

Massive Change:

Adaptive Urban Planning for Climate Change



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Preface

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).

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

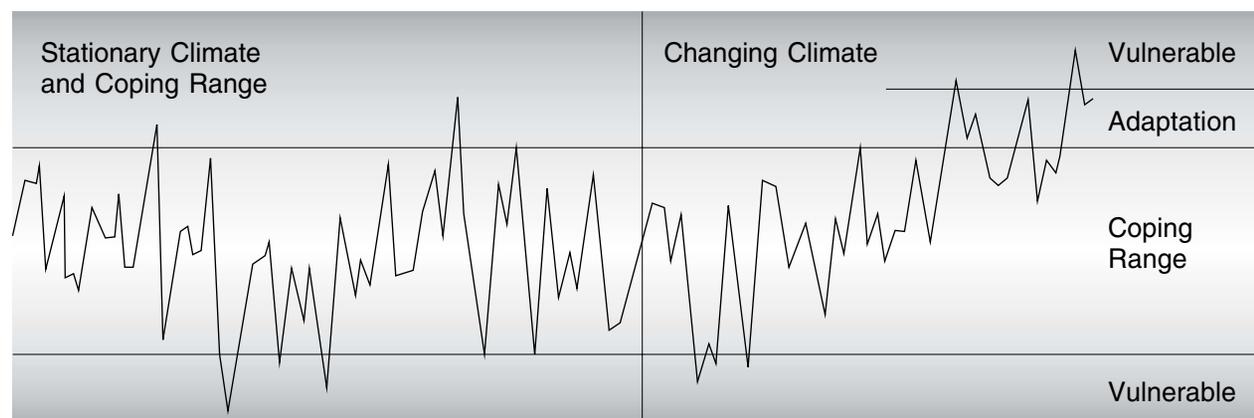


Figure 1. *Adaptation buys time by extending the coping range.*

(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, and the ability to plan for those adaptations will be critical.

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.

Evolving Planning Technology

Increasingly sophisticated information technology now is being routinely applied to planning and design processes, requiring organizations to “plan for how they plan”. Good planning now must include means for instituting continuing review, appraisal, revision of and extension to the planning process itself. 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, develop concepts for a continuous, adaptive planning process for urban communities confronting climate change. Integrate conventional economic, social and physical planning with planning for environmental and energy sustainability and the disruptions expected locally from global warming. Build recursively upon Structured Planning methods, custom tailoring them and strengthening them with other effective urban planning methods and tools. Use the city of Chicago to demonstrate elements of the process, and draw on the concepts developed in other Massive Change planning projects as applications may dictate.

The proposal should:

1. Shape the planning process itself as well as the objectives of its methods and tools to be adaptive over time to changing capabilities and conditions.
2. Consider the full spectrum of environmental planning from anticipation to preparedness to response to recovery.
3. Incorporate as part of the process best practices as they are known or being developed by organizations, agencies and planning experts within the environmental planning community.
4. Anticipate and plan for networked operational cooperation among affected and spared communities locally, regionally and internationally.
5. Implement procedures that seek out tools that will create economic, social and/or environmental benefits in addition to alleviating the effects of global warming.

Project Goals

As general guidelines an Adaptive Urban Planning for Climate Change should:

- Explore a full range of possibilities, paying especial attention to appropriate technologies and user needs. Include means for inspiring the development of 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 the impacts of costs and funding thoughtfully; plans should not be unnecessarily limited, but should not be so unconstrained as to be unattainable in practicality.
- Incorporate as possible the special characteristics of design thinking in the structure and operation of the methods and tools of the planning process.
- Conceive the properties and features of the process as means to build trust and cooperation between planning, executive and user communities.

Overall, the solution should:

- Assume that the proposal can be acted upon as it is conceived. Do not underpropose 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.

The Process

The semester-long Systems and Systematic Design course is a project-based course in which teams of graduate students, deliberately of mixed international origins and different academic backgrounds, apply the computer-supported Structured Planning process to complex design and planning problems. The goal for each project is to develop information thoroughly, propose innovative solutions that take maximum advantage of the information, and integrate these ideas into system concepts that can both be evaluated in their own right and (in a real situation) be the comprehensive project specifications for a follow-on detail design phase of development.

Course Issues

Complexity

What is the nature of “systems” concepts, where products, processes, services and settings are organized to act together to achieve multiple goals? What can be done to assure that a concept is as complete as possible, covering many functions and attaining a high degree of “wholeness” and organic reliability?

Design and planning methods

What is Structured Planning and how can its tool-kit of methods be used to collect, structure and handle information in projects of greater complexity than can be comfortably dealt with intuitively? How can such methods be used by a team to extend the effectiveness of all?

Teamwork

How do individuals with different cultural origins and different academic backgrounds work together successfully on teams? What roles are there to be played and what difficulties must be overcome?

Structured Planning Structured Planning, the systematic planning process taught in the course, is a process for finding, structuring, using and communicating the information necessary for design and planning activities. It is a front-end process for developing concepts thoroughly and cohesively.

A number of projects have been undertaken with it and used to further its development. Among nearly 100 of these, an early published project for Chicago's transit authority (CTA) was *Getting Around: Making the City Accessible to Its Residents* (1972). In 1983, the *House of the Future* project won the Grand Prize in the Japan Design Foundation's First International Design Competition. In 1985, the design of a habitation module for Space Station was undertaken for NASA. In 1987, the *Aquatecture* project won the Grand Prize again in the Japan Design Foundation's Third International Design Competition. In 1991, *Project Phoenix* on global warming was honored as Environmental Category Grand Winner in *Popular Science* magazine's "100 Greatest Achievements in Science and Technology" for the year. In 1993, two award winning projects, *NanoPlastics* and *Aerotecture*, were widely publicized in Europe and Japan; in 1995, the *National Parks* project developed plans for the future of the U. S. National Park Service. In 2001, *Access to Justice*, a project sponsored by the National Center for State Courts, was implemented for use in state courts across the United States, and in 2005, four projects on *Home, Play, Work and Health* were finalists in four of the five competition categories for Denmark's INDEX Awards, the world's richest design prizes. As the process has evolved, it has become an increasingly useful planning tool for products, systems, services, processes and organizations. It is now being used commercially.

A diagram of the process, shown in two figures (pages 14 and 15), outlines the activities that make up Structured Planning and the working documents and final products that are produced along the way. Where products of the process are discussed here in the abstract, it is possible to see specific examples produced for this project in the appendices that accompany this report.

I Project Definition

The Structured Planning process begins with Project Initiation and the production of a Charter. This is a “brief” that serves as an initial communication vehicle between client and planners. It contains background, context, basic goals, a project statement that cuts to the heart of the planning task, resources to be used, and an initial set of issues to be investigated.

Defining Statements are mini “white papers” produced in the Framework Development portion of Project Definition. They focus the project within the direction of the Charter, concentrating on the issues and arguing specific directions that the project should follow with regard to them. Together with the Charter, they define the project.

II Action Analysis

Any system can be viewed as a complex entity working with its users in different ways appropriate to its modes of operation. To plan effectively, a planning team must recognize these Modes, identify Activities that occur within them, and isolate the Functions that the users and system are intended to perform within each Activity. The result of the Activity Analyses conducted is a Function Structure.

Half of the purpose of Action Analysis is the enumeration of Functions. The other half is the development of information about these Functions that reveals insight about what happens as they are performed. During Action Analysis, insights are sought about why things go wrong in performing some Functions, and how other Functions manage to be performed well. These insights are uncovered in the Design Factor Description procedure and developed in documents that become part of a qualitative knowledge base. Activity Analyses record information at the Activity level; Design Factors document insights and ideas associated with Functions.

To capture as fully as possible the ideas suggested on Design Factors, Solution Element documents are written as part of Action Analysis. These are one-page documents designed to capture enough detail about ideas to give them substance when they are needed later. They have three important sections: “Description” — a short explanation, “Properties” — what the idea is, and Features — what the idea does. The Solution Element form is the tool used for committing ideas to paper. The product of Action Analysis is three sets of critical information: a set of Functions (the Function Structure), a set of insights (Design Factors) and a set of preliminary ideas (Solution Elements)

III Information Structuring

Paradoxically, as useful as the Function Structure is for establishing coverage, it is not the best form of organization for developing concepts. Reorganizing information for use in concept development is the job of two computer programs, RELATN and VTCON.

The controlling factor for whether two Functions are associated from the planning standpoint is not whether they are categorically “related” in some manner, but whether a significant number of their potential solutions are of concern to both. Which Solution Elements are of concern to each Function is established in an Interaction Analysis procedure. The RELATN program then uses this information in a Graph Construction process to establish links between Functions.

Another program, VTCON, completes the information structuring process. The graph establishes paths through the Functions by linking them when they are related, but, unlike a road map, a graph is not naturally arranged nicely for visual comprehension. In the Hierarchy Construction activity, VTCON finds clusters of highly interlinked Functions and organizes them into a semi-lattice hierarchy, a very general form of hierarchy most appropriate for planning. The hierarchy is called an Information Structure.

IV Synthesis

In its form from the VTCON program, the Information Structure is simply a hierarchical organization. Nodal points do not have names. The task of Means/Ends Analysis is to create labels for all nodal points in the hierarchy. Moving bottom-up from the known Functions in the bottom level clusters, the question is asked, “To what end are these Functions means?” The answering purpose, in turn is grouped with its sibling nodes and viewed as means to a higher level end. The process continues to a completely labeled Information Structure.

The process is then reversed as a top-down, structured brainstorming procedure: Ends/Means Synthesis. In this process, the planning team asks of high level nodes, “what means do we need to meet this end?” As means are established, they are treated in turn as new ends for which means must be found, until the means become concrete enough to be described as final elements of the system (System Elements). Solution Elements originally conceived for the Functions involved are constantly reviewed as possible end products. New ideas, however, are encouraged, and original ideas are modified or combined in the light of the means that evolve.

During Solution Evaluation, features of the System Elements are evaluated for their contribution to fulfillment of Functions in their part of the Information Structure. If there are unfulfilled Functions, this is the signal to return to the Ends/Means process for additional development.

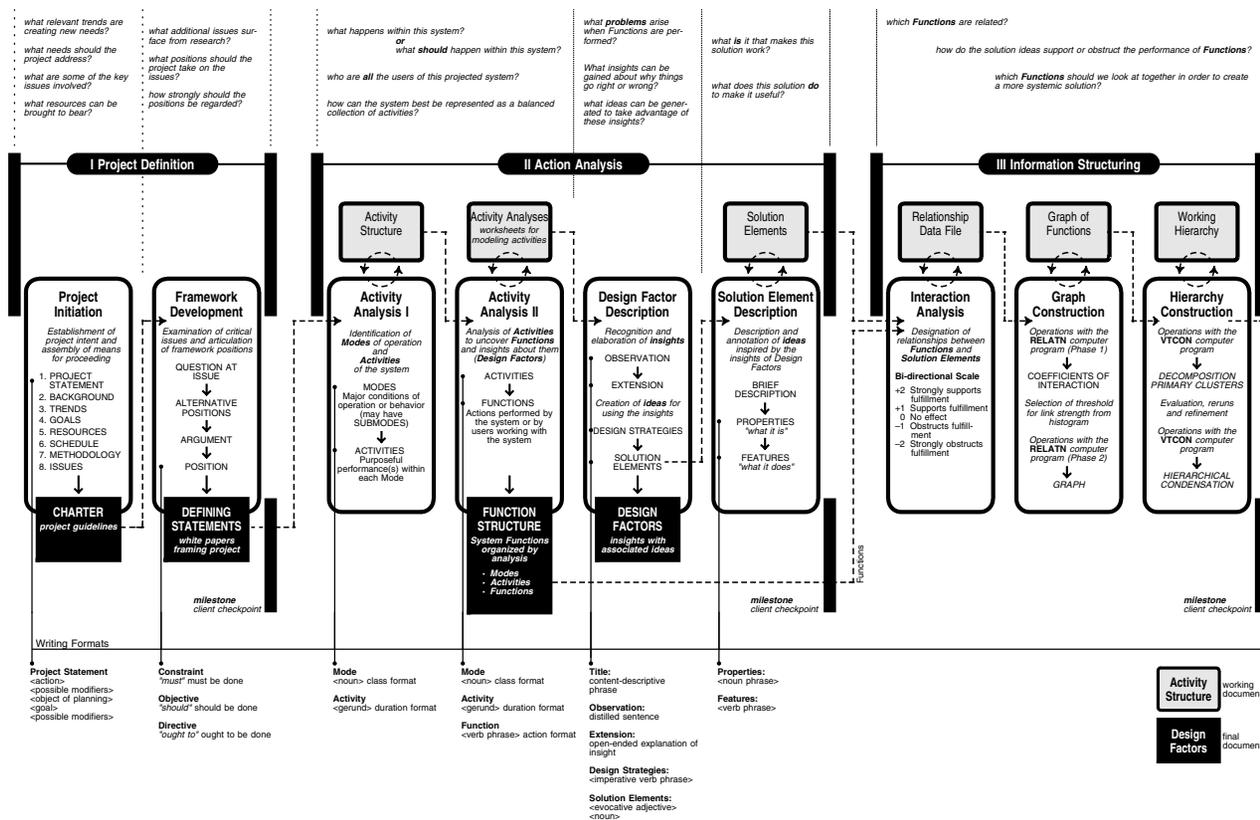
System Element Interaction compares System Element with System Element in a search for additional synergies that can contribute to systemic qualities. More than simply recognizing relationships, the planning team proactively seeks out ways for System Elements to work together — to the extent of modifying one, the other, or both. Changes are incorporated in the properties and features of the individual System Elements.

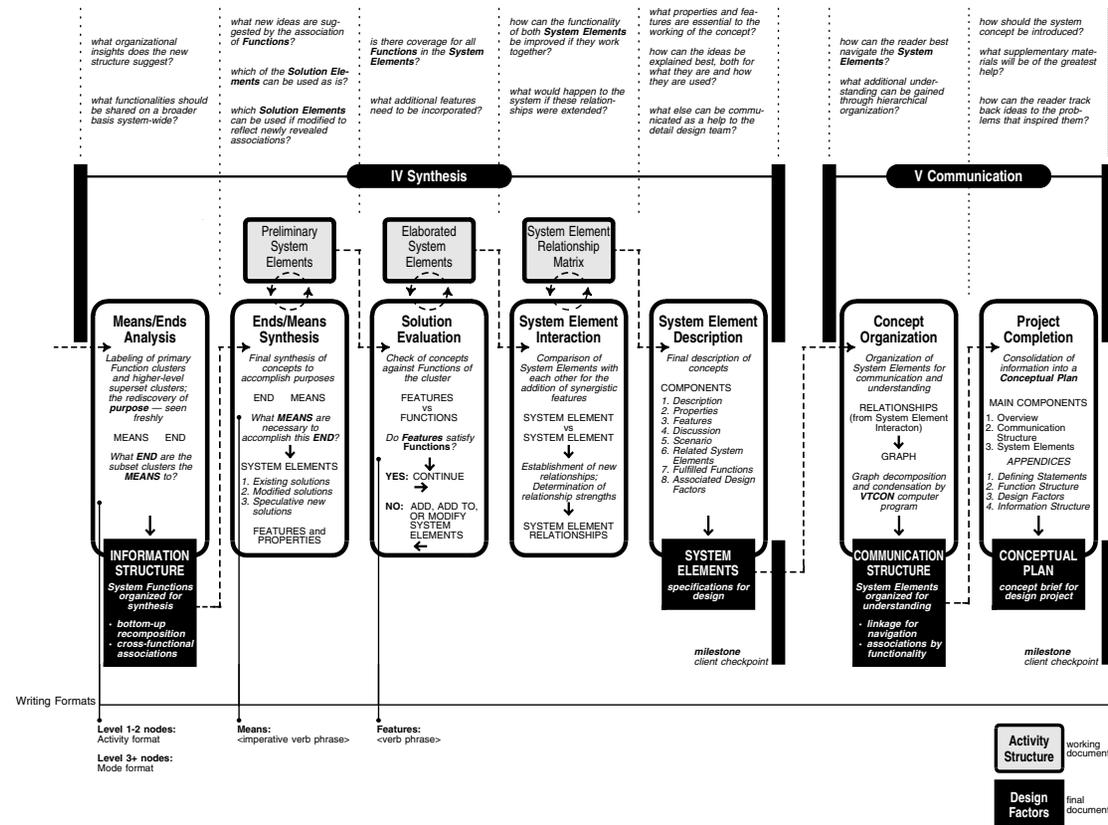
The last task, System Element Description, completes the write-up of System Elements as specifications, including a succinct description, all relevant properties and features, and extensive Discussion and Scenario sections that contain detailed expositions of the ideas in both conceptual and operational terms.

V Communication

Because the result of the Structured Planning process is a complex system, usually with a number of System Elements, a Communication Structure is frequently included as an aid to understanding. This is created during Concept Organization by the VTCON program from an assessment of how important the System Elements are to each other's operation. Using this structure, the reader can understand the system and navigate its concepts with greater efficiency.

The product of the Structured Planning process, assembled in the Project Completion section, is a Conceptual Plan, made up of an Overview that provides background and introduces the system, the System Elements that describe the ideas and their relationships, and Appendices that contain all relevant support information, including the Defining Statements, Design Factors, Function Structure and Information Structure.





The Structured Planning process: *phases IV through V.*

Team

Planning Team

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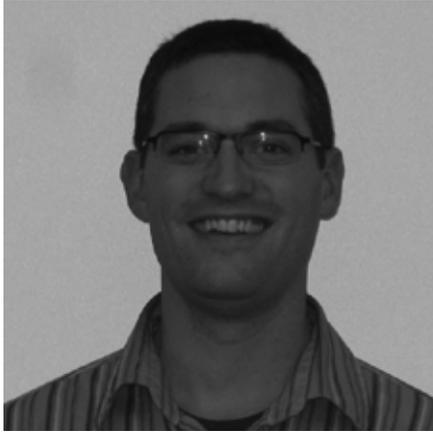
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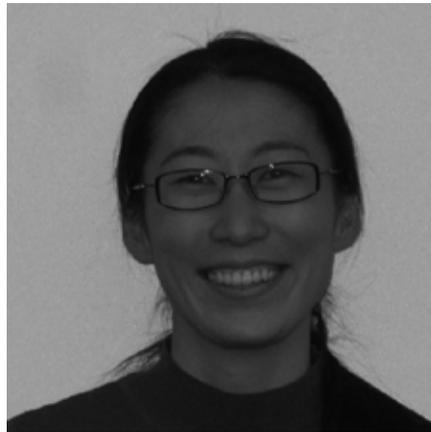
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Eric Wilmot

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Eric Wilmot brings a diverse background to the process of strategic innovation planning. He received a degree in Industrial Design from Carnegie Mellon and is currently finalizing a Masters Degree at the Institute of Design, IIT. With over a decade of international experience in the corporate and consulting environment, he has received many patents and awards as a designer and recognized director. His dedication to environmental initiatives traces to his childhood spent on a dairy farm, and his global travels in development agendas. When he's not working, he can be found sailing, hiking, archery hunting, or reading.



Yoo Jung Ahn was born and lived in Korea before moving to Chicago where she received a Masters of Design Methods from the Institute of Design, IIT in 2006. She previously received undergraduate and graduate degrees in Industrial design from Hong-Ik University in Korea. Professionally, Yoo Jung spent five years at LG electronics as a product designer. There she designed many consumer-electronic appliances and worked across marketing and engineering roles. Along with a passion for design, she holds great cultural diversity as an important factor in design planning and strategy. When not practicing, Yoo Jung loves cooking and enjoying cinema, especially horror movies.

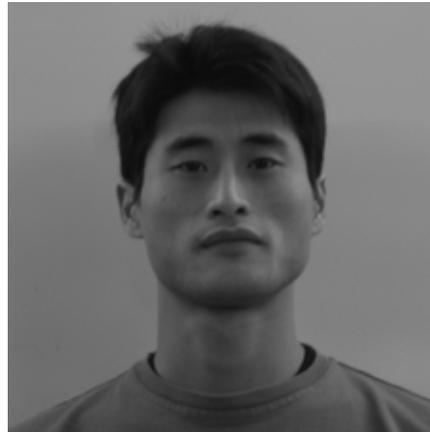


John Montgomery moved to Chicago in 2005 from Memphis, where he was in private practice as an architect, focused on sustainable development. He received a Bachelor of Architecture degree with Honors from the School of Architecture at the University of Tennessee. His work there included foreign studies in earthquake design in Managua Nicaragua. John works for the Public Building Commission of Chicago where he is manager of green building programs. When not working and not studying at ID, John enjoys cinema and bicycling around Chicago.

