



Chicago: Vision for the Future

Infused Nature

December 2008

Institute of Design | Systems Workshop

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Preface

The Project

1909 marks the Centennial of Daniel H. Burnham's and Edward H. Bennett's 1909 Plan of Chicago. The Burnham Plan, as it became known, redirected Chicago's development from disorganized industrial and commercial growth to a planned movement toward the "city beautiful". Along the way, Chicago became a green city with a necklace of parks and boulevards recognized around the world for its beauty. The Burnham Plan challenged Chicago's leaders to arrest the uncontrolled development that characterized the late 19th and early 20th centuries. Challenged by Burnham, Bennett and the Commercial Club of Chicago, the city committed to Burnham's vision, an environment that could be both functional and beautiful.

One hundred years later, Chicago and major cities worldwide face different but equally portentous problems and opportunities. New and powerful forces, both destructive and constructive, confront cities and society. Global warming is changing climate and energizing unpredictably destructive weather. Population growth and movement to the cities are at an all-time high. Global economics are reshaping trade and disrupting established patterns of supply and demand. Voracious energy needs are depleting traditional energy resources, forcing an increasingly urgent search for energy sustainability. High-tech materials sciences along with communications, computing, biological and engineering sciences are reshaping what is possible. Negative and positive, the agents of change have raised the stakes.

Established cities like Chicago must evolve more quickly. Entirely new cities now springing up almost overnight in fast-developing countries, -- like China's Shenhzen -- need to plan for change from the beginning. Both will need vision to weave new technologies into their urban fabric. Both will need wisdom to adapt evolving structure to tomorrow's pressing changes. Daniel Burnham's famous dictum -- "Make no small plans" -- is most timely and appropriate in this year of centennial celebration.

"At no period in its history has the city looked far enough ahead. The mistakes of the past should be warnings for the future. There can be no reasonable fear lest any plans that may be adopted shall prove too broad and comprehensive. That idea may be dismissed as unworthy of a moment's consideration. Rather let it be understood that the broadest plans which the city can be brought to adopt today must prove inadequate and limited before the end of the next quarter of a century. The mind of man, at least as expressed in works he actually undertakes, finds itself unable to rise to the full comprehension of the needs of a city growing at the rate now assured for Chicago. Therefore, no one should hesitate to commit himself to the largest and most comprehensive undertaking; because before any particular plan can be carried out, a still larger conception will begin to dawn, and even greater necessities will develop." --Daniel Burnham

In keeping with Burnham's thinking, this project freely explores urban possibilities for the next century. Rather than a conventional "plan", however, as might be proposed in a blueprint for a cityscape, this study examines a variety of physical, procedural and organizational concepts now emerging or that soon could emerge from evolving technologies and changing social forces. Overall, the project is composed of four separate but integrated studies focusing on urban infrastructure, transport, environmental features (river and lake front), and the role of nature in the city.

The component covered in this report is Infused Nature: possible futures for bringing greater awareness of nature to the city.

Preface

The Course

The design concepts presented are results of a project-based course at IIT's Institute of Design. The semester-long Systems and Systematic Design course is a workshop 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 planning problems. The goal for each project is to develop information thoroughly, propose innovative solutions that take maximum advantage of the information, and integrate those 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 detailed development project.

Course Issues

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

Design planning methods. What is Structured Planning and how can its tool-kit of methods be used to collect, structure and synthesize 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?

The Project Team

Eighteen graduate students from the U.S. and abroad were assigned to four teams for study of Chicago's and other large cities' future. Background experience for team members included degrees in fine art, art history, painting, marketing, strategic management, business management, interior design, product design, graphic design, communication design, psychology, ethnic studies, Spanish and Latin American studies, teaching, economics, political science, cognitive science, comparative media studies and semiotics.

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Preface

The Planning Process: Structured Planning

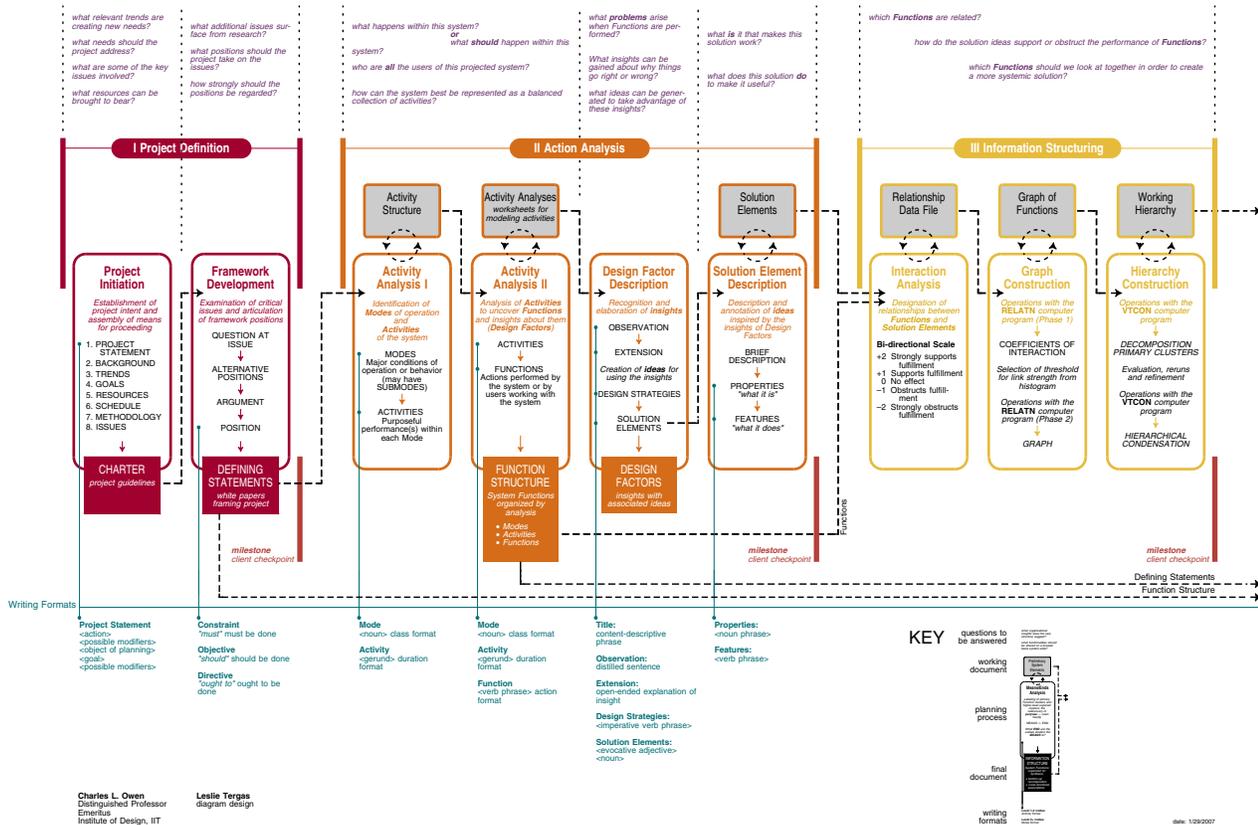
Structured Planning, the systematic planning process taught in the course, is a process for finding, structuring, using and communicating the information necessary for planning. It is a front-end process for developing concepts thoroughly and cohesively.

A number of projects have been undertaken with it and used to further its development. Among more than 100 of these, an early published project for Chicago's transit authority (CTA) was Getting Around: Making the City Accessible to Its Residents (1971). 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 Aeroteecture, were widely publicized in Europe and Japan; in 1995, the National

The Structured Planning Process (Phases I - III)

Structured Planning is a front-end, concept development process for finding, and communicating the information necessary for advanced planning



The Structured Planning process: phases I through III.

Preface

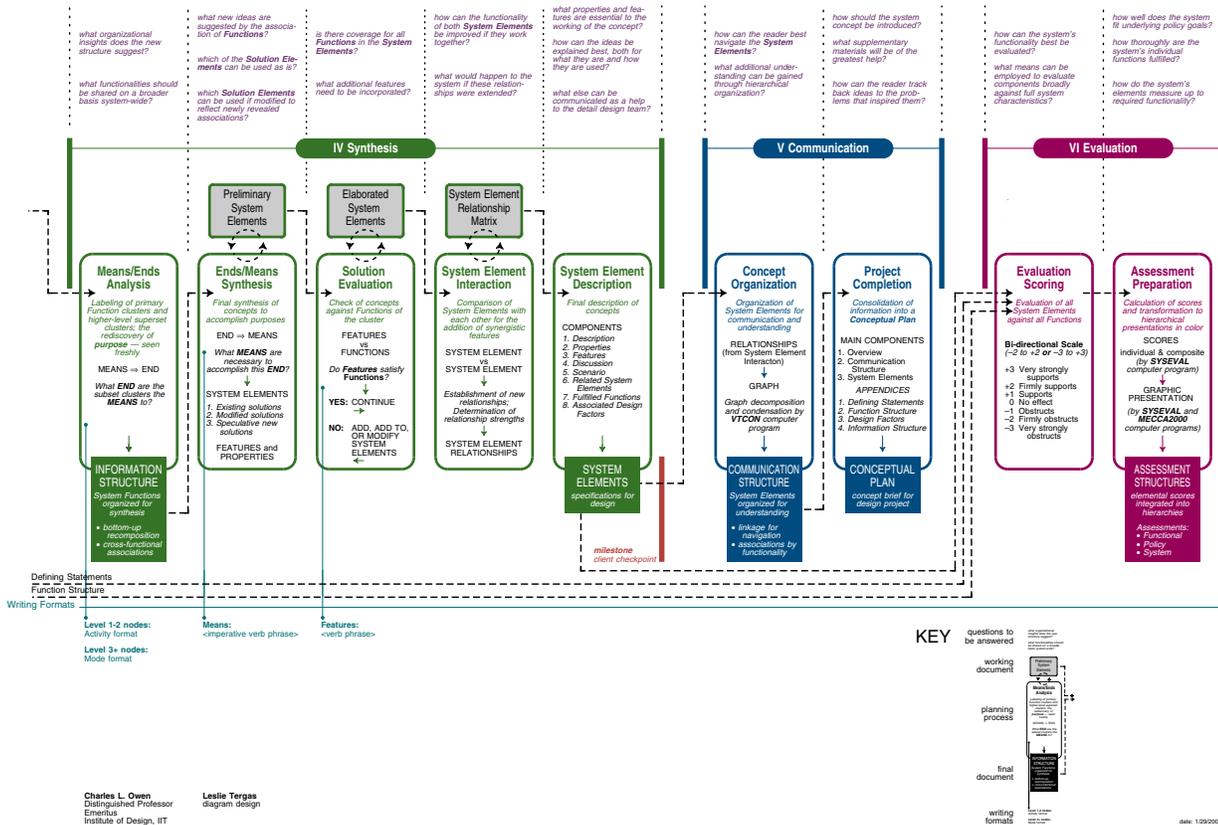
Parks project developed plans for the future of the U.S. National Park Service. In 2001, Access to Justice, a project sponsored by the National Center for State Courts, was implemented for use in state courts in Chicago and across the United States, and in 2005, four projects on Home, Play, Work and Health were finalists in four of the five competition categories for Denmark's INDEX Awards, the world's richest design prizes. Most recently, the 2006 project on Massive Change studied adaptation strategies for global warming in Chicago and similar cities, and the 2007 project outlined design planning concepts to complement policy planning for national health care. As the

process has evolved, it has become an increasingly useful planning tool for business, institutions and government.

A diagram of the process, shown here in two figures, sets out the activities that make up Structured Planning along with the working documents and final products produced along the way. The general description below follows the diagram. The process and its products are discussed here in the abstract; specific examples created for this project may be seen in the appendices that accompany the report.

The Structured Planning Process (Phases IV - VI)

Structured Planning is a front-end, concept development process for finding, and communicating the information necessary for advanced planning



The Structured Planning process: phases IV through VI.

Preface

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, a schedule 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 frame 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 perform or are intended to perform within each Activity. The result of the Activity Analyses 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 them 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 Factor documents, solution ideas are written up in the Solution Element Description portion of Action Analysis. This is done on simple one-page forms 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 it does. 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 uses this information in a Graph Construction process to establish links between Functions.

Another program, VTCON, completes the information structuring process. In the Hierarchy Construction activity, VTCON finds clusters of highly interlinked Functions and organizes them into an Information Structure, a visually understandable, very general form of hierarchy most appropriate for planning.

IV Synthesis

In its form from the VTCON program, the Information Structure is simply a hierarchical reorganization of Functions. Nodal points above the Function level do not have names. The task of Means/Ends Analysis is to create labels for all nodes in the hierarchy. Moving bottom-up from the known Functions in the bottom level clusters, names are found to label nodes as “ends” for which lower-level nodes are “means”. The process continues to a completely labeled Information Structure.

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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). Existing Solution Elements are reviewed as potentially usable directly; others are modified or combined to make them usable, and new ideas are added to fill unmet needs newly recognized.

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 inventive new ways for System Elements to work together -- the invention and design of relationships. Changes and additions are incorporated in the properties and features of the individual System Elements.

The last Synthesis task, System Element Description, completes the specification of System Elements, including a succinct description, all relevant -- now essential -- 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 more easily and navigate its concepts with 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.

VI Evaluation

Structured Planning incorporates evaluation among the steps of the process, most notably during Synthesis. It also offers an optional full-system evaluation technique that can be employed to evaluate final results against policy-level and/or function-level criteria. Used for this, it provides merit values hierarchically for the system, its component parts and individual system elements. It can also create similar hierarchical evaluations for the assessment of functional performance and policy performance. Used to compare systems, it can provide system, functional and policy assessments for multiple competitive candidates measured against common function and system structure frameworks.

Introduction

Daniel Burnham's 1909 plan for Chicago measured a city's livability and progress, in large part, as a function of green space and environmental health. Burnham proposed a comprehensive plan illustrating ways Chicago could shed its industrial past in pursuit of a brighter, more harmonious future, in pursuit of a "city beautiful." One hundred years later, Chicago residents continue to benefit from Burnham's vision as they enjoy miles of lakefront parks, stroll the wide streets of N. Michigan Avenue, and explore precious forest preserves. In thinking about city plans to be implemented over the next one hundred years, how can Chicago celebrate and build upon Burnham's legacies? How can Chicago combine the best of city life with the best of country life to achieve maximum efficiency and functionality in the face of a rapidly growing population?

