGINATOR: Jihyun Lee

CONTRIBUTORS

SCENARIO

System is in the process of restoring the normality of the environment after the disaster has struck.

USERS	SYSTEM COMPONENTS	ENVIRONMENTAL COMPONENTS
Coordinators	Coordinating tools	Working space
Constructors	Workforce database	Network
City Planners	Funds, Sponsor's database	Disaster Site
Sponsors	Assessment tools	Facilities
Volunteers	E-mail	Project Site
Researchers	Telephone	

SYSTEM FUNCTIONS	ASSOCIATED DESIGN FACTORS
F.66 Create feeling of safety	Hard to communicate people who are in affected area.
F.67 Generate regional empathy	No means to connect generated empathy to results.
F.68 Provide financial relief	Unbalance with demand and supply
F.69 Create job opportunities	Hard to mobilize and match skills to the position
F.70 Provide psychological services	Requires long-term service to be effective
F.71 Rehabilitate economy	Most of disrupted business are small business
F.72 Provide conservation courses	Lack of desire to be involved
F.73 Determine vegetation plan	Conflicts with constructor and city planner

Activity Analysis

ACTIVITY

Researching

PROJECT: Design Strategies for a Wetter World

MODE: Evaluation

ORIGINATOR: Andrew Buhayar

CONTRIBUTORS

SCENARIO

Establishing organizations and methods of data collection that will aid in the understanding and implementation of adaptation to a wetter environment.

USERS	SYSTEM COMPONENTS	ENVIRONMENTAL COMPONENTS
Researchers International, State, Local Governments	Databases Simulation Equipment Data Collection Tools	Laboratories Internet Meeting Spaces

SYSTEM FUNCTIONS	ASSOCIATED DESIGN FACTORS
F.74 Establish global research network	Difficult to determine who should be involved
F.75 Evaluate current toolkits	Many areas (groups) don't have access or ability to use new technologies
F.76 Understand changes in climactic conditions	Requires stations around the globe
F.77 Discover emerging technologies	Difficult to implement or make useful
F.78 Gather disaster research data	Too much incoming data to sort, difficult to get on the ground reports

Activity Analysis

ACTIVITY

Improving

PROJECT: Design Strategies for a Wetter World

MODE: Evaluation

ORIGINATOR: Kristian Buschmann

CONTRIBUTORS

SCENARIO

Adaptation methods are continuously examined and made better

USERS

Local populations
Local government entities
Aid organizations
Response personnel
Research institutions
Technology partners

SYSTEM COMPONENTS

Climate change data
Research database
Expertise database
Resource database

ENVIRONMENTAL COMPONENTS

Vulnerable regions
Environmental conditions
Rural areas
Urban areas
Research forums
Technology forums

SYSTEM FUNCTIONS	ASSOCIATED DESIGN FACTORS
F.80 Update/create new tools and processes	New tools and processes are proprietary
F.81 Collaborate with local communities	Local population doesn't adopt solutions
F.82 Communicate new tools and processes	New tools and processes not understood by local population
F.83 Define and collaborate with external partners	Difficult to identify suitable external partners
F.84 Share and distribute regional solutions	No channels for distribution

Activity Analysis

ACTIVITY
Applying

AA-11

PROJECT: Design Strategies for a Wetter World

MODE: Evaluation

ORIGINATOR: Manoj Kumar Adusumilli

CONTRIBUTORS

SCENARIO

Local Areas are trying to respond to changing climatic conditions. New technologies and tools are being tested and implemented. Local vulnerabilities are being assessed and solutions are being prioritized.

USERS	SYSTEM COMPONENTS	ENVIRONMENTAL COMPONENTS
People	E-mail/Internet	Web Site
Government	Telephone	Field Site
Researchers	Media	Labs
Volunteers	Project Database	
	Assessing tools	

SYSTEM FUNCTIONS	ASSOCIATED DESIGN FACTORS
F.85 Evaluate new tools and processes	Tools fail because they are not customized for local conditions.
	Programs are not implemented due to interference from external sources.
F.86 Assess local vulnerabilities	Local data not available
F.87 Apply solution to local vulnerabilities	Solutions are not custom built
F.88 Build local capacity	Local capacity building not possible due to political intervention

Activity Analysis

ACTIVITY

Collaborating

AA-12

PROJECT: Design Strategies for a Wetter World

MODE: Response to Disaster

ORIGINATOR: Manoj Kumar Adusumilli

CONTRIBUTORS

SCENARIO

Once the Disaster strikes the system tries to assimilate the damage and regain normal life.

USERS	SYSTEM COMPONENTS	ENVIRONMENTAL COMPONENTS
People	E-mail	Camp Site
Governments	Telephone	Disaster Site
Relief Organizations	Internet	
Volunteers	Vehicles	
Police	Media	

SYSTEM FUNCTIONS	ASSOCIATED DESIGN FACTORS
F.46 Provide sanitation	Insufficient funds to apportion
F.47 Reconnect lost families	Volunteers are not trained to tackle disasters
F.48 Provide medical care	Insufficient tools and materials
F.49 Provide food/shelter	Untrained volunteers unable to give first aid
F.50 Communicate with concerned	Relief centers are damaged
F.51 Provide transportation	Communication channels are destroyed
F.52 Provide energy/utilities	Roads /bridges are broken down
F.53 Provide psychological counsel	Utilities/energy lines are broken
F.54 Coordinate incoming aid	Reluctant to help
F.55 Conduct ongoing situation assessment	Incoming aid is not planned i.e. not prioritized
	Disaster site too dangerous to approach
F.56 Salvage reusable goods	
F.57 Coordinate volunteer efforts	Information of lost people not updated

Design Factors

1. People resist relocation
2. Warning Systems are dependent on electricity
3. General alarm system is not uniform
4. Lack of resource database
5. No training program exists
6. Lack of personnel
7. Instructions poorly communicated
8. Local warning system is not uniform
9. Water Supply is Contaminated/ Destroyed
10. Lack of adaption specialists
11. Lack of adaption specialists
12. Vulnerable areas undetectable
13. Lack of assessment tools
14. Too many roads & bridges to physically monitor
15. Create incentives to take courses
16. Drainage can fail without warning
17. Requires advanced communication between large organizations
18. Difficult to know what is needed and where
19. Difficult to determine which items are critical
20. No way for victims to communicate their whereabouts
21. Need a group of defined rescue workers
22. Need specific type of rescue resources
23. Coordination of resources is critical
24. Moving to normal transport vehicles won't work in flood water
25. Need way to coordinate between agencies
26. Skills and experience to detect damage are often not found in one organization or community
27. Rescue workers are too busy to assess situation while rescuing
28. No defined criteria for what to assess
29. Need alert for secondary disasters
30. Difficult to communicate amid the chaos
31. Victims will be in shock
32. Epidemics
33. Will require working in heavy weather conditions
34. Need prioritization of utilities to secure
35. Requires ways to locate corpses amid debris and destruction
36. Difficult to prevent contamination
37. Roads/Bridges are broken down
38. Roads/Bridges are broken down
39. Information of Lost people not updated
40. Untrained volunteers unable to do first aid

Relief centers are damaged

41. Communication channels are destroyed
42. Requires long-term service to be effective
43. Volunteers are not trained to tackle disasters
44. Hard to maintain heritage
45. Current land use differs from ideal land use
46. No knowledge about previous state
47. Debris is dangerous to handle
48. Law varies from location to location
49. Hard to imagine previous utilities under the ground
50. Hard to communicate with people who are in affected areas
51. Hard to mobilize and match skills to the position
52. Create incentive for regions to help
53. Center locations can shift due to weather
54. Difficult to determine who should be involved
55. Requires stations around the globe
56. Difficult to implement or make useful technologies
57. Too much Incoming Data to sort, difficult to get the ground reports
58. New research requires documentation
59. Local population resists adaptation solutions
60. No Network exists for distribution
61. Tools fail due to lack of localized customization
62. Utilities/Energy lines are broken

Design Factors continued

Design Factor

TITLE

People resist relocation

DF-1

PROJECT: Design Strategies for a Wetter World

MODE: Preparation

ACTIVITY: Preparing People

ORIGINATOR: Alex Cheek

CONTRIBUTORS

SOURCE/S

"After More Than a Century of Soaking, Washington Town Mulls Move to Higher Ground" William Yardley, The New York Times, November 12, 2006.

Sense of place. (2006, November 20). In Wikipedia, The Free Encyclopedia. Retrieved 05:07, November 22, 2006, from http://en.wikipedia.org/w/index.php?title=Sense_of_place&oldid=88924811

ASSOCIATED FUNCTIONS

F.01 Relocate people

OBSERVATION

When encouraged to relocate, people resist fiercely, even against logic and evidence of danger past, present and future.

EXTENSION

It is difficult to describe the emotion that people feel for the place in which they live. It is tangled up in their personal histories, their families, their communities, their sense of self, their finances and everything else about who they feel themselves to be. What makes someone stay in a town that floods every other year? What makes them want to constantly rebuild.

The idea of topophilia, or "love of place," has been discussed in anthropological and geographic literature with interesting conclusions as they apply to relocation. The idea of place itself is defined as a space that is differentiated from geography in general by meaning given to it by people and culture. "Such a feeling may be derived from the natural environment, but is more often made up of a mix of natural and cultural features in the landscape, and generally includes the people who occupy the place." This implies that more flood or disaster events, by creating a rich history around a place actually enhance topophilia and might make a person's attachment to that place stronger.

DESIGN STRATEGIES	SOLUTION ELEMENTS
Force relocation	[modified] New Home Support
Confront with reality of danger	[modified] DisasterRevue
Have people find/explain the danger themselves	
Ignore history	[speculative] MemoryWipe

Design Factor

TITLE

Warning Systems are dependent on electricity

DF-2

PROJECT
Design Strategies for a Wetter World

MODE
Preparation

ACTIVITY
Preparing Infrastructure

ORIGINATOR
Manoj Kumar Adusamilli

CONTRIBUTORS

SOURCE/S

Personal Observation

ASSOCIATED FUNCTIONS

F.02 Relay Emergency Plans

F.19 Alert Regions

OBSERVATION

Warning systems that are used to provide disaster warnings are dependent on electricity .

EXTENSION

Many warning systems rely upon auditory alert signals used in conjunction with dissemination of more detailed and specific information via television or radio. This often requires electrical service for obtaining informative, actionable warnings. Any number of disaster conditions, such as thunderstorms and high winds may cause disruption of electrical service. Disasters often damage a region's infrastructures, which can result in a lack of electrical power. Lack of electricity leaves battery operated radios as the main form of access for communication of detailed information. This is problematic because many people no longer own battery operated radios, and even if they do they may not have well-charged batteries to power them.

DESIGN STRATEGIES

Develop a non-electricity dependent supplement to the conventional alerting procedure

SOLUTION ELEMENTS

[existing] Power Display

[speculative] Lightning Harvester

[existing CommonCurrents

[existing Concrete Displays

Design Factor

TITLE

General alarm system is not uniform

DF-3

PROJECT: Design Strategies for a Wetter World

MODE: Preparation

ACTIVITY: Preparing region

ORIGINATOR: Manoj Kumar Adusamilli

CONTRIBUTORS

SOURCE/S

Personal Observation

ASSOCIATED FUNCTIONS

F.02 Relay Emergency Plans

F.19 Alert Regions

OBSERVATION

Many community alerting systems only offer one type of alert for every kind of event which could only be understood din local languages .

EXTENSION

Many communities rely on a warning system that offers one kind of alert for all types of disaster and things turn out to be more difficult when the same are in local languages .This would be especially difficult for rescue workers coming from different geographic locations .
While this is effective for gaining attention ,it does not support dissemination more detailed information regarding the impending disaster or what preparations should be taken

DESIGN STRATEGIES

Develop differentiated alerts that make it clear to the alerted what threat is posted .

Develop system for standardized alerts so that people will understand what the alert means, no matter if they are in their local community or elsewhere.

SOLUTION ELEMENTS

[modified] Disaster Icon Language

[modified] Power Displays

[modified] Concrete Displays

Design Factor

TITLE

Lack of resource database

DF-4

PROJECT: Design Strategies for a Wetter World

MODE: Preparation

ACTIVITY: Preparing People

ORIGINATOR: Mario Ruiz

CONTRIBUTORS

SOURCE/S

http://www.eas.slu.edu/SeismicSafety/0310.html

http://www.fema.gov/government/grant/pa/9523_6.shtm

ASSOCIATED FUNCTIONS

F.03 Assess availability of stock of critical items

F.04 Get directory of emergency phones

F.05 Inventory or resources

OBSERVATION

Mutual aid strategies during disaster efforts require an understanding of what resources are available.

EXTENSION

During a disaster relief effort, there are many communities that can help with resources. The challenge for relief organizations is knowing what is available and how to distribute the resources. Resources can come from either local or distant areas.

Currently, the practice is to write agreements pre-disaster and keep a record of participant's roles. However, there is no inventory of actual resources (people and things) that could be used. The agreements are usually in word format and are not available to the general public.

DESIGN STRATEGIES

Publicize resource information

Registry of resources

Deploy resources

SOLUTION ELEMENTS

[modified] PublicMutualAid

[modified] ResourceRegistry

Design Factor

TITLE

No training program exists

DF-5

PROJECT: Design Strategies for a Wetter World

MODE: Preparation

ACTIVITY: Preparing People

ORIGINATOR: Mario Ruiz

CONTRIBUTORS

SOURCE/S

http://www.citizencorps.gov/cert/faq.shtm

http://www.trans4mind.com/counterpoint/whiteley.shtml

ASSOCIATED FUNCTIONS

F.08 Train response personnel

OBSERVATION

There is little training for response personnel that is integrated with the various relief efforts. Training is done in isolation.

EXTENSION

One organization, CERT, leverages a community to help build emergency response training. The neighborhood CERT leader gathers and organizes their own neighborhoods through monthly or bi-monthly sessions that introduce concepts like "fire extinguisher" and "first aid" topics.

This training is for local communities, but it can leverage more technology to keep record of the training sessions and be more interactive. This could also appeal to younger generations.

Prototyping a visual scenario could help trainees remember better by appealing to their visual senses. Incorporating more visual, interactive, and integrated training experiences could apply to more of the user senses.

DESIGN STRATEGIES	SOLUTION ELEMENTS
Simulate disaster	[speculative] Virtual Teaching
Record training sessions	[existing] Training Recorder
Integrate disaster training	[existing] Volunteers Training

Design Factor

TITLE

Lack of personnel

DF-6

PROJECT: Design Strategies for a Wetter World

MODE: Preparation

ACTIVITY: Preparing Environment

ORIGINATOR: Andrew Buhayar

CONTRIBUTORS:

SOURCE/S

"Emerging Technology - 'I'm Looking for Uncle John' Ordinary people can solve communication problems much quicker than clueless government officials when catastrophes like hurricane Katrina strike"
By Steve Berlin Johnson
DISCOVER Vol. 26 No. 12, December 2005

ASSOCIATED FUNCTIONS

F.09 Identify vulnerable areas

OBSERVATION

The preparation for disaster is adversely affected by the lack of personnel involved in data collection around the globe.

EXTENSION

While advances in technology have allowed for long-range forecasting and detection of disasters, there is still a lack of people involved in the preparation, planning, and detection of future disasters. In many cases this is due to the expectation that people involved need specialist training or belong to a particular organizations. Science organizations have for many years used the internet to share data, and those methods have in limited ways been extended to data collection by the general population.

During Hurricane Katrina, online communities were able to create meaningful information exchanges that not only helped relief efforts, but were also able to operate more quickly than established relief groups. The goal was to connect to the vast amount of data that people who are already on the ground could contribute. This information could be used to provide a more descriptive picture of what is actually occurring in order to make adjustments to relief efforts or discover new areas of concern.

DESIGN STRATEGIES	SOLUTION ELEMENTS
Create a virtual facility with video capabilities where researched is analyzed and synthesized by a group of collaborators doing research to improve tools and processes for disaster detection and preparation	[modified] Research Ring
Local volunteers upload information about regional weather and adaptation activities via remote transmitters	[speculative] Volunteer Data Collection

Design Factor

TITLE

Instructions poorly communicated

DF-7

PROJECT: Design Strategies for a Wetter World

MODE: Preparation

ACTIVITY: Preparing People

ORIGINATOR: Andrew Buhayar

CONTRIBUTORS:

SOURCE/S

"Bangladeshis learn flood survival, Basic education has helped to significantly reduce death tolls" By David Montero, The Christian Science Monitor, August 11, 2005

ASSOCIATED FUNCTIONS

F.02 Relay emergency plan

OBSERVATION

In preparing people for disasters instructions are often poorly communicated causing furthering problems.

EXTENSION

Disaster communications are vital for keeping people safe and for coordinating necessary resources for survival.

While communications first need to reach the intended audience, it equally important to have communications understood. This can be particularly difficult given the lack of technology available as well as the variety of languages and literacy rates.

A simple communication effort is being used in Bangladesh. Using a picture book, an aid worker tests locals' knowledge about where..."to seek dry land, how to salvage belongings, and whom to contact for information...Awareness centers like this have been replicated across Bangladesh, training [people] to become the first line of defense against the floods."

DESIGN STRATEGIES	SOLUTION ELEMENTS
Create a visual, picture only, disaster planning and adaptation guide	[speculative] Picture prep
Create a common connection point giving voice responses and information relating to various disaster needs	[speculative] Global 911

Design Factor

TITLE

Local warning system is not uniform

DF-8

PROJECT: Design Strategies for a Wetter World

MODE: Response to Disaster

ACTIVITY: Securing

ORIGINATOR: Manoj Kumar Adusamilli

CONTRIBUTORS

SOURCE/S

Mileti,Dennis S.1999. Disasters by Design: A Reassessmnet of Natural Hazards in the United States. Washington DC: John Henry Press

Board on Natural Disasters. 1999. Mitigation Emerges as Major Strategy for reducing Losses Caused by Natural Disasters,Science 284: 1943 - 1947

ASSOCIATED FUNCTIONS

F.02 Relay Emergency Plan

F.19 Alert Regions

F.30 Control Secondary Disasters

F.88 Build Local Capacity

OBSERVATION

Many Local Warning systems are not uniform and not up to date.

EXTENSION

Communities with warning systems that are not technologically current put their residents at higher risk for being adversely affected by a disaster. Most alert signals provided are one kind of alert that does not differentiate the type of disaster, the imminence of the threat, etc. Many rely upon traditional broadcast media to disseminate alerts. This requires that the potential victim be tuned in to be alerted, which may not be practical. Reliance on broadcast media also presupposes an energy source like electricity, which may be unavailable in disaster situations.

"Warnings must specify the time, location and severity of expected events with appropriate uncertainty bounds in a manner that allows actions to be taken for the survival of people and the protection of property and institutions"(Board on Natural Disasters,1946)

DESIGN STRATEGIES

Develop a warning system that is standardized and updated by and outside agency on a regular basis.

Develop alerting mechanisms that rely upon wireless technology to disseminate disaster information to cell phones, pagers and PDA's

SOLUTION ELEMENTS

[modified] Disaster Icon Language

[modified] Climate Change -The game

Design Factor

TITLE

Water Supply is Contaminated/ Destroyed

DF-9

PROJECT: Design Strategies for a Wetter World

MODE: Response to disaster

ACTIVITY: Securing

ORIGINATOR: Manoj Kumar Adusamilli

CONTRIBUTORS

SOURCE/S

Personal Observation

Long, Duncan "Emergency Drinking Water"
http://www.duncanlong.com

ASSOCIATED FUNCTIONS

F.10 Manage Run-Off

F.16 Monitor Drainage System

F.29 Remove victims from immediate danger.

F.30 Anticipate Secondary Disasters

F.87 Assess Local Vulnerabilities

OBSERVATION

Destroyed water supply creates one of the major difficulties in sustaining life after the disasters.

EXTENSION

During our daily lives most of us take water for granted. But that is not often during a disaster. As water supply systems get contaminated and the water is no longer safe for use. Also the supply systems may get damaged and cannot be restored immediately. That means there would no water from drinking, preparing food or cleaning up.

Each person to survive would require 60 gallons of water per month. There is even no need to mention the consequences of being without water which are in scale from dehydration to epidemics bigger in damage of the disaster itself.