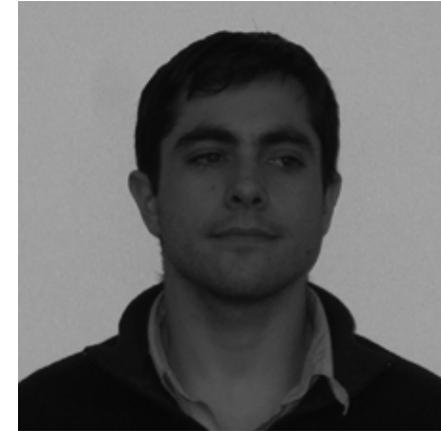




Irene Maria Chong is from Toronto, Canada, but has been living in Chicago since August 2005 pursuing graduate studies. She spent her undergraduate years at the University of Guelph, Ontario, and did a BSc Environmental, majoring in Environmental Economics. Prior coming to Chicago, Irene worked at the Design Exchange, a not-for-profit museum focused on promoting Canadian design and also spent a summer studying urban planning and design at the Harvard Graduate School of Design. Currently she is doing her Master of Design at the IIT Institute of Design, focused on human-centered design, and MBA at IIT Stuart School of Business. Irene likes to cook, and aspires to one day live, eat and work in healthy ways all at the same time.



Sang-Ho Lee studies Design Planning, Institute of Design, Illinois Institute of Technology (IIT), and Stuart Graduate School of Business, IIT. He focuses on combining the design and business strategies to create innovative business concepts from initiation to management by developing insights about people and using those insights to create valuable user experiences that support business goals. He believes design can create high value for customers and organizations. Sang-Ho Lee has diverse experiences, working for DNS (Digital Network System) as a business development researcher, Dong-A Study Abroad Agency as a sales negotiator and project manager, and Korea Trade Center in Chicago as a business strategy specialist.



Erik Van Crimmin brings much international training and experience to the team. Originally from Boston, Erik studied Economics in New England and Design in Sweden. His ability to blend a deep understanding of market forces with creative thinking empowers his experience at the Institute of Design where he is attaining a Masters of Design Methods. His interest in developing more efficient, holistic solutions is driven by his commitment to leverage his experiences to innovate at the meta level. When he's not working on climate change agendas, Erik can be found biking, hiking, playing guitar, or enjoying the outdoors from a photographers perspective.

Project Advisors

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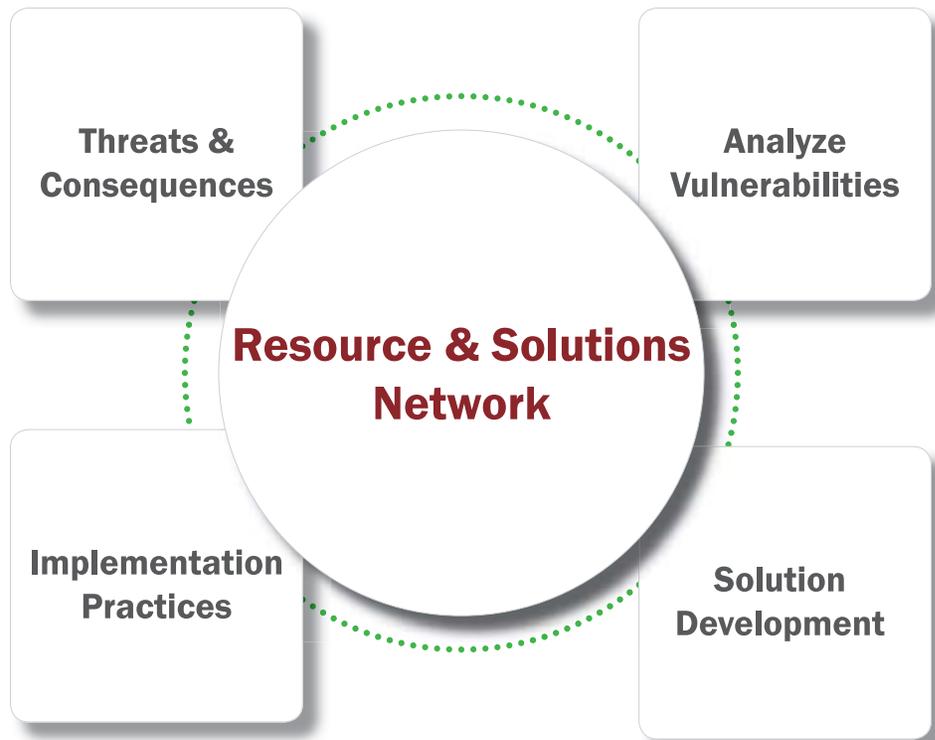
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Introduction

Process overview



This report provides considerations and advice for urban initiatives concerned with climate change. It is not intended as policy and planning guidance, although the processes and tools herein may provide useful in supporting such agendas.

This report supports a city’s initiative to adapt to climate change by providing a host of tools along with organizational and communication competencies in order to assess, evaluate, develop, and amplify possible solutions their city may employ to reduce their vulnerability to the economic, social, and environmental effects of climate change.

This document takes for certain that the impact of climate change will continue to affect planning and development process for entire regions and municipalities. Critical to this effort are short and long term strategies for adapting, rather than purely mitigating the effects of climate change on an urban center. Already, cities across the world are adapting Kyoto protocol initiatives- even in countries that have refused to ratify the treaty on a national level.

This plan however, is contingent on a vital element. The development of a central location for data entry, sorting, reference, and retrieval.

ClimateNet: Central to the successful management of information, the inclusion of this network is critical to the design of this process. ClimateNet represents an information sharing and organizational hub where cities can utilize tools and share information, and store data in a manner that interconnects the many levels of administration

This plan is comprised of 4 key process areas:

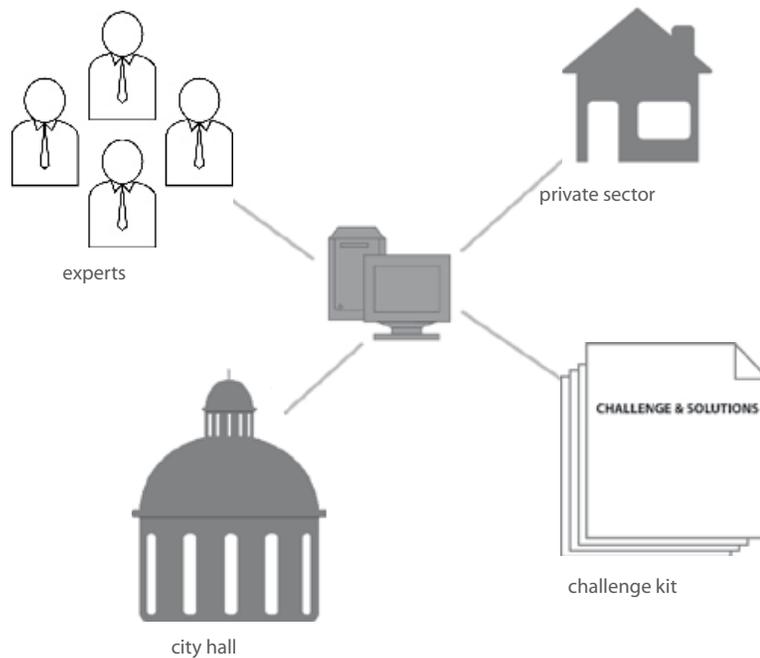
1. **Discover Threats & Consequences:** This section represents organizational and partnership agendas critical to the success of a systemic design and development program.
2. **Analyze Vulnerabilities:** New dynamic ranking tools are introduced here to evaluate a city's vulnerabilities by scoring their capacities and infrastructure in the face of climate change threats.
3. **Solution Development:** A host of suggested network and forecasting tools and processes that allow an organization to evaluate the holistic nature of suggested solutions.
4. **Implementation Practices:** Administration training and competency metrics that must be integral to an organization's functions for successful continuation of systems design programs.

The following pages represent solutions to be employed within the Network and each of the four categories. With each set of solutions, the context of Threat Discovery, Analysis, Solution Development and Evaluation, and Implementation are explored in the various areas across the many functions of an administration.

Presented as a suggested roadmap for the planning process, this report contains a range of suggestions that can be used in conjunction with other parts of the system, or alone according to specific needs.

System Elements

ClimateNet



Description

ClimateNet is a suite of applications allowing users access to a wide array of tools and information. Users include city hall planners and affiliates, climate experts, and the general public. It serves as the communications hub of the climate change initiative.

Properties

- Platform of co-created information and tools
- Portal to the tools in the adaptive planning system, including Challenge Kit, CO2 Monitor, Partnerships and Alliances, Threat Matrix, ClimateWiki.
- Accessible anywhere
- Managed by Climate Change Group and its partner, the Advisory Committee.
- Information center for climate data
- Home base for city planners and affiliates

Features

- Collection of living documents related to climate change
- Shares information, challenges and solutions between planners, scientists, inventors, and the general public
- Links information through Challenge Kit and Solution Validation
- Adaptable education tool
- Serves as central hub for city to monitor issues and progress
- Connects cities and regions across globe through Partnerships and Alliances
- Advanced searching and monitoring capabilities
- Easy to locate information from a variety of sources
- Links to useful external sites
- Leverages wisdom of crowds through ClimateWiki and encourages social content

Discussion

ClimateNet is a platform of co-created information and tools. It is a digital working environment used by city hall staff, affiliates, and the general public.

It contains a series of tools, applications and information portals relating to climate change. It is the home base for planners and their affiliates.

ClimateNet serves as the communication hub for the climate change initiative. The Climate Change Group downloads the Threat Matrix from ClimateNet, presents their problems as Challenge Kits, and respondents reply using SolutionKit. Their submissions are reviewed by the Advisory Committee (and others), and selected using the Solution Filter, which is a component of ClimateNet.

ClimateNet is the home of other specific tools such as the Idea Stockmarket, which allows city employees to post and support a range of solutions that are reviewed by planners and policy makers.

ClimateWiki is also available on ClimateNet, which allows for user-generated content on the topic of climate change.

Households and companies can upload their personal CO2 production data from Power Meter onto

ClimateNet, which compiles and publishes CO2 emission data.

Scenario

Sam Johnson, a senior city planner in Chicago, would like to check on the status of the Challenge Kit he sent out earlier in the week. It posed the question of how the fire department could reduce water use during times of drought.

Sam opens his browser on his office computer and his homepage, ClimateNet, pops up. The computer recognizes him as the user, so he is already logged in. Sam clicks on Challenge Kit and two lists of challenges sorted by date populate the screen. One is the general pool of challenges and the other is a list of the challenges that he has outstanding.

He notices that two entries have been submitted for review for his fire department challenge. Sam clicks on the first entry and a new window opens a pdf of the solution entry. The submission describes a new type of fire hydrant in both text and pictures. Sam can see from the creator's rating that he has won a challenge before, and this idea seems promising.

Sam selects the check box next to the solution and hits the "Solution Filter" button. The submission is electronically sent to his team, who is responsible for reviewing submissions.

RSS Red Alert

Description

A messaging email/PDA system that connects users with article and events of interest based on internet search and choice areas of interest.

Properties

- Linked through ClimateNet to inform individuals on specific news and alerts
- Network through member alliances and partners for information sources
- Selection of alert types: For example - News, Policy, Climate Data, Planning Agendas.

Features

- Text and Graphic based RSS feed to email account or hand held device.
- Bi-Weekly delivery of information
- Optional dedicated desktop porthole with scrolling text headlines

Discussion

Throughout the beginning of the 21st century, the topic of awareness building has blossomed as a first response to curbing human influences on Global Warming. For those who heed the advice of social and environmental advocates, the RSS Red Alert is a system that bolsters individual agendas by providing specific information to those who are most affected. As a general awareness building tool, the RSS Red Alert can elevate the quality of discussion and debate among supporters and objectors.

Informed by Partnership and Alliances through the ClimateNet source site, RSS Red Alert constantly stays on the front line of leading topics, discussions, and discoveries of Climate Change, Sustainability, and best practices for cities and organizations to move toward solutions to the effects of Climate Change.

This feature is the unique capacity that sets RSS Red Alert apart from other dashboard or RSS feed services. Since alerts feed from ClimateNet, the information is filtered by the city's preferences, issues, and problem statements. Cities showing more involvement in the ClimateNet site are then privy to more accurate and directed feeds due to the ability of ClimateNet to filter specific information to city leaders and managers.

These bits of information feasibly range from general news items that inform debates through to network city solutions created in other locations that may apply to another city with similar threats.

Scenario

A national survey has rated your city as the worst performer in the face of energy challenges and threats posed by climate change. Lacking any clear leadership on the issues facing your city, you decide to become better informed and present a case for change at the next city council meeting. As a departmental manager however, you feel intimidated by the political ramifications and the need to compose a strong argument to back your case.

As part of your research, you find ClimateNet and through the primary research tools find that there are some cities involved in the network who match your city characteristics and challenges. You want to learn more, but don't have the time to dedicate to the in depth research across the multitude of areas that face your city. Much more, you don't consider yourself an expert, and so the challenge of stepping into this realm of research is a bit overwhelming on its own merit!

In searching ClimateNet, you see the announcement of the RSS Red Alert tool and decide to download the link. As you sign up for the service, you are surprised to find out the specificity to which the sign-up form provides you options related to your interests and your city. From the little bit of research you've done already, you adequately fill out several areas that you feel are important to your city and sign up for alerts related to WATER, TRANSPORTATION, and CASE STUDIES.

Immediately, you are verified and emailed a list of related tags and links that are related to your requests that already exist on the ClimateNet site. Subsequently, you are updated on a regular basis with environmental trends regarding water consumption and political forces affecting bio-fuels and alternative transportation regulation. There are also several economic arguments and forecasting models that make the case for transformation in the near term to avoid larger costs in the long term.

Most interesting to you however, are several case studies that you are directed to that outline the full process, challenges, and pressure that other cities have overcome in their quest to make positive environmental, social, and economic change in the face of climate change agendas. With this background and argument, you are informed and empowered to make a substantial case for your city to embark on several missions to improve their performance against climate change, and improve the poor performance ranking for the next annual survey.

You position your arguments referencing the sources from RSS Red Alert and ClimateNet, and provide a compelling case for your city to become an official member to the ClimateNet network of participating cities. Not only is this a first step in making your city better prepared to face the threats of climate change, but you are recognized as a first mover, and promoted to a new position as representative on the Climate Change Group that is comprised of other department leaders throughout the city who are also interested in making real progress.

HELP!

Description

An information storage and referral system that empowers the public to act as “eyes and ears” for identifying areas of the city that may be more vulnerable than others in the face of escalating climate change threats.

Properties

- Network with existing city reporting systems for non-emergency calls
- Online public forum
- “Tagging” compilations for requests of similar type for evaluative purposes

Features

- Counter: IT solution for calculating calls and hits
- Simple Graphic interface for tallying location of call origination and observation

Discussion

HELP! is an tracking tool that provides data for solution development when assessing the capacity of city infrastructure to handle the threats and consequences of climate change.

Intended to capitalize on existing links and services between the public and city hall, HELP! is a coding solution. In a larger urban system where non-emergency call centers accept a range of complaints, HELP! leverages that volume as information through two key attributes of the service. First, by tracing the general source of a call, HELP! can provide ranking data on geographic locations that produce the most calls. This likely could be organized by zip code or neighborhood. Secondly, a coding option would exist for help center representatives to key in a “category code” following the transfer extension. This would simply be captured as a ranking.

The goal of such a system would be to act as a user-based input system that is blind to the user, requiring no extra effort.

A second method of information cataloguing and retrieval would be through an online forum where the public could post observations, complaints, and

suggestions for infrastructure performance or improvements.

Online requests would also follow the same “coding” process through a questionnaire which would allow sorting at the central database. As a regular process, the city administration could access HELP! to validate improvements against public opinion. Likewise, they could use this information as insights to areas that may be vulnerable to certain threats, and adjust planning measures accordingly.

Scenario:

In some cities, the effects of climate change will be observed through heavier and more intense periods of rainfall. Initially, this adjustment to weather patterns may seem trivial. But from a city planner and management perspective, dealing with large volumes of runoff from streets, roofs, and parking lots can pose a significant challenge with just a relatively small amount of inch/hour rainfall increase.

As it stands, Judy lives in an area that has been prone to flooding. Over the past fifteen years that she has lived in her house, the basement has flooded on average once every other year, with the past five years proving to be more frequent. Although her location is outside of a 100-year flood plain, her insurance has refused to cover damages in full, and her premium has risen due to risk of the past years flooding trends.

This past summer, her basement flooded twice. She has attended neighborhood meetings and learned that her friends and neighbors in the area have also

been dealing with the same issues. Clearly something needs to be done.

Climate change effects are likely to get worse, not better. Judy decides to go directly to city hall and find out what she can do. There, department officials tell her about HELP! Judy can have her voice heard in a virtual petition by having her friends call and email the HELP! network.

She emails the link to her friends and tells her neighbors about the site as well. A painless process, they simply log on to the site, enter their general area and voice the issue. In this case, Judy goes to the HELP! site, types in her zip code and checks a box called “FLOODING”.

This information is a “shout” of sorts for the city to recognize issue hot spots in the city. With the eventual collection of similar requests from all of Judy’s neighbors and friends who have witnessed the degree of flooding in Judy’s home, a petition like effect takes place. The city can utilize this data in planning for infrastructure updates or overhauls. Similarly, the city can begin to value systemic vulnerabilities to different consequences brought on by climate change. If the city is currently showing signs of strain under the pressure of heavy rain, they can forecast that the future is only going to get worse, and significant investment should be afforded to innovations in rain water handling.

In Judy’s case, her use of HELP! was instrumental in having her neighborhood move up in priority for the next WaterWork project to reduce just the type of flooding she had been experiencing.

Climate Change Group



Description

Climate Change Group is a committee of city employees from nearly department in the city that acts as a clearinghouse and maintains focus within each city department to deal with adaptivity to climate change.

Properties

- Member representatives for individual departments to plan climate adaptation strategies for the city

Features

- Facilitates discussion and generation of ideas to maintain focus of adaptive process
- Meets with and manages interaction with Advisory Committee
- Manages the ClimateNet

Discussion

The Climate Change (C2) Group is an interdepartmental committee with members from every department within the city. The formation of this group is based on the success of an existing group within the city – the Green Building Task Force.

The consequences of global climate change will be so far reaching and extensive that it requires a strong oversight committee to effectively manage all the related activities within the city. Equally important, nearly every level of city operations must incorporate a great many changes. Some of these changes are evolutionary in nature, but many of the changes are revolutionary and require the support of a strong oversight committee to insure that all employees buy into the plan.

Because the city of Chicago has already exhibited such strong leadership in its effort to green the city, the Climate Change Group is a natural evolution of those previous efforts. It is a natural extension of the existing focus groups and task forces to address issues such as green buildings, green roofs, urban forestry, private sector incentives, transit, and many more. It is only natural that Chicago would once again be an early adopter of planning strategies that acknowledge the realities of climate change and that its effects are already occurring. The C2 Group will help Chicago grow from the greenest city in the country to the greenest city in the world and will ensure that Chicago acts as a model to help others cities do as well.

Monthly meetings of the group are devoted to reviewing progress and looking ahead to anticipate potential problems or areas that deserve special focus. Each member reports to the Group concerning the activities within his department and works with other Group members for needed support or in-kind services. With a city the size of Chicago, with the very many services that the city must provide to its citizens, and with the very complex problems associated with climate change, it is vital that the Climate Change Group makes coordination a strong focus of its activity.

In addition to its monthly meetings that focus on keeping routine adaptive planning activities on track, the C2 Group devotes much of its effort to the adoption and annual revision of a citywide Adaptivity Agenda, modeled after the city's highly successful Environmental Action Agenda.