Our system

Since Burnham drafted and publicized his plan, the city of Chicago has grown considerably, both in geographic size—adding 47 square miles of city—as well as in population, with over one million new residents within the city boundaries. Our system seeks to understand the needs of this larger population base as well as the environmental needs of a 21st century Chicago. Burnham's plan sought to highlight how the confluence of natural and urban planning could create a thriving and healthy metropolis. Our system shares this vision and will use it to create a scalable plan for nature that addresses the needs of the people and city of Chicago for the next one hundred years.

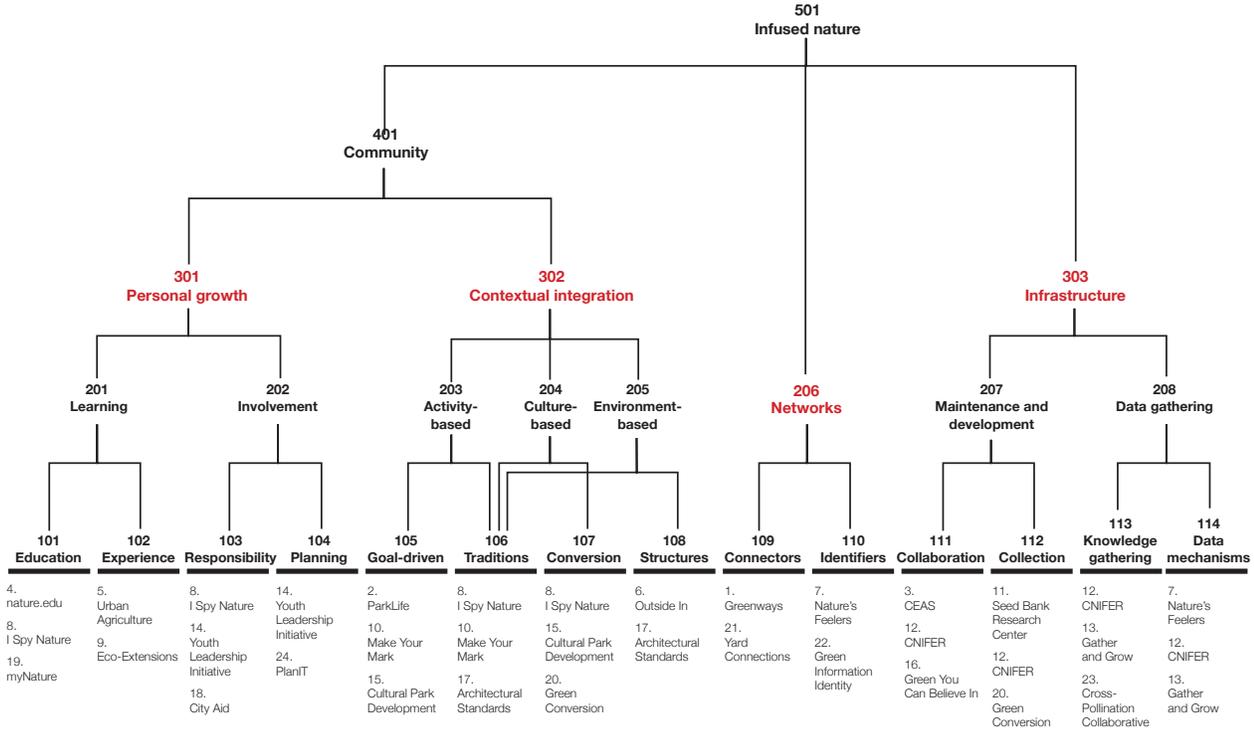
Scope and reach

The inter-connectedness of the Chicago region has exponentially increased, along with its population; this continued development and ever-growing connectivity that was not conceivable until the late 20th century has blurred our perceptions of where Chicago actually ends. It is tempting, therefore, to extend elements of the vision for a new plan beyond Chicago's immediate boundaries to incorporate other regional areas. However, the scope of the new Vision for the Future must remain more localized to be truly effective. Enlarging the boundaries to this extent would increase development and

maintenance costs, causing an enormous strain on underlying systems and resources. Extending scope would also risk diluting potential benefits that were intended to fit the more specific needs of Chicago area communities.

Inversely, too narrow a focus would also be detrimental. While the downtown area of Chicago, for example, is in many ways the most readily identifiable in terms of civic personality, it hardly contains the full scope of the city's activities. Chicago's network of public transportation extends far beyond the immediate borders of the city's commercial centers, regularly connecting many disparate individuals and activities on a daily basis. Similarly, the average Chicago citizen no longer lives and works within a single community; to emphasize solutions in one area while ignoring others would create an unsettling disjunction between the traditional domains of life and work, as well as resulting in a lack of integration between the great diversity of Chicago's neighborhoods. Thus, in order to maintain a manageable scope while recognizing the reach of Chicago's resources—both economic and cultural—beyond the city center, the new plan should adopt a geographical focus similar to that of Burnham's plan. This would allow the plan to remain feasible on both human and planning scales, as well as sufficient in scope to directly benefit the vast majority of those living in the greater Chicago area.

Introduction



System elements and domains

The elements comprising the Infused Nature system reside in four domains:

- Personal Growth
- Contextual Integration
- Networks
- Infrastructure

Individually, each domain represents an aspect of the system; combined they offer a comprehensive snapshot of city life. The concepts set forth in our document strive to bring nature to the forefront of Chicago’s cityscape to honor its past and its future as a “city beautiful.”



Greenways

Connecting spaces throughout Chicago with nature.

Related System Elements:

ParkLife

Fulfilled Functions

- 58 Transport to locale
- 68 Communicate location offerings
- 69 Select destination
- 70 Plan route
- 72 Travel to destination
- 73 Provide transition
- 74 Provide wayfinding
- 75 Engage the senses
- 76 Accommodate multiple paths
- 77 Provides amenities
- 81 Encourage further exploration

Properties

- Land dedicated to green space corridor
- Semi-hard trail surfacing
- Publicity associating corridors with commuting and recreation
- Rental facilities at key points for Skis, bicycles, etc with point to point rental and return.
- System mapped to connect larger green spaces/parks.
- System mapped to compliment or continue public transportation and parallel heavy traffic routes.
- Trail-side information elements to guide/foster exploration

Features

- Connects green spaces to other green spaces
- Provides “green routes” for commuters
- Connects to transportation system nodes
- Provides trail-side amenities to facilitate recreation/exploration
- Creates wildlife habitat pathways.

Associated Design Factors

- 62 Inter-activity transition is difficult
- 67 Inadequate amenities
- 72 Limited transportation options
- 73 Got lost en route

Discussion

Daniel Burnham envisioned green space corridors connecting major parks throughout the city. The system revisits and dramatically expands upon Burnham’s vision. This concept of corridors offers city dwellers a linear green space that not only provides passage from larger greenspace to larger green space, but also offers a green environment that serves both the urge to explore and the need to get from one point to another. In addition, corridors allow for wildlife habitat pathways throughout the city.

Daniel Burnham understood the need to create connections throughout a city. The concept of green space continuity, when illustrated on a map as a city wide design, can be quite captivating. What is more profound than its elegance as an urban planning idea is the impact it has at the ground level. It is in its everyday usage that a system of green swathed corridors throughout the city, where the value of **Greenways** is most apparent. Parks play a vital role in an urban landscape, offering respite from the sometimes harsh stimulus that is a modern city. Parks, and green space, in general, speak to a primal urge in people to connect with a natural world larger than the creation of mankind. Unfortunately, in most urban settings, parks are islands of green space in a sea of “grayscale”, or built environment. They often have to be viewed as destinations, only practical for occasional visits. And while the structural needs of high population density cities will require this to be so, **Greenways** attempts to speak to this issue.

Greenways is a concept that, in this manifestation, is meant to be viewed as a comprehensive and integrated network of green avenues, or corridors, throughout the city. It is much more than a linear park. **Greenways** are meant to be viewed as an integral part of the city’s infrastructure and landscape. They serve the recreational and leisure needs of a city’s populace, but they are also meant to be highly functional, ideally providing the routes of choice for human powered movement throughout the city.

In connecting green spaces to one another, **Greenways** serve to deny the notion of parks as islands, and redefine green space in the city. They provide a sense of continuity and connectedness for the city dweller. Not only do they provide contiguous green space, but they also connect neighborhoods, downtown, the lakeshore, and with larger infrastructure. The parallels with mass transit are important, as **Greenways** will intersect, compliment, and occasionally coincide with mass transit infrastructure. Such a plan, especially one involving land in the way the **Greenways** does, does not happen overnight. The concept lends itself to a progressive roll-out. The goal is comprehensive connectivity and full integration with the

Discussion, cont

urban landscape. The **Greenways** network will prioritize connecting the major green spaces of the city. In addition, **Greenways** will be opportunistic in utilizing the forgotten places. Undeveloped, underutilized, and dormant land are primary targets for conversion to **Greenways**. Taking advantage of Transit footprints and unused rail infrastructure will also come into play. As time progresses, the city can make more assertive land acquisition plans. Also, in decades to come, it is possible that personal transportation (cars), will not be as dominant or necessary, allowing existing roadway infrastructure to be converted to **Greenways**. Communities may have a role in this as well. Programs can be put into place that facilitate residential blocks communally deciding to convert their section of street into **Greenways**.

corridors that enable the movement of human traffic in a way that uplifts the spirit and supports the overall function of the city.

Beyond the functional benefits of **Greenways**, they do serve a variety of discrete recreational purposes. The pathways will be surfaced in a durable and flexible material similar to that used on running tracks today. This surfacing material will also be water permeable, aiding in drainage. Also, in an effort to facilitate their usage for recreation, point to point equipment rental facilities will be offered, allowing people to rent a bicycle or skis at one point in the system, travel to another, and drop off their equipment. As a compliment to this and other vigorous activities, more robust hygiene and storage facilities, or **Clean Hubs**, will be available to wash up and change after a sweaty ride. **Greenways** also lend themselves well to exploring the city. To facilitate and enrich this activity, a variety of information services collectively referred to as the **Green Line** accessible on-site through **Versatile Signage** interactive interfaces, and through mobile devices. These services would guide and enlighten the curious explorers about points of interest throughout the city.

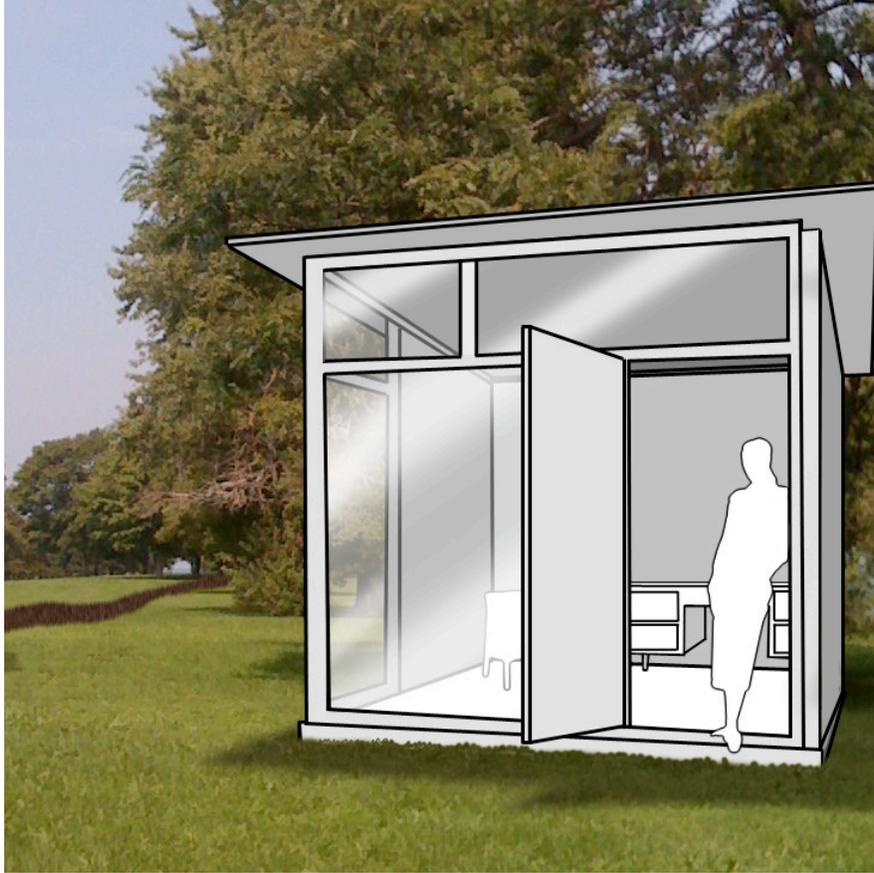
Greenways help to make the city more livable and navigable. They increase the overall amount of green space, which has added value in storm water management and clean air benefits. Ultimately, **Greenways** creates a network of green space

Scenario

Chuck lives on the south side of the city, about two and a half miles from where he works. He commutes to the city everyday using his bicycle. It's his favorite part of the day, because he can travel most of the way on greenways. He knows that eventually, he will be able to go the entire trip (on more than one route for that matter) as the greenways system is established.

In the winter, Chuck walks over to the rental hub near his house to rent a pair of skis. He enjoys it tremendously, but it can be tiring, so he likes being able to drop off the skis without any further commitment.

One week, Chuck's niece visits, and she wants to look around. He recommends using the "green Line" in the greenways system. Using her mobile device, she is guided to the lake shore and learns how Chicago was once mostly wetlands and what species of birds live in the area. She recognizes the call of a bird passing by from the audio on the Infused Nature database. Taking a picture of it, she tags it to that GPS location along with a picture she's taken of herself and sends it to her uncle.



ParkLife

Accommodations that allow people to enjoy the outdoor spaces in a wider array of situations and variety of climate and weather scenarios.