DESIGN STRATEGIES	SOLUTION ELEMENTS
Provide Water	[existing] Water Safe Board
Provide Methods of cleaning water	[modified] Water Wall
Build water supply system resistant to natural disasters	[existing] Water Clean

Design Factor

TITLE

Lack of adaption specialists

DF-10

PROJECT: Design Strategies for a Wetter World

MODE: Preparation

ACTIVITY: Preparing Environment

ORIGINATOR: Jihyun Lee

CONTRIBUTORS:

SOURCE/S

http://www.erosioncontrol.com/

ASSOCIATED FUNCTIONS

F.11 Manage erosion

OBSERVATION

The matter of erosion management covers the large extent of different areas. It would difficult to be manage without specialists who can plan, develop, and manage the related topic properly.

EXTENSION

Controlling erosion with in-depth knowledge on a wide-range of topics helps system develop solutions to erosion control problems and meets with industry regulations. Erosion control is the area in which new information and technologies are emerging. So erosion can be more effectively prevented by using available emerging technologies. So it would be hard but necessary to have right personnel who are qualified in this area with eligible training and experience in effective erosion control. Appropriately planned erosion control by a qualified specialists enables the system to implement practical measures for temporary and permanent erosion control. The system may also need to develop a network of erosion control experts whose expertise is consistent and comprehensive.

DESIGN STRATEGIES	SOLUTION ELEMENTS
Educate and train Specialists	[existing] Advanced Erosion Solutions Specialist Training (AESST)
Share the expertise	[modified] In-house network of network
Plan to execute Right expertise	[existing] Water Diversion
	[speculative] Landscape Planning
	[modified] Deep Rooted Vegetation

Design Factor

TITLE

Extremely disruptive to shut down utilities during non and pre-disaster periods

DF-11

PROJECT: Design Strategies for a Wetter World

MODE: Preparation

ACTIVITY: Preparing Infrastructure

ORIGINATOR: Andrew Buhayar

CONTRIBUTORS:

SOURCE/S

"Consider An Emergency Generator", Processor.com by Steven S. Ross June 24, 2005
http://www.processor.com/editorial/article.asp?article=articles/P2725/31p25/31p25.asp&guid=

Electricity Shortage in California: Issues for Petroleum and Natural Gas Supply
http://www.eia.doe.gov/emeu/steo/pub/special/california/june01article/casummary.html

ASSOCIATED FUNCTIONS

F.17 Coordinate shutdown of utilities

OBSERVATION

The disruption caused by pre-disaster utility shutdowns can be extremely costly. But, those costs need to be weighed against repair and rebuilding costs that might occur given the disaster

EXTENSION

Utilities need to be shut down to reduce damages to the entire-system. The disruption may prevent some preparations for the oncoming disaster, but restoring the services could be more costly. However, controlling shutdowns can reduce the time that the utilities are actually out of service.

A major concern is how organizations will be notified of the potential outages. Preparation and safeguarding systems is extremely important for those organizations that rely on the power. Developing a structured plan for shutdown is vital due to the huge number of stakeholders, many organizations have plans already in place. However, most private residences are not prepared to receive outage communications nor are they prepared in the event of an outage.

DESIGN STRATEGIES	SOLUTION ELEMENTS
Provide orderly shut down of utilities and arrange for alternate supply sources	[modified] Utility Shutdown and Management
Establish mobile alternative energy stations that provide back up power during emergency situations	[speculative] Power Blocks

Design Factor

TITLE

Vulnerable areas undetectable

DF-12

PROJECT: Design Strategies for a Wetter World

MODE: Preparation

ACTIVITY: Preparing Environment

ORIGINATOR: Alex Cheek

CONTRIBUTORS:

SOURCE/S

Team discussions

ASSOCIATED FUNCTIONS

F.12 Identify vulnerable areas

OBSERVATION

Identifying the places that are vulnerable to natural disaster is very difficult. Variables as diverse as soil quality, engineering, demographics and bio-erosion contribute to the vulnerability of a site. Categorizing and assessing all of them is virtually impossible for any single individual.

EXTENSION

"Vulnerability" is not a cut and dry descriptor. For any given area, it is a measure that is formed from the combination of a wide variety of data sets and qualitative assessments. This means that determining the vulnerability of one site might have to been carried out differently in one location than in another. Similarly the salient criteria for one location might change over time or especially, cycle with the seasons or weather patterns.

Another basic problem with detecting vulnerable areas is that to the untrained eye, any given parcel of land might not display the characteristics of vulnerability as expected by the individual performing the inspection. There are two basic kinds of information: primary and secondary. Primary is information is that which is possessed by an eye-witness. Despite its importance, primary information is prone to misinterpretation.

DESIGN STRATEGIES	SOLUTION ELEMENTS
Generalize about vulnerabilities	[existing] Structure Assessment
Set of standards	[existing] EV Index
Strengthen all areas	[existing] HydroRoads
	[speculative] Satellite Imager
Train lay-people	[speculative] Vulnerability prevention training

Design Factor

TITLE

Lack of assessment tools

DF-13

PROJECT: Design Strategies for a Wetter World

MODE: Preparation

ACTIVITY: Preparing Environment

ORIGINATOR: Alex Cheek

CONTRIBUTORS

SOURCE/S

Environmental vulnerability Index; http://www.vulnerabilityindex.net/index.htm

ASSOCIATED FUNCTIONS

F.12 Identify vulnerable areas

OBSERVATION

Due to the multiplicity of factors and the constant discovery of new factors that might contribute to the overall vulnerability of a region, there is no set of tools that can cover the entire range of neccesary factors.

EXTENSION

The United Nations Environmental Programme has started the first systematic, global method for measuring the vulnerability of a region to environmental disasters. Their method utilizes 50 factors that must be measured. This list cannot be considered exhaustive. Included in the set are factors such as biotechnology and spills. These problems are relatively new and as such are a sign that new problems can crop up without much notice as technology changes.

DESIGN STRATEGIES	SOLUTION ELEMENTS
Human evaluation	[existing] Structure Assessment
Computer Imaging	[speculative] X-ray Structures
Computer Modeling	[existing] EV Index

Design Factor

TITLE

Too many roads & bridges to physically monitor DF-14

PROJECT: Design Strategies for a Wetter World

MODE: Disaster Recovery

ACTIVITY: Preparing Infrastructure

ORIGINATOR: Manoj Kumar Adusumilli

CONTRIBUTORS: Andrew

SOURCE/S

Personal Observation

http://unpan1.un.org/intradoc/groups/public/documents/APCITY/UNPAN009855.pdf

ASSOCIATED FUNCTIONS

F.14 Monitor roads/bridge conditions

OBSERVATION

They are too many roads and bridges to physically monitor, especially when disaster strikes.

EXTENSION

During a disaster, roads and bridges are damaged and people might actually use those roads & bridges for evacuation.But incase a structure falls or a road is not drivable people might end up in a secondary disaster.

With road networks increasing every day it would be difficult to monitor the conditions of the roads and bridges, especially during a disaster when people are busy with the rescue operations. At the same time, this can prove to be a major hurdle in administrating rescue operations .

Many structures tend to collapse when disaster strikes because they are already weak due to aging .

DESIGN STRATEGIES

- Have temporary bridges incase the existing ones are damaged
- Predict damage on structures using computers
- Roads are inspected to assess damage
- Have fixed assessment tools to assess the stability of the structure

SOLUTION ELEMENTS

- [existing] Temporary Mobile Bridges
- [modified] Structure Assessment Checklist
- [speculative] Hydro Roads
- [existing] Virtual Structure Modelling
- [speculative] Road Conditions

Design Factor

TITLE

Create incentives to take courses

DF-15

PROJECT: Design Strategies for a Wetter World

MODE: Disaster Recovery

ACTIVITY: Rehabilitating

ORIGINATOR: Manoj kumar Adusumilli

CONTRIBUTORS

SOURCE/S

Personal Observation

ASSOCIATED FUNCTIONS

F.72 Providing conservation courses

OBSERVATION

Land use planning plays a vital role in adaptation. People should be educated about the plan, and also ensured that the plan can be effectively implemented.

EXTENSION

Disaster management programs are relatively new therefore hardly known. These programs do not promise wealth, neither an admiration within society.
People do not find time to learn land use policies as they feel it is not important for them and its the problem of the government to implement corrective measures.
People feel learning about the wetter world would not fetch any monetary benefits and would neglect to learn the same.

DESIGN STRATEGIES

Educate people before the disaster strikes about protecting their environment and for learning and implementing the same they should be given incentives .

SOLUTION ELEMENTS

- [modified] Land use Code
- [speculative] Climate Change Awards
- [speculative] Policy Institute
- [speculative] Relay Incentive Tax Break
- [modified] Safety Training
- [modified] Educate about wetter world

Design Factor

TITLE

Drainage can fail without warning

DF-16

PROJECT: Design Strategies for a Wetter World

MODE: Preparation

ACTIVITY: Preparing Infrastructure

ORIGINATOR: Alex Cheek

CONTRIBUTORS:

SOURCE/S

Team discussions

ASSOCIATED FUNCTIONS

F.16 Monitor drainage system

OBSERVATION

Due to the unpredictably of weather and the tempestuous nature of water, drainage systems can be overwhelmed quickly and seemingly without warning.

EXTENSION

An overwhelmed drainage system can cause disaster very rapidly. Drainage in urban settings is crucial to protect life and property. When drainage systems fail they can often dump huge water loads into dangerous areas. In order to monitor drainage systems effectively, it would be prudent to implement some kind of early warning system that could alert people to the impending disaster. However, no such system exists. Be cause of this, it is vitally important to monitor these systems for failures and for the potential for failures. If these potentials could be communicated, both before, during and after the disaster, things could be better planned and evacuations more effective.

DESIGN STRATEGIES	SOLUTION ELEMENTS
Give earlier warning	[existing] InstantAlert
Let off pressure in a safe place	[speculative] FloodValve
Wider Alarm Region	[existing] RegionalAlarmSystem

Design Factor

TITLE

Requires advanced communication between large organizations

DF-17

PROJECT: Design Strategies for a Wetter World

MODE: Preparation

ACTIVITY: Preparing Infrastructure

ORIGINATOR: Jihyun Lee

CONTRIBUTORS:

SOURCE/S

http://en.wikipedia.org

ASSOCIATED FUNCTIONS

F.17 Coordinate shutdown of utilities

OBSERVATION

It would be hard to coordinate shutdown of utilities in affected area whenever disaster destroy utilities and destruct the infrastructure.

EXTENSION

Public utilities maintains the infrastructure for the public service. Utilities includes electricity,water, natural gas, district heat distribution, public transport, roads and telecommunication such as cable television and telephone lines. Disaster is certain to destroy the infrastructure and break down utilities. At that time, If utilities are not properly operated or shut down at worst, it would have more damage to infrastructure itself and even people in affected area. Utilities can reduce outage times by instituting shut down protocols that reduce damage to equipment and decrease the chance of additional damages. In addition to that, another utilities should be coordinated as temporary substitute instead of shutdown utilities for the affected community. But it is the issue how this matter could be coordinated promptly. Public utilities can be privately owned or publicly owned. Especially privately owned utilities are not well coordinated with the publicly owned. There should be consolidate hub and system to communicate.

DESIGN STRATEGIES	SOLUTION ELEMENTS
Communicate systemically	[speculative] Mobile Communication Center
Create a hub	[speculative] VOIP
Manage shutdown of utilities	[existing] Utility Management
	[speculative] Utility Shutdown

Design Factor

TITLE

Difficult to know what is needed and where

DF-18

PROJECT: Design Strategies for a Wetter World

MODE: Preparation

ACTIVITY: Preparing Region

ORIGINATOR: Kristian Buschmann

CONTRIBUTORS:

SOURCE/S

Team deliberations

ASSOCIATED FUNCTIONS

F.18 Understand available resources

OBSERVATION

As the portfolio helps regions to prepare for a wetter climate, it will be critical to identify what resources are needed and where they should be implemented.

EXTENSION

The task of preparing regions for climate change is a complex one. Understanding the unique needs and capabilities of each region is critical to its success. In order for the portfolio to assess and distribute resources properly, it must account for what resources are available in each region, and which resources must be drawn from other parts of the world. The difficulty will lie in identifying needed resources, locating them, and acquiring them. Without a system of organizing this information, preparation efforts will suffer greatly.

DESIGN STRATEGIES

SOLUTION ELEMENTS

Identify needed resources — [speculative] Resource Locator

Track resource availability — [speculative] Local Database Connectivity

[speculative] Resource Management System

[speculative] Resource Database

Design Factor

TITLE

Difficult to determine which items are critical

DF-19

PROJECT: Design Strategies for a Wetter World

MODE: Preparation

ACTIVITY: Preparing Region

ORIGINATOR: Manoj Kumar Adusumilli

CONTRIBUTORS

SOURCE/S

http://www.ippnw.org/MGS/V1N4-Toole.html

Personal Observation.

ASSOCIATED FUNCTIONS

F.18 Understand available resources

OBSERVATION

Establishing the list of required resources cannot be achieved as the criticality of resources cannot be determined until the disaster strikes. Also storing critical items can be a problem due to perishability.

EXTENSION

Storing essential goods can be a problem during a disaster due to perishability problems. One cannot store food, medicines & water for a very long time while anticipating a disaster. Incase the essential items are acquired and stored and disaster strikes after 10 years using these essential items can be more disastrous.
The availability of essential items is important during disaster as failure in acquiring them in time might result in loss of life. Also acquiring them during the disaster might not be possible due lack of infrastructure .

DESIGN STRATEGIES

A database having up to date information of available resources.

Sharing expensive resources

Resources are supplied as and when required

Frequently used items like foods, clothing etc are supplied by vending machines.

SOLUTION ELEMENTS

[speculative] Incoming Aid Planners

[modified] Local Resource Centres

[existing] Just in time supply

[modified] Material source

[speculative] Resource Management system

[speculative] Secure Resource Pod

[modified] Resource Cooperatives

Design Factor

TITLE

No way for victims to communicate their whereabouts

DF-20

PROJECT: Design Strategies for a Wetter World

MODE: Response to Disaster

ACTIVITY: Rescuing

ORIGINATOR: Andrew Buhayar

CONTRIBUTORS

SOURCE/S

http://www.amerrescue.org/

http://www.tmcnet.com/voip/1106/regulation-watch-communications-life-lines.htm
November 2006, Volume 9/ Number 11
"Communications Lifelines for Disaster Victims" By John Cimko

https://www.citizencorps.gov

ASSOCIATED FUNCTIONS

F.28 Locate victims

F.30 Remove victims from immediate danger

OBSERVATION

During a disaster situation it is difficult for victims to communicate their whereabouts. This occurs due to deficiencies in technology, the victims' lack of training and extenuating conditions.

EXTENSION

The success of most rescues is dependent on the speed at which a victim can be located. Thus, it is vital that rescue teams have a method as well as tools for finding victims quickly. While many large vehicles are equipped with beacons which operate in emergency situations, individual people are extremely difficult to locate, especially in disaster scenarios. Many advanced tools, in the hands of trained experts, can be used to locate non-communicating victims, however a victim's chance of survival increases significantly if their whereabouts can be outwardly communicated.

However, when disaster strikes, many of the modern communication channels are often disabled. Secondary or back up communication systems often do not exist, nor are populations adequately prepared to use such systems. In the case of Hurricane Katrina, there were few ways that disaster victims could make outward communications notifying others of their status.

DESIGN STRATEGIES	SOLUTION ELEMENTS
Use advanced location equipment to find trapped or injured victims	[modified] Precision locator
Create cheap, low cost wearable emergency communication devices	[speculative] Everyday beacon
Develop a person to person emergency location and missing person network	[speculative] Missing persons kiosk

Design Factor

TITLE

Need a group of defined rescue workers

DF-21

PROJECT: Design Strategies for a Wetter World

MODE: Response to Disaster

ACTIVITY: Rescuing

ORIGINATOR: Manoj Kumar Adusumilli

CONTRIBUTORS

SOURCE/S

Oh, Susan. Terror in Turkey.MacLean's v.112 ,no 35 (Aug.30, 1999) p 26- 28

ASSOCIATED FUNCTIONS

F.25 Mobilize rescue workers.

OBSERVATION

During a Disaster, due to lack of trained rescue workers, rescue operations get hindered and are not successfully implemented.

EXTENSION

"My Brother was buried under the rubble - we heard him - but we could not get to him. By the time the soldiers came and pulled him out, he was dead.." A Turkish man expresses dismay with the inadequate rescue operations in the aftermath of the recent earthquakes in Turkey(Oh, 1999).

There simply were not enough skilled and equipped workers to save the tens of thousands of buried victims in Turkey. The increasing scale and severity of natural disasters requires an increase in the scale of rescue operations including increasing the availability of adequately skilled and equipped rescue workers .

DESIGN STRATEGIES

Rescue workers are predetermined and trained to do a specific rescue operation when a disaster strikes

SOLUTION ELEMENTS

[existing] Rescue Prioritization

[modified] Medical First Responders

[modified] Disaster Force

[modified] Mobile Work Force

[speculative] Applied Management Information System.

Design Factor

TITLE

Need specific type of rescue resources

DF-22

PROJECT	Design Strategies for a Wetter World
MODE	Response to Disaster
ACTIVITY	Rescuing
ORIGINATOR	Mario Ruiz
CONTRIBUTORS	

SOURCE/S

http://en.wikipedia.org/wiki/Community_Emergency_Response_Team#Rationale

ASSOCIATED FUNCTIONS

F.26 Mobilize rescue resources

OBSERVATION

There are a lot of resources to coordinate during a disaster, it cause confusion and resources going to the wrong places.

EXTENSION

Volunteers can help with disaster preparedness, disaster fire suppression, basic disaster medical operations, light search and rescue, and team operations. They are designed to act as auxiliary to existing emergency responders in the event of a major disaster.

In addition many volunteers from regions are willing to help provide their resources. A centralized place to coordinate all of these activities is necessary to efficiently operate a disaster rescue mission.

DESIGN STRATEGIES	SOLUTION ELEMENTS
Communicate where resources go	[speculative] Resource Management System
Resource assessment	[modified] Incoming Aid Planner
Capture volunteer responses	[modified] Mozes
	[modified] Volunteer Manager

Design Factor

TITLE

Coordination of resources is critical

DF-23

PROJECT: Design Strategies for a Wetter World

MODE: Response to Disaster

ACTIVITY: Rescuing

ORIGINATOR: Alex Cheek

CONTRIBUTORS:

SOURCE/S

Team discussions

ASSOCIATED FUNCTIONS

F.27 Prioritize and communicate goals

OBSERVATION

The coordination of human resources and material resources is crucial to any relief effort. Disorganization can severely impede the level of support and the continued participance of volunteers.

EXTENSION

In a disaster context, many different types of resources are needed by the victims, others are offered. The importance of coordinating the actions of the human resources in conjunction with the material resources left behind and brought in by relief organizations cannot be overstated. If these two flows fall out of sync, the entire relief effort can be delayed or damaged. In situations like the recent disaster of the tsunami in coastal Asia recently and Hurricane Katrina, huge amounts of assistance and resources were made available to relief agencies. Disorganization in the groups led to huge inefficiencies that led to waste and loss of life.

With no coordination, not only would resources not reach their targets, but donors would lose confidence and possibly withdraw support.

DESIGN STRATEGIES	SOLUTION ELEMENTS
Create backup plans	[modified] Aid Transportation
Track activity centrally	[modified] RFID tags
Create information networks	[existing] ResourceLocator
	[speculative] Weather Monitors
	[speculative] Resource Database

Design Factor

TITLE

Moving to normal transport vehicles won't work in flood water

DF-24

PROJECT: Design Strategies for a Wetter World

MODE: Response to Disaster

ACTIVITY: Rescuing

ORIGINATOR: Kristian Buschmann

CONTRIBUTORS

SOURCE/S

Shorter, Cliff, Freeman, Seb. *Flood Rescue Craft.* Crisis Response Journal (Volume 2, Issue 1)

ASSOCIATED FUNCTIONS

F.29 Remove victims from immediate danger

OBSERVATION

Watercraft designed for normal marine environments are ineffective in flood conditions

EXTENSION

Typical watercrafts are designed for recreational and work purposes on relatively still water. Flood conditions often include swift moving water which is dangerous for open water boats to navigate due to their hull shape. In addition, flood survivors often use whatever flotation is available and endanger themselves by walking in flooded areas where submerged hazards cannot be seen. (Shorter, Freeman).