To make this difficult process more manageable, the Climate Change Group identifies special areas of focus that need the formation of a special ad hoc committee or task force to address specific items that require attention. To accomplish this, the C2 Group relies on the analysis generated by the Threat Prioritization Matrix to identify those departments and agencies that should form a special team to deal with a specific issue. The subcommittees meet as needed to address the issues common to those agencies and then report their findings to the C2 Group.

As the work of the C2 Group progresses and potential solutions to threat consequences develop, this data is posted to the ClimateNet that the C2Group is charged with managing. For those threats that do not have a readily discernable solution, the C2 Group will post a ChallengeKit to ClimateNet soliciting help in resolving those problems. For both potential solutions posted and for ChallengeKit problems, the public and other concerned experts have access through the ClimateNet to offer solutions or improvements to solutions.

By coordinating all the activities relating to Chicago's climate change adaptivity strategies, the Climate Change Group maintains the proper commitment level throughout the city. For a city the size of Chicago, the tendency to develop a large bureaucracy is almost unavoidable. The Climate Change Group makes handling that bureaucracy manageable.

Scenario

Mayor Daley just announced Chicago's Adaptivity Agenda in a major public event at Daley Plaza. Yoo-Jung was a big part of making that happen. She joined the Department of Environment two years ago and has been a very active member of the Climate Change Group from the beginning.

The work of the Climate Change (C2) Group was initially performed by the Green Building Task force, since it was already in place and seemed to be dealing with many of the same issues. Within just a few months, the Green Building Task Force was being overwhelmed by work associated with climate change and it became quickly obvious that the Task Force was much too small.

The Climate Change Group was formed to address this growing list of interdepartmental activities for the city. Also, the size of the committee grew to include a representative from every city department and sister-agency – much larger than the Green Building task Force is.

One of the first tasks for the C2 Group was to get that large group of representatives together and develop the initial draft of the Agenda. It was considerably different from the final version just announced by the Mayor, but you could still see the framework of that initial work in the published Agenda.

After that first outline, the C2 Group began work to form the Advisory Committee. In addition to the local volunteer CEO's on the Committee, Yoo-

Jung worked hard to ensure that the city contracted with internationally renowned experts to join the Advisory Committee as well. The C2 Group had worked closely with Committee members Janine Benyus and James Hansen in those early months to ensure that the C2 Group had a good foundation for its challenging work.

After the first few meetings of the full C2 Group, they began analyzing the threats ahead using the Threat Prioritization Matrix to understand which departments should form smaller subcommittees and task forces to deal with each potential threat. Those task force meetings were much more manageable and allowed members to work more quickly to generate potential solutions that were then vetted at the full C2 Group meetings and reviewed by the Advisory Committee.

The C2 Group work and its process proved successful based on the policy evident in the Adaptation Agenda. The Agenda that Mayor Daley proudly presented that day clearly identified the entire carbon footprint for the city of Chicago – both public and private sectors. It also laid out a plan for both short-term and long-term strategies to reach the goal of a completely carbon-neutral city. It was not going to be easy, but the work of the C2 Group as shown in the Agenda made it obvious that the goal was attainable – and made it clear just why that goal had to be met. Yoo-Jung also took great pride that day knowing the part she had played in helping the city take a great step forward in approaching this goal.

Advisory Committee

Description

An association which consists of various experts, concerned with decision-making of city's environmental policy and gives professional advice with expert knowledge to the city's commissioners and to the Climate Change Group. They are not public officers but exercise an essential influence on the city's important policy decision regarding environmental problems.

Properties

- An advisory association which affects city's environmental programs and policy decisions
- A group of people who have professional knowledge regarding environment problems
- They consist of ecologists, scientists, professors, CEOs, and environmental consultants

Features

- Concerned with city's environmental policy decision
- Provides expert knowledge/advice to commissioners and the Climate Change Group
- Holds regular conference with various experts and city officers
- Studies and researches environmental issues
- Communicates with other experts out of the city or country
- Promotes awareness of the dangers caused by environmental disruption

Discussion

Although the city of Chicago has a Department of Environment, it is impossible for that department alone to predict and prepare for every upcoming problem related to environmental issues. Many problems require high-level expert knowledge and in-depth analysis. To solve these problems, the city organization must utilize people who deal with advanced research and study about the issues, provide expert knowledge, and help to decide policies or standards regarding the environmental issues.

The Advisory Committee is an association composed of prominent experts who have specialized knowledge about energy use, pollution, recycling, green city planning, etc. Also volunteer CEOs and citizen representatives are included.

The Advisory Committee will take on a wide variety of tasks all varying in depth. The main duty is to focus on upcoming city environmental policy. All recommendations will be deliberated and can be appropriately decided by those with the knowledge for a correct course of action. The Advisory Committee can also be used as a resource that can be called upon regarding environmental issues. Having a group of experts in the environmental field can be utilized in by many different offices, including the Mayors office, building commissions, Police and Fire Departments, as well as zoning commissions. The Advisory Committee will



be an on-going entity that will conduct research, and be able to compile data for comparison nationally.

The Advisory Committee will help guide the Climate Change Group in communicating with the media, as well as other experts throughout the world.

Another major responsibility of the committee is to promote and raise awareness of environmental concerns. By having a united group of experts and local business leaders, the city will earn respect from the public as well as other cities and nations. This will show that the city has the environment as a priority and citizens should follow in order.

Scenario

The city of Chicago has decided to create an Advisory Committee to aid city policy when environmental issues are concerned. The group will be headed by the new chairman of the committee, John Lee. John Lee has assembled a team of experts from a number of disciplines, including chemical engineering, ecology, green architecture, etc. He has also assembled a “green team” with natural and renewable resource experts and recycling experts. The team’s first task is to adopt a new sustainable energy source. Mr. Lee chooses to research many different possible energy sources. Through communication with other large cities worldwide, he

is able to gather a great deal of data on all available energy sources. Through cross analysis, Mr. Lee is able to focus his choices to several viable sources, including Bio-fuel, Solar Heat, and Wind Power. The committee has been comprised of not only experts, but also business executives, representatives of NGOs, and citizens. A well rounded discussion ensues concerning the decision making, in attempting to select the appropriate fuel.

The experts involved in the creation of this initiative of sustainable energy sources are integral in briefing, not only the Mayor's office and city officials, but also the media and by extension, the public. Because of the group that John Lee has assembled, the final decision that was reached is under less scrutiny.

The advisory committee also must secure appropriate funding from the city and state governments. Mr. Lee must go before the budget office to state his case for funding, and is able to gain sufficient funding for his project.

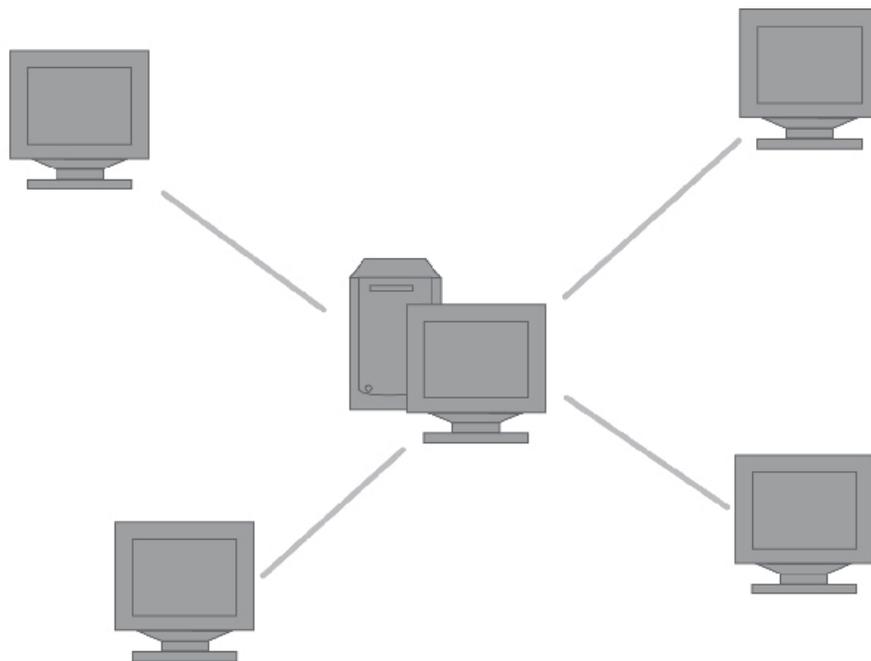
Once the final decision is made, the advisory committee assists in investigating the manufacturers responsible for Chicago's energy infrastructure. Under the watchful eye of Mr. Lee, the committee has advised to reduce the dependency on fossil fuel by using wind power. There is research that must be done on wind power suppliers, windmill

contractors and operators. Not only will experts in this type of energy be useful, but the business executives have extensive experience in this selection and negotiation.

Through discussion with other cities promoting wind, such as Palm Springs California, a quality developer is located. Once building has begun, the advisory committee shifts its focus from decision making to one of its other main duties. That is the duty of promotion and increase of awareness of environmental concerns and disruptions. By making the public and other governmental departments aware of environmental concerns, the process of gaining funding and public approval in the future will be easier. Mr. Lee also makes it a priority for his team to interact with the public to educate the youth on the benefits of renewable resources and environmental issues.

By creating a system of wind power, Mr. Lee and the advisory committee are able to lay the groundwork for a fully sustainable energy system for Chicago. Through the decrease in fossil fuel dependence, and the development of renewable sources, the advisory committee is working towards a cleaner and more responsible city for future generations.

Climate Wiki



Description

A wiki-based section of ClimateNet that allows for user-generated content related to climate change. The critical difference from a typical wiki is the requirement that the author uses his or her real name.

Properties

- User generated content section of ClimateNet
- Requires authors to use real names, which is traceable
- Searchable
- Indexed
- Provides for links to outside network

Features

- Encourages participation and generation of vast amounts of information
- Extremely inexpensive to implement and maintain
- Encourages multi-lingual content
- Easy to locate information across multiple fields
- Promotes more trustable information due to use of real names
- Allows database to cover many issues quickly
- Leverages wisdom of crowds
- Allows users to link to useful information outside of network

Discussion

Because climate change is such a large topic that is continuously evolving, understanding it over time will require a multitude of people working in concert.

ClimateWiki allows for users of ClimateNet to contribute to the base of knowledge about climate change on an ongoing basis. Rather than relying on webhosts to update sites, ClimateWiki is built to encourage participation from anybody who is interested in and knowledgeable about climate change. Leveraging the wisdom of crowds to adapt to climate change makes especially good sense given the complexity and evolving nature of global warming.

Registration requires authors to use real names to better ensure accuracy of reports and information.

Scenario

Margaret Shu is an ornithologist in Maine. She tracks the migratory pattern of birds on the islands off the Maine coast.

Early in April, Margaret spots a species that has never lived in Maine. She photographs the bird, notes its behavior, appearance and location, and heads home to share her findings.

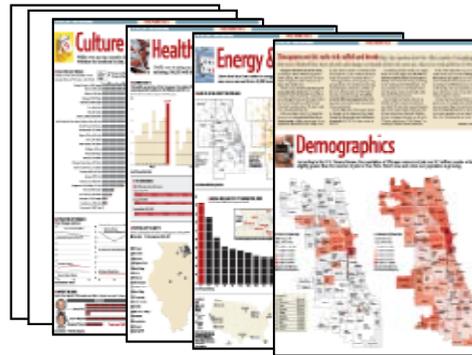
Once home, Margaret logs onto ClimateNet's ClimateWiki and clicks on the "biodiversity" tab. She creates a new section dedicated to the her spotting the new species and populates the section with her newly discovered data. She presses "save" and exits the page.

Instantly her findings are shared throughout the world.

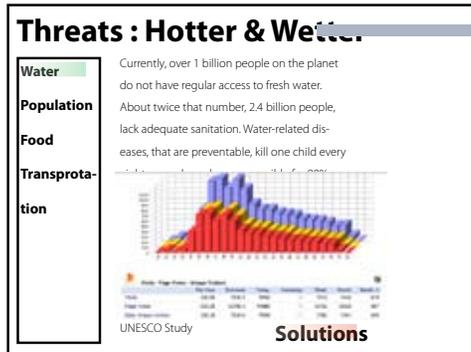
CityLink Solution



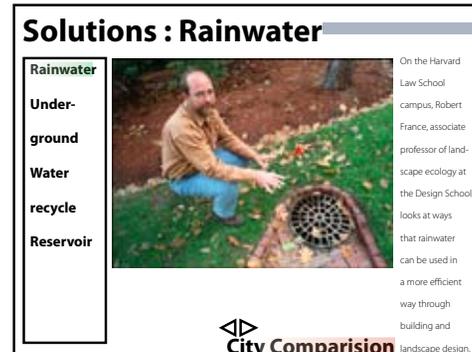
Threat Mapping



City Infor



Threats & Solution



Description

CityLink Solution is a tool to search possible solutions from other cities which have similar threats. If one city suffers with hotter and drier climate, there must some cities have same problems. But it is not easy to share knowledge or solutions because there is no place to consolidate all the information. CityLink Solution provides not only a simple mapping tool to search the city groups that have similar threats, but well organized information such as detailed city information, and solution description. In addition, CityLink Solution provides a function to compare one city to others in terms of general city information, threats and solutions.

Properties

- Web-based searching tool
- A tool to provide information
- A tool to categorize city groups

Features

- Identify cities that have similar climate threats
- Provide simple and efficient searching system
- Provide general information of cities
- Provide threat description to cities
- Provide solutions to cities
- Share knowledge or processes with other people
- Compare one city to the other

Discussion

With an information-oriented society, most information is available on the internet. Climate change planners could search hours and hours to

find climate change solutions on the internet, but it is hard to say they have all the information they need. In addition, visiting many website is not productive and is time consuming. CityLink Solution provides not only a simple mapping tool to search the city groups that have similar threats, but well organized information such as detailed city information, and solution description. In addition, CityLink Solution provides a function to compare one city to others in terms of general city information, threats and solutions.

Threat Mapping is a search tool to find a city group that suffers similar threats. Threat Mapping is an Important tool in CityLink Solution because it narrows down cities from hundreds to about twenty.

CityInfor provides all the cities' general information, listed as demographics, culture, location, energy, weather, health care, transportation and etc. To adapt other cities' solutions, it is critical to understand them; even though one city has the same threats as others, it doesn't mean they would have same solutions due to different city capabilities, culture or public awareness to implement solutions.

Threat vs. Solution is the main information that project managers need. It starts with a short description of major threats and solutions. By clicking the threats, managers can see the detailed information of threats. Threats are listed in the general order of magnitude of threat. The goal is for managers to fully understand how threats become serious in their own city and in those different from

their own. Solutions are listed in terms of detailed descriptions of solutions and implementation processes. This tells managers how solutions are initiated and implemented. Project managers can adapt the solutions to their own cities' capabilities, culture, and public awareness.

After search all the cities, managers can compare one city to others in terms of general information, threats and solutions to prioritize best-suited solutions for their cities.

Scenario

Jinho is a project manager in Korean Climate Change Adaptation. Recently, his country started a project to adapt to climate changes. His team is in charge of finding solutions for sufficient water resources. He visited CityLink Solution and typed '*Insufficient Water*' on the search engine. The display screen showed cities which have the same threats as Korea. He clicked Japan. He could see all the general information about Tokyo. He thought Tokyo has lot of similar capabilities, culture and public awareness to Seoul. He clicked '*Threat vs. Solution*' button and could see how the threat become serious and how it was different from Seoul. Tokyo plans to develop underground water resources as a solution. Jinho could see all the information that how Tokyo initiated the project such as finance, information, technology and human resources, and how Tokyo implemented it. Jinho understands what and how to develop underground water resources, and adds more ideas to improve the solutions.

Threat Prioritization Matrix

Description

A sorting matrix that performs various organizational level evaluations against climate change threats. Using inputs to determine Climate Change related threats, this matrix values those threats against department functions.

Properties

- A sorting Matrix based in a spreadsheet program
- Downloadable from server, or used in conjunction with other input tools
- Accessible by many parties for information sharing
- Inputs are tallied to weigh Departmental vulnerabilities against climate change factors

Features

- Primary “Department Level” input screen
- Secondary “City Level” evaluation screen
- Ranking inputs from 1-10 (least - most vulnerable)
- Color coded “Red, Orange, Green” fields according to threat levels

Discussion

Organization of information is a compelling challenge in an organization’s capacity to develop strategies. A similar challenge is how to efficiently utilize that information in order to drive discovery and insight as competitive advantage.

Similarly, in the quest to adapt to climate change, a certain amount of foresight must be generated in

order to understand vulnerabilities and the consequences of those vulnerabilities on a greater scale. In some cases this calls for preventative measures to be taken well in advance, whereas other solutions may be more straightforward and relatively simple.

But how does an organization balance its operations against threats as widespread as Climate Change?

The organization of threats and vulnerabilities relies on three key factors for evaluation:

1. Living Document

A necessary practice in establishing accuracy in data delivery is to ensure complete and current inputs. A challenge to most organizations, this tactic requires a dedication by familiar voices to evaluate fluctuations in threats or enterprise performance.

2. Accurate Diagnostic Inputs

As the effects and likely impacts of Climate Change become more clear, there will consistently evolve new insights, data, and threats not originally conceived. These fluctuations and changes need to inform the organization by representing the most current information available.

3. Accurate Evaluative Inputs

Just as the threats require regular update, so too does the performance of the organization against these threats need to receive regular attention. As

departments adopt different practices, they need to account for the nature of the change when weighed against the threats of climate change.

Scenario:

An administration sees the need to develop a holistic evaluation of its operations and functions in accordance to the threats posed by climate change. This may require infrastructure changes, it may require phase out scenarios, or it may require preventative solutions development. But how does a large organization identify where and at what measure to fund and initiate such tasks?

Evaluating entire cities vulnerability can be a daunting task. However, the Threat Prioritization Matrix makes this task fairly straightforward to complete. This design represents a “plug & play” solution that can be easily installed and updated through internet preferences. Evaluations take place within each department and are then entered into a larger framework in order to optimize City wide efforts to adapt to the effects of climate change.

Enter Threats and Consequences:

A first step in maximizing the utility of this tool is to accurately capture the consequences of climate change factors to your city.

Department Level Evaluation:

The department director is responsible for the intensive initial task of filling out the matrix to value the functions of his department against the likely conditions that will accompany the effects of Climate Change. This is a living document, so as threats and challenges shift, the matrix can be updated to represent the current state of the art within

each department.

City-wide Evaluation:

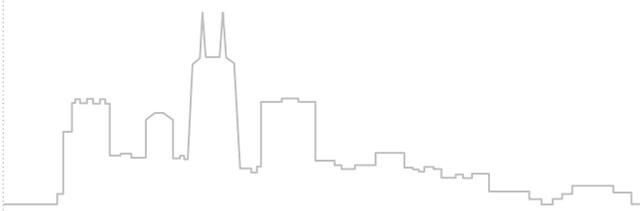
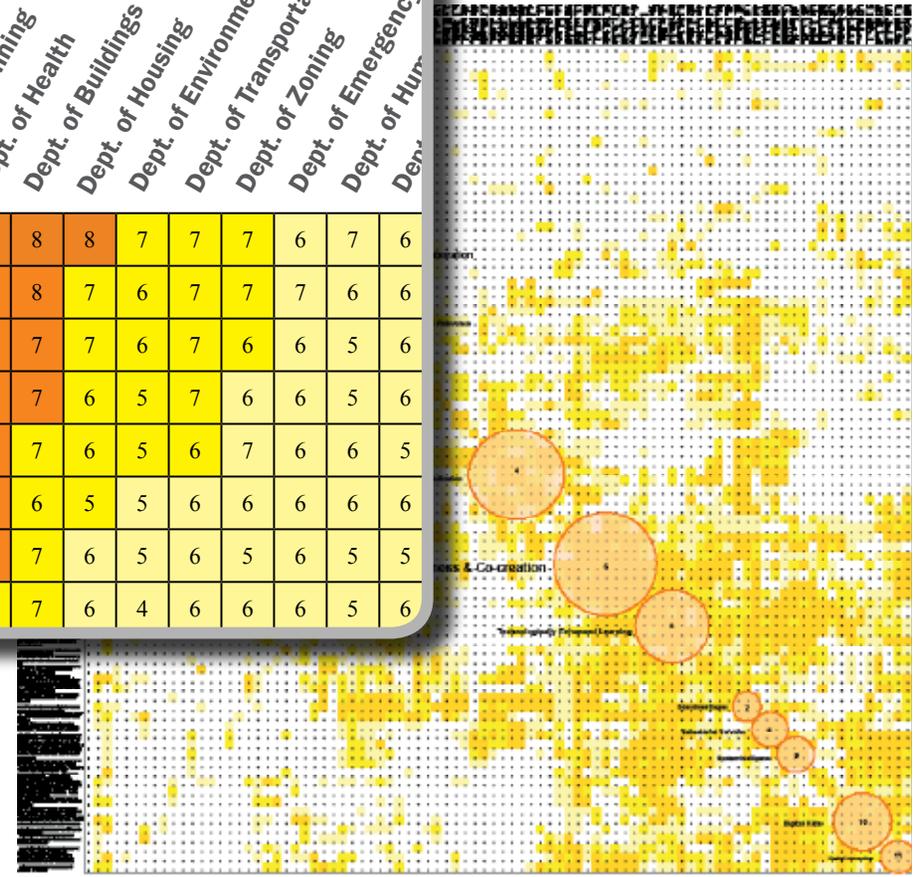
Once the department’s information and valuations are tallied, it is saved and compiled in a central location with all the other city’s evaluations. A larger, second tier matrix represents an entire city and the departments within that city as they have been scored in the previous exercise.