Related System Elements:

- I Spy Nature
- Green Conversion
- CEAS
- PlanIt

Fulfilled Functions

- 54 Determine location
- 55 Identify locale
- 56 Organize participants
- 57 Assemble materials
- 59 Secure activity space
- 60 Gather participants
- 73 Provide transition
- 75 Engage the senses
- 77 Provide amenities
- 81 Encourage further exploration
- 84 Coordinate resources
- 85 Inform participants
- 94 Encourage ongoing involvement content
- 100 Create experience

Properties

- Rentable single-room spaces in park
- Hub for communication technology
- Modular workspaces
- Wall-less overhangs
- Discrete temperature-controlled environments
- Barriers and protective shields made from natural elements
- Storage and amenity facility
- Short and long-term participation database

Features

- Facilitates in-park work
- Supports team collaboration and focused work
- Facilitates outdoor activity during inclement weather
- Protects park users from extreme weather conditions and elements
- Fosters year-round recreation
- Provides safe and secure storage solutions
- Provides showers and amenities for city residents
- Encourages short and long-term recreation and other forms of participation
- Informs park-goers of park happenings and participation opportunities

Associated Design Factors

- 62 Inter-activity transition is difficult
- 67 Inadequate amenities
- 68 Safety as a concern
- 69 Inadequate information for future plan
- 70 Poor awareness of events in the future
- 82 Varied community goals
- 83 Lack of time or resources required to gauge interest
- 84 Lack of community interest
- 86 Unable to identify participants beforehand
- 101 Element availability

Discussion

ParkLife family of three discrete components that supports and facilitates work, recreation, exploration and civic participation in nature. The components: Working Colonies, Microclimates, and Clean Hubs are mutually exclusive solutions that may also be experienced in conjunction with each other.

ParkLife is a set of tangible solutions that facilitates work, exploration, recreation and civic participation. Central to **ParkLife** is the philosophy that parks can and should support multiple aspects of a city person’s life beyond recreation and leisure. The collection of solutions, which is comprised of three components—**Working Colonies, Microclimates, and Clean Hubs**—seeks to reinforce common city-life behavior, as well as introduce new ones.

Components of the system

Working Colonies

As work grows increasingly more mobile due to the globalized economy and advances in communication solutions, work is conducted outside office spaces. Just as the lines between work and home have already blurred, so too will the lines between work, home and the third place. Home and ‘the office’ no longer constitute the primary environments in which people spend their days. The ‘third place,’ an environment designed to support personal, social, and professional interests, is becoming noticeably more prominent in people’s daily lives. **Working Colonies**, a network of rentable single-room spaces throughout city parks, bring the third place to the natural setting to support the demands of collaborative or focused work outside traditional office spaces.

Working Colonies are outfitted with the infrastructure necessary to conduct work, including communication solutions as well as basic activity and storage spaces. Designed to infuse nature into the lives of city people, **Working Colonies** offer controllable wall opacity modules to give workers control over their views and privacy. Open-air, wall-less shelters consisting of transparent overhangs, which offer both visual and physical access to the surrounding environment, are also available.

Microclimates

Another component of **Parklife** is a network of **Microclimates**, atmospheric zones which moderate the weather conditions of the surrounding environment. Like **Working Colonies**, **Microclimates**, offer protection and shelter to park-goers to support greater engagement with the natural settings. Atmospheric zones are created using

Discussion, cont

strategically-designed natural elements. This includes, large rock walls that offer protection from wind and elements; tree islands that offer cover from passing rainfall; and heavy soils that regulate the ground temperature to prevent freezing.

Microclimates support recreation and exploration during weather conditions that would otherwise deter participation or cause people to defect and leave the park.

Clean Hubs

While most **ParkLife** components predominantly speak to in-park solutions, **Clean Hubs** extend beyond the borders of green space, into the city streets to help segue people into in-park activities.

Clean Hubs, storage and amenity facilities, seek to relieve planning and preparation burdens related to in-park recreation, civic activities, etc. Outfitted with showers and personal and personal storage solutions, **Clean Hubs** offer city residents convenient ways to prepare for pre and post-activity events. Peppered throughout the city, these facilities enable recreation and civic participation in a myriad of areas and neighborhoods. Additionally, **Clean Hubs** provide **PlanIt** (described in document) systems, intelligent planning activity wizards that informs users of ongoing or upcoming events, to encourage short or long-term engagements with little preparation or forethought.

The three components supporting **ParkLife** are both comprehensive and diverse to accommodate the different needs and demands of city life.

Scenario

Jed recently moved to Chicago after spending the majority of his life in Michigan. New to the city, Jed set out to explore his neighborhood and local parks. As he entered a nearby park, he was surprised to see how active it was! In his immediate field of view he noticed people picnicking under trees; children flying kites on sloping grass mounds; and couples entering hiking trails. He decides to follow down a trail, as well. He continues down the path for several miles, taking photos and uploading them to the park's **CNIFER** (described in document) system, and intermittently receives information about surrounding trees and fauna via his mobile communication device.

Two hours into his hike, Jed noticed the grey clouds overhead give way to a passing rainfall. Nearby soccer players crowded under a tree island, where Jed sought coverage. As the storm passed, Jed returned to the path to make his way home. Greeted by a hiker named Tom, Jed and Tom continued traveling down the path as they made conversation until they reached **Greenways** (described in document) leading back to their respective neighborhoods. Before parting ways, the hiker told Jed to consult a **PlantIt** system to learn about local recreation and civic participation activities. Additionally, the hiker told Jed he could use the **Working Colony** he reserved for tomorrow afternoon to get a better sense of all the park has to offer. Grateful and appreciative, Jed accepted and went on his way having a better sense of his local park and a new hiking buddy.



CEAS

(Community Environmental Action System)

Neighborhood staff and resources to attend to green space maintenance, short term tool and equipment leases, and information and work sharing hub.

Related System Elements:

- CEAS
- Nature's Feelers
- CNIFER
- Youth Leadership Initiative
- Green Conversion
- Cross-Pollination Collaborative

Fulfilled Functions

- 22 Establish new touch points
- 27 Coordinate resource use
- 28 Manage resource schedules
- 29 Schedule maintenance
- 31 Monitor system components
- 32 Tend to system components
- 33 Service components
- 34 Repair/replace components
- 35 Assess events
- 36 Signal significant system changes
- 42 Assemble resources
- 43 Act upon plan
- 45 Accommodate feedback
- 49 Disseminate response
- 50 Triage event
- 82 Determine community goals
- 83 Gauge interest
- 84 Coordinate resources
- 85 Inform participants
- 86 Communicate goals
- 87 Delegate responsibilities
- 88 Provide materials
- 90 Accommodate feedback
- 94 Encourage ongoing involvement

Properties

- Green space rangers staffed at neighborhood districts
- Local ranger stations
- Tools and equipment for upkeep of local system
- Filter of CNIFER fact module that applies to neighborhood
- Prioritized daily work list to be conducted by the rangers
- Tools and equipment available for lease by local residents
- System of monitoring and tracking leased tools and equipment
- Transaction application to store information and image of neighbor renting equipment
- Reservation application to pre-book equipment
- Smart wall communication system for receiving feedback, contacting neighbors, and reserving resources
- List of long term projects, estimated project length, and tools needed for community service
- List of emergency assistance needed in other neighborhoods
- Archive of local experts, willing to answer questions
- Filter of CNIFER experience module that applies to neighborhood
- Communication system linking CEAS stations to each other

Features

- Monitors and conducts ongoing maintenance within the neighborhood
- Engages with community through both informal interactions and formalized information session
- Receives and respond to neighborhood suggestions
- Cumulates list of volunteer projects
- Mobilizes staff and community to aid other neighborhoods
- Connects people with know-how to people with questions

Associated Design Factors

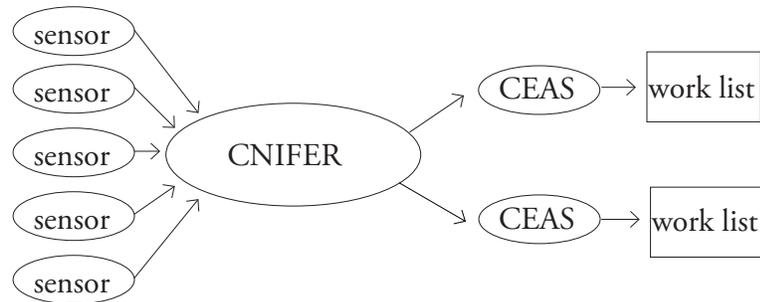
- 43 Observed system needs aren't reported by users
- 44 Maintenance gets off schedule
- 48 Inadequate resources
- 56 Insufficient human resources
- 67 Inadequate amenities
- 68 Participants don't know how to get involved
- 69 Spontaneous activity isn't supported
- 82 Varied community goals
- 105 Lack of caretaking knowledge

Discussion

CEAS is a system of neighborhood staff and resources to attend to green space maintenance, offer short term leases of tools and equipment to residents, and serve as a hub for information and work sharing.

As the city of Chicago gets bigger, successful maintenance and outreach will need to occur on a more localized basis to allow for prompt and appropriate response to community needs. **CEAS** takes a cue from the CAPS program and localizes maintenance personnel in neighborhoods. Each neighborhood is equipped with a **Ranger Station**, that serves as a combination home office for the **Green Space Rangers**, tool and equipment supply shed and community center, and a staff of trained Green Space Rangers who oversee maintenance and liaise with the community.

The **CEAS Ranger Stations** will access the **CNIFER** (described in document) fact module to understand the condition of area green spaces. These facts will be used to create a prioritized work list for the **Green Space Rangers**.



In addition to this work list, **Green Space Rangers** will receive information about local conditions and work needs from the community. Over the next 100 years, conducting maintenance will become increasingly automated. As automation reduces the manual-labor requirements of the **Green Space Ranger**, conducting maintenance within the neighborhood will shift from performing the required tasks to serving as a green presence available for answering questions, receiving information about the current system and ideas for future changes.

To encourage personal involvement in area green spaces and a commitment to increase the amount of nature within private spaces, **CEAS** offers resources to the community to remove some of the impediments that currently stand in the way of green involvement. One reason neighbors do not report damage and maintenance needs within their community green spaces is that they do not believe they will be acted upon. Community members currently must use the

Discussion, cont

311 system to alert the city to issues within their neighborhood. There is no way to monitor whether problems have already been reported, nor is there a way to monitor whether reported problems get acted upon.

CEAS counters these problems in two ways. First, the **Green Space Rangers** are available to personally receive and respond to system issues. The **Green Space Rangers** will have the ability to move these problems to the top of his or her work list. In this way the community members can report problems to the person in charge of addressing these problems and can be assured of the tasks completion.

Secondly, **CEAS** makes it easier for community members and organizations to get involved in public-works projects. Many people who have the time and inclination to put towards improving their neighborhood don't know how to start this process. **CEAS** aggregates information about longer term projects that can be performed, the time required to complete each stage and the tools necessary to encourage both spontaneous and planned volunteering opportunities. Volunteer opportunities in the neighborhood can be viewed and reserved remotely or from the communication wall at the ranger station.

Making improvements to public or private spaces requires tools and equipment to transition the space as well as for upkeep. The cost investment and long term storage needs of these tools often becomes a deterrent to completing a green space project. **CEAS** provides access to tools and equipment through a resource library at the **Ranger Station**. Like with volunteer opportunities, community members can reserve equipment either remotely or from the station. When the community member comes to the **Ranger Station** to pick up the reserved tool, information about him or her is stored and the tool is tagged to monitor where it is being operated. If the community member needs more than the reserved time, they can extend their reservation remotely if no one has booked the tool for the following time slot. If there is another reser-

vation, the ranger can contact the next reservation to confirm the appointment and check for flexibility.

In addition to the physical resources necessary to undertake green conversions, **CEAS** helps community members figure out what are the best green conversions to make and the steps needed to be taken to make these conversions. The public green spaces will offer inspiration for private conversions, with specific implementation information offered through classes at the **Ranger Station**. In addition to this more formalized instruction, Rangers will be trained in environmental science and available to answer or refer community members to resources to address specific questions. One of the additional resources that will be leveraged by **CEAS** is the knowledge held by other neighbors. This could run the gamut from neighbors who are trained botanists, to neighbors who have figured out a quick fix to rain barrel problems. Through the communication wall, Rangers can help connect neighbors with questions to neighbors with answers to not only problem-solve but deepen the community ties.

Scenario

Ken received his Masters in Environmental Science four years ago and has been working at the Bucktown **CEAS** ever since. He likes working at **CEAS** because it gives him a way to bring together his technical knowledge of environmental remediation and upkeep with his love of teaching. While completing his masters, Ken led a first-year undergraduate seminar on urban space renewal. While most of these students wouldn't go on to pursue environmental science, by the end of the semester they had all installed window-greenhouses in their dorm windows and were proselytizing to their friends to do the same. This experience was just as enriching for Ken, who realized that research was powerless if it didn't have a means of bringing about change.

Ken's always been a morning person, so opens the Ranger Station at 6am. He checks the communication wall to see if the neighbors have reported any issues to add to his maintenance list. Sally arrives to the station and launches up the reservation system. Ken pulls the daily work list and maintenance bots and heads out to Holstein Park to gather fallen tree branches after last night's storm. While he's leaving he says hello to Frank, a neighbor who's coming to pick up a bot in order to clear his yard before heading off to work.

Ken arrives to Holstein Park and programs the bot to pick up fallen branches. While the bot gathers the branches, Melinda walks through the park on her way to work. She tells Ken that she noticed a large branch across the bike-alley on Charleston. While she has him, Melinda mentions that her Green Walls were starting to look a little droopy. Did he have any suggestions? Ken messages her a nutrient mix that should help and suggests she stops by the ranger station because he remembers Kim, a neighbor on Hoyne, telling him that she had been having that problem but had discovered a solution. Melinda thanks him and heads off to work. Ken pauses the maintenance robot to head over to the bike alley. He wants to get that large branch cleared before the morning rush hour and needs to investigate why the sensors didn't catch this.

When Ken gets to the bike alley, someone has already slid the branch to one side of the trail to allow for some bike access. The maintenance robot collects the large branch and transports it off the alley, and signals for an urban timber pick up. While the robot completes this process, Ken walks off the trail to check on the sensors. Several **Nature's Feelers** (described in document) sensors have migrated to a nearby elm tree that is fighting an insect invasion. Ken plugs into the **CNIFER** (described in document) database and is pleased to discover that the elm has taken a turn for the better after receiving a nutrient infusion last week. Ken redeploys one of the sensors to the bike alley to ensure that any other fallen branches will be detected.