DESIGN STRATEGIES

Provide alternate transport

SOLUTION ELEMENTS

[existing] Air Rescue

[existing] Hovercraft Rescue

[speculative] Hovering Rescue Tools

Design Factor

TITLE

Need way to coordinate between agencies

DF-25

PROJECT: Design Strategies for a Wetter World

MODE: Response to Disaster

ACTIVITY: Rescuing

ORIGINATOR: Mario Ruiz

CONTRIBUTORS:

SOURCE/S

http://www.ifrc.org/publicat/wdr2005/chapter1.asp

ASSOCIATED FUNCTIONS

F.32 Need way to communicate to relief agencies

OBSERVATION

A variety of relief organizations are all involved in helping a community through a disaster, requiring a strong coordination and communication effort.

EXTENSION

Medical, shelter, fire, police, and volunteer organizations are all involved in ensuring the safety of a community through a disaster. Given the amount of volunteers and areas that need help, a reliable, efficient, and inexpensive way to communicate the relief efforts is important. In addition, poor coordination among relief agencies leads to duplication of effort.

Limitations in giving feedback during disasters is also apparent. Agencies find it difficult to communicate among themselves, much less the traumatized community.

DESIGN STRATEGIES	SOLUTION ELEMENTS
Share disaster assessment information	[modified] Disaster Assessment Builder
Leverage community	[modified] Disaster Communicator
Leverage local media	
Use inexpensive technology	
Create dialogue between humanitarians and journalists	[modified] Journalist Shadows

Design Factor

TITLE

Skills and experience to detect damage are often not found in one organization or community

DF-26

PROJECT: Design Strategies for a Wetter World

MODE: Disaster Recovery

ACTIVITY: Reconstructing

ORIGINATOR: Jihyun Lee

CONTRIBUTORS

SOURCE/S

Post-Disaster Damage Assessment and need analysis
http://www.reliefweb.int

ASSOCIATED FUNCTIONS

F.33 Assess damage

OBSERVATION

Damage assessment includes the process of recognizing damage and responding to disaster. It should be done as soon as possible to execute the plan. Skills and experience to detect damage are not easy to find because information is dispersed.

EXTENSION

Disaster assessment is the gathering and analysis of information related to disasters and disaster response. The scope of information covers the needs for immediate emergency measures, the needs of those affected, and the available resources for responding to those needs. This includes the overall process pertinent to disaster, so needed to get lots of skills and knowledge from the various area other than disaster expertise. For instance, this process would also require a collector, analyzer, interpreter, reporter, and forecaster. So it often not found in one organization or community. Moreover damage would be detected accurately by those who understand the previous situation of the region. The system manages human resources, information, and collects local knowledge to coordinate available skills and experience through the systematic process.

DESIGN STRATEGIES	SOLUTION ELEMENTS
Collect local knowledge	[speculative] University Research Partner
Manage information	[existing] Applied Management Information System
Manage human resource data	[existing] Resource Cooperatives
	[speculative] Volunteer Data Collection
	[speculative] The Power Of Two Program

Design Factor

TITLE

Rescue workers are too busy to assess situation while rescuing

DF-27

PROJECT
Design Strategies for a Wetter World

MODE
Disaster Recovery

ACTIVITY
Rescuing

ORIGINATOR
Alex Cheek

CONTRIBUTORS
Manoj Kumar Adusumilli

SOURCE/S

Team discussion

Fema website
http://www.fema.org

NewsStand Website
http://www.newstandardnews.net

ASSOCIATED FUNCTIONS

F.33 Assess ongoing situation

F.31 Anticipate secondary disaster

OBSERVATION

During a rescue effort, the rescuers will not have time or attention assess critical issues like structural damages with any detail. They are great for quick superficial and initial assessments, but the ongoing situation will need more attention than a rescuer could give inbetween rescues.

EXTENSION

In the time of a disaster, the first people who are sent in to help are the rescue workers. Their presence is vital and their value is immediately understood: they save people's lives. Naturally their responsibilities are extended to include more important tasks, such as documentation, clean-up, transportation, etc. The problem is, as more responsibilities are heaped upon the rescue worker, the less attention that person has to dedicate to pressing matters of life and limb. By tasking them with conducting ongoing assessment as well as the duties that they already carry, the system would be jeopardizing the success of the rescue operations.

DESIGN STRATEGIES	SOLUTION ELEMENTS
Rescue workers carry rescue operations but are equipped to capture data which is transmitted to a central site for assessment.	[modified] On site Documentation.
	[modified] Pod Casting
	[speculative] Weather Monitors
	[existing] Remote Control Aircraft
	[modified] Volunteer Data Collection.
Get info from locals	[modified] Amateur Radio
Train volunteers	[modified] Volunteers Training Institute

Design Factor

TITLE

No defined criteria for what to assess

DF-28

PROJECT: Design Strategies for a Wetter World

MODE: Response to Disaster

ACTIVITY: Securing

ORIGINATOR: Andrew Buhayar

CONTRIBUTORS:

SOURCE/S

"Earthquake Loss Estimates in Real Time Begin to Assist Rescue Teams Worldwide"
Eos,Vol. 85, No. 52, 28 December 2004 by Max Wyss

http://www.rmportal.net/tools/disaster-assessment-and-response-tools

"Advances in Disaster Planning and Research Yields New Risk Assessment Tool"
http://www.buildings.com/Articles/detail.asp?ArticleID=3275

ASSOCIATED FUNCTIONS

F.33 Assess damage

OBSERVATION

During a disaster situation it is often difficult for disaster response teams to know how to coordinate their efforts given incomplete information.

EXTENSION

Knowing what to do, when is a problem of many disaster response teams. The separation between those on the ground and those at command centers is apparent in many of the recent world disasters. Within large disasters, communicating amongst relief agencies presents additional hurdles, especially when each has its own unique communication network.

Working towards better communication and real-time data collection has helped saved lives. By knowing ahead of time how to assess and communicate conditions, the collective understanding can be used to significantly improve rescue operations.

USAID provides a Field Operations Guide for Disaster Assessment and Response that aims to give first responders a tool for communicating specific needs of a disaster struck area.

DESIGN STRATEGIES	SOLUTION ELEMENTS
Develop a database that maintains updated information on incoming aid and communicates needs of disaster areas	[modified] Incoming Aid Planner
Create a best practice guide for disasters searchable and usable from the field	[modified] Best Practices Disaster Guide
Develop an assessment tool that can be operated with minimal training and experience.	[speculative] Disaster Sensor

Design Factor

TITLE

Need alert for secondary disasters

DF-29

PROJECT
Design Strategies for a Wetter World

MODE
Response to Disaster

ACTIVITY
Securing

ORIGINATOR
Andrew Buhayar

CONTRIBUTORS

SOURCE/S

World Disasters Report 2005 - Chapter 8
"Disaster data: building a foundation for disaster risk reduction."
Principal contributor Mark Pelling
http://www.ifrc.org/publicat/wdr2005/chapter8.asp

http://www.desinventar.org

ASSOCIATED FUNCTIONS

F.38 Secure food and water

F.39 Control secondary disasters

OBSERVATION

While many first order disasters can be responded to with increasingly precise measures, making sure adequate response is given to secondary disaster effects is extremely difficult.

EXTENSION

Systems are barely in place to predict secondary disasters. However, one system is getting much better.

"[DesInventar]...is an inventory system, a methodology to register data about characteristics and effects of diverse types of disasters, with special interest in disasters that are invisible from global or national scales. The inventory allows to watch accumulated data of these invisible disasters at a global or national scale.

...DesInventar is also a tool that facilitates the analysis and representation in space and time of hazards, vulnerabilities and risks in a retrospective and prospective way, for applications in risk management in such various activities as those of planning and mitigation to those of attention and recovery."

Even with a such a predictive tool, communicating the danger is another problem given the wave of primary disaster effects.

DESIGN STRATEGIES	SOLUTION ELEMENTS
Design a system that predicts secondary disasters	[existing] Secondary Disaster Net
Develop protocol and communication tools for each type of secondary disaster	[modified] Next Disaster Alarm
Create primary response tools that quell secondary disasters	[speculative] Comprehensive Disaster Toolset

Design Factor

TITLE

Difficult to communicate amid the chaos

DF-30

PROJECT
Design Strategies for a Wetter World

MODE
Response to Disaster

ACTIVITY
Securing

ORIGINATOR
Andrew Buhayar

CONTRIBUTORS

SOURCE/S

The Disaster Message Service (DMS)
http://www.viexpo.com/

Text messages aid disaster recovery
By Clark Boyd
http://news.bbc.co.uk/1/hi/technology/4149977.stm

Revisiting SMS during Disasters
http://www.knowprose.com/node/10312

ASSOCIATED FUNCTIONS

Strategies for a Wetter World

F.40 Communicate progress

Response to Disaster

F.45 Communicate secure areas

Securing

Manoj Kumar Adusumilli

Mario

OBSERVATION

Many primary communication systems are disabled in disaster situations. Secondary systems are slow in gaining usage because their existence is relatively unknown.

EXTENSION

While SMS messaging and Ham radio have been shown to provide reliable communication in the event of a disaster, a bigger issue may be that victims do not realize that those systems are in place for their benefit. Additionally, disaster communications have been focused on getting information into the affected areas instead of having victims communicate their situation and needs.

One system called the The Alert Retrieval Cache, using open source technology takes a text message and automatically uploads it to a web-page, or distributes to an e-mail list to create a system that links those in need with those who can help.

By giving victims the opportunity to communicate outwardly the ability of the relief workers to coordinate their efforts will improve.

DESIGN STRATEGIES	SOLUTION ELEMENTS
Create an aggregated pool of response and rescue information that can be transmitted and understood easily	[existing] Disaster Messaging
Distribute emergency charging systems for cell phones independent of infrastructure	[existing] Cell Charge
Broadcast reminders to utilize the SMS network in the event of a disaster	[existing] Disaster reminder

Design Factor

TITLE

Victims will be in shock

DF-31

PROJECT: Design Strategies for a Wetter World

MODE: Response to Disaster

ACTIVITY: Securing

ORIGINATOR: Manoj Kumar Adusumilli

CONTRIBUTORS: Mario Ruiz

SOURCE/S

Mileti, Dennis S.1999.Disaters by Design:A Reassessment of Natural Hazards in the United States. Washington DC: John Henry Pres

Interview in disaster area -Adapazari/ Srilanka

http://nbcert.org/medicaloperations.htm

Verichip: http://www.verichipcorp.com/news/1128192073

ASSOCIATED FUNCTIONS

F.36 Identify lost victims

F.37 Maintain civil order

OBSERVATION

During a disaster, people are taken by surprise and their families get separated. Also civil order is lost due to lack of control from the concerned as they are busy handling the rescue operations.

EXTENSION

People experience psychological shock during disasters. This shock is extended after the disaster in the form of safety feeling. Once person undergoes such an extraordinary event, it is difficult for them to return to daily life. People live with the feeling that they are not safe any more and that the event would repeat. So they remain watchful. Extensions of disaster like, aftershocks or tsunami reinforces this feeling of unsafety.
Also the entire civil order is lost as the concerned are busy handling rescue operations .

DESIGN STRATEGIES	SOLUTION ELEMENTS
Lost victims are identified using technologies like RFID, Kiosks etc.	[speculative] Standardized Missing Person Kiosk
	[modified] Medical First Responders
	[speculative] Victim Support Data Base
Civil order is maintained by having police and also by using other security forces available locally	[existing] Police Partners
	[modified] Contact Security Forces
Perform and indicate triage	[modified] TriageTagger

Design Factor

TITLE

Epidemics

DF-32

PROJECT
Design Strategies for a Wetter World

MODE
Response to Disaster

ACTIVITY
Sustaining

ORIGINATOR
Manoj Kumar Adusamilli

CONTRIBUTORS

SOURCE/S

Personal Observation

Vector-bourne disease surveillance and natural disasters. Emerging infectious Diseases., v.4 no2 April/June 1998.

ASSOCIATED FUNCTIONS

F.39 Control Secondary Disasters

F.46 Provide Sanitation

F.73 Determine Vegetation plan

F.76 Understand Changes in climatic conditions

OBSERVATION

Natural Disasters such as hurricanes and floods, are frequently followed by a proliferation of mosquitoes. There is great threat to public health in the form of disease transmitted through these mosquitoes (Nasci , 1998).

EXTENSION

Arboviruses are viruses transmitted by mosquitoes or other arthropods. In stagnant water during post-disaster conditions there is a great potential for the increase in population of mosquitoes. Most increases in mosquito populations is only in nuisance species that do not carry disease. However , there has only been limited monitoring of arbovirus activity immediately following disasters. There is great potential for impact on public health situations from mosquito transmitted diseases during the response to a natural disaster.

DESIGN STRATEGIES

Provide for insecticide application in disaster areas.

Control the problem species during preparation

SOLUTION ELEMENTS

[modified] Mosquito Net

Design Factor

TITLE

Will require working in heavy weather conditions DF-33

PROJECT: Design Strategies for a Wetter World

MODE: Response to Disaster

ACTIVITY: Securing

ORIGINATOR: Manoj Kumar Adusumilli

CONTRIBUTORS

SOURCE/S

Personal Observation

ASSOCIATED FUNCTIONS

F.41 Conduct ongoing situation assessment.

F.42 Bolster Structures, Roads & Bridges

OBSERVATION

During disaster, both rescue workers and the machinery used in rescue operations will have to work under extreme weather conditions.

EXTENSION

During a disaster working in rescue operations could be very difficult as water is all around and temperatures can be very low. People and equipment are often wet for hours.
Travelling in water clogged roads would be very difficult.
Both man and machinery have to work under extreme weather conditions like heavy rain, heavy snows, high wind lightning etc.

DESIGN STRATEGIES

Conduct assessment when disaster strikes and upgrade the system for future disasters.

SOLUTION ELEMENTS

- [existing] Weather Channels
- [existing] Amateur Radio Service
- [existing] Heated Roads
- [existing] Safety Training
- [existing] Temporary Bridges
- [modified] Readiness Games

Design Factor

TITLE

Need prioritization of utilities to secure

DF-34

PROJECT: Design Strategies for a Wetter World

MODE: Response to Disaster

ACTIVITY: Securing

ORIGINATOR: Mario Ruiz

CONTRIBUTORS

SOURCE/S

http://www.toolbase.org/Technology-Inventory/Plumbing/gas-excess-flow-valves

http://www.nextekpower.com/apps/emprep.html

http://www.lacetoleather.com/dis.html

ASSOCIATED FUNCTIONS

F.43 Secure utilities

OBSERVATION

During disasters, water, gas, and electricity lines are damaged and need to be shut-down to prevent further destruction.

EXTENSION

During disaster utility lines can be managed at the community or individual home level. In some cases there are systems that manage the shutdown of utilities by sensing sudden fluctuations in use (in the case of lines breaking). It's important for homes to become sustainable during times where utility lines are shutdown since it's unpredictable how long they will be out of service. Developing self-sustaining electrical tools would provide more

Individual homes should be aware of how to shut down their utilities in the event of a disaster.

DESIGN STRATEGIES	SOLUTION ELEMENTS
Power down gas lines through excess pressure controls	[existing] ExcessFlowValves
Electrical supplements when grid goes down	[modified] ElectricGridSupply
Train for shutting down utilities	[existing] UtilityShutdownTraining

Design Factor

TITLE

Requires ways to locate corpses amid debris and destruction

DF-35

PROJECT
Design Strategies for a Wetter World

MODE
Response to Disaster

ACTIVITY
Securing

ORIGINATOR
Alex Cheek

CONTRIBUTORS

SOURCE/S

Personal observation

ASSOCIATED FUNCTIONS

F.44 Locate/remove corpses

OBSERVATION

In the event of a disaster, corpses may be difficult to find as they might be buried within debris and destruction. Finding the bodies of deceased loved ones is very important but difficult in a disaster setting.

EXTENSION

It is important in many ways that corpses be collected and handled appropriately. This helps with psychological issues, religious issues as well as health concerns. When bodies are buried in debris, it becomes very difficult to locate and appropriately manage the bodies. Usually tools such as bulldozers and cranes are used to clear flood and disaster debris, but this type of equipment is not sensitive enough to see of feel such a soft thing as a corpse. If the corpse can be located during or before the clearing process, then the bodies can be handled as seen fit by family members and government.

DESIGN STRATEGIES

Infrared Imaging

Physically feel corpses

SOLUTION ELEMENTS

[existing] Body Viewer

[speculative] SawStop

Design Factor

TITLE

Difficult to prevent contamination

DF-36

PROJECT: Design Strategies for a Wetter World

MODE: Response to Disaster

ACTIVITY: Sustaining

ORIGINATOR: Jihyun Lee

CONTRIBUTORS:

SOURCE/S

The NewYorkTimes, Dec 1 2006
Usnews Oct 1 2005

ASSOCIATED FUNCTIONS

F.46 Provide sanitation

OBSERVATION

Undesirable bacteria spreads easily through water, food and even erosion. Contamination caused by disasters is hard to detect and prevent.

EXTENSION

Disease outbreaks are a major secondary disaster event that might occur in a wetter world. It becomes worse specifically when water and sewer systems are damaged or destroyed. For instance, cholera spreads quickly when water and food are contaminated by those who carry the bacteria. Dysentery, unlike cholera, can spread directly from person to person, as well as indirectly through contaminated water and food. This contamination may lead to diseases that can cause serious health effects. Most diseases have carrier animals. SARS, for example, gets carried around from human to human by common house cats. A carrier animal will make your virus all the more successful, because it will be very hard to detect and even harder to prevent the outbreak. Moreover even erosion generates undesirable and unseen bacteria due to soil particles.

DESIGN STRATEGIES	SOLUTION ELEMENTS
Prevent contagion	[modified] Disinfected overgarment
Purify water	[speculative] Water purifying cup
Provide a fresh food	[speculative] Food inspector stick
	[speculative] Sealed food
	[speculative] Washing pill

Design Factor

TITLE

Roads/Bridges are broken down

DF-37

PROJECT
Design Strategies for a Wetter World

MODE
Response to Disaster

ACTIVITY
Sustaining

ORIGINATOR
Andrew Buhayar

CONTRIBUTORS

SOURCE/S

"GIS for Transportation Management in Disaster Situations" by Ikhu-Omoregbe, SMART
http://users.tkk.fi/~sikhuomo/gis_theo_tech.html

"Repairing and Reconstructing Disaster-Damaged Roads and Bridges: The Role of
Federal-Aid Highway Assistance" by Robert S. Kirk September 16, 2005

ASSOCIATED FUNCTIONS

F.51 Provide transportation

OBSERVATION

During a disaster transportation networks are often affected by roads and bridges that are damaged or impassable.

EXTENSION

A disaster often has the ability to affect much of a regions infrastructure. Transportation due to road and bridge damage is often diminished.

Disaster response teams usually are capable of debris removal, regrading, removal of landslides, construction of temporary road detours, erection of temporary detour bridges, and use of ferries as an interim substitute for highway or bridge service. The goal is to reestablish essential transportation networks as quickly as possible. Support services that need to reach the affected areas often have to find alternative routes and even alternative forms of transportation.

The goal of any rebuilding is to design a more resilient network than previously existed. However, those long term planning steps are difficult to enact given funds and the ongoing network usage.

DESIGN STRATEGIES

Use advanced planning and design strategies to develop stronger and more flexible transportation networks

Maintain equipment for quickly clearing and rebuilding transportation networks

SOLUTION ELEMENTS

[modified] GIS Transport planning

[existing] Road clear

Design Factor

TITLE

Information of Lost people not updated

DF-38

PROJECT: Design Strategies for a Wetter World

MODE: Response to Disaster

ACTIVITY: Sustaining

ORIGINATOR: Andrew Buhayar

CONTRIBUTORS:

SOURCE/S

"Many Displaced by Katrina Turn to Relatives for Shelter", By Blaine Harden and Shankar Vedantam, Washington Post, September 8, 2005 http://www.washingtonpost.com/wp-dyn/content/article/2005/09/07/AR2005090702415.html

"Residents Stay Put, Despite Orders", By Timothy Dwyer and Michael A. Fletcher Washington Post, September 8, 2005 http://www.washingtonpost.com/wp-dyn/content/article/2005/09/07/AR2005090701309.html

ASSOCIATED FUNCTIONS

F.47 Reconnect lost families

F.50 Communicate with concerned

OBSERVATION

During a disaster knowing where victims are located and where response teams are needed is difficult given a lack of tracking.