By compiling all department rankings in one central matrix, evaluations by threat allow the program to “sort” by identifying and grouping those departments most affected by a particular threat.

In this example, WATER SCARCITY is the threat, and four departments rank as “HIGHLY VULNERABLE”. The Threat Prioritization Matrix identifies those department representatives, and allows a concentrated effort in the development of design strategies and constraints. By introducing multiple departments to the scenario, solutions can be generated that benefit multiple stakeholders and maximizes return on investment across a triple bottom line

This method of evaluation streamlines solution development by allowing the right people from the most affected departments to gather and focus on specific topics and solutions that can be implemented in their regular planning activities.

	Dept. of Streets & Sanitation	Dept. Water Management	Fire Department	Dept. of Planning	Dept. of Health	Dept. of Buildings	Dept. of Housing	Dept. of Environment	Dept. of Transportation	Dept. of Zoning	Dept. of Emergency M	Dep	
Water Scarcity	10	10	10	9	8	8	8	7	7	7	6	7	6
24" Lake Level Drop	10	10	9	9	8	8	7	6	7	7	7	6	6
Flooding	10	9	9	9	7	7	7	6	7	6	6	5	6
Urban Heat Island Effects	10	9	9	9	8	7	6	5	7	6	6	5	6
Heat Related Deaths	10	9	9	9	8	7	6	5	6	7	6	6	5
Heat Waves	9	9	8	8	7	6	5	5	6	6	6	6	6
Extended Electrical Peaks	9	9	8	8	7	7	6	5	6	5	6	5	5
Population Increase	9	8	7	7	7	7	6	4	6	6	6	5	6



Performance Web

Description

An tool that allows national or international stand-ings based on vulnerabilities to the threats and con-sequences anticipated by Climate Change.

A mapping solution available in common software that allows information to be easily understood. Moreover, inputs are easy to adjust, add, or modify given the nature of change required by the organiza-tion.

Properties

- Rose or Spider graphing techniques associated with spreadsheet programs
- Downloadable from server, or used in conjunc-tion with other input tools
- Accessible by many parties for information sharing
- Multiple city comparison capabilities
- Scalable as additional threats or performance metrics are required for monitoring

Features

- Color coded threat points
- Historical tracking by shading improvement zones
- Real time dynamic updates from multiple input channels

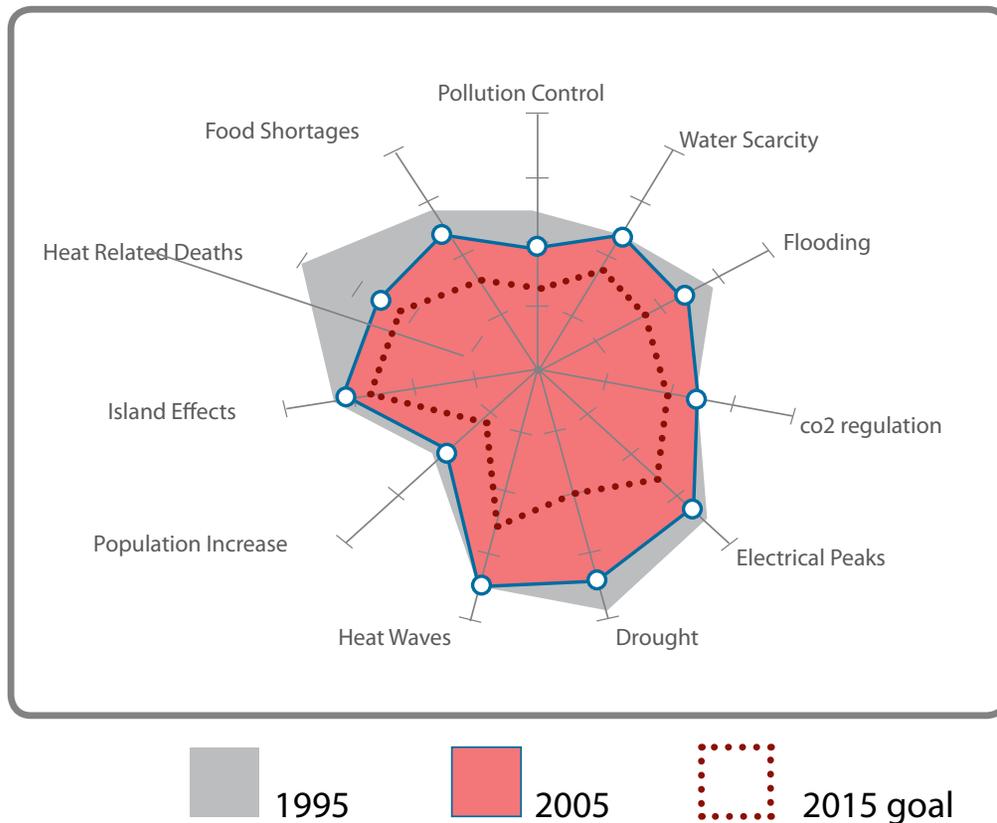
Discussion

You can't fight the enemy if you don't know where he is. This is the underlying premise for the devel-opment of this performance measurement tool. By evaluating a city's geography, growth, infrastruc-ture, and consumption trends,

In staging a proper response to the specific threats Climate Change poses to a city structure, the state of the city must first be recorded and examined. Performance Web is a way of compiling already available, but disparate sources of information, in a manner that is easy to comprehend and evaluate.

Specifically, Performance Web allows a macro view of a city's performance against the variety of risks and ecosystem crises connected to climate change. Performance Web plots a performance rating of the city against these threats. Shown as a rose, or spider graph, this chart not only allows a snapshot of a single city's vulnerabilities to the threats and consequences of climate change, but also provides a vehicle for performance comparison with mul-tiple cities who are facing similar threats and con-sequences.

As a recording process, Performance Web allows an organization to evaluate performance measures from year to year - marking improvements or ne-



gating gains that previous accomplishments may have delivered. Ultimately, the goal of attaining Net-Zero process is easily identified as the “bullseye” of the chart - and an organizations processes are constantly striving toward that goal.

Scenario:

This tool operates with the understanding that adapting to climate change is an ongoing process, and not a procedure. There are two preceding requirements necessary for this tool to be used accurately: 1) evaluation of threats and the consequences of those threats to an organization related to climate change, and 2) a comprehensive rating of the organizations functions as they may be affected by those threats. (See Threat Matrix)

Initiated by a Commission level authority or by the Climate Change Group, Performance Web would run analysis of the current annual standings of the city against threats such as water scarcity, heat waves, energy production, pollution, biodiversity loss, etc. For this scenario, the City of Portland has run the Performance Web, and has found that it is particularly vulnerable to the effects of increased heavy snowfall.

As a first step, this informs Portland officials of the severity of the threat. Moreover, by utilizing the comparison utility of this tool, Portland can evalu-

ate it's performance ranking against heavy snowfall with other cities who may also be particularly vulnerable to this specific threat. Networking in this manner allows for more robust solutions generation as the different actors involved will likely have unique perspectives on problem solving.

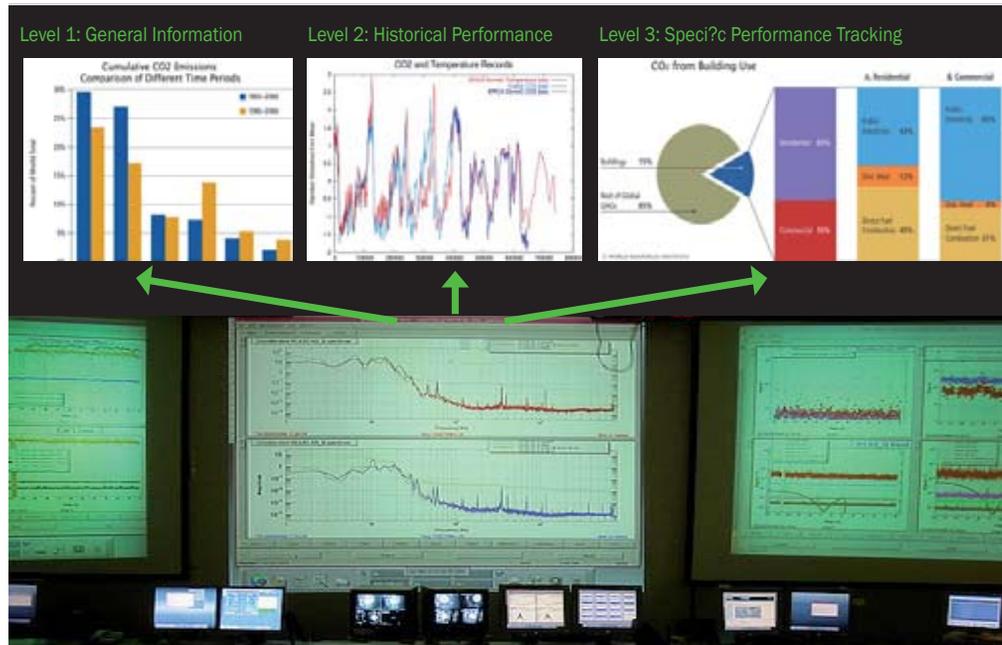
In this case, Portland has found some interesting agendas already underway in London and Seattle - where winter climes have shown increasing snowfall over the past decade.

After developing some solutions to deal with this issue, the programs are put into testing and prototyping by the City of Portland. As a performance measurement, Portland's capacity to handle the next series of heavy snowfalls are rated and ranked by the officials involved. This new ranking is recorded in the Performance Web, and the overall standing against the threat is updated.

With the new measures and procedures in place, Portland has seen a reduction in traffic congestion, better public awareness communications, and less structural damage due to standing snow loads. These improvements are recorded as a net gain in the City's ability to deal with heavy snowfall, and the rating is moved "upward" from a "7" to a "5", and that historical ranking improvement serves as a model for recording progress toward that specific threat.

The Performance Web allows for this type of scenario to be run across multiple departments and against multiple threats - allowing multiple agendas to be performed simultaneously, and for the impacts of those agendas to be valued against other department functions and solutions for overall progress reporting.

CO2 Monitor



Description

A dynamic information display tool that sorts and displays carbon contributions from macro (Country, State, Region) to micro (city, industry, process) level.

Properties

- Monitors past and present rates of CO2 production
- “War Games” simulation options
- Historical data display for CO2 reduction planning
- National, Industry, and Sector level information levels

Features

- Main screen feed for overall CO2 output monitoring
- Sub panels for detailed information regarding specific activities
- Historical monitoring capabilities for progress evaluation
- Provides reports per department for their activities and areas for improvement
- Provides track record of cause & effect relationship between improvement tactics and realized return on investment
- Allows different levels of access for different departments requiring information

Discussion

Adaptive urban planning for Climate Change is a process focused on the mitigation and adaptation means necessary for urban centers to plan for the likely effects of climate change.

Given current scientific majority opinion and trends of climate change factors, enterprise is quickly realizing the need to consider these factors in their planning strategies. City planners are especially interested in these trends given the scale and potentially large scale effect climate change can have on a dense urban population.

In the adaptive planning process, the need to understand the state of the art precedes any action. This proposed solution allows for CO2 Monitoring in real time that allows a visual comparison of real data for the continuous reduction of CO2 emissions as a contributor to climate change.

This tool is best used as a supporting agent with all future planning agendas. In the example shown, data is revealed from macro to micro level instruction. Having compiled a range of carbon contributions using inputs from the Carbon Footprint Kit, this database allows a visual comparison of targets for future reduction.

Although this could be utilized and referenced by any computer in a network, the full effect of this tool could be seen best at the Joint Operations Center (JOC). The purpose of this tool is to provide an easy to understand, easy to monitor interface that conveys complex information in a simple manner.

Using carbon output data as initial inputs, visual identification of worst violators and fluctuating contributors can easily be identified and traced. Should the user need to identify more specific information regarding a sector, the CO2 Monitor tool can organize by filters to provide in depth, specific information on an as needed basis.

Parallel with supporting proactive agendas, the detection tool can also support RSS Red Alert tool by sending high alerts when any performance metric exceeds an acceptable threshold when compared with performance level benchmarks. Likewise, the CO2 Monitor tool would dynamically update information on the Threat Prioritization Matrix which analyzes a wider range of threats facing a city structure. In this case short, midterm, and longer range outlooks would serve to inform policy and directives given a city center's ability to act, or need to temporarily offset carbon emissions with the purchase of Carbon Credits or similar trading schemes.

Scenario:

From the control room: This tool is launched as a small group of department leaders choose to tackle yet another step toward CO2 emission reduction. Making their job easier in the order of magnitudes, they quickly leverage the capacity of this detection and development program to access real-time information in order to provide accurate monitoring of CO2 emissions by output source.

Data contributions range from national historical averages to specific industry sectors for more holistic solutions development. The detection tool is accessed in order to provide in-depth information regarding the real estate sector contribution of CO2 output for Chicago. By accessing information on an increasing level of detail, the team can quickly see that within the real estate sector, the biggest contributor to green house gases is not commercial, but residential building sources. From this information, the accuracy of action agendas can be validated by addressing poor performance areas specific to the residential sector.

The city team leverages this information to then develop suggestions through the Threat Prioritization Matrix for what measures the Department of Buildings, Department of Planning, Department of Construction and Permits, and other associated groups may employ to reduce CO2 emissions.



C2 Simulator

Description

A tractor-trailer sized, analysis and display unit for simulation of environmental scenarios.

Properties

- A custom trailer with high definition video screens and sophisticated computer simulation equipment.
- A simulation tool for city planners to analyze various adaptation strategies and evaluate their applicability.
- A virtual reality simulator.

Features

- Provides space and equipment for joint operations analysis of climatological and urban planning scenarios
- Provides education to the public through virtual reality generation.

Discussion

The C2 (Climate Change) Simulator is a portable, tractor-trailer sized unit. It has two primary functions. First it functions as a research, training and operational center for detailed analysis by specialists working with the Climate Change Group. Second, it travels throughout the city or region, for public education and dissemination of detailed information about the climate change issue.

In the first mode it is connected to the Joint Operations Center (JOC) to provide supplementary support for detailed analysis of both on-going monitoring of a diverse range of city functions and simulations of adaptation strategies. Parked at the JOC location and fully connected to the citywide monitoring and control center, the C2 Simulator provides a conference facility that allows a very broad range of analysis operations at an extremely detailed level.

Its second primary function is for public education and specifically to effect widespread change in public perceptions and attitudes surrounding the climate change issue. In order to accomplish this, it must make a compelling case for the very real dangers we already face. It must make an equally compelling case that there are reasonable and attainable solutions to the problem. And finally, it is

intended to personalize this experience to the largest extent possible.

Virtual reality simulation has a long history. With attractions like the Universal Studios' Amazing Adventures of Spiderman, many Americans are familiar with the compelling reality created today by computers and video screens. Similar technologies have been used for decades in flight training simulators and similar military applications, like NASA's virtual landscapes projected on multiple screens giving a 180-degree view. Much simpler simulators, running fixed video synchronized to the movement of a 'cabin', have been available at funfairs throughout the country. These rides are often among the most popular draws at their various venues.

On an even smaller scale, a similar experience can be created with electronic goggles or a helmet. Later developments extended the process to include data gloves to relay a user's hand and finger movements to a virtual reality system, which then translates the wearer's gestures into manipulations of virtual objects. As these virtual reality generators have become more detailed, more immersive and less costly, people have used these apparatus for a wide variety of entertainment, inspiration, socializing and training activities. Many of these

recent adaptations have allowed the users to significantly alter the virtual reality in real time by their interactions, further advancing the reality of the simulations. With the use of virtual simulation so widespread and common, it is a visualization technique perfectly suited for public education about global climate change issues.

For this use, the trailer is transported to various neighborhoods or to special festival venues where large public attendance is likely. Small groups of people (6 - 15) enter the trailer. Initially they are exposed to a preview exhibit and short movie to set up the story. Next they are exposed to a 10 - 20 minute virtual reality simulation experience specifically designed to simulate climate changes and affect a change in public attitudes. The process shows participants what will happen to their city when – not if – climate change effects begin to become too severe to ignore.

Generally, the walls and ceiling consist of full size high-definition video screens. The trailer includes a robust, full function super-computer system to drive analysis and simulations software. The simulations software produces customized images to replicate the particular surroundings of the city, or even of a specific neighborhood.

The HD video screens generate a compelling virtual reality to indicate various conditions: 1) current situations or conditions of city/neighborhood; 2) anticipated changes in global climate and the consequences of business-as-usual, localized for the specific audience, and for a wide range of climatological threats; 3) various proposed adaptation strategies and the short- and long-term improvements for society based on those strategies.

The virtual reality experience is intended to create the maximum effect by combining the full-surround, HD-coordinated video images with sound, heat, wind, even smell.

The business as usual scenario will include effects of various severe climate change elements:

- Extreme shortage of petroleum
- Shortage of food
- Various consequences of water issues – both shortages and over-abundance events
- Insect infestation
- Both Hotter/dryer and Wetter overall climates
- Changing lake levels

The result is intended to help the public understand that they can both mitigate and delay climatological effects, and that they must take an active part in urban adaptation that will be necessary because

of effects that will certainly result from the high concentrations of CO₂ already generated over the last century and currently in the atmosphere. At the conclusion of the simulation experience, participants are encouraged to take a pledge to immediately begin personal action to affect change and to support the city administration in its efforts to do the same.

Scenario

Parked outside the city's Joint Operations Center, the C2 Simulator was buzzing with activity. The Climate Change Summit had just closed at the convention center and there were several internationally known climate scientists still in town, visiting the Joint Operations Center and participating in simulations scenarios in the C2 Simulator.

The visiting scientists were divided into three teams partnered with members of the city's Climate Change Group and the staff at the JOC. Each team was concentrating on various adaptation strategies. Initially they had met in the front area of simulation trailer around the large conference table to discuss the overall plan and the roles for each team. Later that afternoon, after each team had completed its analysis, they would meet again



to review and compare outcomes and to find the best way to combine various solutions for the best synergistic result.

The large HD video screens were ideal for this analysis because they allowed a very large amount of information to be displayed along with maps, and detailed images of any part of the city. The database included all of the demographic and infrastructure information for each neighborhood. The robust computer equipment running the simulation software and analyzing the city's existing capabilities was state of the art and provided the analysts with all the capabilities they needed. By the end of the day, the group had a significant update to the city's adaptation plan and the Climate Change Group had scheduled another session five weeks later with several of the participants.

These was still a long way to go before the city would consider the work complete, but the work to date had provided an accurate analysis of the city's carbon footprint and had identified the primary areas that needed immediate attention. The work of the past three years had made a significant impact – the carbon footprint had been reduced by more than 18% and the city had a credible plan to get to 65% reduction within another four years.

As soon as the group left the Simulator, the crew came in to begin the transformation for its scheduled trip to the Target store the next day. The C2 Simulator made a few of these trips each month, but this was an especially busy period. Still, with their past experience, the transition was easy. The conference table and chairs were removed and the visual display boards were arranged in this front area that would served as the introduction for tomorrow's crowd. The seating in the video/analysis area was quickly swapped out and the transformation was essentially complete. In many ways the most dramatic change was the easiest – simply running a different computer program to perform the localized simulation for the public education event.