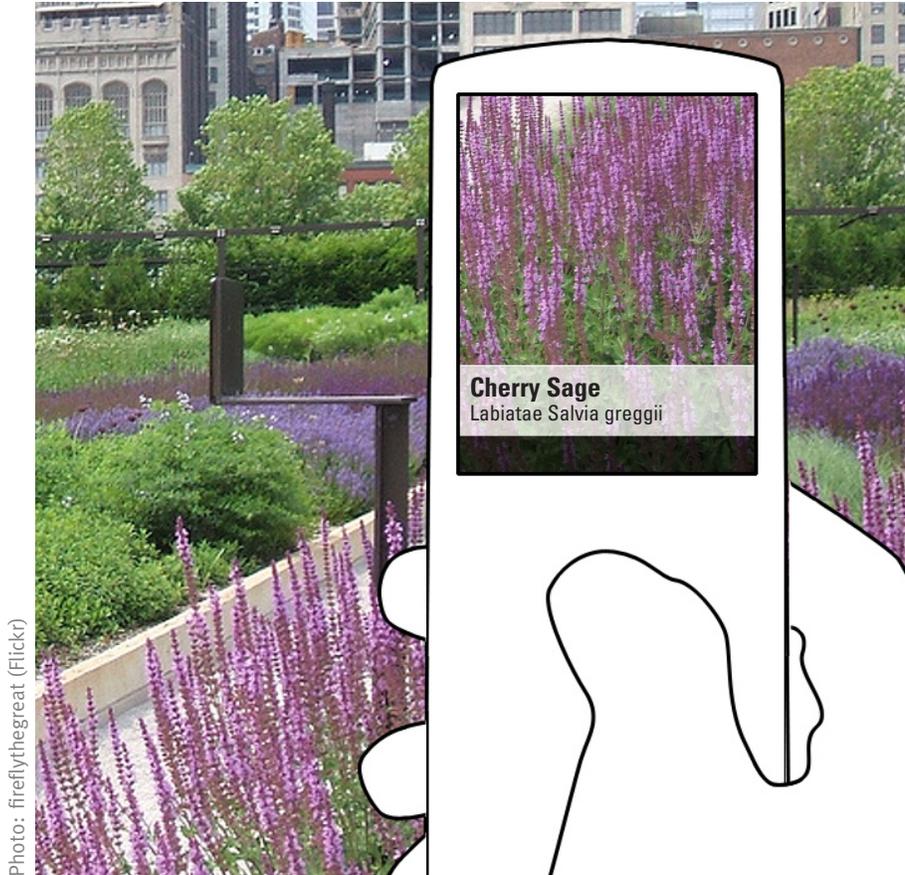
After performing the morning maintenance, Ken returns to the Ranger Station. Sally is giving supplies to a girls scout troop who signed up for a native flower planting project in Senior Citizen's Park. She gives the tools, seeds and instruction to the troop leader and reminds her that there is a communication device in with the tools if she needs Sally for any questions. When Sally finishes up, Ken tells her that while there were many branches down, it looks like most people in the neighborhood fared pretty well after the storm. Sally tells him that it looks like the storm hit much harder further to the south. They check the **CEAS** network and notice that both Marquette Park and West Englewood have signaled that they required additional assistance. Sally responds to West Englewood that they would mobilize their community to respond later that afternoon.

Ken sends out a broadcast to the community that emergency assistance is needed in West Englewood and that a Bucktown **CEAS** relief squad will be leaving from the Ranger Station at 5pm and returning at 8pm. While Ken notifies the community, Sally freezes reservations for the day and pulls together the tools and equipment not needed to fill existing reservations. She contacts reserves transport that will pick them up at 5pm that will return people to their homes by 8pm.

Scenario, cont.

Sally takes one of the robots and heads down to West Englewood to complete her shift helping them recover from the storm. Ken stays at the Ranger Station, leasing equipment to neighbors. The girlscoouts return from their planting and wonder if it was possible to stop the flower planting to go help down in West Englewood. Ken thanks them for their help and orders transportation to take them and their robots down to West Englewood. He contacts Sally to let her know that they would be coming in order for her to identify an achievable task for the scouts to perform.

At noon, the late shift rangers arrive. Ken updates them on the situation in West Englewood. The late-shift rangers access **CNIFER** (described in document) data to better understand the situation in West Englewood and prepare for the deployment of the Bucktown **CEAS** relief squad later that day. While they prepare for action, Ken teaches the weekly “Homegrown Lunch” class that helps people understand what fruits and vegetables are best to grow, how to take care of them and when to harvest. Melinda has come to this class and afterwards Ken puts her in touch with Kim on the communication wall to get help with her droopy Green Walls.



nature.edu

A suite of tools to informally connect and educate individuals about nature.

Related System Elements:

- I Spy Nature
- CNIFER
- Youth Leadership Initiative
- MyNature
- Plantl

Fulfilled Functions

- 1 Identify learners
- 2 Identify instructional goals
- 4 Construct resources
- 7 Gauge learner needs/wants
- 8 Articulate concepts
- 9 Facilitate discussion
- 10 Synthesize concepts
- 11 Direct to additional resources
- 12 Archive knowledge
- 16 Supply feedback
- 75 Engage the senses
- 76 Accommodate multiple paths
- 78 Facilitate sharing of experience
- 79 Archive experience
- 81 Encourage further exploration
- 99 Sense presence
- 100 Create experience

Properties

- Grade-independent and device-agnostic information
- Database to support aggregated information via user input/database output
- Suite of ergonomically-friendly devices for accessing information (glasses, handheld devices)
- High-resolution display projection to display information overlay
- GPS media capture and tagging
- Partnerships with existing organizations (like youth advisory board and CEAS) to structure activities
- Extension of formal education as defined by Chicago Public Schools (CPS)
- Interface that allow users to search and transfer images and other archived media
- Access to downloadable expert commentary
- Planning database and interface to alert users of upcoming events of interest

Features

- Creates and facilitates plans for nature-related learning and interactions through organized activities and self-exploration
- Supports group activities and goals through shared information
- Aggregates and store data from multiple input sources
- Contains real-time updating capability to link simultaneous users
- Displays projected information overlay regarding surrounding environment and associated activities
- Supports translation/explanation of technical terminology within context
- Transmits newly captured data to central database (CNIFER)
- Accesses historical images and data
- Synchs with multiple existing device types
- Delivers appropriate level of information detail, according to user settings
- Tags GPS-positioned information to allow appropriate user access

Associated Design Factors

- 1 Mixed learner group
- 2 Uneven learner/teacher ratio
- 3 Mixed educational goals
- 4 Inexperienced teachers
- 8 Asynchronous learners
- 9 Varied learner knowledge/needs
- 10 Technical language
Comprehension
- 11 Limited opportunities for Learning
- 13 Lack of learner engagement
- 15 Resource information
Unrecorded/lost
- 16 Knowledge is siloed
- 17 Archiving not done on a timely basis
- 45 Data too diffuse for quality aggregation/incomplete data gathering
- 92 No place to archive
- 99 No need identified
- 100 Comparison of options
- 101 Element availability
- 102 Responsibility a turn-off
- 103 Infrastructure mismatch
- 107 Availability of replacements
- 109 Failure of maintenance
- 112 Behavior interferes with human goals

Discussion

nature.edu is a suite of tools to informally connect and educate individuals about nature. This platform is intended to support a wide range of activities and age groups through modular and free-form educational activities in which participants can plan, participate in, track, and save their experiences as part of a private archives or as a contribution to the CNIFER system database (described in document). This archive allows users to tap into an ever-growing knowledge base, individually or in groups, and provides multiple access points such as public parks and forest preserves, neighborhoods, and the lakefront.

nature.edu provides a full suite of tools and capabilities to support informal learning. Recognizing that people learn in different ways and have a variety of preferences, this educational toolkit leverages point-of-need information with personal preferences to support, but not dictate, an individual's experience in nature.

This supporting role in an educational experience is paramount; now, as in the future, humans' experience in nature straddles a delicate balance between a desire for knowledge regarding the world around them and an equally strong need to treat the natural environment as a respite from technology, connectivity, and the need for efficiency that runs rampant through the rest of life in the present day. While technical advances are likely to continue at a rapid rate, this need for an unplugged experience grows along with it.

That said, the technical capabilities inherent in a more ubiquitous system of learning about the environment are not far off, and making use of that capacity may allow individuals to participate in and learn from nature in a way that is currently not possible. Taking care to design a system that allows for the capability, while also allowing it to be ignored, is a critical element of its design.

Components of the system

NaturePrep

Informal educational experiences in nature can be both planned and unplanned; in some cases there is some amount of research before setting off, while in others the desire for knowledge is spur-of-the-moment and very casual. **NaturePrep** supports the both modes of nature interaction, to the extent desired by the individual, with planning tools that allow people to find appropriate experiences ahead of time or in situ by providing information and 'heads-up' alerts based on user preferences, encouraging exploration that might otherwise have been dismissed.

Discussion, cont.

For ahead-of-time planning, **NaturePrep** can be used as an electronic guidebook that allows users to semantically search and gather information about specific locations prior to visiting in order to get up-to-date information about seasonal highlights, bird and animal activity, and status of flora and fauna.

This base set of features provides a means to search for activities or environments, but its power increases for users who input their own interests and preferences into the system. Through tracking and recording of prior experiences, **NaturePrep** can ‘suggest’ outings or experiences. The more the system is used, the more robust recommendations can be, while still allowing for free-form information access where desired.

For more impromptu use, **NaturePrep** can use this base of collected and customized information to alert individuals to opportunities for spontaneous exploration. Through access via mobile device, the system can unobtrusively send a message when a user is approaching a certain type of park or environment in which there have recently been butterfly sightings, for example, in which one had expressed interest. The use of crowd-sourced data to continuously gather individual bits of information to build a rigorous and comprehensive knowledge base allows individuals to tap into a vast source of constantly updated information.

Finally, **NaturePrep** can be used to track nature-related activities and events to provide users with advance notice for areas of potential interest.

Nature Goggles

Piggy-backing on **NaturePrep**'s data capabilities, **Nature Goggles** allow individuals to tap into this knowledge base at point-of-need for more specific information about elements in their environment as well as upload and record information themselves. Through a variety of mobile devices, people can make use of GPS positioning and create personalized information overlays to their immediate surroundings.

For an individual standing at the lakefront, for example, GPS positioning—combined with **NaturePrep**'s database of collected photo information—can allow a user to not only view information about what type of tree is in front of them, but also move to and view linked data that moves from an individual instance to a deeper body of knowledge about that tree species in general. This connection to the overall database also affords the ability to identify non-place specific content, such as bugs or birds that travel through a space but are not specific to it.

In addition, the growing archive of imagery collected by users over time delivers temporal tracking of information in conjunction with location-based content. This provides the possibility of viewing the development of a physical location in time as well as space through the simple act of choosing a past point in time.

natu•recorder

In the same way that **Nature Goggles** provide a means of accessing information about the world at a customized level while taking advantage of the **NaturePrep** database, **natu•recorder** lets individuals accumulate and gain information through media capture in a way that suits their particular needs while contributing back to the archive maintained by collective contribution. **natu•recorder** functionality is device-independent and can be built into a variety of capture mechanisms, including **Nature Goggles**.

It is likely that the bulk of content supplied by participants is visual in nature, but the platform is capable of capturing, tagging, and archiving content from audio and textual sources as well as visual input. As a result, bird songs and sounds caused by environmental actions such as wind can also be incorporated into the overall database for use in identification or reference through **Nature Goggles** or through access from the central database of content. This capability also allows for annotation of experiences that can be stored individually or shared communally for broader access if desired.

Discussion, cont.

Finally, **natu•recorder** allows for the possibility maintaining and using one's personal archive of content in ways that extend the natural environment beyond a single place or moment in time. The smell of an ocean, or the sound of wind rustling through trees, can be stored and replayed at a later date to recapture the essence of the experience.

Scenario

Jim was biking home when he got a familiar buzz from his phone. Pulling over briefly, he pulled out his mobile device and scanned for messages. He spied a recent memo with the subject “Hérons!”—Jim, a waterbird enthusiast, had set up his **NaturePrep** account to alert him to bird-related events and unusual sightings. He’d been tracking heron progress throughout the early spring and was in touch informally with some CEAS Rangers he’d met over the summer, but this was the first he’d heard that they were back and nesting.

Diving into the memo, he saw it was from his friend Polly, a fellow Youth Leadership Initiative member. The two of them had hit it off the summer before at a working session for the Nature Museum in which they had planned a program aimed at teens that focused on hawks and wildlife who had found homes in nooks and crannies in city buildings. Too bad she had a boyfriend already...

Jim viewed the real-time video feed she had linked to the message and sure enough, two herons were perched on the embankment near the lagoon in Gompers Park. Gompers wasn’t too far away; he set off on his bike.

Arriving at the Park, he stopped by the Visitor Center to say hello to Tony, the CEAS ranger who was the go-to guy in this neck of the woods. Jim had met him during a bird monitoring event in Gompers and had appreciated Tony’s long-term commitment to the community and his easy way with both people and animals. Swiping his phone at the entrance to get an instant update for any new park info, he swung by the open-air desk and gave a friendly wave. They chatted for a while about the state of the lagoon; the heavy downpours due to climate change had increased occasional flooding, and the wetland areas had been a boon for communities that weren’t too keen on the foot of water that ended up in their basements from time to time. Tony told him that the plan to convert some surrounding roads to greenways with more permeable ground-cover was kicking in this summer, and to feel free to come by to check out

their progress in a few months.

But enough small talk; the herons were back? Tony had been tracking them, too, and mentioned he had taken a bunch of public **natu•recorder** footage already. He thought Polly was still around; Jim tapped into the video feed she’d already set up, and sure enough she was still by the lagoon. Jim headed out, with Tony suggesting that he take the long route to check out the reclaimed prairie area.

Jim walked his bike around the side of the center and headed out towards the tallgrass prairie. He spotted a section of plants that came up about waist-high with inch-wide prickly bulbs on the ends of the branches—what on earth were these? He turned on his **Nature Goggles** with a quick tap on the side of his glasses to find out more: this was Rattlesnake Master (*Eryngium yuccifolium*), apparently. He scrolled quickly through some high-level information, learning that the plant was native to Illinois and could live in a variety of habitats, before laughing at the fact that this was actually a member of the carrot family and that pioneers had mistakenly thought the plants was good for rattlesnake bites, hence the name.

Stepping back, he surveyed the landscape. The prairie was pretty magnificent, it was hard to believe that not long ago it had been lawns and cultivated plants; Jim was a firm believer in the power of letting nature do its thing, and he was proud to have participated in the process of letting prairie grasses and sedges reclaim the environment here. He suddenly got the urge to see how much the environment had changed, and adjusted his **Nature Goggles** timeline to a few years prior. Wow... he relived the transformation once again, seeing manicured green lawns, followed by dirt and scrubby grass, then saw them grow to their current height through season after season. He captured the scene, along with the sound of the wind through the grasses and stored it with **natu•recorder** for more contemplation later.

He snapped out of his reverie: gotta find Polly and

Scenario, cont.

get caught up on the heron activity. He flipped off the display and headed to the wetland area, checking his mobile device quickly to catch the most recent feed. As he got closer, he noticed Polly had annotated some footage for him personally, in addition to sending it up to the main database. “the smaller one looks like you” the note said, queued to a series of frames in which the herons searched for food.