EXTENSION

Finding and then tracking disaster victims is extremely difficult given that victims in many cases are totally disconnected from both physical identifiers (home, workplace, products) and family. Unless victims are routed into relief locations and tracked, it is nearly impossible to record the displacement of populations. Victims that do not communicate with disaster response teams may go undetected completely.

If accurate counts are not possible, response teams may miss people in need or ignore larger problems. During Katrina rescue teams were going house to house searching for victims and then spray painting those houses that have been searched. While these methods were tedious, they were necessary. Many advanced search techniques are available, but combining those methods with recording and mapping techniques is not at a level of sophistication to track victims and update response in real-time.

DESIGN STRATEGIES	SOLUTION ELEMENTS
Use body heat and RFID tags to locate and then track victims to improved relief operations	[modified] Census Activities
Maintain missing person kiosk and other standardized reporting devices	[speculative] Standardized Missing Persons Kiosk
Create centers for synthesizing and communicating victim reports from various response teams and incoming victims	[speculative] Mobile Communication Centers

Design Factor

TITLE

Untrained volunteers unable to do first aid

DF-39

PROJECT: Design Strategies for a Wetter World

MODE: Response to Disaster

ACTIVITY: Applying

ORIGINATOR: Manoj Kumar adusumilli

CONTRIBUTORS

SOURCE/S

American Red Cross Website
http://www.redcross.ogr

ASSOCIATED FUNCTIONS

F.48 Provide medical care

OBSERVATION

During disasters, volunteers cannot help (or) move the injured victims as they are not trained to administer first aid. Sometimes this might also result in loss if life.

EXTENSION

When a disaster strikes and during the immediate recovery period, situations often occur that require first aid to be administered by non-medical personal. Response by medical personnel and relief services happens quickly, but there is a span of time when stop-gap medical procedures and first aid need to be administered by those within affected areas. Critical medical situations may be mitigated or alleviated by immediate administration of first aid. Once relief services and medical personnel arrive at the scene of a disaster, those who can administer first aid for non-critical medical conditions free up medical personnel to attend to more seriously injured victims.

According to the American Red Cross, approximately 18% of the American general population are trained in administering emergency first aid procedures. This provides a relatively small amount of people who are able to provide emergency care immediately after a disaster and support medical personnel in the on-going relief efforts.

DESIGN STRATEGIES

Volunteers are trained to administer First Aid.

Medical Centers are setup at a very short notice.

SOLUTION ELEMENTS

[modified] Medical First Responders

[specualtive] Medical Alert System

[modified] Virtual Clinic

[existing] Temporary Medical Centers

Design Factor

TITLE

Relief centers are damaged

DF-40

PROJECT: Design Strategies for a Wetter World

MODE: Response to Disaster

ACTIVITY: Sustaining

ORIGINATOR: Mario Ruiz

CONTRIBUTORS

SOURCE/S

http://www.krabirelief.com/html/krabi_community.htm

http://www.brelief.net/projects.htm

ASSOCIATED FUNCTIONS

F.48 Provide medical care

F.49 Provide food/shelter

OBSERVATION

Disaster relief centers are critical to ensure the safety of the people, it's necessary to create structures which can resist further second-order damage.

EXTENSION

Buildings can easily be swept away during wetter weather with floods and high winds. Buildilng structures that are more robust, or self-repairing in these times can help retain the relief centers. In addition, the role of the relief centers are many; it can be a more permanent location that is a community center post-disaster, but serves as a central location during a disaster.

The relief centers should be pertinent to help train the jobless, youth, and elderly. The community should be leveraged to help decide which materials and location are the best for a community/relief center.

The relief center should be guarded so that damage during wetter weather is mitigated and, in turn, used to help power the facility during disaster events. In addition, communication devices should be used in case there is any damage to the center.

DESIGN STRATEGIES	SOLUTION ELEMENTS
Leverage community input	[existing] CommunityCollab Design
Strong structural and natural materials	[existing] Self-Repair Cement
	[existing] Bamboo Structure
	[existing] SuperNails

Design Factor

TITLE

Communication channels are destroyed

DF-41

PROJECT: Design Strategies for a Wetter World

MODE: Response to Disaster

ACTIVITY: Sustaining

ORIGINATOR: Alex Cheek

CONTRIBUTORS:

SOURCE/S

Katrina Help Info Wiki; http://katrina-help.info/wiki/index.php/Katrina_PeopleFinder_Project

ASSOCIATED FUNCTIONS

F.50 Communicate with concerned

OBSERVATION

In a disaster, families worry about loved ones from whom they have not heard. The problem is often that standard communication methods are not functioning due to weather damage.

EXTENSION

One of the scariest things for families in times of disaster is for the family to be separated. With no standard means of communication, some people use broadcast news, bulletin boards, online communities and hand made fliers all proliferate to help people reconnect with lost family members. Aside from rec connection, people need to know the whereabouts of each other in real time. With communication lines out, this is very difficult. In disasters, phone lines can be destroyed, cell towers knocked down and radio stations blown away. There is little chance that parcel delivery services can deliver things and the USPS, despite its motto, can travel on the damaged roads. Except for satellites, in that situation, communications are down.

DESIGN STRATEGIES	SOLUTION ELEMENTS
Satellite connections	[existing] SatellitePhones
Internet Protocol	[modified] VOIP phones
Broadcast Wide	[existing] Amatuer Radio

Design Factor

TITLE

Requires long-term service to be effective

DF-42

PROJECT: Design Strategies for a Wetter World

MODE: Improving

ACTIVITY: Rehabilitating

ORIGINATOR: Jihyun Lee

CONTRIBUTORS:

SOURCE/S

http://www.istss.org/

ASSOCIATED FUNCTIONS

F.53 Provide psychological service

OBSERVATION

Psychological tasks of recovery for affected people should be explored including long term effects of disaster. Emergency relief without follow up care is often ineffective .

EXTENSION

Disaster affected people can suffer excessive scaring or serious pathology without a proper action. Psychological service is needed to enable people to retrieve their mental health. Psychological service should be done from psychological first aid to long term clinical treatment. Psychological first aid service can relieve affected people temporarily. Psychological matter are often not treated in a short time period. Long term treatment may offer sufficient relief, one to one trauma counselling or therapy may be required to heal longer term effects of stress and trauma. Personnel need to be followed up long term especially if traumatized in the disaster. Severe stress and trauma responses (often called Traumatic stress or critical incident stress responses) need to be assessed and monitored for their potential long term entrenchment and evolution of symptoms and illnesses

DESIGN STRATEGIES	SOLUTION ELEMENTS
Provide long-term service	[existing] Nursing homes
Network with psychologists	[existing] PLTC
Assess and monitor the psychological state	[existing] Physical Frameworks

Design Factor

TITLE

Volunteers are not trained to tackle disasters

DF-43

PROJECT
Design Strategies for a Wetter World

MODE
Response to Disaster

ACTIVITY
Sustaining

ORIGINATOR
Alex Cheek

CONTRIBUTORS

SOURCE/S

"In Cambodia's Biggest Dump, School Offers Hope." Jennifer Hile, National Geographic Today, September 12, 2003. http://news.nationalgeographic.com/news/2003/09/0912_030912_tvtrash-dump.html

ASSOCIATED FUNCTIONS

F.56 Salvage reusable goods

OBSERVATION

Once a disaster has occurred, it is often difficult to find the raw materials needed for recovery and reconstruction. However, there is often much usable material available. The problem is often not a lack of materials, but a lack of trained people to perform salvage tasks.

EXTENSION

Currently, there are workers who specialize in collection of garbage and recycling waste, but the materials left in the wake of disaster are very different. Most people who work salvaging are working in large municipal dumps, specializing in particular items, extracting specific materials from them. The salvageable materials and goods that can be collected after a disaster are often of questionable quality and safety. It requires personnel who are trained in basic assessment and inspection of all sorts of reusable goods. From building supplies to food to textbooks. If collected indiscriminately, salvaged goods could be dangerous for the applications to which they are applied as well as to the people who are assigned to collect them.

DESIGN STRATEGIES

Train Volunteers

SOLUTION ELEMENTS

[modified] Volunteer Training Institute

Design Factor

TITLE

Hard to maintain heritage

DF-44

PROJECT: Design Strategies for a Wetter World

MODE: Disaster Recovery

ACTIVITY: Reconstructing

ORIGINATOR: Andrew Buhayar

CONTRIBUTORS

SOURCE/S

"Integrating Historic Property and Cultural Resource Considerations into Hazard Mitigation Planning" Prepared for Federal Emergency Management Agency, May 2005

http://www.heritagepreservation.org/

http://architecture.suite101.com/article.cfm/rebuilding_heritage_mississippi

ASSOCIATED FUNCTIONS

F.64 Repair/build infrastructure

OBSERVATION

In the aftermath of a disaster, extensive damage may make it difficult or even impossible to maintain heritage.

EXTENSION

The damage caused by a disaster may make it difficult to maintain the particular heritage of a community due to the fact that many cultural assets cannot be replaced. Additionally, community members may feel it easier to start new in another location, rather than rebuilding. However, rebuilding in a manner that embraces that heritage can be important to the long-term success of a community. A proper accounting of existing cultural assets makes the process of rebuilding easier and aligns community members around rebuilding.

"What our project [Mississippi Heritage Project, post Katrina] is demonstrating is the important role conservation and the recovery of heritage plays in the healing process of the community, their shared identity and shared history. It is a very apolitical, neutral context that can bring a lot of different groups of people together." (Morris Hylton III, Initiatives Manager for the NY-based World Monuments Fund)

DESIGN STRATEGIES	SOLUTION ELEMENTS
Catalog a community's assets and determine how best to store and protect each artifact	[existing] Heritage vault
Create a scorecard to determine what cultural assets need to be restored to help restore the community	[existing] Heritage scorecard

Design Factor

TITLE

Current land use differs from ideal land use

DF-45

PROJECT: Design Strategies for a Wetter World

MODE: Disaster Recovery

ACTIVITY: Reconstrucing

ORIGINATOR: Kristian Buschmann

CONTRIBUTORS

SOURCE/S

AlertNet. *Problems dog tsunami effort.* **Reuters** (August 25, 2005)

ASSOCIATED FUNCTIONS

F.59 Applying land-use evaluation

OBSERVATION

Current land use may conflict with reconstruction efforts.

EXTENSION

Land use will play a crucial role in reconstructing after a disaster. Natural disasters offer the opportunity for regions to learn from previous land use mistakes and apply ideal land use guidelines. Applying ideal land use practices can be especially difficult in post disaster contexts, however. Populations struggling to meet immediate survival needs do not have the luxury of applying forward thinking land usage. In post tsunami Andaman and Nicobar "...Mud barriers have been built along parts of the coast to keep the sea out at high tide. But environmentalists say loose soil from the wall is damaging the nearby coral reefs which are some of the most pristine in the world. They also say the barrier is preventing water running off the land, increasing the risk of malaria because mosquitoes are breeding in water that can't drain away. "We've really invited a disaster," said Samir Acharya of the Society for Andaman and Nicobar Ecology." (Reuters).

DESIGN STRATEGIES

SOLUTION ELEMENTS

Communicate ideal land use

- [speculative] Best Practices Guide
- [speculative] Traveling School Bus

Implement ideal land use

- [speculative] Landscape Planning
- [speculative] Land Use Code
- [speculative] Development Rights

Design Factor

TITLE

No knowledge about previous state

DF-46

PROJECT: Design Strategies for a Wetter World

MODE: Disaster Recovery

ACTIVITY: Reconstrucing

ORIGINATOR: Manoj Kumar Adusumilli

CONTRIBUTORS

SOURCE/S

Milenti, Denis S. 1999. Disasters by Deisgn: A Reassessment of Natural Hazards in the United States. Washington DC: John Henry Press

ASSOCIATED FUNCTIONS

F.60 Evaluate spontaneous adaptations

OBSERVATION

Disaster strikes repeatedly i.e. floods come every year but if the previous adaptations are not captured the adaptation has to start over creating a loss of resources, time and money.

EXTENSION

"There is no central repository for other social response data collection in the United States. Researchers should be encouraged to archival data sets for other and for long term use in a central respiratory within a year or two after collection .Some ongoing funding would be needed to establish and maintain a central location for archived data ,but the information itself might be made available through a web site or other computer -accessible source .Such an archive could be expanded over time to include all related data sets and could even be a resource for practitioners and policy makers. It might also be used to encourage government agencies to centralize data collection. The existence of a centralized archive would accelerate the development of standardized measures of data collection on the social aspects of hazards and disasters. Currently ,across-disaster comparisons are constrained because different researchers measure the same things in different ways .No central location exists from which a researcher can find and obtain measures for a particular aspect of a disaster-for example applications to agencies for assistance after a disaster, how well existing measures worked in getting needed information.[etc]... Sustainable hazards mitigations would be facilitated by standardized measurement in order to provide across community comparisons "(Mileti,257-8).

DESIGN STRATEGIES

Proper classification of data is essential so as to ensure future accessibility to the data.

Capture Data and store for future use.

SOLUTION ELEMENTS

[speculative] Applied Management Information system

[existing] Weather Stations

[modified] Volunteer manager

[modified] Local database Connectivity

[speculative] Web investigator

[modified] Local Resource centers

[modified] On site Documentation.

Design Factor

TITLE

Debris is dangerous to handle

DF-47

PROJECT: Design Strategies for a Wetter World

MODE: Disaster Recovery

ACTIVITY: Reconstructing

ORIGINATOR: Mario Ruiz

CONTRIBUTORS

SOURCE/S

http://www.epa.gov/katrina/debris.html

http://www.epa.gov/epaoswer/non-hw/muncpl/disaster/disaster.htm

ASSOCIATED FUNCTIONS

F.61 Demolish/remove debris

OBSERVATION

Most debris from disasters is recyclable material that can be used by business or people in the community.

EXTENSION

"Green Waste" can be turned into mulch and used by businesses or people in the community for various things. Much of this can generate new jobs and income for people given the length of time that it takes to rid an area of debris. Clean-up efforts are difficult for a central organization to take on solely, so leveraging community help and providing a way to recycle the material is an efficient and sustainable way of dealing with debris.

Since debris can be part of building structures, machines are likely the best way to gather and sort through the various types of debris (damaged buildings, sediments, green waste, personal property, ash and wood).

City officials, from an Ohio tornado disaster, found that the two greatest obstacles to managing the debris were communicating instructions to residents and sorting the green waste to maximize chipping and mulching efficiency.

DESIGN STRATEGIES	SOLUTION ELEMENTS
Get equipment and supplies from neighboring cities	[speculative] Resource Inventory System
Determine recycling program	[existing] Recycling Center
Leverage community as workforce	
Develop communication plan	[existing] Debris Communicator

Design Factor

TITLE

Law varies from location to location

DF-48

PROJECT: Design Strategies for a Wetter World

MODE: Recovery

ACTIVITY: Reconstructing

ORIGINATOR: Alex Cheek

CONTRIBUTORS

SOURCE/S

Personal observation

ASSOCIATED FUNCTIONS

F.62 Conduct policy research

OBSERVATION

When preparing people and regions for climate change, it is important to engage local government for help in education and supporting policies and laws. To do this well, knowledge of the current local legal system is very important to help with the decision making process. The difficulty in this proposal is that legal systems vary widely from place to place.

EXTENSION

The great variability from society to society, and even from region to region and town to town in laws regarding environmental preparation and protection make implementing a broadly conceived plan very difficult. The reason for conducting policy research is to try to understand what will combinations of policies will best help a community adapt to global climate change, including policies that will help communities remain flexible to unpredictable changes in weather. With every community there is a different set of concerns and different players to get to know. Literally, a lifetime could be spent getting to know each political situation

DESIGN STRATEGIES	SOLUTION ELEMENTS
Use local Experts	[existing] LocalContact
Categorize areas	[modified] Regional Political Profiles
Use world experts	[existing] Database Experts
	[speculative] NGO Partnership

Design Factor

TITLE

Hard to imagine previous utilities under the ground DF-49

PROJECT: Design Strategies for a Wetter World

MODE: Disaster Recovery

ACTIVITY: Reconstructing

ORIGINATOR: Jihyun Lee

CONTRIBUTORS:

SOURCE/S

www.tieliikelaitos.fi

ASSOCIATED FUNCTIONS

F.64 Repair/build infrastructure

OBSERVATION

In the case of planning to repair and reconstruct the damaged infrastructure, it is difficult to locate and assess damage to buried lines.

EXTENSION

When disaster happens, lots of utilities would be damaged from the disaster. In the stage of reconstruction, businesses, contractors, city and emergency services need to recognize underground utility. But water, power, gas, telecommunications and sewer buried underground are unseen and out of sight. So it is really hard to imagine where utilities are located. This really affects reconstruction. Damage to a buried pipe or cable affects the integrity of the utility systems and reduces the value of the infrastructure. System doesn't have the information indicating the presence and position of buried utility. Understanding the previous state and planning can contribute significantly to reduce potential damaged and cost incurred. Collective data and supervision can contribute to solve the problem.

DESIGN STRATEGIES	SOLUTION ELEMENTS
Collect data	[existing] Utilities data center (UDC)
Detect utilities previously buried	[speculative] X-ray detector
Represent buried line	[existing] Utility Map

Design Factor

TITLE

Hard to communicate with people who are in affected areas

DF-50

PROJECT: Design Strategies for a Wetter World

MODE: Disaster Recovery

ACTIVITY: Rehabilitating

ORIGINATOR: Jihyun Lee

CONTRIBUTORS: Alex Cheek

SOURCE/S

American Red Cross web site:
Http://www.redcross.org

FEMA website
Http://www.fema.org

American Red Cross and FEMA,1995.
Your family Disaster Plan.
Jessup,Maryland.

ASSOCIATED FUNCTIONS

F.66 Creating feeling of Safety

OBSERVATION

Because of damage to infrastructure as well as the chaotic situation, communication in disaster is difficult.

EXTENSION

Although the idea has universal appeal, many families and individuals do not have personal disaster plans and are unaware of the disaster plans for their community .Disaster plans are not created and community plans are not investigated for multitude of reasons including that the threat of a disaster is abstract,it is considered morbid and time-consuming and it has a low priority in busy lives.
Because of the lack of planning, there is a need to communicate in real-time. However, due to the chaotic situation, this is difficult. Victims often assume a state of panic and do not react rationally to communication. This, compounded by the fact that communication infrastructure may be damaged, partially or completely, means that communication is often virtually impossible.
In trying to create a feeling of safety, organization is a key component. Well structured and sure communication can help, but is often absent in times of disaster.

DESIGN STRATEGIES

Communicate the disaster plan effectively and educate people about the oncoming disaster.

SOLUTION ELEMENTS

- [modified] Educate about wetter world
- [modified] Research Certification
- [speculative] Travelling School Bus
- [modified] Empower Locals
- [modified] Local Representative
- [speculative] Police Partners

Design Factor

TITLE

Hard to mobilize and match skills to the position DF-51

PROJECT: Design Strategies for a Wetter World

MODE: Disaster Recovery

ACTIVITY: Rehabilitating

ORIGINATOR: Andrew Buhayar

CONTRIBUTORS

SOURCE/S

http://www.jobsearch.org/hurricane-jobs

"Pathways to Employment" Initiative Expanding Employment Services for Hurricane Survivors - ETA News Release: [09/30/2005] http://www.dol.gov/opa/media/press/eta/eta20051850.htm

ASSOCIATED FUNCTIONS

F.69 Create job opportunities

OBSERVATION

In rehabilitating a community it is difficult to locate and organize people needed in the rebuilding process.

EXTENSION

The number of people that descend on a disaster area can be overwhelming even if their intention is to help. Organizing the various groups and individuals is particularly difficult given such short-term involvement. In many cases individuals are brought in as a member in a group. The group maintains a structure for assigning individuals to various tasks in order to complete defined projects. The group can also preform all screening activities needed to assess an individual's skill set prior to arrival at the disaster site.

At the same time web sites can help organize job applicants and available work opportunities. The various sites direct the flow of information with the hope of finding work for displaced individuals or generating the workforce needed to continue rebuilding.