The C2 Simulator arrived at the Target on Roosevelt parking lot on a busy Saturday morning with great fanfare. Target stores throughout Chicagoland had been promoting the Simulator visit for all week with in-store signage, newspaper inserts and underwriting announcements on WBEZ. Target had even done shelf promotions of its greenest items in the store to encourage customers to buy green. Finally, the Simulator's tour of Target stores was beginning.

As people arrived to do their weekly shopping at Target, about one in three took time to enter the C2



Simulator either on their way into the store or on their way out. Families, in particular, were likely to visit. In fact, almost half of the families who visited said they made the trip to Target because of the Simulator (which certainly pleased the Target marketing executives who made the decision to sponsor the Simulator and support it with a considerable promotional budget). Most visitors to the Simulator spent an average of 15 minutes. It wasn't so long that it caused serious delays in their Saturday errands, but long enough to experience the effects of C2 Simulator and get the overall message.

While waiting for the VR simulation in the video area, each group spent about six minutes in the orientation area looking at the display boards – where some of the world's most knowledgeable climatologists had met just yesterday. Many of the visitors already had some knowledge of the issues, in large part because of the city's ongoing marketing strategies that had been in place since Mayor Daley introduced the city hall green roof 14 years ago. However, nearly all visitors were surprised to learn just how much they didn't know about their own neighborhood and the impact they each had in making climatic conditions better or worse.

Next the group moved into the video area where they watched a two-minute video bringing the fo-

cus directly to South Loop area. And finally they watched about eight minutes of scenario strategies on the full surround video screens which illustrated why the city was focused on climate change adaptation and what this would mean for their neighborhood in the future. The sound, wind, heat and cool special effects made the scenarios seem absolutely believable.

To keep the overall experience short enough to maintain a high level of participation, each session was limited to a single or a pair of strategies. When visitors learned that there were actually more than a dozen such illustrative scenarios, several elected to stay to watch a second or third group of scenarios.

Post-visit surveys of a random sample of visitors showed that 80 percent of them left the exhibit feeling like climate change is a very real problem for themselves and their families, but that there were concrete actions they could take to fight back. Better still, 83 percent of visitors signed a commitment to take those actions and 74 percent committed to recommend a visit to C2 Simulator to friends and family.

Most encouraging was the surprisingly enthusiastic response from Target's frontline employees. After being served coffee, muffins and fruit, they

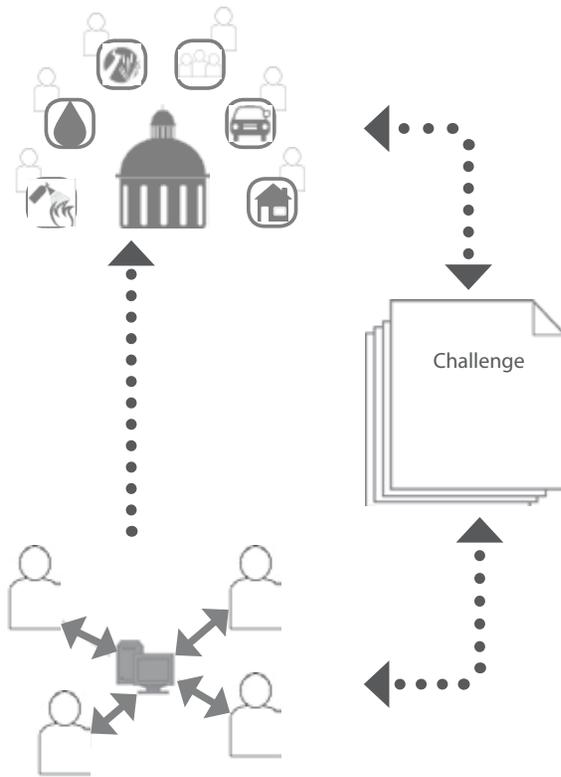


were the first to go through the Simulator. Two employees appeared on the Metro page of the Tribune Sunday morning as they were coming out of the Simulator. Throughout the weekend, they recommended (unprompted!) a visit of the Simulator to Target customers.

While the real effects won't be known for some time, it was a very encouraging start. Target was a new sponsor to the program and they were very pleased with the response – so pleased, in fact, that

they extended the tour and planned a repeat visit to the Roosevelt store. They even began to schedule the Simulator for several Target stores in nearby cities.

ChallengeKit



Description

The Challenge Kit is a section of ClimateNet. The Challenge Kit is a collection of interfaces that encourage participation from outside city hall to help solve problems associated with climate change.

Properties

- Section of ClimateNet
- Collection of digital interfaces with interactive fields
- Gateway for planners and for competition entries
- Searchable by multiple criteria
- Private and public sections

Features

- Clearly identifies problems/challenges
- Advertises demand for specific solutions
- Opens up solution generation to anybody with internet connection
- Connects solutions to problems

Discussion

Global warming is perhaps the greatest issue facing modern society. Adapting to it and mitigating our contribution to it will require a concerted effort of all concerned parties. It will certainly be too complex a problem to be solved by a single city organization, especially as new risks and threats arise. The Challenge Kit gives individuals or companies outside the city an opportunity to contribute to the adaptation process and help communities solve problems as they arise, and provides financial compensation for workable solutions.

The Challenge Kit is a set of tools that encourages outside participation in the fight against global

warming. It structures proposed solutions from outside city hall, collects them in a central place on ClimateNet, and allows planners to select the most appropriate solutions through Solution Filter. When the city selects a solution and implements it, the creator of the solution is rewarded.

First, a Challenge is identified by the Climate Change Group. If no solutions are generated from the Idea Stockmarket the Challenge is formally written and posted onto ClimateNet in the Challenge Kit area. The Challenge resides, for an allotted amount of time, among other Challenges that are outstanding requests for solutions.

These Challenges are publicly accessible, in fact the public is encouraged to view them and help solve the problems posted. If an individual believes he or she has developed a solution to a given problem (Challenges are not necessarily products, they can be services, techniques, methods, etc) they are encouraged to complete a SolutionKit form. On the SolutionKit form they detail the solution in whatever format is appropriate, be it diagrams, written form, and/or photographs or drawings.

Once submitted, these SolutionKit forms reside within a ChallengeKit until the submission deadline passes. They are then reviewed by the techniques outlined in the Solution Filter. If a solution is selected and implemented, the creator of the SolutionKit form is rewarded.

Scenario

Styro is a small company specializing in condensed foam used to extinguish fires at gas stations. Its founder and president, Harold Maupin, is marketing his devices and searching for new customers. He learns about Chicago's ini-

tiative to open up its doors to outside designs from a news conference held by the city, and decides to pursue it as a potential avenue.

Harold accesses ClimateNet from his work computer and sees the link for solution submissions. He clicks through and opens the site for ChallengeKit. There he sees a list of outstanding challenges posed by the city. In the search field he types "water" and a list of challenges relating to water appear. He finds one that discusses the city's need to reduce the amount of water used to fight fires.

Harold believes that some of his products, if retrofitted, could be a solution to the city's issue. He contacts his design team and engineer and they develop sketches and a prototype for submission to the city's request. Their submission will be a new type of fire hydrant that uses 20% of the water of a normal hydrant because the water activates a more powerful foam that is used to extinguish the fire.

Harold downloads the SolutionKit form, a part of the Challenge Kit, from ClimateNet. He populates the appropriate fields with information about his product. He then uploads the completed form onto ClimateNet, after which he receives an email confirmation that it has been received by the city.

Harold logs off his computer and waits for the city's reply, which they say will take four to six weeks.

Solution Filter

Description

The solution filter is a search engine tool that enables effective filtering of information and solutions about global climate change.

Properties

- An online search engine tool main screen with four different sections of searchable information: geographic, climatic, economic, and contact

Features

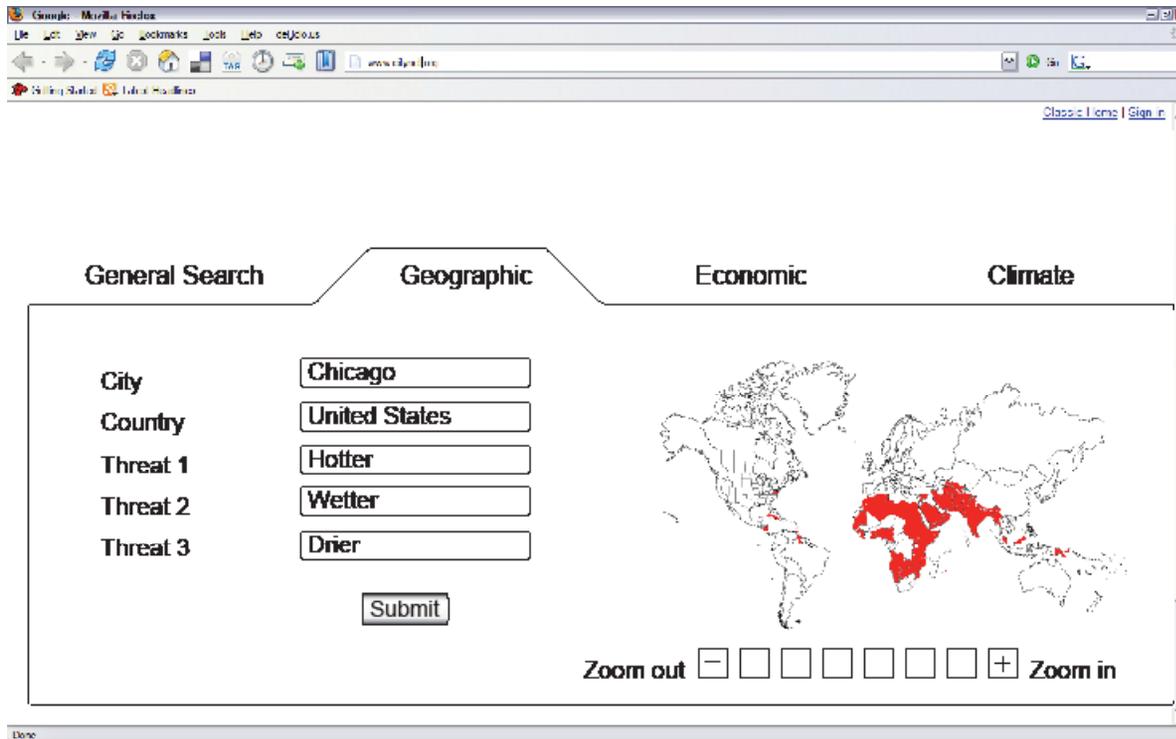
- Each section has its own page
- Each page has various related fields with drop down options which the user can select
- Provides a wide breadth of current information on global warming issues
- Provides adaptation and mitigation solutions implemented by other cities
- Allows information to be searched based on different criteria such as geographic region, economic status and climatic zone
- Able to search for information on cities facing similar threats

Discussion

Throughout the adaptive planning process, a wealth of research and solutions are generated by both the public and private sectors. This information is continuously uploaded to the ClimateNet database, which is used by cities or individuals seeking current information on climate change. However, the problem lies wherein there is so much information, it becomes difficult to filter out irrelevant information and find exactly what is needed.

The solution filter would alleviate this problem, by providing the interface to filter out information by general or specific criteria, such as climatic zone, economic levels or geographic region.

The filter solution works similarly like the Google search engine, or a library database. The interface offers a series of search fields to be filled, or drop down menu to select from, which enable ClimateNet to search for specific solutions only. This makes expedite the research process.



Scenario

Faced with the problem of climate change, Felix, a city worker wants to seek solutions to adapt to the problem, but not know where to even begin. He does not know much about climate change. What he does know is extensive knowledge about the history and current context his local region, Topeka, Kansas, such as the annual budget, the population, the seasonal climate, annual gross domestic product etc.

Felix recognizes that Topeka faces the threat of rising temperatures, and wants to search for other cities that have begun implementing solutions that would be feasible for Topeka. He recognizes that Topeka faces certain constraints, such as budgetary matters since it is a small town of just over 122,000, and cannot implement costly solutions that a large urban city like Chicago would.

Entering the appropriate fields, Topeka hits enter, and waits for the results.

Solution Variation

Description

Net Present Value Calculator for triple bottom line based benefits given an applications life cycle over a period of time.

Properties

- Economical tool
- Risk assessment tool

Features

- Calculates the current cost of future benefits
- Enables effective cost-benefit analysis

Discussion

The effects of climate change happen in such small and steady incremental steps, it's hard to really grasp the real breadth of the issue. With so many stakeholders, and so many facets to the problem, it can be daunting to even begin to uncover the cost of global warming.

The recent Stern report, released by Sir Nicholas Stern, Former World Bank chief economist presents the stark reality of the financial implications of global warming if action is not taken now. "The benefits of strong, early action" he says, "considerably outweigh the costs." By investing in our future now, we stand to reap benefits that far outweigh the cost of global warming affects in the future.

It is estimated that the cost of global warming could be as high as twenty percent of the world's gross domestic product (GDP), simply by investing a mere one percent of the annual GDP could significantly reduce emissions at the expected impacts to follow. Coupled with stringent mitigation policies, Stern values the future benefits a \$2.5 trillion annually. If we were to continue to act according to current day policy standards, our inaction would result in poorer quality of life in the future due to the disruption caused by global warming, hence shrinking the economy anywhere from 5-20 percent.

The net present value (NPV) is a way to evaluate the long-term financial costs of a problem, but in terms of current day dollars. In a case such as global warming, future implications are uncertain, but in order to adapt the cost of action must be valued in discrete terms.

The underlying idea behind NPV is that the value of money today is not necessarily worth the same in the future. In other words, if you had \$100 today, its purchasing power would be less ten years down the road, because it would have been eroded by factors such as inflation.

A key component in evaluating the NPV is the discount rate, which can significantly alter the valuation of a proposition. The discount rate is used in determining the present value of future cash flows. It enables you to compare the costs and benefits that do not occur at the same time.

PV = present value
 FV = future value
 r = discount rate
 t = time

$$PV = FV / (1+r)^t$$

In order to adapt to global warming, there are significant costs to planning for adaptation. The benefits of these actions may not be clearly evident for quite some time, so calculating the NPV of a future problem can help make it understandable in current day terms.

The challenge behind this is selecting the correct discount rate. Though it may seem to be an arbitrarily chosen number, it is guided by how people understand and view the future to their current day context. It must be cautioned, however, that whichever discount rate is selected, it may influence which course of action is chosen.

For example, imagine if you had a loan repayment of \$1,000 to pay in the future, say ten years from now. If the current day interest rate offered by the bank was five percent compounded annually, you would need to put aside \$613.90 in order to have that money ready ten years down the road.

Now let us assume a higher interest rate of eight percent, but for the same period of time. The present value when then be lower, at \$463.20

$$PV = FV / (1+r)^t = 1000 / (1+0.05)^{10} = \$613.90$$

$$PV = FV / (1+r)^t = 1000 / (1+0.08)^{10} = \$463.20$$

(worth more in future)

The higher the discount rate, there is more motivation to put place resources in initiatives that have a higher return on investment in the short run. The cost of future benefits is cheaper if the money is invested earlier rather than later. On the other hand, the lower the discount rate, there is more motivation to put resources into initiatives that have a higher payoff in future, because a dollar today is not worth that much more in the future. In other words, the future cost is not more than what it is now, so there is no incentive to invest or save money.

Scenario

Thomas McDonald is the facilities manager at DMB Engineers. It is the largest engineering firm in North America, with around the world. With the recent release of the Stern report on global climate change, DMB Engineers has decided to take part in the green initiative and do their part to help combat this problem. Their goal is to reduce their carbon footprint by modifying the way they do business and how they operate.

One of the plans of action to initiate this paradigm shift is to assess what they can do at their own office and facilities. Thomas suggested that they try changing their outdated heating systems, which are not very energy efficient. With energy resource prices on the rise, it has been putting a strain on the facilities budget. The new cooling system would use less energy, reduce costs and they were guaranteed to last longer as well. However, newer cooling systems that are more energy efficient have high capital cost of \$100,000 a pieces seems quite prohibitive. The current systems still had at least another ten years of good use in them. The question for Thomas then is should he invest in the new systems now, or wait until they break down.

Thomas decides to do a cost-benefit analysis of the energy efficient systems, by calculating the net

present value. Using an 8 percent discount, Thomas discovers that the cost per year of the new cooling system is actually less, given that it is built to last longer. So despite the high upfront price of the system, the benefits will stretch over a longer period of time. Thomas makes his decision to purchase the new system, placing DMB Engineers one step closer to reducing their carbon footprint.

Alliance Connector

Description

Alliance Connector is a data analysis system to find the best-suited alliance combinations between private and public institutions. Alliances are critical to process projects and implement solutions efficiently and productively. Alliance Connector categorize and prioritize all the institutions in terms of strengths, weaknesses and capabilities, and connect the best-suited partners based on specific requests from project managers by satisfying other institutions' needs like technology, information, finance, and human resources.

Properties

- Proposal collection website
- Data analysis and prioritization system
- Data transmission process software
- Alliance data storage
- Customized alliance connection system
- Automatic data delivery software

Features

- Collect detailed alliance proposals from the outside private/public institutions
- Transmit the proposal information to main alliance database
- Categorize and prioritize the data based on technology, information, finance, and human resources
- Receive alliance requests from project managers

in terms of technology, finance and human/ information resources

- Search on the main database to determined best-suited alliances based on specific requests from project managers
- Provide project managers potential alliance candidates; information in terms of what they demand and offer to establish an alliance

Discussion

1. Alliance Connector

Alliance Connector looks for an agreement between public and private institutions to achieve different goals and interests by sharing each institution's advanced resources like technology, information, finance, and human. Most of public and private institutions try hard to establish good alliances with the institutions which have superior resources. Alliance seekers spend tons of time and money for that because they know even though an alliance is hard to achieve and maintain, it provides core capabilities once it set. Alliance Connector will be a tool to help City of Chicago establish an advanced alliance network.

Alliance Connector is consisted of 4 main functions listed as

1. Collect detailed alliance proposals from the outside private/public institutions

2. Transmit the data to Ally database, and categorize and prioritize the data based on technology, information, finance, and human resources
3. Receive alliance requests from project managers and search best-suited alliances
4. Provide project managers' potential alliance candidates' information

2. Ally.org

All the functions are operated by six elements. Ally.org is a website to collect proposals from outside organizations or individuals, alliance seekers. Proposals are submitted with a digital format on the web page by clicking boxes and writing a proposal and company summary. The boxes are categorized by two main groups such as OFFER and DEMAND. OFFER section is the information, what they can offer or contribute to City of Chicago. OFFER sector will give full information to understand alliance seekers' superior resources. DEMAND sector is the information, what they want from City of Chicago. Surely, there are some volunteers and donators to help City of Chicago in terms of technology, finance and human/ information resources.