She turned as he approached, noting that she knew he was here because she’d tagged him as a friend in the system, and had caught his recent prairie footage moments before. They focused again on the birds... it was nice to see these old friends.



Urban Agriculture

Large-scale (vertical farming) and small-scale (neighborhood marketplaces) agro-solutions where residents can grow, trade or purchase goods.

Related System Elements:

Green Conversion

Cross-Pollination Collaborative

Fulfilled Functions

- 4 Construct resources
- 5 Coordinate logistics
- 21 Leverage existing touchpoints
- 22 Establish new touchpoints
- 82 Determine community goals
- 83 Gauge interest
- 84 Coordinate resources
- 85 Inform participants
- 86 Communicate goals
- 87 Delegate responsibilities
- 88 Provide materials
- 89 Encourage participation
- 90 Accommodate feedback
- 91 Assess progress
- 93 Share experience
- 94 Encourage ongoing involvement
- 95 Publicize outcome
- 96 Communicate participant impact
- 97 Assess success
- 100 Create experience
- 104 Identify need
- 105 Procure element
- 106 Integrate element
- 107 Tend to element

Properties

- Large transparent structure
- Hydroponic growing systems
- Light management system
- Energy conservation center
- Point of financial transaction
- Temperature controlled
- Food and plant supplier
- Walkable aisles
- Water recycling system
- Community-supported and owned store
- Trade and purchase facilitator
- Adjacent outdoor garden space
- Indoor growing system
- Plant and flower depot
- Tagging system for food identification system
- Recommendation and review archive

Features

- Provides high-yield crops
- Conserves and recycles energy and water
- Supplements natural light
- Supports indoor growing systems
- Protects crops and goods from contamination and disease
- Supports and monitors foot traffic
- Fosters community participation
- Offers food distribution channels for local residents and growers
- Tracks all transactions-purchases, trades, etc.
- Identifies source of all foods and goods
- Monitors and manages health of goods

Associated Design Factors

- 6 Difficulty finding resources
- 7 Conflicts of information
- 82 Varied community goals
- 88 Lack of incentive to take responsibility
- 91 Difficult to collect feedback/monitor progress during event
- 97 Difficult to measure individual participant impact
- 99 No need identified
- 100 Comparison of options
- 101 Element availability
- 102 Responsibility a turn-off
- 105 Lack of caretaking knowledge

Discussion

Urban Agriculture is city and community-scaled urban agriculture solutions that provide access to fresh and local goods. Downtown Urban Agriculture is manifested in Vertical Farms which reside in multi-story buildings and offer large quantities of produce, fruit, herbs, plants, etc. to be purchased and procured by city residents. Extending into local neighborhoods and communities are small-scale Corner Store Coops which are socially and economically supported by local residents of the community.

Urban Agriculture offers city residents the opportunity and experience to build personal relationships with the food system- from production to procurement to consumption. Solutions range in scale to support both high-traffic downtown-scapes and less busy neighborhoods and communities.

Components of the system

Vertical Farms

Abandoned warehouses and multi-story buildings can be re-purposed and converted to **Vertical Farms** to support food production, state of the art growing techniques and points of purchase for city residents. Using greenhouse methods and recycled energy, Vertical Farms can provide steady, predictable food production cycles regardless of season or extreme weather conditions like drought or floods. By using vertical space, indoor farming solutions eliminate the need to seize large plots of land, a process that may lead to deforestation and abuse of the natural environment. Additionally, indoor farming can take advantage of soil-less growing methods such as hydroponics, to offer high-yield crops year-round with significantly less water loss than industrial farming techniques.

To offset energy costs and overhead fees, **Vertical Farms** offer restaurants as additional revenue stream. The meals served at the restaurants are prepared from ingredients and goods grown on premises supporting a local and sustainable food story.

Corner Store Coop

Urban Agriculture in neighborhoods exist on a far smaller scale. **Corner Store Coops**, markets that economically and socially supported by neighborhood residents, take advantage of both outdoor and indoor farming techniques and allow city residents to engage in food production in ways that were once available only to farmers. **Corner Store Coops** are distributed throughout the city to serve immediate grocery needs of neighborhoods and communities. Housed in small facilities, **Corner Store Coops** sell, distribute and facilitate the trade

Discussion, cont.

of fresh grains, produce, herbs, plants, flowers etc. City residents may purchase goods grown by the **Coop**, or they may sell and exchange their garden/home-grown goods with other **Coop** supporters. Every piece of food or good can be traced back to its respective grower through **Nature Tagging** (described in document), a tracking and labeling system that provides consumers with relevant supplier and site information. In the event of contamination, source of contamination can be traced, isolated and managed.

Scenario

Lisa, a young professional, reports to her company's downtown office once a week to collaborate with co-workers and attend important meetings. On her way home from the office, Lisa stops in at a **Vertical Farm** to pick up groceries for dinner. As she enters the facility, she is greeted by rows of fresh greens and vegetables from which she selects a head of lettuce and broccoli. Slowly, she makes her way up the spiral path to the fresh and dried fruit section on the level above. Taking a minute to look out the window to enjoy the scenery, she reaches for a crate of strawberries and blueberries. Shortly thereafter, Lisa checks out and continues on her way home to Logan Square.

Only blocks away from her house, Lisa realizes she forgot tomatoes and thyme. Making a slight detour, she quickly runs into the local **Corner Store Coop** where she selects Nick's sweet tomatoes and Charlie's thyme. Within minutes, she pays and continues home to prepare her meal.

The next day Lisa stops in the **Corner Store Coop** to leave a note for Nick applauding his tomatoes.

Background: jaliyaj (<http://flickr.com/photos/jaliyaj/2249896687/>)
Plants: Andrew Rivett (<http://www.flickr.com/photos/veggiefrog/2311184994/>)



Outside In

A set of tools, materials, and objects that help you integrate nature into daily life and indoor spaces.

Related System Elements:
Seed Bank Research Center
Architectural Standards
nyNature

Fulfilled Functions

- 10 Synthesize concepts
- 75 Engage the senses
- 81 Encourage further exploration
- 100 Create experience
- 104 Identify need
- 105 Procure element
- 106 Integrate element
- 107 Tend to element

Properties

- Building features (windows, walls, doors) that moderate the interactions between indoor/outdoor environments
- Ready-made solutions that promote indigenous planting in and around the home
- Indoor gardening and planting kits
- Plants doing services in the home, replacing machines or building structural components
- Larger nature elements (e.g. trees, water features) in lobbies or foyers

Features

- Breaks down the barriers between indoor and outdoor
- Allows people to easily grow plants, herbs, flowers indoors
- Replaces building processes with natural, plant-based processes (filtering air, filtering water, natural insulator)
- Brings some of the drama and wonder of nature into the indoor environment
- Helps people create their own outdoor nature spaces with minimum overhead and maintenance
- Brings stress-relieving and aesthetic benefits of nature into the built environment

Associated Design Factors

- 99 No need identified
- 100 Comparison of options
- 101 Element availability
- 102 Responsibility a turn-off
- 103 Infrastructure mismatch
- 104 Unsettling/annoying behavior adjustments
- 105 Lack of caretaking knowledge
- 106 Lack of assessment metrics
- 107 Availability of replacements
- 108 Recycling is difficult
- 111 Mechanism displays unexpected behavior
- 112 Behavior interferes with human goals

Discussion

Outside In is a set of tools, materials, and objects that help individuals integrate nature into their daily lives and the spaces they frequent.

Despite the advances in technology that will undoubtedly accompany our strides into the future, 100 years from now the fundamental effect nature has on human beings - both in terms of psychological and physiological benefit - will likely remain the same.

Extensive research reveals that “people with access to nearby natural settings have been found to be healthier than other individuals” (Kahn 1999, 14 referencing Kaplan and Kaplan’s 1989, 173). “Other studies have examined the relative effects of natural and urban settings in reducing stress... Overall, findings showed greater stress recovery in response to the natural settings” (Kahn 1999, 13).

Since nature will continue to contribute to the wellbeing of Chicago’s citizens, it could and should play an important role in defining in the spaces and objects of the future. Outside In is aims to integrate nature into future spaces and objects in interesting, delightful, and functional ways.

On a large scale **Outside In** consists of building features and materials that break down the barriers between the indoor and outdoor worlds, both metaphorically and physically - to help people appreciate the nature around them and extend their living spaces into the natural environment. These elements help bring some of the drama and wonder of the natural world into the build environment.

On a smaller scale Outside In consists of tools and ready-made kits that facilitate bringing nature indoors - in the form of indoor gardens or greenhouses, functional elements that assist in air and water purification, and decorative elements that serve aesthetic purposes.

Ideally, **Outside In** will help people get in touch with what M. Thomashow calls an *ecological identity*: “how people perceive themselves in reference to nature, as living and breathing beings connected to the rhythms of the earth, the biogeochemical cycles, the grand and complex diversity of ecological systems” (Thomashow 1995, xiii).

Components of the system

Permeable Barriers

Permeable Barriers help blur the line between indoor and outdoor spaces, extending indoor livable space in warmer months into the

Discussion, cont.

surrounding area and making it easier to see the natural world outside. For example: **Roll-away walls** consist of modular segments that can roll up like window shades, by adjusting their molecular structure to transition from a rigid to a flexible material. **Windows on demand** are wall tiles with adjustable opacity, making it easier to reveal the natural world outside where a formal or full-sized window may not exist.

Grown@Home

Grown@Home objects facilitate bringing nature into an indoor space. These offerings span a range of purposes - from more functional kits that facilitate food production - to more aesthetic elements that delight the senses and soothe the soul. For example: Window green house gardens are glass boxes that take up the lower portion of a traditional window, allowing you to grow and harvest hydroponic plants indoors; these miniature green houses utilize sunlight and can collect rain water from the outdoor environment through a permeable exterior. Planter coffee tables grow hydroponic herb gardens beneath a transparent table-top, adding a bit of interest to a traditional piece of furniture. Candle plants utilize bioluminescence to create a soothing ambient light in place of candles - eliminating a common fire hazard in the process. Organic floor coverings are nature-based “carpets” that encourage people to enjoy the sensory experience of walking barefoot in the grass. All of these components can be monitored using myNature system (described in document).

Modular Garden Systems

Modular Garden Systems make it easy to setup a customized, indigenous garden in indoor and outdoor spaces in your daily environment. For example: Snap-n-plant modules are growing kits for your porch or balcony that snap together to create a customized garden in terms of shape and content; the modules can attach to the ground, walls, or even ceilings. Turf rolls are pre-seeded “garden” rolls in varied widths that can be placed on an existing plot of land, and simply require

water to get started. Seeded trellises are ready-to-grow garden trellises that will eventually grow into more permanent features in a backyard or other green space.

BioUtilities

BioUtilities utilize plants and organic processes to assist in maintaining a comfortable and clean indoor environment. For example: Living machines utilize plants to supplement or even replace basic water and air filtration in a home or office space. Interior and exterior Vertical Gardens and **Green Walls** assist in insulating a space, assisting with temperature regulation.

Green Roofs would also fall into the **BioUtilities** category, and are known to have a variety of benefits: “one study estimated that green roofs on all Chicago city buildings would save 720 megawatts annually (equal to several coal plants or one small nuclear plant) for a cost savings of \$100 million” (Kiefer 2008). Additionally, green roofs offer sound insulation, reduce noise pollution, absorb airborne particles, produce oxygen, reduce water loss, and provide temperature regulation (Kiefer, 2008). It is likely external Green Walls will provide similar benefits.

While many of these BioUtilities may exist behind the scenes, they could be highlighted in more transparent installations in a space, increasing awareness and understanding of natural processes in the built environment. For example, a building lobby could include ponds and water features that are actually the later stages of water filtering in-progress. They could additionally be integrated with **I Spy Nature** (described in document) rotating installations (described in document).

It is important to emphasize that many of the **Outside In** solutions have a ready-made component so that the integration of nature into one’s home or work space is not only desirable, but simple to accomplish, ensuring that many people can enjoy the benefits of nature on a daily basis.

Scenario

Jane is a 32 year old, self-employed entrepreneur who frequently works in a communal office space on the tenth floor of a downtown Chicago high rise. Being self-employed she could work from home, but she actually prefers the communal office - it's been a great way to share ideas with other entrepreneurs, utilize common resources, and maintain a network of contacts. Plus, she enjoys getting out of her house and into a different space every now and then - she finds it helps her creative thinking.

Today at the communal office Jane notices that her asthma isn't as bad as it usually is. Come to think of it, her asthma has been getting better since the building managers installed vertical gardens in the space to assist with air filtration. And the vertical gardens aren't just functional, they're also nice to look at - Jane finds the added green in the otherwise technical environment soothing. She decides to look into putting a vertical garden into her apartment.

By mid-afternoon Jane reaches a stopping point in her work and decides to leave the office. Technology enables her to work from just about any location—so, as a result, she has flexible work hours. This is great, especially when the weather's beautiful (like it is today) and she'd like to enjoy more time outside.

Jane grabs her belongings and exits into the building's green lobby, taking a moment to enjoy one of her favorite features about the building: instead of devoting real estate to a traditional, under-utilized lobby space, the building sits atop an open-air garden space that leads to an enclosed elevator bank with a virtual doorman. She pauses to feed the carp swimming in the living machine ponds — a set of water features that are actually filtering grey water for reuse inside the building.

Jane makes her way home via a series of interconnected **Greenways** (described in document), which is akin to taking a nature walk through the city. She takes her time, stopping to chat with

neighbors along the way. Soon she reaches her local **Urban Agriculture** community co-op stand (described in document), where she can purchase fresh-grown fruits and vegetables for her meal tonight. Jane picks out some fresh lettuce and apples.

Jane also makes a stop at her local nature depot to pick up a new module for the vegetable garden she's assembling on her porch—she's excited to try growing cherry tomatoes and thinks they will make a good addition to her garden. As Jane selects the cherry tomato module, something else catches her eye—it's a vertical gardening kit that helps people create green walls, just like at the office! Jane is excited to try this out in her own home. She purchases both items and places them in a rolling cart to transport them home; in her apartment complex there is a collection site for the carts, so she doesn't have to worry about bringing it back to the depot on her own.

Once Jane gets home she activates up the roll-away walls that separate her living room from her porch—suddenly the two spaces are open to each other, making her overall living space much larger. Jane enjoys the cool breeze drifting into her living room and the pleasant sound of birds and neighbors chatting.