DESIGN STRATEGIES	SOLUTION ELEMENTS
Have a database to update information on incoming aid and disaster struck areas	[speculative] Incoming Aid Planner
To provide lecture and intensive workshop to educate research methods	[speculative Volunteers Training Institute

Design Factor

TITLE

Create incentive for regions to help

DF-52

PROJECT: Design Strategies for a Wetter World

MODE: Disaster Recovery

ACTIVITY: Rehabilitating

ORIGINATOR: Mario Ruiz

CONTRIBUTORS

SOURCE/S

http://www.metrokc.gov/prepare/programs/regionalplan.aspx

ASSOCIATED FUNCTIONS

F.67 Create regional empathy

OBSERVATION

In a disaster situation, communities can get help from surrounding communities to help provide resources.

EXTENSION

Communities have mutual aid agreements, but some need more specific plans for regional response to disasters. Drafts of plans are sent to various regions and are signed and agreed to. Documentation is passed along between the various regions to plan out the response process and the document can be edited or modified by local communities.

These plans work with local or state disaster plans already in place as well as any mutual aid agreements done by the communities. Incentives like tax breaks can also help participation in the plan since it can cover public/private sectors.

DESIGN STRATEGIES	SOLUTION ELEMENTS
Create platform for editing	[existing] DisasterPlan Wiki
Leverage tax incentive plans	[speculative] Resource Tax Break

Design Factor

TITLE

Center locations can shift due to weather

DF-53

PROJECT: Design Strategies for a Wetter World

MODE: Preparation

ACTIVITY: Preparing Infrastructure

ORIGINATOR: Mario Ruiz

CONTRIBUTORS

SOURCE/S

http://www.city.toshima.tokyo.jp/english/bousai/bousai3.html

http://www.mobilehealthclinicsnetwork.org/sample_abstracts06.html

ASSOCIATED FUNCTIONS

F15. Identify location for relief centers

OBSERVATION

The location of a relief center can change during and after a disaster depending on the current weather patterns.

EXTENSION

The function of a relief center should be to provide food and water, provide shelter, relay information, provide emergency medical treatment, and act as a temporary gathering site. During flood situations, it's imperative that the designated relief center to remain undamaged.

The needs of disaster recovery situations necessitate mobile relief centers that can be dispatched and moved easily. Usually, large buildings like high schools gyms are used as relief centers, but movable solutions are more adaptable.

Adaptable relief centers can, therefore, be placed where they are most critical and can work with other relief organizations who decide the best location for these.

DESIGN STRATEGIES

Movable relief centers

Modular systems

Localized dispatch

Communicate whereabouts

SOLUTION ELEMENTS

[modified] MedicShelter

[speculative] ReliefDispatcher

Design Factor

TITLE

Difficult to determine who should be involved

DF-54

PROJECT: Design Strategies for a Wetter World

MODE: Evaluation

ACTIVITY: Researching

ORIGINATOR: Alex Cheek

CONTRIBUTORS:

SOURCE/S

Raymond, Eric S. *The Cathedral and the Bazaar*. http://catb.org/esr/writings/cathedral-bazaar/

ASSOCIATED FUNCTIONS

F.74 Establish global research network

OBSERVATION

It is not enough to say that one must establish a global network. This is a geographical descriptor which does nothing to specify who should be in the network. The characteristics are relatively easy to define, but it is difficult to find those people.

EXTENSION

Global networks are the new standard tool for problem solving and innovation. Eric S. Raymond, the open source guru, said in his well-known essay, "The Cathedral and the Bazaar," "Given enough eyeballs, all bugs are shallow." This means that if enough people look at a problem, all problems are easy to spot, if not fix. This implies that a network should seek to include as many individuals as a possible. However, eyes that have no idea what they are looking at rarely offer fruitful contributions. This leads us to the problem of deciding who should be included in the network, whether by name, or by academic qualification, or criteria of language or location. It is a difficult and important task that has no standard answer.

DESIGN STRATEGIES	SOLUTION ELEMENTS
Focus on established experts	[existing] iCommons
	[existing] University Research Partner
	[existing] Database Experts
Identify experts publicly	[speculative] Adaptation Awards
Leverage wisdom of crowds	[modified] Open Research

Design Factor

TITLE

Requires stations around the globe

DF-55

PROJECT: Design Strategies for a Wetter World

MODE: Evaluation

ACTIVITY: Researching

ORIGINATOR: Jihyun Lee

CONTRIBUTORS:

SOURCE/S

http://www.pfeg.noaa.gov/
http://www.ucar.edu/

ASSOCIATED FUNCTIONS

F.76 Understand changes in climactic conditions

OBSERVATION

In order to understand global climate change a global network is needed.

EXTENSION

A region's climate is determined by both natural and human-made factors. The natural elements include the atmosphere, geosphere, hydrosphere, and biosphere, while the human factors can include land and resource uses. Changes in any of these factors can cause local, regional, or even global changes in the climate. In fact, computer models show the trends in factors that describe climate, such as temperature and precipitation, vary regionally. So it's not easy to monitor global climate in one place due to the environmental characteristics. Accordingly, climate should be monitored globally and should not be limited to a specific region. Climate would be monitored by receiving, measuring, processing and retransmitting data around the globe. So station would be necessary to collect and monitor accurate climate data by region.

DESIGN STRATEGIES	SOLUTION ELEMENTS
Monitor world weather	[existing] World Weather Database
Network with weather forecasting org	[speculative] Weather Channels
Collect weather data	[existing] ResearchRing
	[speculative] Technology Information Gatherer
	[speculative] Weather Stations

Design Factor

TITLE

Difficult to implement or make useful technologies DF-56

PROJECT: Design Strategies for a Wetter World

MODE: Evaluation

ACTIVITY: Researching

ORIGINATOR: Kristian Buschmann

CONTRIBUTORS:

SOURCE/S

Cowen, Ron. *A Swarm of Umbrellas vs. Global Warming: Astronomer thinks small to save Earth.* **Science News** (November 4, 2006)

ASSOCIATED FUNCTIONS

F.77 Discover emerging technologies

OBSERVATION

New technologies may not always be applicable.

EXTENSION

New technologies will often present the opportunity to better solve problems than current solutions, but putting them into use can be difficult. Factors such as cost, development, availability, and technical expertise can render an emerging technology "ahead of its time."

Some technologies may be adopted from other applications and not yet suited for the direct application of adapting to a wetter climate, while others may require the cooperation of multiple governments, or even the entire planet. An extreme example of this is a proposal to deploy a series of earth orbiting shades covering an area "...of about 100,000 km, [that] would act as a mostly transparent umbrella for the entire planet. The cloud would reduce by 1.8 percent the amount of sunlight reaching Earth, and that shading would significantly cut global warming, Angel calculates. He describes his ambitious plan, which he says could be deployed in about 25 years at a cost of several trillion dollars.... " (Cowen).

DESIGN STRATEGIES

Identify emerging technologies

Match technologies to applications

SOLUTION ELEMENTS

[speculative] Technology Network Forum

[speculative] University Research Partner

Design Factor

TITLE

Too much Incoming Data to sort, difficult to get the ground reports

DF-57

PROJECT: Design Strategies for a Wetter World

MODE: Evaluation

ACTIVITY: Researching

ORIGINATOR: Manoj Kumar Adusamilli

CONTRIBUTORS

SOURCE/S

Board on Natural Disasters. Reducing disaster losses through better information. National Academy Press. Washington D.C. 1999

ASSOCIATED FUNCTIONS

F.78 Gather Disaster Research Data

OBSERVATION

During the disaster, information is received at a very fast pace which is very difficult to sort. And also, due to its huge size, it cannot be immediately sorted. The disaster site may be difficult to approach to get on site disaster information.

EXTENSION

Disaster decisions are too often made without all the facts. A decision maker's job is difficult because there are so many sources from which to acquire relevant information.

Here is a sample list of organizations holding information relevant to disaster decision making: National Weather Service, News papers, Individuals/citizens, NOAA , USGS , NASA, Census statistics, EPA, FAA, DOD.(Board of Natural Disasters,16-17)

An added complication due to this situation is that different decision makers in a given disaster area may be making decisions based on different and conflicting information. An individual may be receiving information for the Weather Channel on the internet, an government officials may be in direct communication with NASA forecasting groups. The conflicting information leads to conflicting and less efficient action during emergencies.

DESIGN STRATEGIES

Information is directly obtained from the disaster site.

Information is Automatically sorted while uploading it .

SOLUTION ELEMENTS

[speculative] Web investigator

[modified] Locate Resource Center

[modified] Volunteer data collection

[modified] Local Interview Training

[speculative] Applied Management Information System

[speculative] Contact point

Design Factor

TITLE

New research requires documentation

DF-58

PROJECT: Design Strategies for a Wetter World

MODE: Evaluation

ACTIVITY: Researching

ORIGINATOR: Mario Ruiz

CONTRIBUTORS

SOURCE/S

http://commdocs.house.gov/committees/science/hsy24463.000/hsy24463_0.HTM

http://www.drj.com/new2dr/model/w3_002.htm

ASSOCIATED FUNCTIONS

F.79 Develop new strategies

OBSERVATION

Research conducted for adapting to wetter weather should be preserved in documentation.

EXTENSION

Currently research done during a disaster is not very well documented. In addition to that, research done in preparation for a disaster can be shared and distributed among various regions to build on learnings.

Conducting social science research to understand human behavior during and preparing for disasters can help improve solutions. Currently, there is a gap between social science research and disaster planners.

In the US, the National Science Foundation is investing almost $200M in resources for social science research, which is partly being used to focus on disaster situations.

DESIGN STRATEGIES	SOLUTION ELEMENTS
Share research	[modified] Research Database Wiki
Make research engaging	[existing] Visual Training
Connect researchers with planners	[modified] ResearchForum

Design Factor

TITLE

Local population resists adaptation solutions

DF-59

PROJECT: Design Strategies for a Wetter World

MODE: Evaluation

ACTIVITY: Improving

ORIGINATOR: Andrew Buhayar

CONTRIBUTORS

SOURCE/S

"After More Than a Century of Soaking, Washington Town Mulls Move to Higher Ground" By William Yardley, New York Times, November 12, 2006

ASSOCIATED FUNCTIONS

F.81 Collaborate with local communities

F.82 Communicate new tools and processes

OBSERVATION

Many times a community will shun adaptation solutions, even though those solutions may prevent property damage and loss of life.

EXTENSION

The town of Hamilton, Washington has long had problems with flooding. While FEMA has through the years invested over ten million dollars in the town related to infrastructure repair and aid, the town is finally looking to relocate. The move will cost an estimated four million dollars.

However, Many residents are resisting the move despite the obvious logic. Reasons range from being too old to start over, people filing claims with FEMA after each flood as a scam, but in most cases not having the money to do so. Hamilton's plan to move will actually help purchase the property on a voluntary basis.

DESIGN STRATEGIES

Support network for long-term relocation (housing, employment, health care)

Create a support system to help people whose small business is destroyed or affected by disaster.

SOLUTION ELEMENTS

[speculative] Network For Relocating Transportation

[existing] Small Business Support System

Design Factor

TITLE

No Network exists for distribution

DF-60

PROJECT: Design Strategies for a Wetter World

MODE: Evaluation

ACTIVITY: Improving

ORIGINATOR: Manoj Kumar Adusamilli

CONTRIBUTORS:

SOURCE/S

http://www.gao.gov/docdblite/details.php?rptno=GAO-06-808T

Personal Observation

ASSOCIATED FUNCTIONS

F.84 Share and Distribute regional solutions

OBSERVATION

During a disaster, resources are available but due to lack of efficient distribution channels resources are wasted (or) do not reach the needy on time.

EXTENSION

Hurricane Katrina was one of the largest natural disasters in U.S. history. Despite a large deployment of resources at all levels, many have regarded the federal response as inadequate.
The military mounted a massive response to Hurricane Katrina that saved many lives, but it also faced several challenges. Based on its June 2005 civil support strategy, DOD's initial response relied heavily on the National Guard, but active forces were also alerted prior to landfall. Aviation, medical, engineering, and other key capabilities were initially deployed, but growing concerns about the disaster prompted DOD to deploy active ground units to supplement the Guard beginning about 5 days after landfall. Over 50,000 National Guard and 20,000 active personnel participated in the response. However, several factors affected the military's ability to gain situational awareness and organize and execute its response, including a lack of timely damage assessments, communications problems, uncoordinated search and rescue efforts, unexpected logistics responsibilities, and force integration issues.

DESIGN STRATEGIES

Establish Distribution Networks before the disaster strikes. These Distribution networks should be established permanently so as to ensure availability during future disasters.

SOLUTION ELEMENTS

- [modified] Just in time Sourcing
- [modified] Resource Cooperatives
- [speculative] Network for Relocating Transportation
- [modified] Resource Locator
- [modified] Resource Data Base
- [speculative] Secure Resource Pod

Design Factor

TITLE

Tools fail due to lack of localized customization DF-61

PROJECT: Design Strategies for a Wetter World

MODE: Evaluation

ACTIVITY: Applying

ORIGINATOR: Mario Ruiz

CONTRIBUTORS:

SOURCE/S

http://www.adas.co.uk/record/display_index.html?podlet_id=39&article_id=32

http://www.forestcare.com/forestry.htm

ASSOCIATED FUNCTIONS

F.85 Evaluate new tools and processes

OBSERVATION

The creation of new tools and processes for adaptive solutions to wetter weather conditions requires localized evaluation.

EXTENSION

Creating solutions to adapt to wetter weather requires some sort of evaluation to ensure the solution will resist the natural forces of a disaster event.

Typically in the design process, evaluative research is critical to ensure the feasibility of the solution.

In addition to evaluative processes, tools may require modification for communities to implement locally. New tools should work with various communities to test out and tailor to each region's individual needs.

DESIGN STRATEGIES

Build prototypes

Build relationship with regions to evaluate

Document evaluation research

SOLUTION ELEMENTS

[modified] ToolPilot

[modified] ResearchNetwork

Design Factor

TITLE

Utilities/Energy lines are broken

DF-62

PROJECT: Design Strategies for a Wetter World

MODE: Response to Disaster

ACTIVITY: Sustaining

ORIGINATOR: Jihyun Lee

CONTRIBUTORS

SOURCE/S

metrokc.gov

ASSOCIATED FUNCTIONS

F.88 Build local capacity

F44. Secure utilities

OBSERVATION

In the case of disaster, utilities often break down and it is often hard to repair them quickly. There is no efficient alternative system to support people in the affected areas during the situation.

EXTENSION

When disaster strikes, it often makes one or more of the utility systems break down and people may lose the service of one or more of their utilities without warning. Power outages in an affected region are typically related to severe weather such as heavy rain, snow and high wind. In this case, utility lines on the ground for electricity and gas would not be safe from wind, trees and floods. In addition to weather-related causes, outages can also be a result of equipment failure, damage to cables, or line loading. This problem should be figured out easily and quickly to be repaired but can take a long time. So people need to know who is responsible for the various utilities they use as alternatives. So they can contact the proper agency for help. In this case, utility can provide orderly shut down of utilities and arrange for alternate supply sources because electricity can be purchased from utility company and other areas.

DESIGN STRATEGIES	SOLUTION ELEMENTS
Provide emergency manual	[speculative] Utility Company Bill
Connect alternate supply source	[modified] Portable Battery Generator
	[speculative] Self light
Prevent damage	[speculative] Utility Management
	[existing] Buried Lines

Solution Element

TITLE

Weather Monitors

existing
modified
speculative

SE-1

PROJECT
Design Strategies for a Wetter World

MODE
Response to Disaster

ACTIVITY
Applying

ORIGINATOR
Manoj Kumar Adusumilli

CONTRIBUTORS
Mario Ruiz

DESCRIPTION

Smart Phone device that is handed to village people or those responsible in towns to give people preparation information. It would give dynamic inputs by which experts would change the plan as per the changing local situation.

SOURCE

www.wxnotice.com
http://www.iawfonline.org/summit/2005%20Presentations/2005_posters/Kremens%20et%20al.pdf

PROPERTIES

- Digital Touch Screen
- Network Connectivity
- Self Charging
- Huge Memory
- Weather Proof
- Data entry Keyboard

FEATURES

- Shows disaster plan .
- Provides ways to disseminate current research on disaster preparedness
- Shows way to safe places

ASSOCIATED FUNCTION/S

F.33 Assess ongoing situation

F.31 Anticipate Secondary Disaster

F.27 Prioritize and Communicate goals

SOURCE DESIGN FACTOR/S

Coordination of resources is critical

Rescue workers are too busy to assess situation while rescuing.

Solution Element

TITLE

Contact point

existing
modified
speculative

SE-2

PROJECT	Design Strategies for a Wetter World
MODE	Response to Disaster
ACTIVITY	Applying
ORIGINATOR	Manoj Kumar Adusumilli
CONTRIBUTORS	Kristian Buschmann

DESCRIPTION

Mobile communication centers with satellite connections that are deployed to isolated areas

SOURCE

http://www.ri.cmu.edu/pub_files/pub2/matthies_l_1995_1/matthies_l_1995_1.pdf
http://www.pages.drexel.edu/~cgt22/papers/Burns-Lansdown.pdf
http://broadcastbiscuit.com/Sat.html

PROPERTIES

- All terrain Vehicle
- Satellite connectivity
- Remote maneuverability
- Solar Panels
- Energy Storage unit
- Display Panels

FEATURES

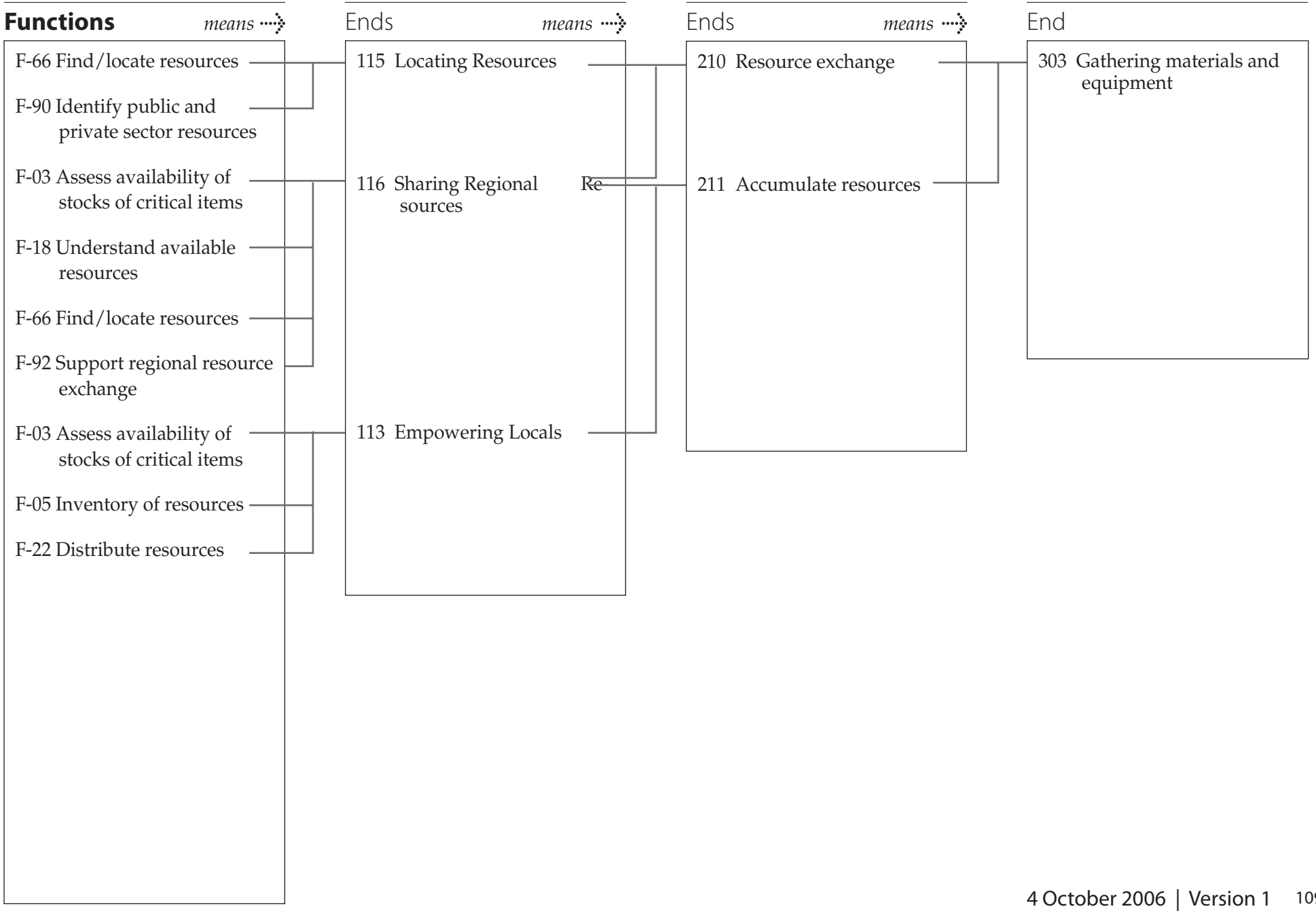
- Senses the event of Disaster
- Becomes active at the disaster
- Uploads on site information via satellite connections
- Displays Emergency plans through the digital display
- Can be moved remotely to a safer place