3. Data Trans & Ally Storage

The submitted proposals are transmitted to Ally Storage by Data Trans. Data Trans is a data trans-

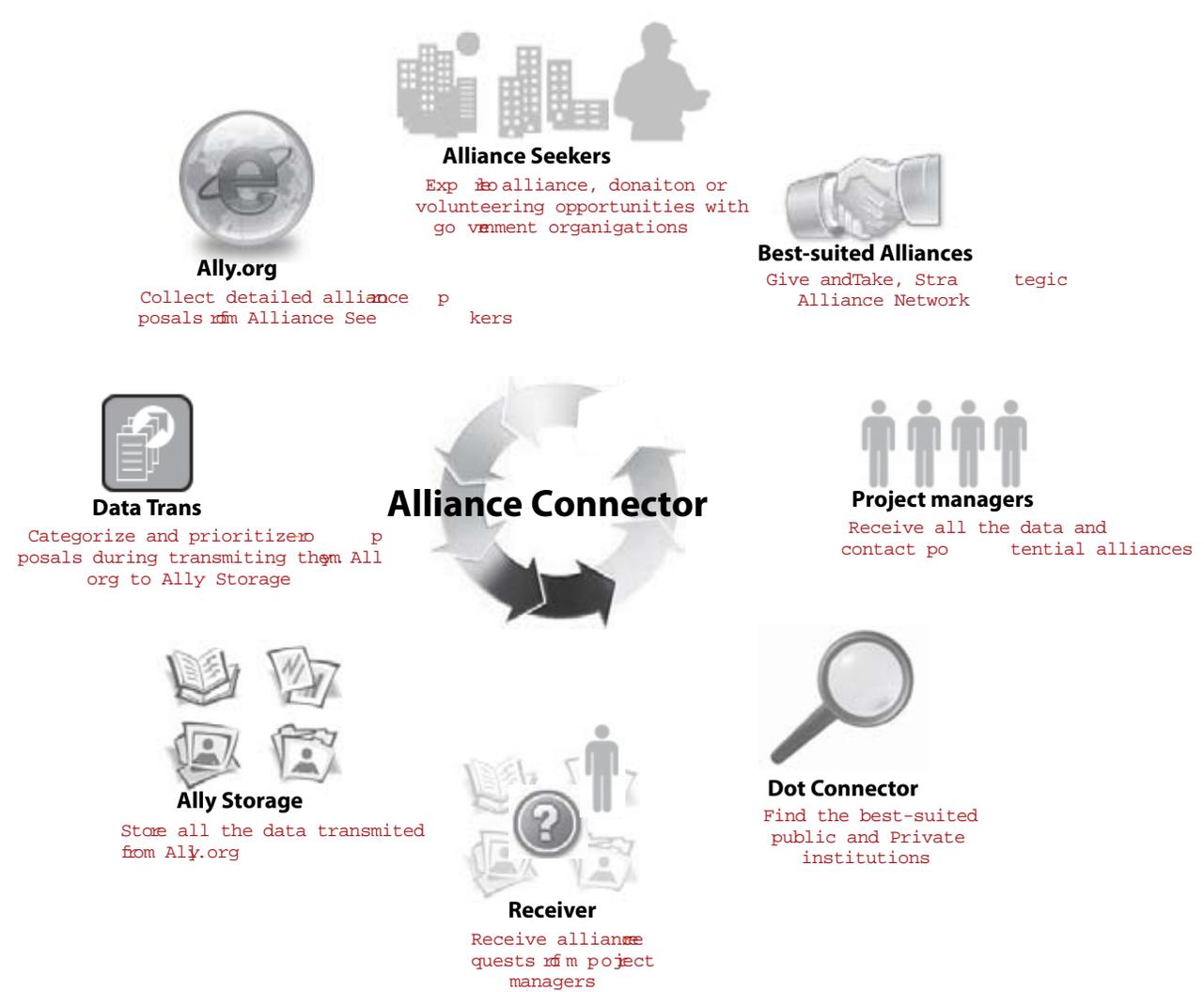
mission system. It categorizes the proposals in terms of technology, finance and human/ information resources, and prioritizes each categorized group in terms of value and urgency and cost.

4. Receiver

Receiver is a tool to submit alliance requests from project managers in City of Chicago. After developing solutions in projects, managers identify what they need to implement best-suited solutions efficiently and productively, and evaluate their own capabilities of implementation in the organization. Whatever they come up with needs, they submit their needs by using Receivers. A request can be completed by submitting a description of project and insufficient resources.

5. Dot Connector

Dot Connector is a search engine to find the best-suited public and private institutions to ally with City of Chicago. After identifying and prioritizing potential institutions in the Ally Storage, Dot Connector gathers more information about the selected institutions or individuals on other business intelligence websites to increase the possibility of successful alliance establishment.



Alliance Connector Process Map

Scenario

Mark is a project manager, Climate Change Department in City of Chicago. Two months ago, he received information from Threats Analysis Department that by increasing temperature, Chicago will become significantly hotter and drier by the end of the century, causing severe air pollution, a drop in the water supply and up to six times more heat-related deaths in major urban centers. Among the threats, dropping water supply is the most urgent.

Mark's team look for possible solutions to reduce the level of threat, dropping water supply. At the end of the project, they end up few possible solutions listed as saving water campaign, developing underground water resources and building reservoir. City of Chicago has capacities to implement two solutions, saving water campaign and building reservoir, but they are lack of resources to develop underground water resources; no technology to find underground water resources and pump up the water, insufficient finance, and no experts to plan the project.

After the capability evaluation, Mark submits a description of project and insufficient resources. 20 minutes later, a screen opens with well organized potential alliance institutions' detailed information,

categorized and prioritized in terms of technology, finance and human resource. Mark establishes an alliance with UNCOVER WATER COOPERATION, which has an advanced technology to find underground water resources and pump up the water by accepting their demands such as City of Chicago's future projects involvement priority. Mark also ensures sufficient finance from David Foundation, financial donation, no demands. In addition, five individuals, experts in developing underground water, volunteer for help to plan the developing plan.

Leadership Training

Description

A series of training program that provides consistent knowledge and useful information about environmental issues to project managers of each department. This program includes on-line and off-line education and also provides opportunities to attend special activities which build the qualities of good leaders for urban sustainability.

Properties

- A training program for management staff and project leaders
- On-line and off-line education relevant to leadership and sustainable development
- A course which builds up environmental specialists

Features

- Conducts regular workshops and seminars
- Invites experts for special lectures
- Provides on-line education programs
- Sends managers on an environmental field trip
- Provides mentoring program
- Performs community service
- Educates ethical decision-making for sustainable development
- Offers credits and certificates if managers complete the program

Discussion

The leadership role is very important in every project and every department of each organization. Leaders must manage entire projects including people, resources, communication, and schedules. Therefore managers need good leadership qualities along with a broad range of knowledge about their work.

Leadership Training is one of the necessary programs which develop the competencies of organization for urban planning under climate change. It is through Leadership Training that management will gain the abilities and knowledge that will carry them to success. Building leaders is a key, as they will be the driving force in creating an effective plan.

Leadership Training consists of several programs which collaborate to create a well-rounded and effective leader for city projects. Programs will consist of both online and offline courses, which will enable users to work both on company time, and away from the office. Online education will provide managers with a great amount of knowledge from various courses. All managers should complete credit hours every month and the result will be reported to chief managers. These programs are not only for improving managers' working efficiency,



Structure of Leadership Training

but may also be a type of evaluation methods.

Team leaders will be able to learn on their own schedule using the online courses, but will also learn in person from expert sources through special lectures. These offline courses will allow leaders to learn directly from experts in various fields, giving those proficient in the planning process the necessary background to accomplish their tasks. Managers can also discuss key issues and problems regarding their projects through workshops and seminars regularly. It will broaden their understanding about work that other managers are doing, as well create a strong network among different departments. If needed, managers will visit certain places to gain knowledge in the field and gain first hand experience. Through other programs such as mentoring programs, ethical decision-making sessions, and community service, managers will qualify themselves as good leaders. These courses will create environmental specialists of the team leaders, and allow them to teach their subordinates. When these programs are used as a system, the team leaders will be able to transfer knowledge to team members, delegate and evaluate them, therefore making a more effective team.

In the end, Leadership Training helps managers are able to fully understand their roles, and can execute an effective plan for the city's programs.

Scenario

Jim Smith has been appointed as the chief manager of the Chicago Department of Environment, and has been given a new initiative to reduce CO2 emissions from the city of Chicago. He has been given complete control over the cities public works and utilities as resources to complete his task. To complete this momentous task, Jim needs the help of many well trained individuals on his team. Jim will follow the principles used in Leadership Training to create a task force well trained enough to make an impact citywide.

The first action that Jim takes is to locate experts in the field of carbon dioxide emissions. Upon gaining their assistance, Jim sets up mandatory training sessions for the leaders of his task force. The task force will include managers of many different public departments including: Energy Management and Air Quality, Permitting and Enforcement, Natural Resources and Water Quality, Urban Management and Brownfields Redevelopment, Government Relations and Policy, Administrative, Fiscal and Communications, and Community Programming and Education Outreach. These managers will be taking a wide range of training courses on the removal of CO2 emission sources. Jim decides that an effective way to teach his managers is to take them on a trip to Copenhagen, a city currently at the forefront of CO2 emission reduction. Copenhagen has reduced CO2 emission by 23% from 1990 to 2000 and still trying to reduce CO2 emissions by

30% compared with 1990 levels. By viewing the successful example, leaders can see first hand what they hope to accomplish, and they will be able to meet those to have accomplished the task in the clean environment.

Jim also uses online software to create online courses to train team leaders during off time. This allows team members to learn necessary information at there own schedule, while Jim is able to dictate what is accomplished during work hours. Jim's training program is so strong that he creates his own set of requirements that must be accomplished so leaders may achieve accreditations. The certificates awarded will allow leaders to participate in future city programs, and at higher levels of management.

The Leadership Training that Jim provides creates a sense of team unity and common knowledge that the team will draw upon when forced to spend long hours working apart towards a common goal. Once Jim's team is properly trained to his specifications, he will be able to execute a much more efficient plan that can be properly delegated. The communication between departments should be stronger because of the common knowledge that the team shares, as well as the relationship that the leaders have developed. Jim will be lauded for his performance, as having strong leaders will insure the success of his carbon dioxide emission reduction plan.

3Cs Challenge

Description

A program which develops organizational competitiveness and promotes interdepartmental collaborations and cooperation. 3Cs means 'Competition', 'Collaboration', and 'Cooperation.' It can be apply for not only internal departments but also outside of the city organizations. The interrelationships among the 3Cs improve work efficiency and strengthen networks.

Properties

- An innovative program to enhance organizational competencies
- A interdepartmental or interorganizational competition, collaboration, and cooperation
- A technical method to connect and develop both inside and outside of the organization
- Strong networks between many different entities to improve work efficiency

Features

- Connects people, departments, organizations and cities
- Promotes collaborations and cooperation with many different sectors such as academia or NGO
- Creates or strengthens inside/outside networks
- Shares ideas, information and resources with other department

- Facilitates communication with other people, department, organization, and cities
- Provides training or education using floating staff
- Makes strategic partnership with other cities

Discussion

When working on a project, it is difficult to complete tasks individually if the project regards complex issues. As the world moves towards globalization, no organization that can complete its work alone. Therefore, collaborations between organizations and departments are crucial for the development of an organization. They are especially important when environmental issues are concerned, because they require much effort and communication among many different areas.

3Cs challenge is a program which was designed for developing organizational competitiveness and promoting interdepartmental collaborations and cooperation. It strengthens networks between organizations, cities and countries. Therefore the 3Cs: competition, collaboration, and cooperation, are essential elements which enhance organizational competencies.

Competition means friendly rivalry while achieving common objectives. For example, an idea contest

or competitions among departments may be a good opportunity to gain new ideas from staff members and also inspire enthusiasm for their work.

Secondly, collaboration is the link that connects each person or department. It includes direct participation by two or more people in designing, processing, and producing. The relationships between these people are often internal arrangements that are usually vertical, sometimes among divisions in the same organization. Normally those collaborative arrangements take more time to build than those cooperative ones. Therefore for good collaborations, organizations should encourage not only improving skill but also building trust among staff members. Teambuilding, workshops and interdepartmental trainings can be good examples to build teamwork. Through these programs, an organization can improve not only individual abilities but also overall organizational competencies.

Lastly, cooperation means a series of effort to share information, support managerial and technical training, and provide useful information. Cooperation is normally external and horizontal: the people do not need to work together. Floating staff is a type of traditional cooperative method for training and improving staff's skills. Also open source and public databases may be advanced ver-

sions of cooperation. Cooperative relationships are more public because they allow for non-exclusion principle, whereas collaborative relationships are generally exclusionary. Cooperative relationships can be achieved among department, organization, cities, and even countries. Therefore cooperation is a good way for an organization has to expand its organizational and spatial boundaries.

An organization can enhance its competitive power and maximize organizational capabilities through 3Cs challenge.

Scenario



The City of Chicago has planned a “Green City Idea Contest” aimed at all staff members in city departments. There is a prize of \$3000 for the first prize and the results of the contest can be adopted as city’s policies.

Sarah Winston is the manager of “Green City Idea Contest” and is busily preparing the event. First, she reorganized the city’s database system for everyone who participates in the event to search information which they need. This system is based on an intranet server and contains massive materials in many different fields. Anyone can search the database if they are identified using ID and password. Also, all past project reports are saved in project gallery and may be reviewed by staff. These reports may be used with a manager’s permission.

Scott Macdonald, a staff member of the Energy Management and Air Quality department is preparing the contest. He is interested in recycling and separate trash collection and researching other cities’ precedents. Trash problems correlate closely with both air and water pollution, therefore he thought this problem should be solved as soon as possible. Scott began his research from the city’s database system and reviewing past project reports. However Scott could not find a good solution, so he extended his research out of the city. He found cities which had adopted environmental policy and

decided Freiburg, a southern city of Germany, as the perfect model. Freiburg instituted an environmental policy in the 1980s and is considered the cleanest city in Germany. Scott requested detailed data using international city information network. It is a network which is established for information exchange and international cooperation, and many famous cities are joined as member cities. Member cities share data with each other, sometimes there are joint projects if needed. Two days ago, Scott received a report from a Freiburg city office. Through the report, he learned strong leadership, good policies and citizen’s sense of environment pride are the major power for success. Based on thorough research and planning, successive environmental education, and consistent policy, Freiburg became world’s best cleanest city. Now Scott is planning a high-level recycling system idea for the upcoming contest modeled on the successful example of Freiburg.

This is a successful example of how the 3Cs challenge encourages interdepartmental competition and collaboration for common objectives. This program also highlights external cooperation using networks and sharing information. The final goal of 3Cs challenge is maximizing organizational competencies.

Green Text

Description

Green Text is a content distribution system. In general, searching or sending data is a very painful task due to no means to inform the latest update data or availability. Green Text provides members of ClimateNet a capability to avoid searching the same topics or projects to check the latest news or achievements. It not only informs members the most relevant and latest information by simple registrations and distributions, but provides Navigator, a personal data storage, to check registered issues immediatly. In addition, Green Text provides Focus Discussion, linked with Navigator, to discuss about the issues with others including publishers.

Properties

- A web based system
- Personal data storage
- A tool to distribute data
- A place to discuss about issues

Features

- Get registrations from members
- Categorize updated data
- Prioritize updated data in terms relevancy
- Inform updated data information to registered members through emails with green text.
- Provide a personal data storage place to organize registered issues

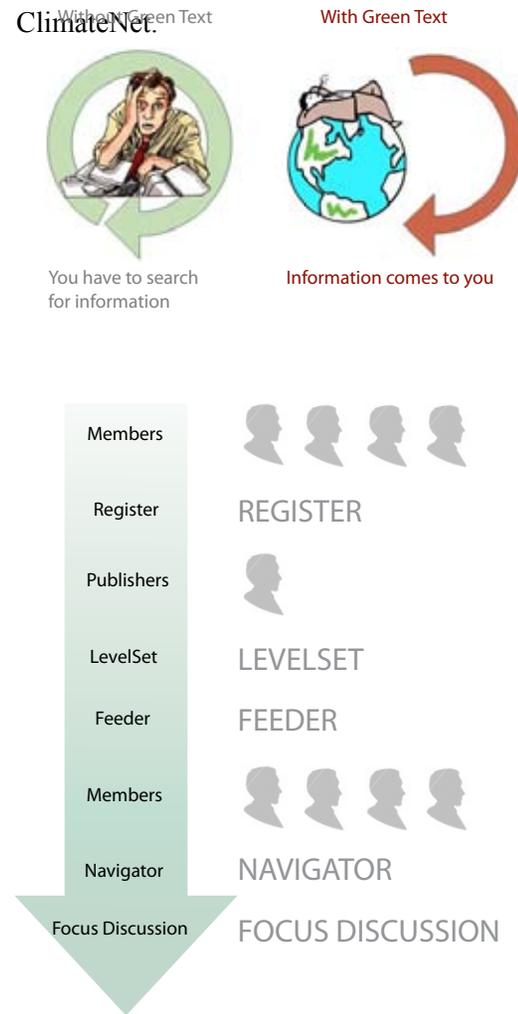
- Provide group discussion places in ClimateNet

Discussion

Green Text is a data distribution system to help members of ClimateNet get specific information efficiently. Register receives registrations from individual members. Whenever network members are interested in specific topics or projects, they go to Register to be informed the latest information in the future. The process of registration is consisted of two sections, listed as the catagory of issue and the level of relevancy; Members choose category by clicking boxes from broad to detail. Determining the level of relevancy is critical not to miss very important information by receive too many emails that not useful or irrelevant.

LevelSet is a tool to determine the relevant level of newly updated information. Setting levels of information importance or relevancy is very critical specially nowadays due to an information-oriented society; people spend too much time to search highly relevant data.

Feeder informs data updating news to registered members. Members are informed the updating news through emails. The subjects of updating news on the email are green text that members won't miss to check them or confused with other spam emails. Data updating news contains short descriptions of projects, updating dates, publishers and link to



Navigator is a personal data storage place to organize registered issues. After informed updated projects, members go to Navigator to check the information. Simply clicking the linked titles of projects, members can get the information.

Focus Discussion is an web place to share opinions with others, including original project publishers. Members have questions or objections after reading projects, but it is hard to meet others due to geographical distance. They can ask questions each other to understand the processes and ideas better.

Scenario

Minho is a member of ClimateNet. He started to work for Korean Adaptive Environmental Change three weeks ago. Recently, his team has been working on a project to find a better way to provide food to Seoul, capital city of Korea. During the research on the ClimateNet, he found that City of Chicago has been working on “Urban Green Roof Project” to increase food supply capability and reduce CO2 level.

Minho visited ClimateNet more than 5 times a day to check whether Urban Green Roof Project is updated or other similar projects are coming. Few days later, he felt checking and searching many times a day is very inefficient. And one of his team members told him about Greet Text. His team member said that Green Text is a content distribution system. It provides members of ClimateNet a capability to avoid searching the same topics or projects. It informs members the most relevant and latest information by simple registrations and distributions, provides Navigator to check registered issues immediately, and provides Focus Discussion, linked with Navigator, to discuss about the issues with others including publishers.

After the conversation, Minho simply registered urban agriculture capability as a category, and set

level two as a level of relevancy; one is the most relevant data and five is the least relevant data. One hour later, he got an e-mail with green text. There are lists of projects with short descriptions, update dates and publishers. He clicked one of them, linked to ClimateNet. He logged in ClimateNet as usual and visited to his personal place, Navigator. There are all the issues and projects that he registered. He clicked Urban Green Roof Project. As reading, he found that there is a Focus Discussion button, linked to group discuss pages. He clicked the button and discuss the project with others, working on similar projects for other cities.

FreeRide

Description

An expansive transit system of busses and light rail serving the city without fare.

Properties

- Robust free transit system serving all areas of the city.
- Means of significantly reducing automobile use and associated CO2 contribution.

Features

- Fully integrated transit system serving entire city.
- Busses operate in large part on dedicated right-of-way to speed service.
- Transit stops planned for rapid boarding and de-boarding.
- Significantly reduced headway to increase convenience and ridership.

Discussion

Transit is one of the largest contributor in the United States to CO2 contribution in the atmosphere. Private automobile use, and much of that single occupant trips, is the largest sector by far of that transit slice.

There are three primary considerations. First, private vehicles do not pay their own way – private car use is one of the most heavily subsidized activities in the US, through both public and private sources. Current externalized costs include normal road construction and maintenance, sprawl associated with parking and widened roadways, lost time associated with congestion, health and other societal costs, noise pollution, and many more. The city's reversal of its subsidy policy would influence how much people drive and their willingness to switch to public transit. The second, and much more important consideration is the environmental burden. Third is the pending crisis of peak oil. Within a very few years, it will become clear that we have passed the point of peak oil production and fuel prices will begin a sustained steep price increase.

Numerous sources, including the Federal Highway Administration, list the conservative or mid-point estimates for unrecognized, externalized costs for

automobile use at \$59 billion annually and the social costs at \$125 billion – and these are only the beginning of the hidden subsidies.

A massive cost often ignored is the cost of ‘free’ parking. Because private car use is so pervasive, and because we generally expect to park for free, there are four ‘free’ parking spaces for every car in America – almost all required by zoning codes. These spaces include the residential space plus the many free spaces at various retail locations and many places of work. The vast amount of land area devoted to free parking is in no way free. Its value is added to the operating costs of all of the establishments providing the parking, and those costs are passed along to the consumer. Donald Shoup, in his book ‘The High Cost of Free Parking,’ calculates the subsidy for this free parking to be at least \$127 billion and perhaps as much as \$374 billion annually. Development of the land currently devoted to parking can be a source for funding the move away from dependence on the automobile.