She then gets to work setting up her cherry tomato module on the porch; the module simply snaps to the other modules she has already setup - some for cabbages and flowers. The modules are all enabled with smart technology, so they can detect and monitor each other - and Jane can monitor the entire garden in person or remotely using the **myNature** system (described in document). Jane admires how easy it was to arrange the modules to her liking.

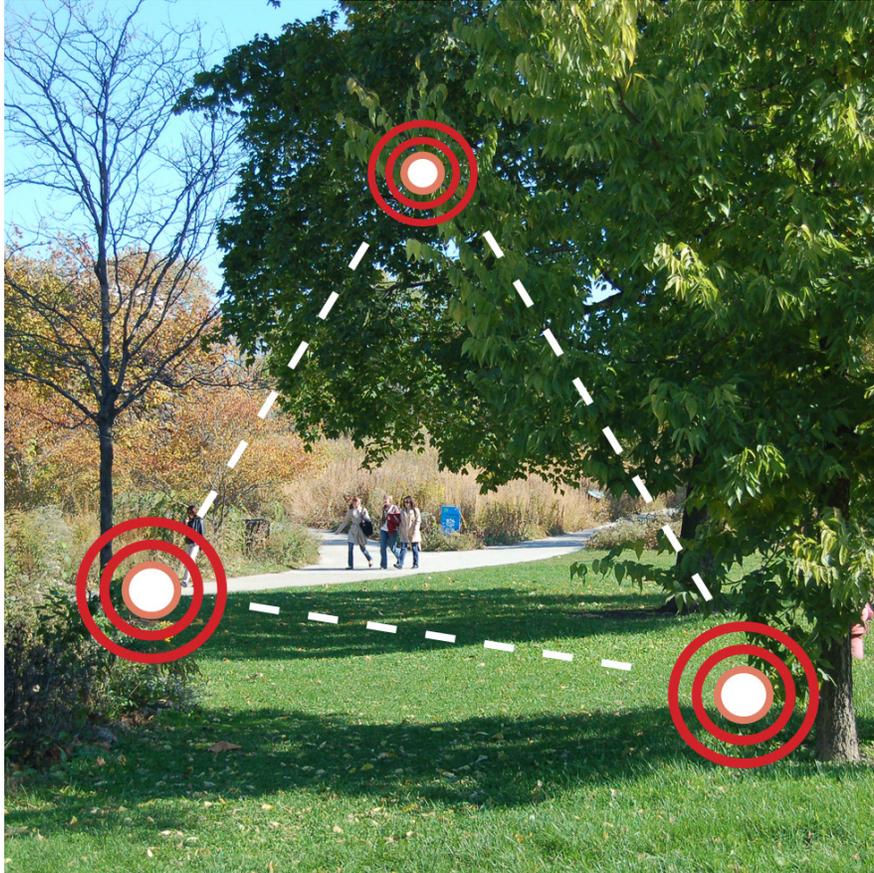
Dinner time is growing near, and Jane has plans to make a salad. On the bottom half of one of her living room windows she has installed miniature green houses - they're a great place to grow hydroponic plants, especially herbs. The green

Scenario

houses require hardly any maintenance, since they utilizes sunlight and rain water from the outdoor environment. Jane slides open the drawer and picks some mint and rosemary for her salad.

Later that evening, Jane decides she deserves some quiet time for relaxation. She sets up several candle plants - which produce a soft, bioluminescent glow - throughout her living room. She slips off her shoes, sips a glass of wine, and walks barefoot on her organic floor covering. She enjoys the tickle of the grass-like texture beneath her feet.

As Jane prepares for bed, she adjusts the opacity of her windows-on-demand wall tiles, so she can get see the rising moon outside as she falls asleep.



Nature's Feelers

A network of miniature, autonomous, and mobile sensors for nature-related data collection used to determine maintenance needs or detect environmental changes.

Related System Elements:

- | | |
|------------------|-------------------|
| CEAS | Plantl |
| Nature's Feelers | Parklife |
| CNIFER | nature.edu |
| Gather and Grow | Urban Agriculture |
| myNature | Green Conversion |

Fulfilled Functions

- 26 Analyze resource use
- 31 Monitor system components
- 35 Assess events
- 36 Signal significant system changes
- 37 Aggregate system data
- 40 Evaluate resources
- 44 Survey progress
- 46 Receive alert
- 49 Disseminate response
- 50 Triage event
- 51 Evaluate data
- 92 Archive experience
- 93 Share experience
- 96 Communicate participant impact
- 97 Assess success
- 99 Sense presence

Properties

- Miniature, autonomous, mobile sensors distributed throughout the environment
- Wireless ad-hoc network
- Designated gateway sensor nodes

Features

- Collect real-time data about chemical levels, temperature, humidity, pH levels, nutrient levels, moisture, pests, disease, etc.
- Send data, via a wireless ad hoc network, to one of several gateway sensor nodes, which forwards the data to the central database (CNIFER)
- Move and can be dispatched as needed throughout the environment
- Harness solar power, wind power, or bioenergy from pH gradients in soil

Associated Design Factors

- 34 Resources can't be measured
- 40 Symptoms of larger problems exist in multiple domains
- 43 Observed system needs aren't reported by users
- 45 Data too diffuse for quality aggregation/Incomplete data gathering
- 50 New condition alters adaptation needs
- 52 Cannot receive alert
- 54 No means to determine resources
- 56 Insufficient resources: people and tools
- 58 Insufficient or misinterpretation of data

Discussion

Nature's Feelers are a network of miniature, autonomous, and mobile sensors for nature-related data collection. The sensors form a wireless ad-hoc network and, through designated gateway sensor nodes, send the collected data to a central database (CNIFER). The data can be used to determine maintenance needs, and may also help detect serious problems or events (e.g. outbreak of disease, pests, flooding).

Nature's Feelers is a collection of sensors forming a Wireless Sensor Network (WSN), aimed specifically at monitoring nature and nature-related data in the Chicago region. The "feelers" are miniature, autonomous sensors that form a wireless ad-hoc network and send the data they've collected to a central database (**CNIFER** - described in document), most likely via designated gateway nodes. **CNIFER** is then able to interpret the data and predict, prepare for, and potentially prevent serious problems (such as pest infestations, heavy rains that may result in flooding, etc).

Background: Wireless Sensor Networks

Much of the early research into Wireless Sensor Network (WSN) technology was conducted by and for the military; specifically, DARPA funded and continues to fund a large number of WSN-related projects (Romer and Mattern 2004, 2).

As WSN technology has advanced over the years, many new, and sometimes surprising, applications have emerged, including: vital-sign monitoring of patients in hospitals, tracking vehicles and food distribution, and rescuing avalanche victims (Romer and Mattern 2004, 4-8).

There are particularly interesting applications of WSNs to nature and the natural environment: WSNs can be used to measure humidity, pressure, ambient light, temperature, salinity of water, and even the behavior and migration routes of wild animals (Romer and Mattern 2004, 6). Additionally, sensors can monitor "plant growth, pH levels, the presence of nutrients, moisture, pests or disease" (Georgia 2008) which can significantly impact gardening and farming.

The implications of WSNs are varied and wide-reaching: WSNs have the potential to save lives, make processes more efficient, and detect danger or damage early. By tracking previously unknown information, they assist in minimizing unnecessary resource usage - for example, by tracking crop growth status they can "significantly [reduce] the need for on-farm labour inputs" (Georgia 2008), thus reducing costs associated with running a farm.

Nature's Feelers Network Structure

The effectiveness of **Nature's Feelers** may be optimized by allowing

Discussion, cont.

the sensors - or “nodes” - to organize into an ad hoc network in which “nodes can directly communicate with each other” and route data between various nodes (Romer and Mattern 2004, 3). An ad hoc network does not rely on specific infrastructure, such as a satellite, for routing data between nodes (Romer and Mattern 2004 3), thus minimizing the overhead associated with network creation and maintenance, and allowing nodes to function in a variety of spaces regardless of the presence of data routing infrastructure.



Figure 1: An ad hoc WSN allows nodes to communicate directly

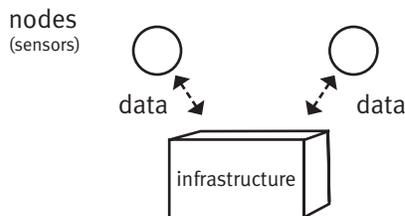


Figure 2: Infrastructure-reliant WSN requires nodes to communicate via established infrastructure

In order to make an ad hoc network effective, certain nodes will be designated gateway nodes which support “long-range data communication networks (e.g., GSM networks, satellite networks, or the Internet)” (Romer and Mattern 2004, 3). These gateway nodes can send data from surrounding sensing nodes back to the centralized **CNIFER** database. The gateway nodes will thus be equipped with additional technological capabilities beyond the regular sensing nodes.

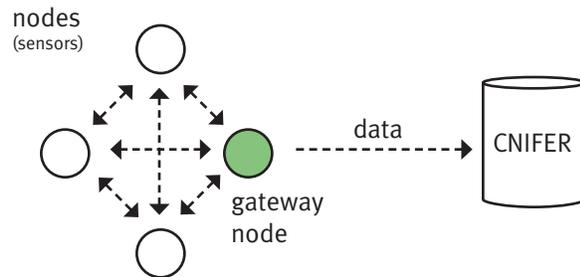


Figure 3: Sensors and gateway nodes communicating with CNIFER

Eventually technological advances may make this distinction unnecessary, enabling all sensors to also act as gateway nodes in the network.

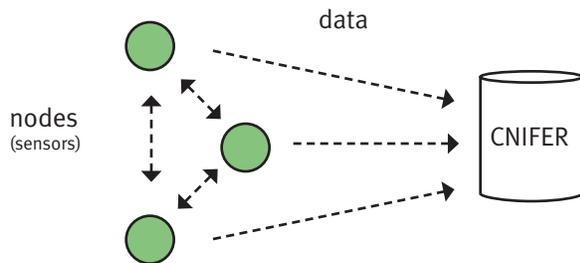


Figure 4: All sensors communicating with CNIFER
Sensor Mobility

Autonomous and mobile sensors will help the **Nature’s Feelers** network go above and beyond traditional data monitoring networks - allowing it to be more responsive, dynamic, and adaptive depending on real-time changes in the environment. For example, if a subset of sensors detects a fire in a forest preserve, additional sensors can move to that area to provide additional data-collection capacity.

There are two approaches to node mobility: passive techniques minimize mobile capabilities required by the sensors, and instead harness existing movement in the environment (e.g. sensors float along the current in a stream); whereas active techniques build mobile capabilities into the

Discussion, cont.

sensors themselves (e.g. a sensor has mechanical capabilities to move on its own) (Romer and Mattern 2004, 2). **Nature's Feelers** will be most effective by taking an active approach to mobility, so that nodes can move throughout the environment of their own accord or on demand.

It is important to consider the range in which nodes will be able to communicate with each other to form their ad hoc network. If nodes must be within a certain geographic range to communicate with one another, movement beyond that range will interfere with that communication (Romer and Mattern 2004, 2). In that case, **CNIFER** may need to function as a data router to send information between nodes that may be outside of communication range with each other. If a sensor has been sent on emergency deployment beyond the range of its ad hoc network, it should attempt to return to that network when possible. Similarly, not all sensors should be deployed to an emergency hot spot at once to maintain system coverage.

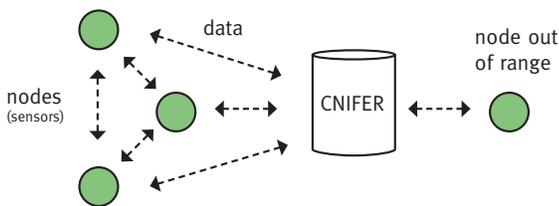


Figure 5: CNIFER functioning as a data router

Powering the Sensors

The sensors will need to utilize stored power or harness power from the environment (Romer and Mattern 2004, 2). The latter may be accomplished via solar cells, wind power, or potentially by harnessing pH gradients in soil (Thomson 2008) - and this harnessed energy would likely need to be stored in a battery on the sensor.

System Deployment

Sensors may be released into the environment in one large deployment, or added to the environment

over time (Romer and Mattern 2004, 2).

A projected roll-out may work as follows:

- Start with networked probes that people can put in their yards, which can be easily overseen and tended to
- Incorporate solar power or bioenergy to recharge batteries.
- Begin to deploy sensors in less populated areas (e.g. forest preserve) that are passively mobile and interact with designated gateway nodes
- As sensors become smaller, given technological advances, introduce autonomy and active mobility in which all nodes function as gateways

Node density, and thus coverage of data collection, depends upon deployment strategy and node mobility. As mobility increases and more sensors are introduced into the environment, and coverage will improve. However, node density for a given location will vary depending on environmental needs and the needs of the larger system.

Scenario

It's a warm spring day, and several **Nature's Feelers** sensors are swarming around the environment, largely unseen by the human eye. These miniature, mobile sensors are measuring important environmental data - like temperature, soil pH and nutrient levels, humidity, and foliage growth. They communicate directly with each other by passing information wirelessly to sensors in a similar geographic region, and also share their data with the **CNIFER** database (described in document).

Around lunchtime, one sensor comes across a patch of soil near Lincoln Park that seems particularly abnormal in terms of nutrient levels, pH levels, and overall contamination. Via wireless signals, it summons several other sensors to explore this area more thoroughly.

Meanwhile, Juan is a **CEAS Green Space Ranger** (described in document) working at a Ranger Station today, answering community questions and on-call for general maintenance needs. Thanks to the communication wall in the station, he is able to keep an eye on his current maintenance work list provided by the **CNIFER** database.

Suddenly, a new maintenance need is added to this list as a top priority - there appears to have been a chemical spill of some kind near Lincoln Park; the **Nature's Feelers** sensors have detected abnormal levels of contaminants in the environment in a specific location. This is certainly suspicious. Juan sends a command to the **Nature's Feelers** sensors, instructing more of them to investigate that area and identify the perimeter of the effected region. Juan then grabs his tool kit and his mobile computing device, which also has access to the **CNIFER** data, and heads out to investigate the problem.

Once on-site, Juan is able to begin the process of tending to the contaminated soil. Before he got there, **Nature's Feelers** had already identified the perimeter of the contaminated area - so Juan doesn't need to waste time doing that manually. As he begins the decontamination process, Juan uses his mobile computing device to control and moni-

tor the **Nature's Feelers** sensors in the area: he instructs the sensors to monitor specific patches of the soil to track his progress.