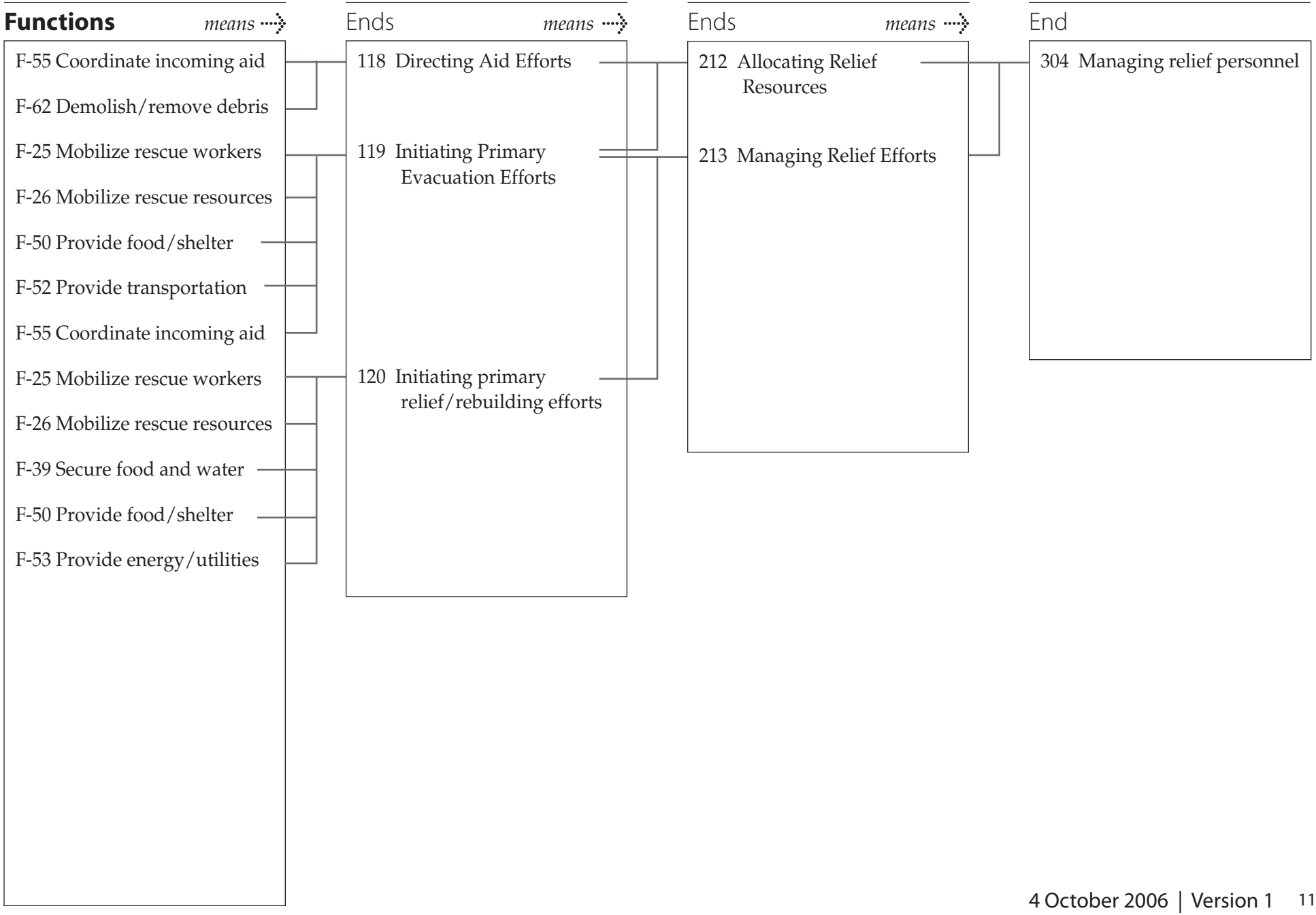
ASSOCIATED FUNCTION/S

F.78 Gather Disaster Research Data

SOURCE DESIGN FACTOR/S

Too Much Incoming Data to sort, difficult to get the ground reports.

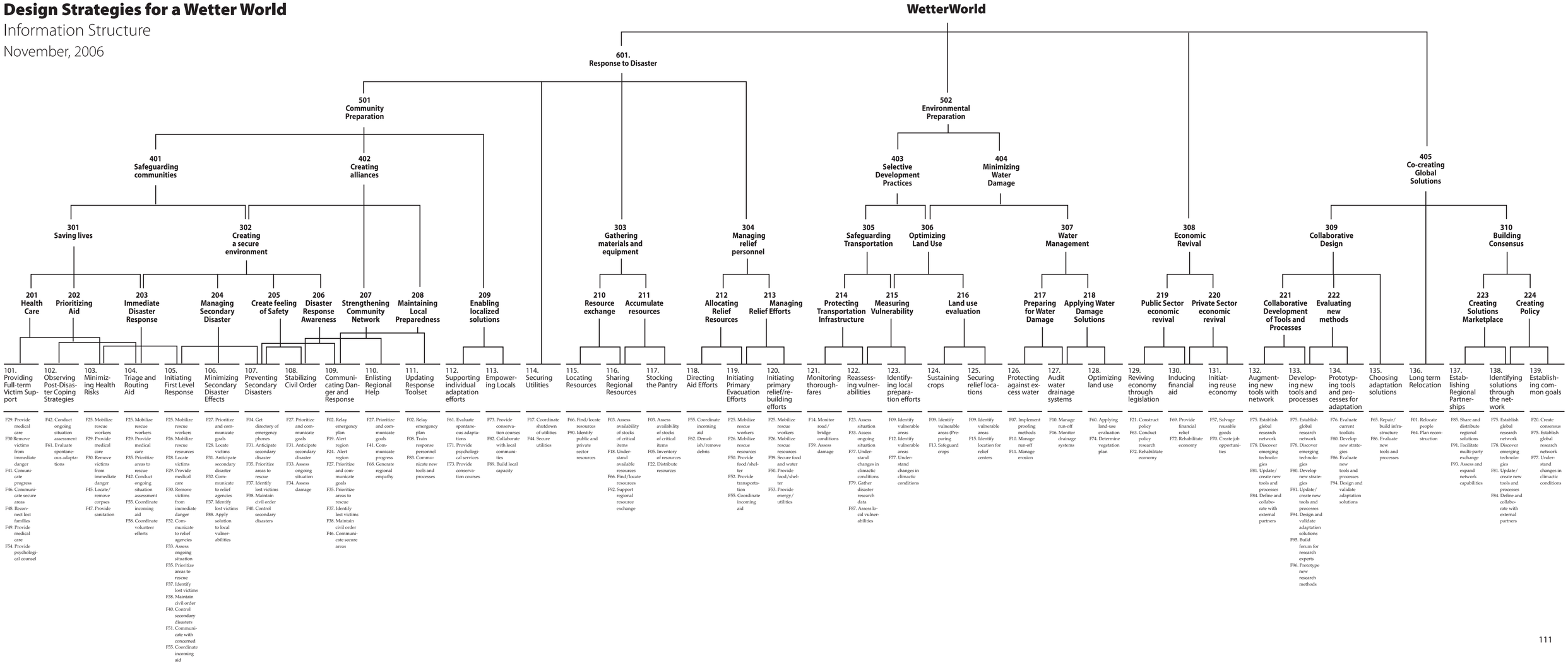

Functions
means
F-66 Find/locate resources
F-90 Identify public and private sector resources
F-03 Assess availability of stocks of critical items
F-18 Understand available resources
F-66 Find/locate resources
F-92 Support regional resource exchange
F-03 Assess availability of stocks of critical items
F-05 Inventory of resources
F-22 Distribute resources
Ends
means
115 Locating Resources
116 Sharing Regional sources
113 Empowering Locals
Ends
means
210 Resource exchange
211 Accumulate resources
End
303 Gathering materials and equipment

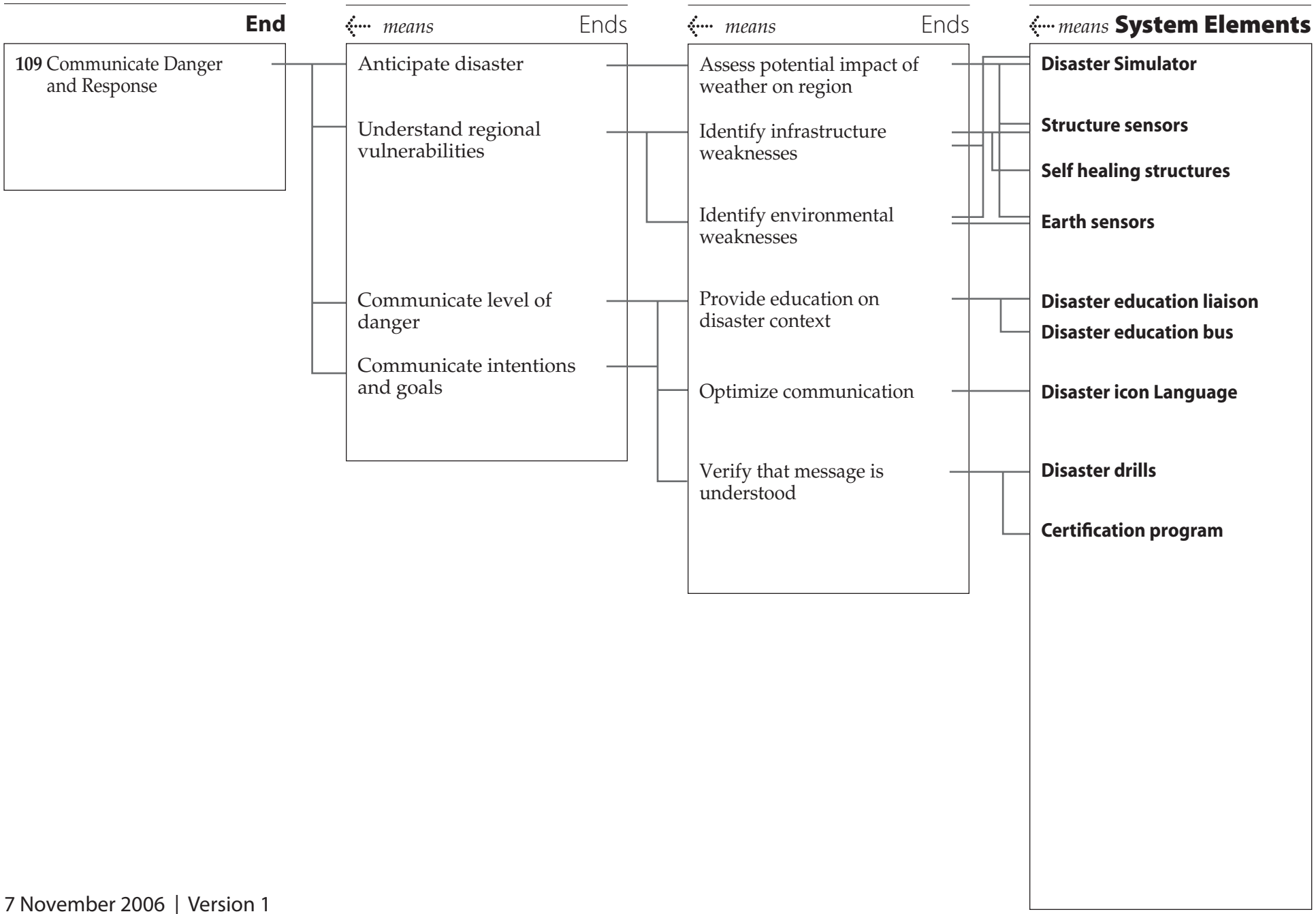

Functions
means
F-55 Coordinate incoming aid
F-62 Demolish/remove debris
F-25 Mobilize rescue workers
F-26 Mobilize rescue resources
F-50 Provide food/shelter
F-52 Provide transportation
F-55 Coordinate incoming aid
F-25 Mobilize rescue workers
F-26 Mobilize rescue resources
F-39 Secure food and water
F-50 Provide food/shelter
F-53 Provide energy/utilities
Ends
means
118 Directing Aid Efforts
119 Initiating Primary Evacuation Efforts
120 Initiating primary relief/rebuilding efforts
Ends
means
212 Allocating Relief Resources
213 Managing Relief Efforts
End
304 Managing relief personnel