Another factor, congestion, causes 3.9 billion hours of travel delay annually, which equates to \$67 billion in annual cost. The effect of longer delivery times, missed meetings, business relocations and other congestion results are not included in this figure. The total cost for these societal subsidies is

more than \$475 billion nationwide, and Chicago’s portion of the subsidy is more than \$31 billion.

Obviously, there are much better ways to approach the task of moving citizens around the city. If even a small portion of this \$31 billion were transferred to public transit, CTA ridership could grow several-fold and replace much of the private automobile use.

FreeRide is a proposal to completely subsidize the cost of public transit, just the way we completely subsidize public benefits ranging from primary and secondary education, to police service, fire service, and the public right of ways used for all forms of transportation. All CTA’s bus and rail service would become completely free – the FreeRide.

This plan draws on two examples already in place. First, Portland’s TriMet bus and rail system includes an area downtown known as Fareless Square, for which all transit has been free for more than 30 years. Fareless Square is an area of approximately 2 square miles, 330 blocks, and includes all of downtown Portland and the near northeast neighborhood. Fareless Square is frequently cited as a significant factor in the success of Saturday Market and numerous downtown merchants since 1975, and in significantly reducing private automobile

use downtown.

Fareless Square has been an unqualified success in meeting its original objectives of:

- improving air quality standards,
- increasing awareness of transit service and transit ridership,
- reducing the need for parking,
- reducing auto congestion.

The second example is found in the astounding success of Curitiba, Brazil's bus rapid transit (BRT) system. BRT was invented in the 1970's by Curitiba's architect-Mayor Jaime Lerner. BRT has helped give that city's transit system the highest daily ridership numbers in the world – equaling its population count. With three-quarters of commuters on buses – the world's highest transit usage – the streets have become unclogged. And to top that off, it is the only major urban public transit system in the world with no subsidy.

While Curitiba's population tripled and transit use increased ten-fold during the last 30 years, air pollution has declined, and overall fuel consumption dropped by 25 percent – a 75% reduction in per capita fuel consumption.

More recently, Bogota has constructed a 41-kilometer BRT system, which has become the world's busiest bus system in less than two years. Car traffic has dropped 10 percent, and they have started car-free days on Sundays, holidays, and even selected workdays.

With FreeRide in place, ridership will certainly increase several-fold, and BRT is the best way to accommodate the increased ridership for two primary reasons. It has been shown to be the most cost effective solution per passenger mile. Also, it has been shown to increase ridership by its user-friendly nature.

Basically, BRT is a bus system with attributes like a train – including fast service on a dedicated busway, absence of fairs handling on the vehicle (so riders can get on and off quickly), and traffic signal prioritization (so the bus does not compete with automobile traffic). But its cost is a fraction of what rail costs – 10% or less of the cost of rail service. The BRT vehicle is an 80-foot double articulated bus capable of carrying 270 passengers and is highly maneuverable on the street even with their extra length. On a dedicated guideway the busses can be operated as several 270-passenger double-articulated buses coupled in tandem, forming a bus-train.

In order to pay for the significant increase in vehicles and service that FreeRide will generate, the city will have to increase its current subsidy to CTA several-fold. The source of the additional bus subsidy will come from significantly decreasing the current subsidy to the automobile. For instance, even if we limit the analysis of car subsidies to the consequences of congestion alone, the average delay per Chicago traveler in the peak commute periods is 58 hours per year and the cost burden for Chicago is \$4.3 billion. This is four times CTA's current annual operating budget.

One specific source for funding of the increased transit subsidy can be the leasing of development rights for the overabundance of parking spaces throughout the city. With four parking spaces per car and with the significantly increased transit ridership, there will be a very large stock of unused parking spaces. The city can offer the right to develop some of this area for a fee. A commercial or retail development would petition to be allowed to reduce its parking by 50% or more and pay to be permitted to develop that land. The petition would include a planning process with CTA to analyze the transit routes for compatibility with the proposed new development. If the planning analysis confirmed that this was an appropriate site for development, the agreement would include a transit stop(s)

at that location to provide a convenient replacement for the reduced parking availability. The fee paid access to that development area would go directly to CTA for increased service.



FreeRide: Bus and Train



CTA Map

Scenario

For the last year, Eric had been setting his alarm an hour later than he had for the previous ten years. A year ago he reluctantly took the advice of his wife Irene and began taking CTA rather than driving to work. Within a few days, he was desperately looking for ways to avoid having to admit he had been wrong. Yes, the FreeRide was much quicker than his automobile commute, plus it turned out to be very convenient, and he found he liked talking with many of the other regular commuters. And there was that other thing – it was free. He knew the “I told you so” was coming, and he was right. Irene was not going to pass up the opportunity to remind him that she had been urging this for six months.

Eric walked three blocks to the transit station where he boarded the city’s new Bus Rapid Transit (BRT) system. Initially Eric thought the boarding process was sort of odd – it was more like boarding a train. But it sure seemed to work well. Also, it was a better shelter for the Chicago weather and it took less than 10 seconds to board the 20 - 30 people that we usually at Eric’s stop. Eric generally tried to make sure he got to the station as close to 7:30 as possible, but in fact it didn’t much matter. With headways consistently less than 5 minutes apart, he

could miss his regular bus and make it to work on time without any trouble.

After boarding, the long, double-articulated bus sped up rapidly and made relative few stops from Eric’s far northwest suburb on its way to the south side. The trip only took about 30 minutes, which was less than half the time it took Eric to commute by car, and when the traffic was bad the old commute was even longer still. That is why he was able to set his alarm an hour later now. In hindsight, he was not sure why he held out so long before switching to CTA for most all of his in-city travel, especially since gas was now more than \$7.50 a gallon. Since we had passed peak oil almost two years ago, gasoline seemed to be on a steep and steady climb.

Chicago had planned for this transition for quite a few years. The city had made the commitment to significantly increase CTA’s funding while drastically cutting back on automobile subsidies. Initially the transition was a little tough and there was more than a little public resistance, but the results had been nothing but positive. Ridership had risen more than three-fold already and was still climbing. Automobile use had dropped significantly and the air quality numbers showed a big improvement. For those who still chose to drive and pay the \$100

or more to fill up, the roads were considerably less congested, even with quite a few roads dedicated as busways to separate the BRT system from automobile traffic. Since the BRT vehicles didn't compete on the same roadway with autos and had priority signaling at intersections, they were able to maintain their schedules easily.

For other commuters who took the EI, things were better as well. Fares had been eliminated for the trains as well, and CTA had added quite a few new cars. They had the same commitment to headways of less than five minutes for all vehicles in the CTA system. The planning had been well thought out, in part because Jaime Lerner, the former mayor of Curitiba and the inventor of BRT, had been retained as a consultant when CTA had decided to move forward with FreeRide. His experience in setting up Curitiba's transit system was invaluable to the City during the planning and transition.

One of Jaime's suggestions seemed particularly odd at first and was extremely hard to swallow for the CTA management. But like most everything else Jaime recommended, this proved to be crucial to the success of the transit system. He had insisted that all full-time employees, all executives, and board members – especially the executives and board members – had to use CTA as their primary

mode of travel if they were to stay on. It is not surprising that any system works much better when those who manage it are faced every day with the consequences of their actions. They had daily reminders of what was working and what was not.

But then, so did Eric. And as far as he could see, things were working pretty well. Yes, Irene was not going to let him forget how much time and money he was saving now, and she had a plan for how to spend at least a little of what they were saving at the upcoming sales along North Michigan Ave.

Green Roofs

Description

?????

Properties

- A human-made extension of an existing roof
- A garden on top of a roof
- Green space in the urban city

Features

- Lowers building temperatures
- Lowers utility bills
- Extends life of rooftops
- Replaces the green space lost to building development
- Supports growth of vegetation
- Promotes biodiversity
- Cleans the air
- Reduce the urban island heat effect
- Absorbs excess storm water

Discussion

As cities become denser with people, development is sure to follow, thus expanding the urban concrete jungle. Cities like Chicago that are lined with skyscraper after skyscraper become susceptible to urban heat effects. Coupled with the onset of global warming, Chicago is undoubtedly feeling the pressures of excessive heat. In 1995, the city experienced its worst heat wave, where temperatures rose to 106 degrees fahrenheit, but with factor in humidity and the ambient air felt more like 120 degrees fahrenheit. Temperatures remained in the low 90s to low 100s for a week, and as a result over 700 people died.

With rising temperatures caused by global warming, the urban environment becomes an ideal target for this type of climatic disaster. Though development is necessary to accommodate population growth, it reduces the city's green footprint which is necessary for the existence of a healthy urban environment. One of the key contributors to Chicago's urban island heat effect is the materials used to construct buildings, such as concrete and asphalt. These materials have significantly different thermal bulk properties and surface radiative properties than surrounding rural areas, which help balance out negative environmental stresses. For

example, the dark color of asphalt is non-reflective and very heat absorbent.

One successful way to counter overheating in the city is through green roof initiatives.

They are an extension of the existing infrastructure, but replace green space lost to the footprint of the building. Green roofs are lightweight, engineered systems that allow for the growth of vegetation without compromising the integrity of the original roof.

There are two types of green roofs: extensive and intensive. Extensive green roofs are lower in weight, cost and maintenance. Usually sedums, grasses, and wildflowers will be grown in these types of green roofs, which only require a few inches of soil and very little irrigation. However these types of green roofs do not accommodate human traffic. Intensive green roofs on the other hand are heavier, costlier and require more maintenance. Typical vegetation includes flowers, shrubs, trees, and vegetables.

Green roofs are an effective way of cooling the air in urban centers where temperatures are generally a few degrees hotter than rural surroundings. They provide many benefits which are enjoyed by all. Environmentally, they can help clean the

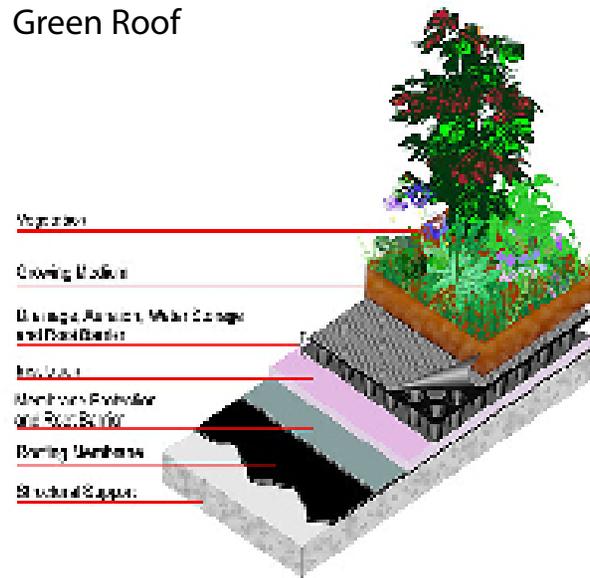
air, reduce noise pollution, increase biodiversity, dampens the urban heat island effect, and reduce up to 75% of storm water runoff, which can carry contaminants such from the building surface and into the water system. Socially, they provide an aesthetic benefit and return lost green space. Economically, they help conserve energy, reduce utility bills by up to 10%, lengthen the longevity of the roof and increases property value.

Scenario

Madeleine works at Outdoor Gear on King Street West at the Toronto location. It is a retail store that specializes in outdoor clothing and equipment. Her reasons for working here is that she is very passionate about environmental issues. One of the favorite things she enjoys doing is going up to the green rooftop garden for lunch everyday, where she gets a great view of the city, while in a green space.

At Outdoor Gear, they have an extensive green rooftop, where wild grasses flourish. Bird, bees and other bugs flock to this small urban green oasis, and seeing this makes Madeleine feel good about the company that she works for. Though they are not widely popular, green rooftops are definitely catching on in Toronto, and Outdoor Gear is a leader in this movement.

Green Roof



When Madeleine first started working at Outdoor Gear two years ago, the building did not have a green roof and was far less energy efficient. During the summer, the baking heat would be sucked into the building, making it overly warm and uncomfortable. To mitigate this, the building facilities manager would increase the air conditioning output, which resulted in high energy bills, and gave Bill, her manager the incentive to build a green roof. Since then, the building has been kept cooler thus reducing energy bills and leaving more resources to other store improvements.



CityFarm

Description

A system of small-scale urban farms set up on vacant property, or as an amenity for new development. The farms are constructed of topsoil and mulch brought onto the site and irrigated primarily with stormwater from WaterWork.

Properties

- An urban farm for raising local produce.
- A method of increasing local employment, particularly for low-income residents.
- A new amenity for urban apartment and condo dwellers.
- A strategy to reduce the transportation and other petroleum based burdens for food.
- A method for reducing soil erosion from agriculture

Features

- Provides organic produce for local consumption.
- Provides local employment.
- Adds new amenity to increase urban residential development.
- Reduces city's carbon footprint from food growth and consumption.
- Reduces demand for irrigation water from traditional aquifers.

Discussion

As one shops at the local grocery store, it is not often obvious where fresh produce has been grown or how far it traveled to get to the produce aisle – more than 1500 miles as a national average. In Chicago the distances traveled for specific produce is:

- 2143 miles for grapes
- 2095 miles for broccoli
- 1671 miles for asparagus
- 1555 miles for apples
- 813 miles for corn
- 781 miles for squash
- 233 miles for pumpkins

As a result of this long distance travel – much of it by airfreight – large amounts of CO₂ are added to the already-significant problem of global warming. This excessively large distance food travels from farm to table, when coupled with the extreme dependence of agriculture on petroleum products for everything from combines to pesticides to fertilizers, makes what should be a green process to one that is anything but.

Even a decade ago it took \$1.00 worth of petroleum based products (in fuel for farm equipment plus the base for duratives of pesticides and fer-

tilizer) to produce \$1.50 worth of crops. While petro-based pesticide production use has increased 33 fold in the past 50 years, crop loss to pests has increased 20%, largely because more than 500 pests have become resistant to our most powerful chemical weapons.

Additionally, our heavy dependence on repeated tilling has resulted in six bushels of topsoil washed into the ocean for every bushel of corn produced. Over the past century, the North American prairie has lost more than a quarter of its topsoil and a third of its fertility. And finally, the agricultural industry accounts for 70 percent of total worldwide water use taking 60 gallons of water to produce 1 pound of grain. Much of this irrigation water is from fossil water reserves, which are rapidly being depleted.

These problems can be addressed within the city by CityFarm.

The Resource Center in Chicago has more than 30 years of experience in non-profit recycling and re-use. Recently the center has put that experience to use in developing urban farming. They have converted city-owned lots of rocks, dirt and chunks of wood to one-acre farms each with 1,500 tomato plants and nearly year-round growth of carrots,

beets and other root crops, producing high-quality produce for consumption at a number of local restaurants.

In order to have the significant impact needed for a global adaptation strategy, this small example will be greatly expanded to a citywide initiative. Already, cities like Hong Kong and other Asian cities produce much of their produce needs within their city limits with similar strategies. America's own experience with Victory Gardens of WW2 also shows the clear applicability of widespread urban farming on small individual parcels.

Because there are plenty of vacant lots in the city, particularly in distressed neighborhoods with depressed property values, this is a strategy with great potential. One-acre farms such as those by Chicago's Resource Center can employ three people from the neighborhood, generating a salary of \$20,000 each derived from sale of the produce. The farms can be established quickly and on a temporary basis for vacant lots that may later return to traditional residential or commercial development.

As the founder of this concept, Ken Dunn, has said, "The areas where this is available is where there is a need for jobs."

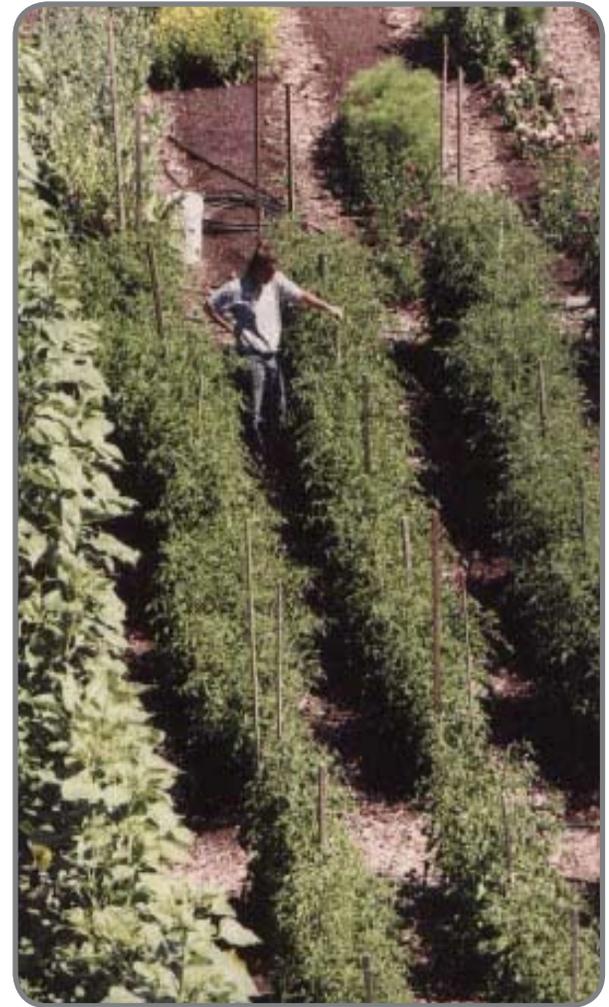
But the concept is not limited to the more distressed neighborhoods. With the very large increase in condominium and loft apartment development in the urban core, CityFarm is a great option for a common amenity. Upscale apartment and condominium dwellers will value the opportunity to exercise their 'green thumbs' while taking advantage of the potential for high quality produce. Furthermore, this is a demographic likely to buy into the environmental aspects that this brings to the community.

To establish the farm plot, topsoil and mulch are brought in and placed atop the existing site for an optimum organic growing medium. This approach eliminates much of the problems of the current agri-business. The tilling and erosion problems are eliminated; organic farming and polyculture help to eliminate the pesticide and petro-fertilizer issues. Irrigation needs are greatly reduced by the methods used to establish the growing medium; and finally, the source of this irrigation water can come from WaterWork, another urban adaptation strategy.

This strategy works in many ways to advance urban adaptation to climate change. It provides an extensive source of reliable produce production

within the heart of the city. It essentially eliminates the dependence on petroleum and the pesticide and fertilizer derived from petroleum. It eliminates the rampant erosion typical of traditional tilling. And it is much less water intensive and relies on recycled water within the city. The CityFarm produce replaces an equal amount that would otherwise be produced in ways very unfriendly to the environment and/or be transported over great distances.

Beyond all these environmental benefits, the quality of produce for the consumer can be significantly increased because the produce can be picked at its optimum time, due to the short distance for transport within the city.



CityFarm

Scenario

Three Chicago families living very different lives in very different parts of the city share one surprising thing. Each Saturday morning, they are tending their plots at a CityFarm.

Tom stays on the West Side. Life there can be hard, especially when you have no regular job and “home” is elusive. But Tom had been watching the development of CityFarm in his neighborhood and as the farm started to take shape, he decided to stop by and check it out. When he found out he could work at CityFarm without a work history and a background check, he decided it might be worth signing on.

He showed up the first day his neighborhood CityFarm opened and never left. The satisfaction of producing something that feels real and complete is a new experience for Tom. By the end of the season, Tom had learned that hard work at CityFarm produced a living wage. The unexpected benefit of learning small business skills, along with basic farming skills taught at the site helped Tom move into the lower management ranks of CityFarm. His life is more organized than it has been in years, and he takes a lot of pride and satisfaction in his work.

Tomeka is the mother of three young children. Two are now in school, with one just about to enter kindergarten. Tomeka works as a clerk at City College. The job doesn’t pay particularly well, but it does offer her the opportunity to take classes free at the college. During her workday, she takes a class in the morning before work begins and again at noon, bringing her lunch along.