Thanks to **Nature's Feelers'** real-time data collection, which he accesses using the **CNIFER** interface on his mobile device, Juan can rest assured that the contamination hasn't reached any important water reservoirs. Furthermore, **Nature's Feelers** track the direction of the breeze, so Juan can make an intelligent decision about whether or not people downwind need to be evacuated based on the severity of the chemical spill. Fortunately, today's spill seems relatively small and contained - and since **Nature's Feelers** and Juan got to it early, the damage should be minimal.

Photos: Jennifer Murawski (<http://www.flickr.com/photos/jmurawski/499327931>)
Aerial Sky (<http://www.flickr.com/photos/aerialsky/1689522181>,
<http://www.flickr.com/photos/aerialsky/1689518419/>)
Nadia Prigoda-Lee (http://www.flickr.com/photos/the_girl/31055206/)



I Spy Nature

Installations and architectural features throughout the city that make nature and natural processes within the built environment more transparent.

Related System Elements:

- Greenways
- nature.edu
- I Spy Nature
- Make Your Mark
- Architectural Standards
- PlantIt

Fulfilled Functions

- 8 Articulate concepts
- 9 Facilitate discussion
- 10 Synthesize concepts
- 11 Direct to additional resources
- 21 Leverage existing touchpoints
- 22 Establish new touchpoints
- 24 Disseminate message
- 25 Keep content current
- 31 Monitor system components
- 75 Engage the senses
- 80 Provide physical take-aways
- 81 Encourage further exploration

Properties

- Rotating installations
- Permanent architectural features
- Partnership with organizations, like the Nature Museum, to design and sponsor installations
- Partnership with neighborhood parks to setup and display installations

Features

- Highlights natural processes (like water treatment, compost) by actually showing the processes to people in a transparent way; accompanied by signage that explains the phenomenon, stages, features, etc.
- Helps people see nature in the built environment, how and where natural processes are occurring in their daily lives in the city

Associated Design Factors

- 1 Mixed learner group
- 9 Varied learner knowledge/needs
- 10 Technical language comprehension
- 13 Lack of learner engagement
- 24 Missed/unknown messaging opportunities
- 26 Unknown or extremely large audience
- 27 Unaware of existing touch points
- 28 Existing material not in re-usable format
- 29 Unable to predict audience reaction to new touch point
- 31 Messaging medium is damaged or vandalized
- 32 Messaging medium requires maintenance
- 84 Lack of community interest
- 110 Interference prevents sensory input
- 111 Mechanism displays unexpected behavior
- 112 Behavior interferes with human goals

Discussion

I Spy Nature is a set of installations and architectural features throughout the city that make nature and natural processes more transparent. Rotating installations provide visually stimulating, educational touch points, while architectural features encourage people to see nature present in the built environment on a daily basis.

I Spy Nature is a set of installations and architectural features throughout the city that make nature and natural processes more transparent. These initiatives will facilitate improved citizen understanding of how and where natural processes support daily life in the Chicago region.

Components of the system

Rotating installations

Rotating installations provide visually stimulating, educational touch points to increase awareness of natural processes (e.g. water treatment, composting) in the city. The installations will highlight natural processes in a transparent fashion - so that people can actually observe the processes occurring in real time, interacting with them whenever possible. The rotating nature of the installations ensures that content will update and change, and can respond to the season, hot topics in the news, scientific trends, etc.

The installations will be accompanied by interactive signage which utilizes the system's **Green Information Identity** (described in document). The signage will explain the natural phenomenon being highlighted, stages of the process the people can see happening, key features to note, etc.

Discovery of and navigation to the installations will occur via the city's interconnected system of **Greenways** (described in document). Not only will **Greenways** assist people in travelling to the installations, but **Greenways** space may actually be used to house installations. Additionally, installations may be setup in local parks, community gardens, building lobbies, or street corners. **I Spy Nature** should work with local communities and neighborhood groups to determine which types of installations would be most appropriate for a particular context.

Design and sponsorship of installations may be facilitated by partnerships with local community organizations - such as **CEAS** (described in document) and **Green You Can Believe In** (described in document)- as well as museum and educational organizations, like the Peggy Notebaert Nature Museum.

Discussion, cont.

Installation content could include:

Large scale, transparent compost bins: visitors are able to observe the stages of composting in progress, learn about the types of materials that can be composted, and contribute their own organic waste the compost effort. A take-away could help visitors understand how to incorporate more composting into their daily lives. Smaller scale versions of a transparent compost bin installation could be placed throughout parks and public spaces to supplement or replace traditional trash cans.

Hydroponic root structure exhibits: transparent aquariums display hydroponic root structures for various sized plants - from grass to herbs, from shrubbery to trees - providing an insight into the complex natural systems that exist beneath the ground, mostly unseen (see Figure 1).



<http://www.ag.unr.edu/Cramer/hydroponic.html>

Figure 1: Hydroponic roots on display

Underwater walkways: transparent tunnels could highlight and educate people about underwater ecosystems in the river and lake. Tunnel surface could be an interactive, touch-screen display that allows people to select objects and plants they'd like to identify or learn more about. Care would need to be taken to design tunnels in such a way that they are not harmful to the ecosystems.

Permanent architectural features

Permanent architectural features encourage people to see nature present in the built environment on a daily basis. These include:

Features that incorporate housing and safety features for urban wildlife. This could include bird housing/nesting spaces built into bridges or balconies, or window features/coatings that prevent birds from flying into buildings.

Research suggests that “human contact with animals promotes physiological health and emotional well-being” (Kahn 1999, 15-16), even if it is just in the form of observing from afar. By fostering healthy, safe spaces for urban wildlife to reside in the city, we have the opportunity to expose city dwellers to that wildlife in safe, moderated fashions.

Features that help people see nature that may exist behind walls or fences. This could include various sized portholes into gardens and greenhouses where people can stop and peer into a lush green-space they may be otherwise unaware of.

Features that indicate how a building interacts with nature and natural elements. For example, blue tiles in the building exterior show where water pipes or gutters are (Lerner 1997, 32). Similarly, color-changing panels on a building’s exterior could indicate internal oxygen levels, air quality, etc.

These features can be integrated into **Infused Nature Design Standards** (described in document) to increase ubiquity of nature-related elements in

Discussion, cont.

new building designs, and in renovations to existing buildings.

Scenario

Aiden and Martina are spending a weekend in Chicago, visiting Aiden's aging parents. Aiden's parents enjoy living in the city because it's so easy to get around—with public transportation and a plethora of activities at their fingertips, they don't feel limited at all by their age.

Today Aiden and Martina have some time to kill while Aiden's parents participate in a gardening seminar at the local senior center. Aiden suggests they take a walk through the city's renowned **Greenways** — after all, he's heard they're pretty impressive. Martina agrees.

The pair uses an interactive kiosk at a nearby coffee shop to plan their route with the PlanIt system - and they learn that one of the Greenways is just a block away. They decide to start there and loop back to the senior center. Martina purchases a banana from the coffee shop and then they head out.

Before they reach the **Greenway** they can already see it—there's a series of portholes along the fence leading up the Greenway that gives them a sneak peak at the beautiful greenery within.

As they step into the **Greenway**, Aiden and Martina are impressed by how little city noise there is—the plants seem to provide a noise buffer. They stroll along the path for several minutes, hand-in-hand, enjoying the quiet and occasional bird calls. Martina glances upwards to see where the birds calls are coming from, and she notices that a nearby building has what appears to be a set of built-in bird houses between its first and second floors. How delightful! The birds have a permanent place to nest that provides ambient warmth, but they're still integrated into the urban nature experience.

As they turn a corner they notice an interesting installation in what appears to be a giant, transparent barrel. As they get closer they see signage explaining the installation: it's a transparent compost bin. Indeed, the transparent bin lets them see the different stages of composting occurring—they

can even see the tiny worms crawling around in there. What kind of worms are those? Martina thinks they're kind of gross, but Aiden engages with the interactive signage to learn more about the worms.

Meanwhile, Martina notices that at the top of the transparent compost bin there's a space for visitors to add their own organic waste. She finishes eating the banana that she bought at the coffee shop, and adds the peel to the compost bin. She feels good knowing this waste will eventually become a fertilizing material for gardens and farms throughout the region (according to the installation's signage). In fact, she'd be interesting in learning how to get compost fertilizer for the local garden in her neighborhood at home—she swipes her mobile device in front of the installation and suddenly a list of references and related websites appears on her screen, so she can research the topic later. Satisfied with his newfound knowledge about the worms, Aiden checks his watch - oh no! They better get back to the senior center to meet his parents. They leave the composting exhibit and pick up their pace.

As they emerge from the **Greenway** and approach the senior center, Aiden notices something peculiar on the side of the building: it has a series of tiles that appear to be slowly changing colors, sort of like a mood ring: some tiles are red and orange, while others are a deep blue or emerald green.

Just then Aiden's parents emerge from the senior center, chatting animatedly, and cradling potted plants they presumably planted during their gardening seminar. Aiden asks his parents about the strangely colored tiles on the side of the building, and his father explains that the tiles indicate important environmental statuses about the building. The red and orange tiles indicate the internal temperature of the building, while the deep blue tiles indicate indoor air quality, and the green tiles represent the health of the plants in and around the building. Aiden smiles - it is like a mood ring for the building, a sort of environmental mood ring.

Scenario, cont.

Aiden muses to his parents and wife that Chicago is certainly doing some interesting work integrating nature into the city environment. This sparks an interesting conversation that carries them back into the **Greenway** as they head to a nearby cafe to grab lunch.



Photo: Nikki Pfarr

Eco-Extensions

A set of programs that encourage citizens to learn about nature and natural spaces/processes through engagement with other cities and communities.

Related System Elements:

- CEAS
- Cross-Pollination Collaborative
- Cultural Park Development
- nature.edu
- ParkLife
- Urban Agriculture

Fulfilled Functions

- 1 Identify learners
- 2 Identify instructional goals
- 7 Gauge learner needs/wants
- 8 Articulate concepts
- 9 Facilitate discussion
- 11 Direct to additional resources
- 12 Archive knowledge
- 54 Determine location
- 56 Organize participants
- 57 Assemble materials
- 59 Secure activity space
- 60 Gather participants
- 61 Establish activity parameters
- 66 Document experience
- 67 Plan future activities

Properties

- Coordinated educational programs, trips, and activities
- Networks of communities, families, and schools
- Various “flavors” of opportunities available to correspond with student’s age, grade level, and personal interests
- 1:1 relationships between Chicago-based neighborhood parks and parks in remote locations (e.g. Japan): “sister” parks
- Technology-enabled links with remote natural spaces (live video feed or ambient devices that indicate certain qualities such as weather, number of visitors)

Features

- Connects students with host families or communities in remote locations
- Provides immersive learning opportunities for students, lasting days, weeks, or months
- Teaches students nature-related skills (e.g. organic farming) that they can bring back to the Chicago region and share in school
- Exposes people to nature, skills they may not see in everyday life
- Enriches a person’s understanding of and appreciation for nature, and where their food comes from
- Provides insight into culture and nature in remote locations
- Encourages sharing of knowledge and experiences related to park usage, conservation, and maintenance

Associated Design Factors

- 3 Mixed educational goals
- 6 Difficulty finding resources
- 8 Asynchronous learners
- 11 Limited opportunities for learning
- 13 Lack of learner engagement
- 16 Knowledge is siloed
- 67 Inadequate amenities
- 68 Safety as a concern
- 69 Inadequate information for future plan
- 70 Poor awareness of events in the future
- 82 Varied community goals
- 84 Lack of community interest
- 94 Inability to commit to ongoing involvement
- 95 Difficult to establish metrics for success
- 98 No follow up after individual event or engagement
- 105 Lack of caretaking knowledge

Discussion

Eco-Extensions is a set of programs that encourage citizens to learn about nature and natural spaces/processes through engagement with other cities and communities. Programs may be formalized for education, designed for personal recreation and relaxation, or aimed at fostering remote community/neighborhood relationships.

Eco-Extensions provides Chicago-area residents opportunities to look extend their experience of nature beyond their immediate environments by connecting individuals with sister parks, local agro-tourism, and alternate educational experiences. Through a set of programs, aimed at youth, adults, and families, participants can explore the ‘big picture’ of nature in new ways.

The program is intentionally broad in terms of audience and scope to allow multiple touchpoint for interaction; in some cases, experiences are designed to be folded into more traditional or curriculum-based education, while in others the interaction is intended to be informal and relaxing, with education rooted firmly in the background. Specific programs and detailed descriptions are available online and are updated regularly to reflect seasonal offerings, such as festivals coordinated with specific holidays.

Actual coordination of the events, programs, and nature partnerships occurs through collaboration between the Chicago Public Schools (CPS), **Green You Can Believe In** (a bottom-up community volunteer program, described in document) and the Chicago Parks Department.

Components of the system

Sister Park Partnerships

These formal classifications of **Sister Park Partnerships** create alliances between local, Chicago-based parks and greenspaces in other states and countries. The program extends the existing sister park program already in place at a national park level and makes it accessible on a smaller scale, creating additional investment within each individual community as well as opportunities for broadened problem-solving and support for the greenspaces themselves.

These connections can forge a **Sister Park Partnerships** can be either culturally thematic—for example, a park in Archer Heights, a heavily Polish neighborhood, partnering with a neighborhood park in a town back in Poland,—specific to the terrain, flora, and fauna (such as a wetlands park that partners with a lagoon area in Florida), or based on usage patterns, like parks with all-weather hiking areas that may have particular maintenance or shared logistical concerns. In other

Discussion, cont

words, the goal is to create more than an arbitrary linkage between two greenspaces, but rather establishing an ongoing tie that can help with long-term plans and maintenance as well as cultural awareness, where nature gains as much as participants in the spaces.

Besides the official designation of being sister parks and the benefits of shared information, **Sister Park Partnerships** can support location-specific signage, artifacts, and displays to can make these connections more immediate and meaningful on a day-to-day level to those who use the parkland. This can occur through collaborative planning around events, such as a Day of the Dead celebration that links a cemetery in Chicago to one in Mexico and is accessible through a collaborative archiving of material or even a live feed of events as they unfold. These celebrations and events can leverage existing formats coordinated by **Cultural Park Development**, described elsewhere in this document.