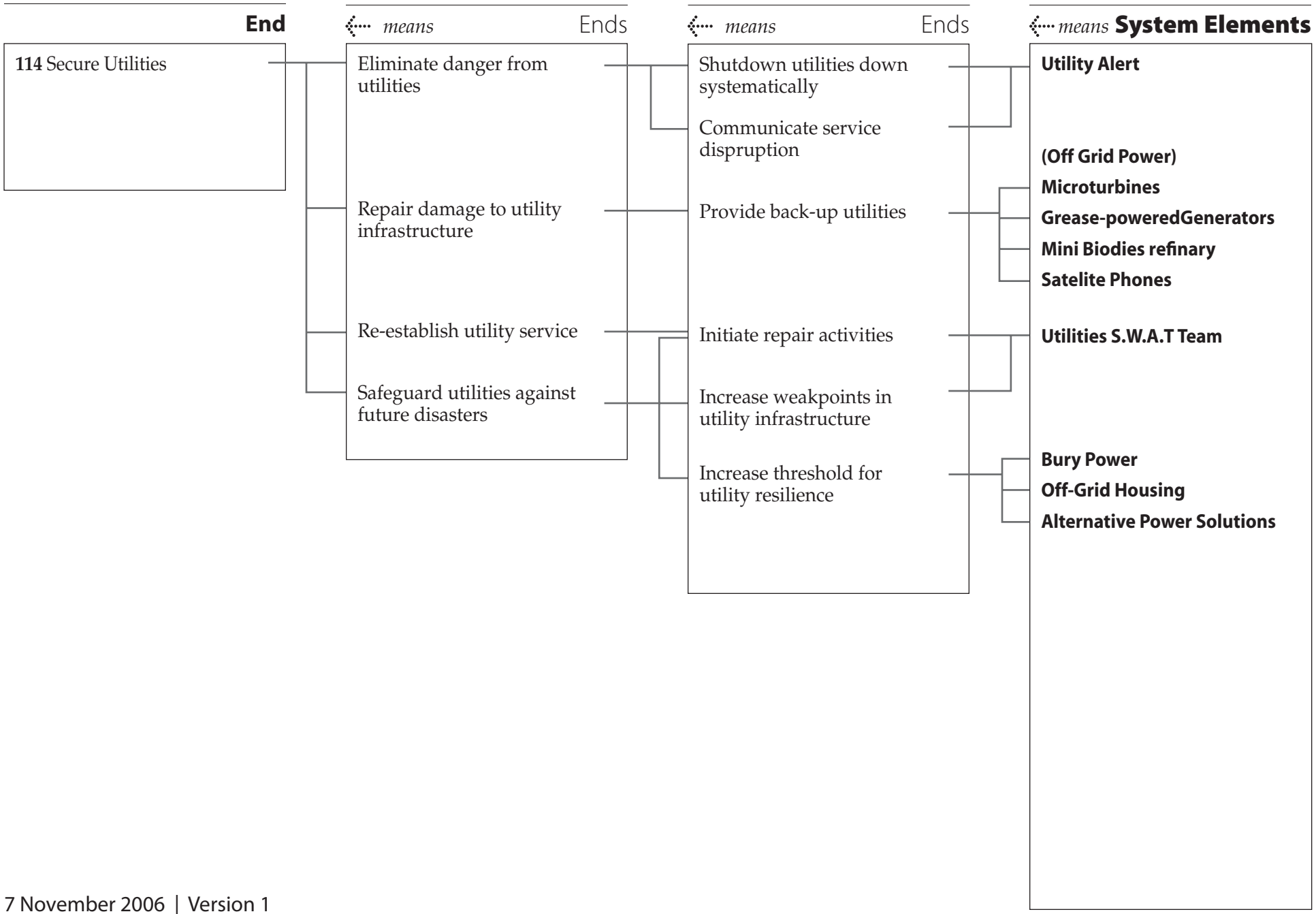
Design Strategies for a Wetter World

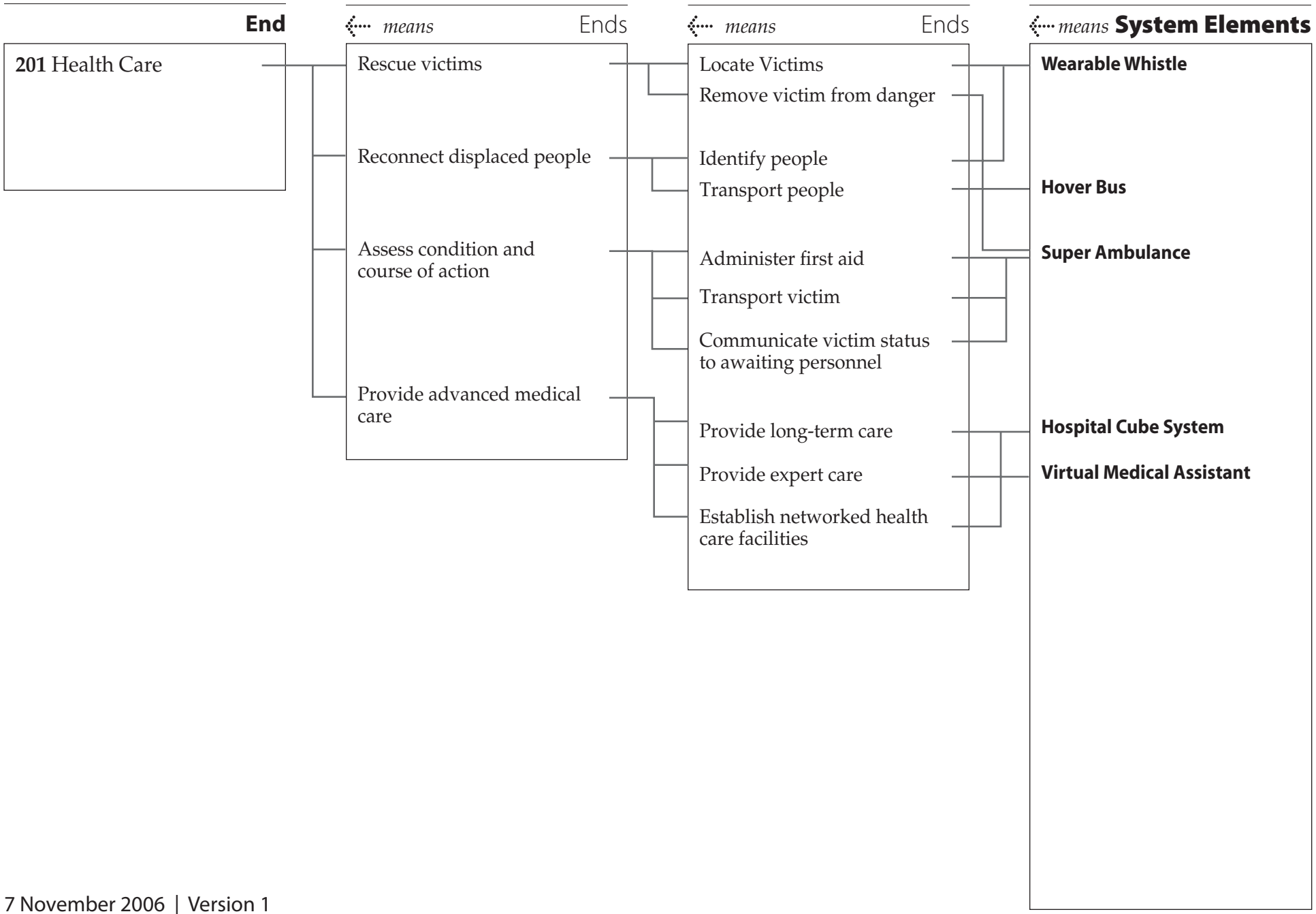
Information Structure

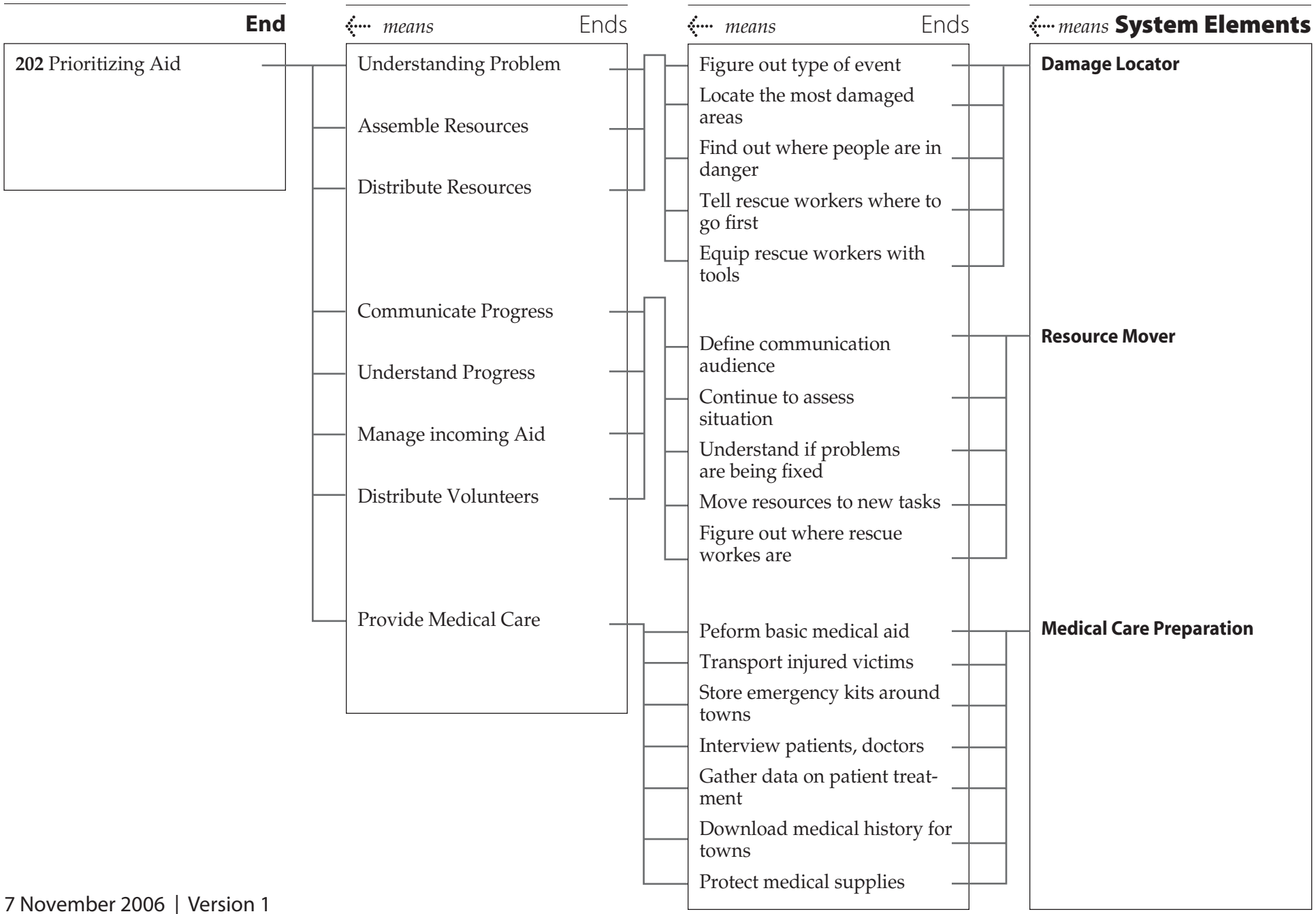
November, 2006

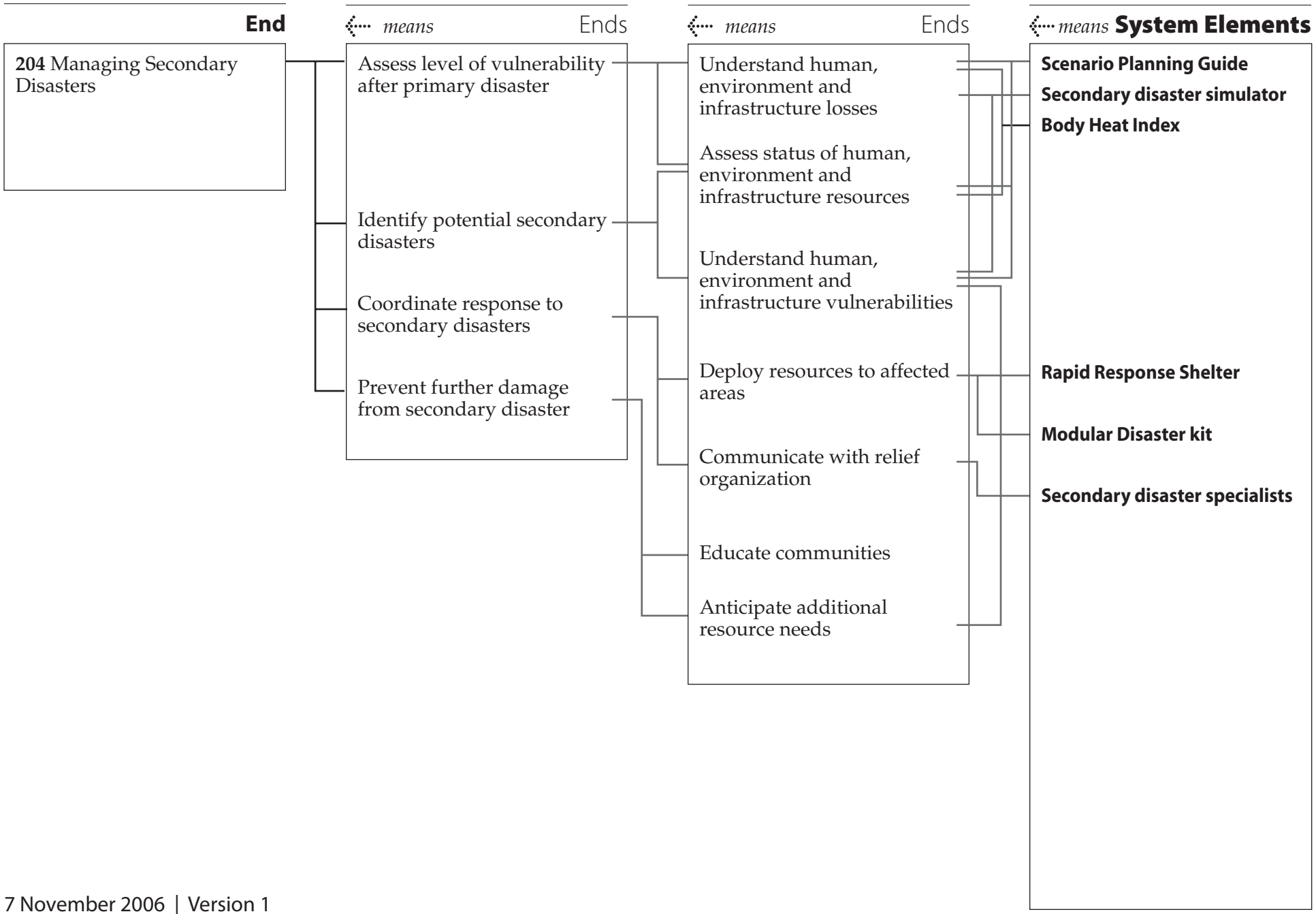


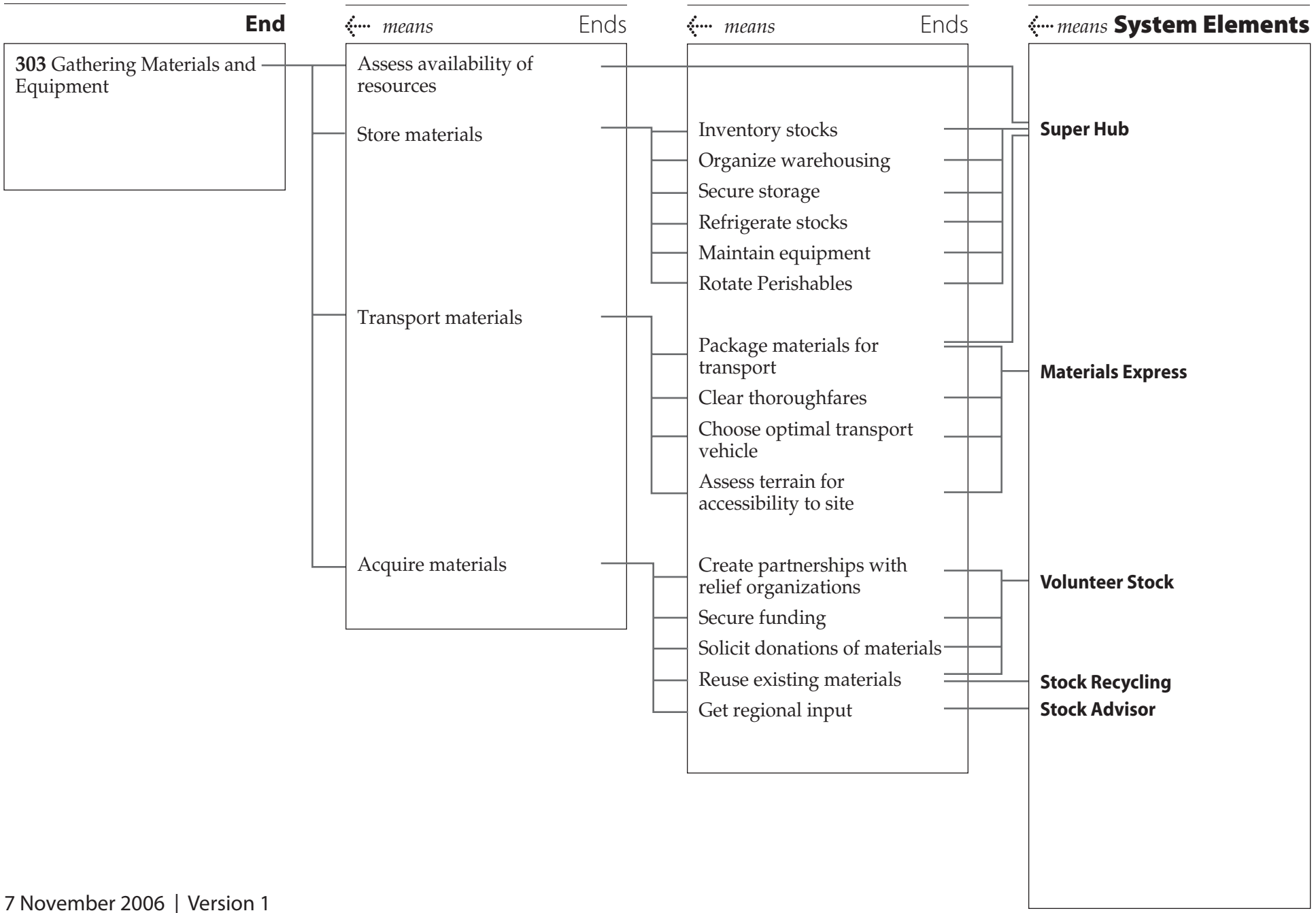

End
means
Ends
means
Ends
means
System Elements
109 Communicate Danger and Response
Anticipate disaster
Understand regional vulnerabilities
Communicate level of danger
Communicate intentions and goals
Assess potential impact of weather on region
Identify infrastructure weaknesses
Identify environmental weaknesses
Provide education on disaster context
Optimize communication
Verify that message is understood
Disaster Simulator
Structure sensors
Self healing structures
Earth sensors
Disaster education liaison
Disaster education bus
Disaster icon Language
Disaster drills
Certification program

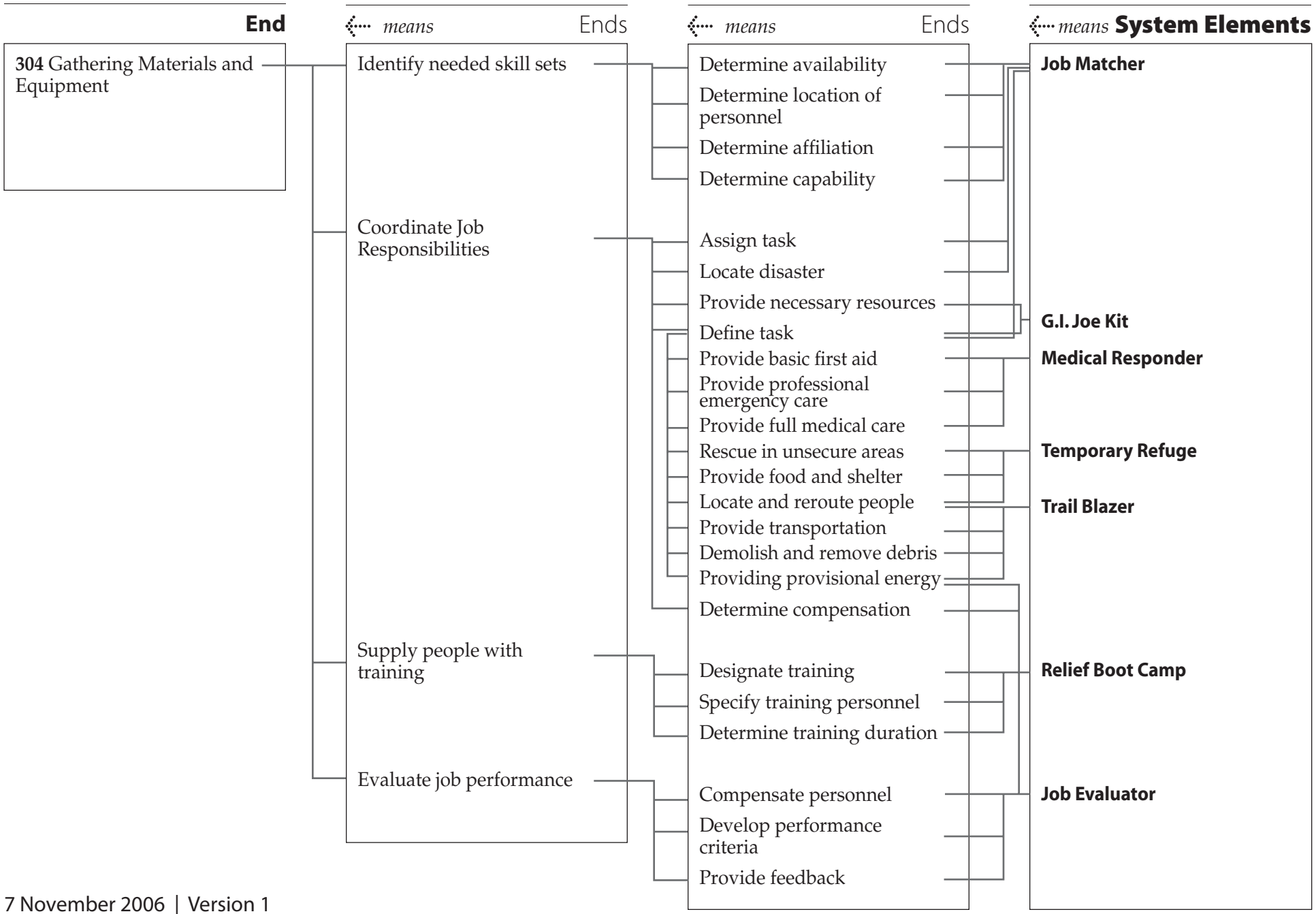

End
means Ends
means Ends
means System Elements
114 Secure Utilities
Eliminate danger from utilities
Repair damage to utility infrastructure
Re-establish utility service
Safeguard utilities against future disasters
Shutdown utilities down systematically
Communicate service dispruption
Provide back-up utilities
Initiate repair activities
Increase weakpoints in utility infrastructure
Increase threshold for utility resilience
Utility Alert
(Off Grid Power)
Microturbines
Grease-poweredGenerators
Mini Biodies refinary
Satelite Phones
Utilities S.W.A.T Team
Bury Power
Off-Grid Housing
Alternative Power Solutions

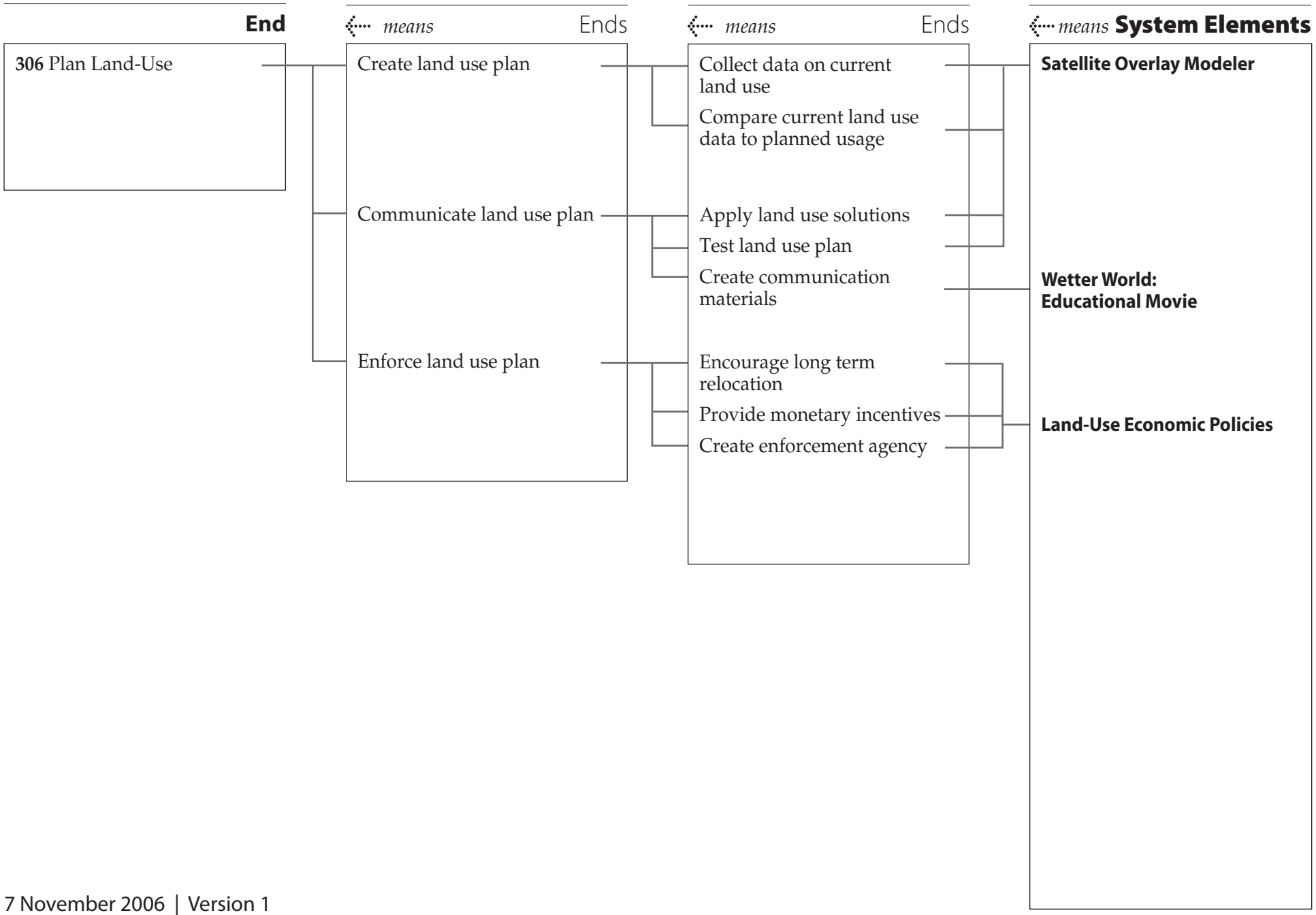

End
means Ends
means Ends
means System Elements
201 Health Care
Rescue victims
Reconnect displaced people
Assess condition and course of action
Provide advanced medical care
Locate Victims
Remove victim from danger
Identify people
Transport people
Administer first aid
Transport victim
Communicate victim status to awaiting personnel
Provide long-term care
Provide expert care
Establish networked health care facilities
Wearable Whistle
Hover Bus
Super Ambulance
Hospital Cube System
Virtual Medical Assistant