Taking care of the kids, studying for her classes and working doesn’t leave Tomeka a lot of time for much else. However, when CityFarm opened in her neighborhood, the kids were curious and so was she. Tomeka saw families working together at the farm and decided that she and the kids would benefit from working together on a project as equals where the outcome was concrete and non-debatable. Trying to keep three young kids traveling the straight and narrow leads to a lot of fussing and tension. At the farm, Tomeka and her kids were taught the basics of urban farming – what crop worked best for this soil or that season, which crops were easier to grow for novices like her family, and how and when to plant, water and tend for potential pests. They worked alongside each other as a team with a shared goal. It has brought them closer together as a family and helped Tomeka realize each child’s particular talents. She plans to communicate that

to their teachers in hopes that she can improve their chances for success in the classroom.

John and Carol are a couple of 50-something empty nesters who recently moved to Chicago. Their home is a small condo in a converted mid-rise industrial building in the West Loop near Union Station. The couple shares green sensibilities, recycling as much as possible and taking public transportation daily. Although most of their food still comes from Dominic's or from Whole Foods, they appreciate the fresh herbs and produce that they grow themselves. John has a green thumb and grew his own herbs on the balconies at their previous urban home.

They chose their current condo in part because they saw the CityFarm in their neighborhood as a way to meet new neighbors, to connect to Chicago, and to live their green values. But they see the farm as just a beginning. They would like to add a recycling center and a coffee bar to the farm to make it the gathering place that the immediate neighborhood is missing. The CityFarm in their neighborhood is not directly associated with their condo development but is a part of the development next door. It was part of the redevelopment of that building two years ago. As that development was being planned, the developer learned

that the Department of Construction and Permits had a green roof initiative that had recently been expanded to include CityFarm as part of that strategy. The city has certain requirements for green development and CityFarm was one of the options. In choosing this option, the developer was required to devote a certain portion of the top deck for the parking garage that was already planned. In addition, the CityFarm is open for use by all local residents at a small fee.

Over the past five years, CityFarm has been so successful throughout the city that there are now more than 700 locations. There is an overall management organization that now has a steady supply of produce that is large enough that they have contracted with Whole Foods as a supplier.

Bio-Hydrant

Description

A new water saving fire hydrant design

Properties

- Provides advanced solutions over traditional uses of hydrants
- Utilizes advanced agent technologies that improve duties of all users

Features

- Bio-foam chamber containing high expansion foam cartridge chambers
- Keyed operation that prevents unauthorized use and waste of water
- Bio Foam Cartridges (inserted at time of use) allow firefighting and street cleaning with significant water reduction.

Discussion

The Bio-Hydrant is a new product design stemming from insights provided by the Threat Prioritization Matrix. Answering the challenge of systemic solutions providing for the reduction of water consumption, the Bio-Hydrant combines chemical engineering with product and process design to solve three major use challenges of today's fire hydrant system.

First, the primary function of a fire hydrant is for easy access to water for fire suppression. This is challenged in colder climates as winter use can prove a challenge as hydrants sometimes malfunction due to freezing. Also, fire fighting has progressed in the use of agents and compounds that are proven to fight fire more effectively and safely than water.

The new Bio-Hydrant couples this technology with a cartridge type of approach that uses water supply from existing hydrant infrastructure to catalyze the expanding foam reactions from the cartridges. Supplementing this design is the capability of fire fighters to swap different cartridge types as appropriate to the type of fire they are fighting.

A secondary challenge of the fire hydrants traditional design is its use by street cleaning machines

that depend on water for dust suppression and superior cleaning capability. This new cartridge system also extends to save water consumption in this case in similar fashion to popular bathroom cleaning products. Filling the street cleaner with a foaming solution allows for minimum water use in performing street cleaning activities. Additionally, since the cartridge contexts are designed to be biodegradable no harm is done to the environment with residue that is left on the street. And as an added benefit, the foaming solution can be designed to provide cleaning capability beyond that provided by water alone. This allows for oils and fluids typically leaked out by cars to be collected and processed in the street cleaner processing center rather than by infiltrating ground water systems during rain storms.

A third benefit of this hydrant design is the water savings recognized by minimizing the amount of water spent in summer months when unauthorized groups open hydrants, creating intersection floods that waste large amounts of water. By requiring the cartridge for operation, the water flow is capped well below ground level. This also addresses the freezing troubles cited earlier. Even in a citizen had access to a cartridge, the product of the hydrant would be a foaming agent, and not conducive to water play.

Scenario

As mentioned, this new product benefits the primary function of the fire hydrant in enabling fire suppression. In this scenario, City firefighters show up to the scene of a fire with all the same equipment that they would usually use to fight a fire. However, this fire happens to be at a chemical plant, and typical water suppression techniques only serve to spread the fire.

This new hydrant design allows the firefighters to adapt to the situation by accessing the cartridge kits now carried by all fire engines throughout the city. In this case, a different type of cartridge is selected- One that expands quickly at first, and then slowly after application. This cartridge agent serves for dousing chemical and electrical fires more safely than standard cartridges used in putting out household fires that mainly include lumber as a fuel source.

By using these cartridges along with water supply from the Bio-Hydrant, the fire is suppressed significantly faster which saves the amount of water used in the emergency, and ultimately reduces the amount of damage by containing the fire with the new formula foaming agents.

Water Monitor

Description

Attached to water “mains” throughout the city, this solution is a metering tool that calculates flow to different neighborhoods throughout the year. Data is gathered by a handheld device that allows city officials to evaluate and plan new agendas for water consumption and development.

Properties

- Plumbing coupling attached to water mains supplying different grids/neighborhoods
- CPU in unit provides current monitoring and historical data
- Graph outputs showing peak draw times, days, weeks with associated volumes
- Underground application in manhole or vault environment

Features

- CPU hardwired to permanent or battery backup system
- Monitor ‘reader’ used by officials to point-and-read
- Graphic display
- Computer upload capacity

Discussion

The lack of water is a global threat that will increasingly affect our planet over the next generations. The issue of how water is used and monitored is already a hot topic in cities in drier climates such as Phoenix and Las Vegas. As an example, these cities have recognized water scarcity and responded by requiring the removal and replacement of sod and non-natural landscaping and with natural desert landscaping.

Through other agendas such as the US based LEED system for building, water consumption is credit worthy with 20%-30% reductions easily realized by simple choices of low flow fixtures for potable use and rain barrel and drip systems for landscaping. Other city agendas often request watering to occur at night when less water is lost to evaporation. But how else can a city manifest its interest in conserving water?

The Water Monitor system allows for accurate information collection that categorizes use per neighborhood on a per/capita basis. With this information, city planning can leverage this empirical evidence to then target technical solutions for developers and homeowners as well as fine tune messaging campaigns to heavy use areas.

Data is transferred in two steps. The first collection of data occurs at the underground location where the monitor lives. In frequently scheduled readings, city officials collect this data on their handheld monitor capture device. This device is equipped to capture inputs from multiple locations. Once rounds are completed by the official, the handheld device is taken back to the city office, and data is uploaded to a desktop application that compiles and integrated the new information with previously collected data for comparison. This data informs ClimateNet as an input that informs the dynamic nature of Performance Web and the Threat Prioritization Matrix.

Scenario: Water Action Campaign

With fresh water supplies becoming increasingly strained, a city recognizes the need to conserve water. As a first step, knowledge of where the most water is being used, and at what times consumption is peaking is critical data to support further action agendas. As a prototype, the Water Monitor is a product that is chosen to be installed on water mains that supply several neighborhoods across a range of demographic criteria.

Over the course of a 2 year test, a single city official is designated as being responsible for the monthly collection of data from individual sites that contain the underground monitors. With a handheld, wireless reading device similar to those used by many utility companies, data is collected with the simple press of an “upload” button.

With this transaction, the previous months water flow and activity recordings are uploaded from the underground unit to the handheld unit. This frees data space on the underground unit for recording the next month’s usage. The handheld unit becomes the carrier of the information between the on site location and the home base computer.

Once back to the office, the information is uploaded to a mainframe database. Via a standard USB or fire wire connection, all the collected data from the many sites is uploaded to a main database. This new information is already formatted from the output of the underground monitor, and syncs up to the previous month’s data that has already been input from previous rounds by the city official.

As the database grows, patterns of use can be observed and evaluated. The longer the data is collected, the more accurate city officials can pinpoint seasonal and location water consumption trends. With this data, the city can appropriate PR campaigns to specific neighborhoods who are shown to be the heaviest users of water. It can also help to survey housing types and landscaping trends that may cause over consumption. This may help city departments such as Buildings and Zoning to evaluate potential rules and regulations for new development agendas.

WaterWork

Description

A system of neighborhood scale waterways to transport stormwater along the surface to mitigate the problems associated with combined sewer systems and to replicate the natural drainage system that existed before urbanization.

Properties

- A series of surface water transport and storage structures.

Features

- Reduces the demand on the city's sanitary sewer system.
- Provides use of stormwater to offset demand on the city's potable water system.
- Provides aesthetic water features within neighborhoods.
- Helps to revitalize distressed neighborhoods.

Discussion

Four Philadelphia architects, Charles Loomis, Chariss McAfee, Juliet Geldi and Gavin Riggall, have designed a comprehensive system they called Waterwork that envisions using stormwater management to rehabilitate urban areas in decline. This proposal won the grand prize in a year-long design competition in Philadelphia, completed earlier this year.

Chicago, like most American cities, has a perpetual problem in dealing with stormwater impact on its combined sanitary and storm sewer system. Ideally these should be separated. (See sidebar.) For mild events, the system has the capacity to deal with total flow, although the cost to treat stormwater is a large burden on the city. However, peak events (summer storms and similar events) overwhelm the city's wastewater treatment plants and oily street sewage mixed with human sludge is dumped into the Chicago River.

The system designed by the Philadelphia team contains excess rainwater, using simple principles now used in large-scale projects in Germany and America. The plan replicates the effect of a crisscross of streams and creeks to capture, store, purify and return the water to the aquifer. This new system closely replicates the original stormwater drainage

system and keeps stormwater drainage out of the wastewater system.

As team architect Juliet Geldi put it, the plan was to re-create that original ecology with a “new urban watershed” that would follow “the path of the water from the rooftop, through local cleaning and storage devices, eventually returning the water to the aquifer” or to the local rivers in a clean state.

The plan uses water features like pebbled ponds and grassy swales to carry and purify stormwater. Canals and surface streams will carry the water now introduced into underground pipes. The clean water will be carried along the surface from neighborhood to neighborhood on its way to the rivers, and will provide a resource for irrigation and other uses. This is a greatly expanded stormwater plan to supplement Chicago’s current rain-barrel plan and to reduce the burden on the city’s sanitary sewer.

The new plan called WaterWork aims to return the water cycle to one that employs natural processes and provides a visual amenity through form and function of the system. This system will be employed in Chicago to combine with CityFarm in a synergistic way to increase mitigation effects. In effect this will begin the separation of the city’s sewer system into two distinct storm and sanitary

systems, customized to deal with very different conditions. The existing combined sewer system will increasingly become a sanitary sewer system relieved of the burden of stormwater. Increasingly, stormwater will be intercepted before it enters the sanitary system and will be treated naturally in the new WaterWork system.

WaterWork need not displace any occupied land, because the new planned waterways follow the existing grid of streets and rights-of-way. The system is completely expandable and scalable, because one-by-one, households can divert water from their roofs and yards into the neighborhood WaterWork. Also in the same expandable and scalable manner, the water carried by the WaterWork will be able to act as a sink in the changing rainfall patterns resulting from global climate change.

WaterWork will increasingly become a resource for the growing CityFarm. Wherever possible, and particularly where paired with CityFarm, a location will be sought for each block or group of up to 4 blocks, where a small storm pond will be created to reduce the effect of larger rain events and as a temporary reservoir for irrigation.



Scenario

As Sang-Ho came home from work, he had to struggle to stay dry. The thunderstorms were getting quite intense lately. It was surprising to see just how much water a storm like this would generate, especially now that it was clearly visible in the WaterWork system that carried storm drainage along the surface, as opposed to within the underground sewage system.

Just a few years ago, all of this water would have been introduced into the city's sanitary sewer system and would have greatly overwhelmed it. Even with the deep tunnel system in Chicago, there was not enough capacity for storms such as these. Since the WaterWork system had begun a few years, the number of events where the sewer system was overwhelmed was becoming fewer and fewer – even with the increase in storm severity.

If it weren't for the struggle to keep at least a little bit dry, Sang-Ho might have enjoyed the walk. He had to admit that the aesthetic features of WaterWork were impressive and added significantly to the beauty of the walkway. With a combination of grassy swales mixed with small rain gardens adjacent to the street,

nicely detailed surface drainage structures along other parts of his path, and small reservoirs every block or so, it was quite a wonderful addition to the streetscape. The Chicago Park District had done a commendable job of integrating WaterWork into neighborhood parks and even the larger campus parks throughout the city.

In some neighborhoods, WaterWork was directly integrated with CityFarm plots. If the weather improved as predicted, Sang-Ho would be at his local CityFarm on Saturday. In spite of the general drought of the past several months, this rain would likely mean he would not have to irrigate his plot this weekend, but WaterWork would allow this rain to recharge the reservoir in case it was needed next week.

Power Meter

Description

Power Meter is a tool that monitors and displays the CO₂ produced by a household or company. It taps into touchpoints of power use and compiles CO₂ information.

Properties

- System that monitors household or company-wide CO₂ production
- Connects to electric meter, oil tank, gas meter, hot water heater and records use
- Compiles information in central local database and converts use data into CO₂ production data
- Disseminates and displays critical information on interactive LCD
- Connects via local network with ClimateNet and uploads data

Features

- Allows individuals to track CO₂ production over time
- Programmable to set weekly, monthly, yearly goals
- Downloadable to computer and ClimateNet to compile large samples of data
- Allows green companies to display results as part of advertising campaign
- Allows households and companies to com-

pare their CO₂ production with each other and with foreign counterparts

- Programmable to flexibly account for renewable resource use

Production of rating may be used for future tax incentives or other initiatives

Discussion

In an urban environment buildings contribute a substantial amount to the generation of greenhouse gases primarily through their heating and electricity use.

Technology exists to assist buildings in decreasing energy use. The problem is that there is no user friendly platform that allows individuals to monitor their building's CO₂ generation.

There is evidence that demand for such a product exists. Despite our reputation (and track record), the American population cares deeply about environmental concerns. A recent Gallop Poll reported that 40% of Americans "personally worry about the environment a great deal," and 37% "worry about the environment a fair amount." Recent successes of hybrid vehicles and organic food point toward a trend of ecological friendliness.

The Power Meter allows homeowners to play an

active role in the mitigation of climate change. The Power Meter has remote connections to each major energy gauge: the oil tank (or gas meter), the electric meter, and the hot water heater. It wirelessly sends its information directly to a wall-mounted interface or a home computer, where it operates as a background widget.

Power Meter translates energy use into CO2 production and continuously records and plots use. This allows the user to view peak use times of day, week, month or year. It also allows users to more directly quantify efforts that they themselves may have taken to improve energy efficiency. For example, they would immediately know how much more efficient a new refrigerator is compared with an old model.

Additionally, the results from Power Meter are automatically uploaded onto ClimateNet whenever a user checks the widget. This allows not only for household tallying of CO2 production but it gives private companies a chance to publicize their gains in efficiency, should they choose to do so.

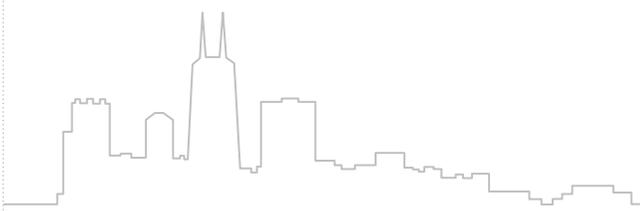
Scenario

Phil turns on his home computer to check his email. After checking it and closing his browser he sees on his desktop the widget for Power Meter. It quietly displays a graph of energy use for the month. He clicks it.

A small applet instantly boots up and displays the most important information about Phil's home energy consumption: heat, electricity, and gas. The figures show that his family's efforts to reduce their energy consumption are slowly starting to take effect. Their new clothes drier was installed a month ago and they had the old windows upstairs replaced.

In the bottom right corner the applet neatly shows their expected savings this month: \$33.47.

Phil closes the applet and puts his computer to sleep.



Yellow Light

Description

Yellow Light is educational TV programs for all the people, affected climate changes, to not only increase their awareness of regional climate changes, but acknowledge them how to cope with the changes. Yellow Light is implemented in the programs, existing popular TV programs such as Sesame Street, Simpsons or CNN News. All the programs will be delivered and organized by the tones, determined in Concept Communication, and supported by alliance institutions, established by Alliance Connector. It is customized in terms of different geographical threats and age groups to increase their interests and comprehension. It will deliver the knowledge of climate changes, such as causes, changes, impacts, adaptive and mitigative solutions, and etc. More importantly, it can deliver many different ranges of tones and subjects due to various capabilities of programs.

Properties

- A communicational and educational channel
- A tool to increase public awareness

Features

- Increase public awareness
- Acknowledge how to cope with climate changes
- Inform city's adaptive actions and achievements
- Select programs by different communication tones
- Customize contents in terms of different geo-

graphical threats and age groups

- Interconnect with Alliance Connector

Discussion

Determining tones of communication is very important to achieve goals, and also determining communication channels is critical. There are many different communication channels. Each channel has strengths and weaknesses. A communication and educational channel, Yellow Light is one of communication channels. Yellow Light is implemented in the programs, existing popular TV programs such as Sesame Street, Simpsons or CNN News. It is very flexible to inform and educate various ranges of tones and age groups because TV programs have different target groups and tones. Following paragraphs are examples that how Yellow Light can be implemented in different kinds of programs with various tones.

Next generation will be the victims of climate changes. We have an obligation to educate and train them to cope with acute situations. Cartoon for Children can do the role on TV. To increase young children's participation, program directors and the managers of the Ministry of Education should discuss how to approach young children with the program and what messages the program delivers. Yellow Light would provide various depth of messages by different programs to different age groups,

even adults. In USA, King Of the Hill and The Simpsons have not only very high popularity ratings, but extensive audience groups. Even though the both cartoon movies deal with heavy topics, audiences don't feel a repugnance for the cartoons. Like other heavy topics, climate changes can be handled in a effective way by Cartoon for Adult.

Documentary should be delivered with a story. Knocking people's sensitivity is a highly recommendable approach to deliver knowledge and messages. Documentary could be watched various age groups. All the family members can watch it together and understand the threats of climate changes through the indirect experiences. For instance, Documentary tells a story of a penguin family, living south pole. Due to global warming, they are in danger of losing their roosts. Young penguins even die because of the difficulty of adaptation. Whole story could personify the penguin family.

Movies will deliver the messages of the urgency of climate changes. Most movies, handling acute global warming situations, are based on future events. Even though the stories are extrem and fiction, they are enough to warn audiences what might happen if we don't act now, or at least give people a chance to talk and think about whether the serious situations could happen.

News is to inform the laest events to audiences

and to warn and commend what to do when the situation is urgent. It also announces not only how city or government is doing to adapt and mitigate climate changes, but what government achieved.

Scenario

Jin is 10 years old elementary school student. One day, he comes back home from school with his friends, and they sit on the living room and turn on the TV to watch their favorite program, Sesame Street. They saw one character has a hard time using Green Bag, Separate Garbage Collection Campaign. He and his friends laugh and giggle because they think they could do better. Few days later, Jin tries to help his mother seperate garbage. He learns how to seperate from the TV program.

Jimi is 20 years old college student and lives in Chicago. He goes to his friend's house to do geography homework together. Around 8 pm, they are tired, and turn on the TV to take a break. They watch Game Show, a quiz competition between three people. One competitor chooses a subject on the quiz category board. Subject is "Hurricane". All the questions are how to adapt climate changes. Jimi and his friend are also answering queations and competing each other. At the end of the show, they realize that they know very little about climate changs. And they decide to do research for Chicago's climate threats as a school assignment.

Program	Time	Audience	Approch	
Sesame Street	5:30 pm	4+ yrs	Fun	Being familiar with the topic
The Simpsons	6:10 pm	13+ yrs	Satire	Bring the topic to public
Documentary	7:00 pm	8+ yrs	Knocking Sensitivity	Develop emotional attachment
Game Show	8:00 pm	15+ yrs	Exciting	Educate knowledge of emergency, adaptation and mitigation
CNN News	9:30 pm	18+ yrs	Informing	Inform urgency of people's act and the newest events
The day after tomorrow	10:10 pm	18+ yrs	Fun & Exciting	Understand what would happen in the future

Example