End
means Ends
means Ends
means System Elements
202 Prioritizing Aid
Understanding Problem
Assemble Resources
Distribute Resources
Communicate Progress
Understand Progress
Manage incoming Aid
Distribute Volunteers
Provide Medical Care
Figure out type of event
Locate the most damaged areas
Find out where people are in danger
Tell rescue workers where to go first
Equip rescue workers with tools
Define communication audience
Continue to assess situation
Understand if problems are being fixed
Move resources to new tasks
Figure out where rescue workes are
Peform basic medical aid
Transport injured victims
Store emergency kits around towns
Interview patients, doctors
Gather data on patient treat-ment
Download medical history for towns
Protect medical supplies
Damage Locator
Resource Mover
Medical Care Preparation


End
means Ends
means Ends
means System Elements
204 Managing Secondary Disasters
Assess level of vulnerability after primary disaster
Identify potential secondary disasters
Coordinate response to secondary disasters
Prevent further damage from secondary disaster
Understand human, environment and infrastructure losses
Assess status of human, environment and infrastructure resources
Understand human, environment and infrastructure vulnerabilities
Deploy resources to affected areas
Communicate with relief organization
Educate communities
Anticipate additional resource needs
Scenario Planning Guide
Secondary disaster simulator
Body Heat Index
Rapid Response Shelter
Modular Disaster kit
Secondary disaster specialists


End
means Ends
means Ends
means System Elements
303 Gathering Materials and Equipment
Assess availability of resources
Store materials
Transport materials
Acquire materials
Inventory stocks
Organize warehousing
Secure storage
Refrigerate stocks
Maintain equipment
Rotate Perishables
Package materials for transport
Clear thoroughfares
Choose optimal transport vehicle
Assess terrain for accessibility to site
Create partnerships with relief organizations
Secure funding
Solicit donations of materials
Reuse existing materials
Get regional input
Super Hub
Materials Express
Volunteer Stock
Stock Recycling
Stock Advisor


End
means Ends
means Ends
means System Elements
304 Gathering Materials and Equipment
Identify needed skill sets
Coordinate Job Responsibilities
Supply people with training
Evaluate job performance
Determine availability
Determine location of personnel
Determine affiliation
Determine capability
Assign task
Locate disaster
Provide necessary resources
Define task
Provide basic first aid
Provide professional emergency care
Provide full medical care
Rescue in unsecure areas
Provide food and shelter
Locate and reroute people
Provide transportation
Demolish and remove debris
Providing provisional energy
Determine compensation
Designate training
Specify training personnel
Determine training duration
Compensate personnel
Develop performance criteria
Provide feedback
Job Matcher
G.I. Joe Kit
Medical Responder
Temporary Refuge
Trail Blazer
Relief Boot Camp
Job Evaluator


End
means
Ends
means
Ends
means
System Elements
306 Plan Land-Use
Create land use plan
Communicate land use plan
Enforce land use plan
Collect data on current land use
Compare current land use data to planned usage
Apply land use solutions
Test land use plan
Create communication materials
Encourage long term relocation
Provide monetary incentives
Create enforcement agency
Satellite Overlay Modeler
Wetter World: Educational Movie
Land-Use Economic Policies

	System Elements	Common Currents			Lightning Harvester			Power Display				Buried Lines		
	Features	1	2	3	1	2	3	1	2	3	4	1	2	
Functions	F17. Coordinate Shutdown	■					■	▪	▪		■			
	F44. Secure Utilities	■	▪	■	■	■	■	■	■			■		

■ Strongly supports fulfillment of the Function ▪ Supports fulfillment of the Function

Design Strategies for a Wetter World Feature/Function Matrix

	System Elements	Earth Modeler				WetterWorld The Game				Disaster Icons			Concrete Displays	
	Features	1	2	3	4	1	2	3	4	1	2	3	1	2
Functions	F02. Relay emergency plan	▪	■		■	▪	▪	■		■	▪	■	▪	
	F19. Alert region	■	■		■	▪	■	▪	▪	■	▪		▪	
	F27. Prioritize/Comm goals	▪		■	■	■	▪			■			▪	
	F35. Prioritize areas to rescue	■	■	■	■	■	▪				▪			
	F37. Identify lost victims			▪		▪				▪			■	
	F38. Maintain civil order		■		■	■	▪	■	■	▪	▪	■	■	■
	F46. Communicate secure areas	■	▪	■	■	■	▪		▪	▪	▪	■		

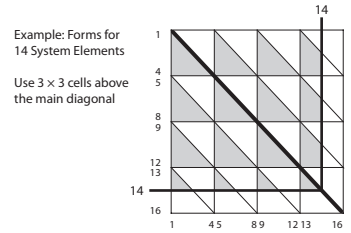
■ Strongly supports fulfillment of the Function ▪ Supports fulfillment of the Function

WetterWorld System Element Relationships

System Element Pairings: Rows **1–4** with Columns **9–12** Page **123**

1	**Common Currents**	SCORE **2** 1. **Common Currents** can be visualized and managed in the **Earth Modeler.** 2. **Earth Modeler** will have reliable pwer source from **Common Currents.**			
2	**Wetter World: The Game**	SCORE **3** 1. **Wetter World: The Game** can be used to experiment with the results of **Earth Modeler.** 2. **Earth Modeler** will provide the up-to-date model for **Wetter World: The Game.**	SCORE **1** 1. **Wetter World: The Game** can experiment with the distribution from **Super Hub.** 2. **Super Hub** can be virtually modeled in **Wetter World: The Game.**		
3	**Disaster Icon Language**	SCORE **2** 1. **Disaster Icon Language** can give a uniform visual language to **Earth Modeler.** 2. **Earth Modeler** allow people become familiar with **Disaster Icon Language.**	SCORE **2** 1. **Disaster Icon Language** label all of the deliveries from **Super Hub.** 2. **Super Hub** can recieve orders in terms of the **Disaster Icon Language.**	SCORE **3** 1. **Disaster Icon Language** can give quick signals to and from the **Transportation Router.** 2. **Transporation Router** increase literacy of the **Disaster Icon Language.**	
4	**Concrete Displays**	SCORE **1** 1. **Concrete Displays** can be connected to the warnings in **Earth Modeler.** 2. **Earth Modeler** can coordinate the placement of **Concrete Displays.**	SCORE **2** 1. **Concrete Displays** can direct the deliveries from the **Super Hub.** 2. **Super Hub** display the order status on the **Concrete Displays.**	SCORE **2** 1. **Concrete Displays** can give quick signals to the **Transportation Router.** 2. **Transporation Router** increase implementation of the **Concrete Displays.**	SCORE
System Elements		**Earth Modeler**	**Super Hub**	**Transportation Router**	
		System Elements **9**	**10**	**11**	

Score
3. Critical relationship
2. Strong relationship
1. Slight relationship
0. No relationship



Cells
To avoid duplication, use shaded cells only when the form is for comparisons where row numbers are greater than or equal to column numbers (for example, 4 × 4 for 5–8 *vs* 1–4 or 1–4 *vs* 1–4; 3 × 3 for 2–4 *vs* 6–8)

Some questions to ask:

1. How should System Element X work with System Element Y?
2. What new feature/s are possible if System Element X works with System Element Y?
3. What new property/ies would make System Element X work with System Element Y?

WetterWorld System Element Relationships

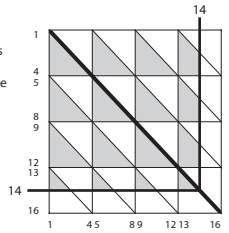
System Element Pairings: Rows **1–4** with Columns **12–14** Page **124**

1	**Common Currents**	SCORE **2** 1. **Common Currents** can be extended and lines buried using an **Earth Nailing Robot.** 2. **Earth Nailing Robot** will have reliable power source from **Common Currents.**		
2	**Wetter World: The Game**	SCORE **1** 1. **Wetter World: The Game** can be used to modify the **Earth Nailing Robot.** 2. **Earth Nailing Robot** will be tested in **Wetter World: The Game.**	SCORE **0** 1. **Disaster Icon Language** will **Roll-Out Roads.** 2. **Roll-Out Roads** will be made navigable by **Concrete Displays.**	
3	**Disaster Icon Language**	SCORE **1** 1. **Disaster Icon Language** can be used to program the **Earth Nailing Robot.** 2. **Earth Nailing Robot** will be able to communicate using the **Disaster Icon Language.**	SCORE **0** 1. **Disaster Icon Language** will **Roll-Out Roads.** 2. **Roll-Out Roads** will be made navigable by **Concrete Displays.**	SCORE **0** 1. **Disaster Icon Language** will **Lightning Harvester.** 2. **Roll-Out Roads** will be made navigable by **Lightning Harvester.**
4	**Concrete Displays**	SCORE **0** 1. **Concrete Displays** can be used to direct the **Earth Nailing Robot.** 2. **Earth Nailing Robot** will update the **Concrete Displays.**	SCORE **0** 1. **Concrete Displays** integrated into the **Roll-Out Roads.** 2. **Roll-Out Roads** will be made navigable by **Concrete Displays.**	SCORE **0** 1. **Concrete Displays** will not effect **Lightning Harvester.** 2. **Lightning Harvester** will not effect **Concrete Displays.**
System Elements		**Earth Nailing Robot**	**Roll-Out Roads**	**Lightning Harvester**
		System Elements **92**	**18**	**14**

Score
3. Critical relationship
2. Strong relationship
1. Slight relationship
0. No relationship

Example: Forms for 14 System Elements

Use 3 × 3 cells above the main diagonal



Cells

To avoid duplication, use shaded cells only when the form is for comparisons where row numbers are greater than or equal to column numbers (for example, 4 × 4 for 5–8 *vs* 1–4 or 1–4 *vs* 1–4; 3 × 3 for 2–4 *vs* 6–8)

Some questions to ask:

1. How should System Element X work with System Element Y?
2. What new feature/s are possible if System Element X works with System Element Y?
3. What new property/ies would make System Element X work with System Element Y?

System Element

TITLE

Climate Change

existing
modified
speculative

SE-1

PROJECT	SUPERSET ELEMENT/S	RELATED ELEMENTS
Design Strategies for a Wetter World	Communicate Danger and Response	3-D Modeler
ORIGINATOR Mario Ruiz		
CONTRIBUTORS		
SOURCE http://en.wikipedia.org/wiki/Mod_%28computer_gaming%29 http://en.wikipedia.org/wiki/Halo_(video_game_series)	SUBSET ELEMENTS	

DESCRIPTION

Climate Change is a real-time strategy and first-person shooter video game produced in partnership with makers of Halo 1 and 2, Bungie. Climate Change (vanilla) version will work together with the PC version that has a toolkit to produce Mods (or user-generated content).

PROPERTIES

- Software video game
- PC component
- Developer toolkit to create modifications or Mods to gameplay

FEATURES

- User-generated content toolkit
- Provides simulation of climate change in the future
- Multi-player game
- Online and PC components

FULFILLED FUNCTIONS

F.09 Identify Vulnerable areas
F.26 Priortize and Communicate goals
F.30 Anticipate Secondary Disasters
F.34 Priortize areas of Rescue
F.39 Control Secondary Disasters
F.59 Apply Land-Use Evaluation
F.75 Evaluate Current Tool Kits
F.76 Understand change in Climatic Conditions
F.79 Develop new Strategies
F.85 Evaluate new tools & Processes

DESIGN FACTORS

People Resist Relocation
No Training Program Exists
Lack of adoption specialists
Drainage can fail without warning
Difficult to know what is needed and where
Difficult to determine which items are critical
Coordination of resources is critical
Skills and experience to detect damage are often not found in one organization or community
Requiers ways to locate corpses amid debris and de struction

DISCUSSION

Currently, there is little consumer friendly simulation software that can help people learn about the effects of **climate change**. Though models exist, they usually don't link the effects with the direct consequences in a community, city, or town. **Climate Change**, the video game, is used to simulate disasters in urban and rural settings and how one would strategize against those changes.

Leveraging the creativity of the gaming community to imagine tools and simulate disaster effects can be a more interactive educational tool. The Armed Forces has been using simulation software since the 1970s with the introduction of the game "Mech War". The Armed Forces continues to invest in military training that is interactive and example-based, shifting from abstract reasoning to something more concrete.

In addition to the strategic importance of simulation-based learning used in the military, software games like Halo are used as a platform by producing versions for PC players. These versions can be modified with provisional toolkits, such as the Halo Custom Edition tool kit to generate and input user content into the game. The underlying gameplay is not affected with **Climate Change**, simply the use of additional tools and strategies that are used to combat the effects of disaster.

Screenshot of Halo 2: New Mombasa, a user-created map based on the Halo 2 E3 trailer.

SCENARIO

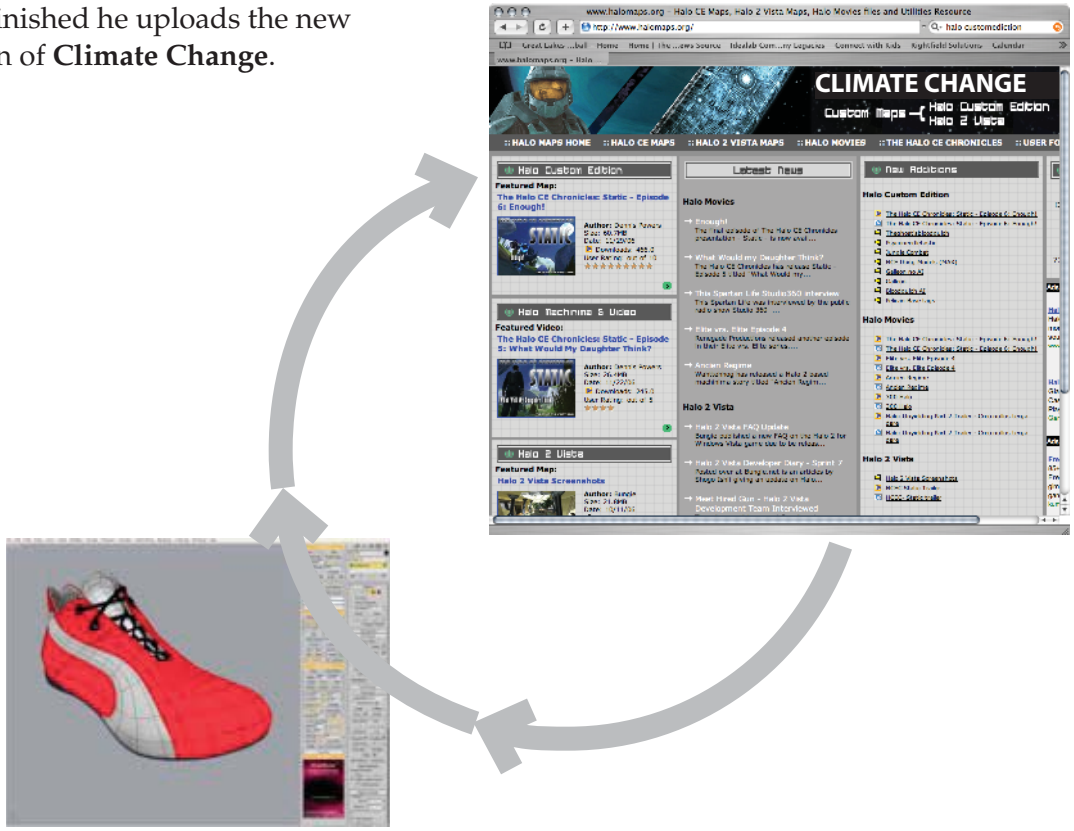
John comes home one day and receives a copy of **Climate Change** and immediately puts it into his Xbox console, he's finally got his copy of the new software created from Bungie, the makers of Halo 1 and 2.

The setting is Earth 2075 and it is in the midst of abrupt climate change and terrorism. The Earth has seen numerous natural disasters hit and destroy

DISCUSSION (CONTINUED)

homes and cause deaths all over the world. To further increase the danger, terrorists see this as an opportunity to infiltrate vulnerable cities like London, Paris, New York, and Jakarta. A rich entrepreneur has set up a special SWAT team that will fight against the terrorists as well as save the lives of people. The terrorists have destroyed solutions put in place to help mitigate the effects of natural disasters, your job is to rebuild those to protect the people and to rid the world of the terrorists.

In another part of the country, Tom is building a new mod that will help fight some of the flooding in Manila. John downloads the **Climate Change** toolkit for edits and begins to design a new type of bridge. When his new design is finished he uploads the new design into the PC version of **Climate Change**.



System Element

TITLE

Lightning Harvester

existing
modified
speculative

SE-2

PROJECT	SUPERSET ELEMENT/S	RELATED ELEMENTS
Design Strategies for a Wetter World	Self Healing power grid	PowerDisplay
ORIGINATOR Alex Cheek		
CONTRIBUTORS		
SOURCE http://www.alternateenergyholdings.com/alternate_energy.html EIA: http://www.eia.doe.gov/ Lightning Power: http://peswiki.com/index.php/Directory:Lightning_Power	SUBSET ELEMENTS	

DESCRIPTION

The **Lightning Harvester** is a roof top solution for harvesting the enormous power released during a thunderstorm.Because the average lightning bolt contains so much energy that it cannot be directly captured by any available means, it must be buffered by earth. If this technique is coupled with a green roof system, the tallest buildings in a city could be outfitted and capture the power of the 20-75 strikes that they recieve per year. The electricity would be stored in new utility-scale bateries and converted to AC as it was dispersed.

PROPERTIES

- Lightning rod installed in a green roof
- Grounded green roof
- Web of conductors to direct the current into the storage component
- Utility scale batery to stor very large amounts of energy
- Alternator to convert DC to AC

FEATURES

- Attract lightning to the lightning rod and protect surrounding structures
- Channel electricity into a green roof buffer
- Collect portion of the energy into a storage aparatus
- Distribute the energy to the building on which it is sited
- Enhance value of green roof

FULFILLED FUNCTIONS

F.18 Understand available resources
F.52 Provide Energy/Utilities
F.75 Evaluate current toolkits
F.77 Discover emerging technologies
F.79 Develop new Strategies
F.80 Update/Create new tools and processes
F.85 Evaluate new tools and processes
F.95 Prototype new research methods

DESIGN FACTORS

Need priortization of utilities to secure
Requires Long-Term services to be effective
Hard to imagine previous utilities under the ground
Difficult to implement or make useful
Local population resists adaptation solutions
Utilities/Energy lines are broken

DISCUSSION

The **LightningHarvester** is a roof top solution for harvesting the enormous power released during a thunderstorm. Because the average lightning bolt contains so much energy that it cannot be directly captured by any available means, it must be buffered by earth. If this technique is coupled with a green roof system, the tallest buildings in a city could be outfitted and capture the power of the 20-75 strikes that they receive per year. The electricity would be stored in new utility-scale batteries and converted to AC as it was dispersed.

SCENARIO

The average lightning bolt contains approximately one million kilowatts (1,000,000 kW) of electrical energy, and lightning strike towers work by 'harvesting' this atmospheric electrical energy and converting a substantial portion of it into usable electricity. Harnessing the natural energy produced from a bolt of lightning as a clean energy solution will not only eliminate numerous environmental hazards associated with the energy industry, it will also significantly reduce the costliness of power production. When amortized over four to seven (4-7) years, a lightning farm will be able to produce and sell electricity for as low as $0.005 per kilowatt hour, thus significantly undercutting the current production costs of its competing energy sources.

The average office building uses 66,000 KW of energy per year. The tallest office buildings recieve 50-90 lightning strikes per year. Even if the **LightningHarvester** were only able to capture 1/100 of the energy from each lightning strike to a building, and the building only recieved 40 strikes per year, it could still provide 8 times of the power that the building needs per year. If it only captured 1/1000 of the lightning, **LightningHarvester** could power it for almost 10 months of the year on lightning alone.
On top of the pure energy benefits, the **LightningHarvester** could be the value add that could put green-roof technology into the mainstream.