Eco-Experiences

Organized outings and vacations, like weekends at a working farm or a trail conservation event, allow people to combine education and recreation by traveling to farms, forests, or other nature-related destinations where they can learn, practice skills, and take part in maintenance and conservation. Coordination occurs through an online site through which users can search for experiences that they find appealing, and sign up directly. There are two types of programs:

ecoXchange

In certain ways this program functions similarly to conventional travel planning with a nature-related focus, in that participants can select trips of interest, but what differentiates **ecoXchange** from traditional eco-vacations is that participation as a “visitor” incurs a certain commitment to be a part of the action, but also designates one as a potential host in return for the visit. By entering the network, users essentially agree to trade their own hosting capabilities at a later date. The “swap” consists of

participation in a nature-related activity; a weekend spent working at a farm, for example, can be swapped in the future for an urban park experience, or a shoreline hike, for the farmer that had played host. In doing so the program encourages individuals or families to share their expertise and also creates opportunities for participation in activities with which one not otherwise have access. By participating, people can find new friends with whom they share nature-oriented interests, and provides an agro/urban exchange that leaves both parties with more insight and interesting travel experiences.

Membership in the organization is free, and relies only on establishing an online profile with details about applicable nature-related activities or environments one could offer as an exchange. There is no established duration for **ecoXchange** experiences; these events can be brief or long-term, depending on the interests and availability of options, and agreements established by the host and traveler. In the interest of safety, references and/or confirmation of personal integrity from existing members is supported on the site and is required to book an experience.

Through participation, individuals and organizations outside of Chicago can gain honorary membership in **Green You Can Believe In**, providing access to the database of expertise and discounted admission to Chicago-area nature areas.

ecoAbroad

ecoAbroad provides students and other individuals with immersive experiences where they learn nature-related skills and processes in distant locations. Coordinated through a partnership with CPS, **ecoAbroad** experiences can be used for school credit, much as traditional travel abroad programs behave.

Experiences through the **ecoAbroad** program typically combine hand-on education with a higher-level course of study, allowing students to learn both skills and related knowledge that they can

Discussion, cont.

bring back. Agricultural experiences might include exposure to agricultural tending, math and science using agriculture as a basis for content, and business skills that tease out how to run a sustainable business. Other experiences might include internships in sustainable architecture and landscape design, veterinary tech training, the entomological study of insects at a research lab, or database programming and design that can help planners determine an appropriate future course of action based on projections and previous events. In each case a host institution is responsible for coordinating room and board for students, whether on premises or in neighborhood areas, and an advisor in the student's chosen area of focus is designated as a mentor for the duration of the program.

The specifics of the curriculum vary per student, but follow general guidelines established by the originator school and the host institution; long-term partnerships are encouraged to facilitate the program with a minimum of new administrative overhead. Credit is assigned on the basis of completed assignments and the completion of an independent study, which is approved by the advisor and a committee of applicable associated teachers with expertise in the subject area.

Scenario

Bruno checked his watch to double-check that he was on time; he hated the idea of making his host wait for him, since the main reason he was here was to help out during a busy planting season. This was his first **ecoXchange** visit, and he wasn't quite sure how it worked. Teddy had sounded awfully enthusiastic in their email exchanges leading up to this though, so perhaps he shouldn't be worried.

The door swung open to reveal Teddy, a solidly built man in his early thirties. After a quick confirmation that it was indeed Bruno, the man hauled him into the house with a welcoming slap on the back, telling him this was the best possible week to be here—not only were the delicata squash perfect this year, but the neighboring farm had just dropped off some incredible goat cheese. So after a morning showing him around the farm and an afternoon of harvesting the crops, they were going to eat like kings.

This all sounded pretty good... as his host gave him a tour of the working farm, Bruno reflected on the trail through nature that had led here in the first place. As a kid growing up in Portage Park, he had taken a certain amount of exposure to nature for granted; he crossed through it every day on his way to school, for crying out loud, not to mention the variety of activities and festivals housed in the park throughout the year. It hadn't occurred to him at the time that many people didn't have greenspace as a regular thing.

One of the coolest things, though, was the **Sister Park Partnership** with a park back in his grandfather's hometown in Poland. To mark the partnership, Portage Park had a rotating exhibit that featured information, photos and even video from its Polish equivalent. In fact, his family had gone to Poland on a trip when he was just a kid and they had made a point of visiting the sister park. He laughed, remembering that it had had an exhibit about HIS park, and what had thrown Bruno at the time was that all the labels and text were not in English; now it all made sense, of course. His

school had maintained a pen-pal relationship with students in a nearby Polish school, and he still had some of the letters his 5th-grade counterpart had written him decades ago.

He had continued his involvement with nature into high school by participating in an **EcoAbroad** semester his junior year. Bruno had always been a geek at heart, and his programming skills had come in handy working in that Canada Tech research lab for a semester. He's been pretty intimidated at first, working with a bunch of college students and professors, but he'd proven his skills early on by building a complex database query with relative ease and after that only got a bit of good-natured hazing about all the ways in which Canada was better than the US. By the end of the semester, which he'd also filled with forays into jazz guitar and the study of some nifty waterbirds that gathered near the campus on a regular basis, he felt he'd made some really solid additions to the climate change prediction software the lab was developing. Plus he'd made some good friends, some of whom he was still in touch with through professional conferences. In fact, he'd been meaning to call one of them about being a guest lecturer at a **Cross-Pollination Collaborative** (described in document) meeting in a few months. He made a mental note to do that as soon as he got back from vacation.

By now they were already at the free-range goat area, where seven goats eyed him greedily for food. Teddy was describing how to collect milk from them, did he want to give it a try? Bruno laughed nervously, pulled up a stool, and started to give it a go. He'd have to do some real planning to show Teddy the highlights of infused nature in Chicago, he laughed to himself; they may not have goats, but just wait until he got a load of the vertical farms...



Photo: © Rachel Cooper

Mark Your Mark

Connecting spaces throughout Chicago with nature.

Related System Elements:

ParkLife

I Spy Nature

Fulfilled Functions

- 99 Sense presence
- 100 Create experience
- 101 Sense reaction
- 102 Accommodate reaction
- 103 Return to baseline

Properties

- Fast track approval process for public space usage for public art projects
- Simple guidelines, resources, and space designations for natural monument creation.
- Participatory artifact creation
- Documentation stations for capturing photos, videos, stories
- Digital artifacts database (holograms, smells, audio, factoids, photos, stories, videos)
- Public and private artifact access channels

Features

- Facilitates active community participation in outdoors, creative activities
- Enhances visual interest and appeal of urban landscape.
- Brings urban cultural traditions and greenspace into a close relationship, furthering their interdependence.
- Offers creative outlet for energy often expended in vandalism.
- Facilitates digital documentation

Associated Design Factors

- 65 Activity did not fulfill user’s recreational expectations
- 67 Inadequate amenities
- 92 No place to archive

Discussion

“Make Your Mark” is a set of tools and programs that are intended to facilitate and increase the sense of ownership and involvement that people have with their local green spaces. It is also intended to encourage creative, outdoors activity for both individuals and groups. This system element offers opportunities for people to document their experiences to share both publicly and privately. It also creates opportunities for communities to enhance their urban setting with art and artifacts in a creative and attractive way.

The goal of the system is to infuse nature into the fabric of daily life for city dwellers. This infusion is a two-way street in that people should feel that they can exert some of their own creative energy in a green setting and have something to show for it. This speaks to some fundamental human urges of expression and an inclination to leave a mark as evidence of one’s passing through a space. This system element serves to guide and focus that energy, as well as engage people and facilitate the expression of these urges. It also helps to steer these same energies from a more destructive expression. Ideally, all of these things converge in the mind of the user towards a sense of ownership and a more custodial relationship towards green spaces.

Make Your Mark will seek to achieve these ends in a number of different ways. The emphasis will be on three major areas; digital or virtual mark making, structured mark making, and spontaneous mark making.

The digital mark making component will allow people to create virtual tags and “hang” them in a virtual space at an actual location. GPS technology enables the marking of a location in space and coordinating that with data in a virtual space. This can be photography, video, text, or any other content posted by the user. These “marks” can be created on-site, and viewed or managed remotely, through mobile devices, or at information access point (Versatile Signage).

Structured mark making is program based, and oriented towards the creation of art works in nature. This falls into two main categories; the natural and man-made. The natural focuses on the creation of art works in a collaborative way, in a natural setting and using natural materials available at hand. The goal is twofold in that it engages people in a creative group activity, and engages and familiarizes them with the outdoors in a new and interesting way.

The man-made mark making is an extension and facilitation of community mural creation and public art creation. Led by trained

Discussion, cont

artists and craftsmen these projects could be carried out by groups representing Chicago's diverse population. These projects serve to enhance the overlap of man and nature by extending positive visual evidence into each other respectively, and blurring the boundaries between the two. With content potentially incorporating nature motifs or concepts, they will serve to educate the participants and enlighten passer-by, as well as create a conceptual bridge between the natural world and the urban landscape.

The spontaneous component of this mix comes in to play with creation of areas designated for creative expression. These will take different form in different places. They are analogous to a sandbox, where people can have fun, express themselves, and the slate can be made blank with relative ease. In some instances, this could be a blank wall surfaced with self cleaning nanotechnology materials marked as a "paint me" wall; in other cases it could be more elaborate moveable installations that invite reconfiguration and rearrangement.

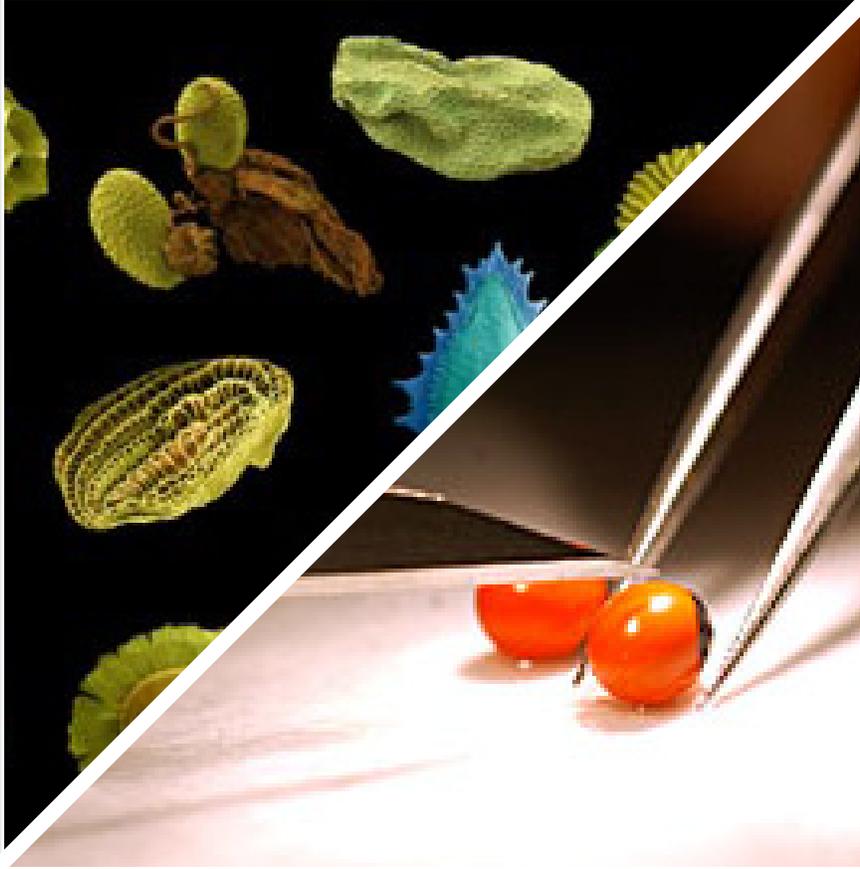
Ultimately, the goal is to increase the level of engagement in and with the natural world. **Make Your Mark** will bring what is urban into nature and vice versa, furthering the infusion of nature in the City of Chicago.

Scenario

It's a mild, early summer day. School let out a few weeks ago, and Michael, DuShawn, and Albert are all looking for something to do. Lately, they've been checking out the "paint me" wall down by the skate park on the lake shore to watch guys paint. There's a new wall there that legal to tag, so long as it's not obscene or gang related. It doesn't become a problem in any case, because the wall has become a center of attention for a lot of kids looking to show off their artistic skills. The guys love to check it out daily, because it goes every couple of days. It has also become an attraction, because artists are really able to spend some time on murals, now that it's above board

The three friends have known each other for their whole lives, and have gotten into the habit of doing some pretty serious joking with each other. While Michael is talking to Keia, a girl he's into, DuShawn tapes a piece of paper to his back reading "I VOTE BUSH!" On his back and takes a picture and tags it to the site. It's not until they return to that spot that they get a buzz on their mobiles and the picture comes up and they all bust up in laughter. Later, Keia and a couple of her friends pass some **Versatile Signage** where their mobile devices buzz, indicating that someone on their friends list has tagged the spot. They take a look at the picture and get a good laugh out of it. Walking further down the lakeshore, they wave to a group of friends that they know have signed up for an Art In Nature project. A local sculptor is leading them in the construction of seven foot tall statue of Lake Michigan fish. They're making it out of sand and stones that they've harvested from the lake bottom. They're getting pretty dirty in their work, but it looks like fun. Keia decides to get involved with the next project and accesses the **MetaCalendar** to sign up for the next project.

Source: "Seeds - Time Capsules of Life" by Rob Kessler & Wolfgang Stuppy



Seed Bank Research Center

A museum-like seed storage facility and research center open to the public for viewing, observation and education.

Related System Elements:

Urban Agriculture
Nature's Feelers
Cross-Pollination Collaborative
Greenways

Fulfilled Functions

- 1 Identify learners
- 2 Identify instructional goals
- 3 Create learning plan
- 4 Construct resources
- 5 Coordinate logistics
- 8 Articulate concepts
- 9 Facilitate discussion
- 10 Synthesize concepts
- 11 Direct to additional resources
- 12 Archive knowledge
- 19 Identify audience
- 20 Develop content
- 21 Leverage existing touchpoints
- 22 Establish new touchpoints
- 25 Keep content current
- 100 Create experience
- 104 Identify need

Properties

- Accessible facility
- Transparent processes
- Hub for research and innovation
- Center for learning and education
- Repository and safe-haven for seeds

Features

- Supports seed-related research
- Offers educational opportunities
- Protects and nurtures seeds
- Develops comprehensive research agendas to advance the understanding and development of crops, flora and fauna in Chicago
- Converses and shares data and findings with other research bodies
- Provides transparency into research

Associated Design Factors

- 3 Mixed educational goals
- 6 Difficulty finding resources
- 7 Conflicts of information
- 13 Lack of learner engagement
- 15 Resource information unrecorded/lost
- 16 Knowledge is siloed
- 82 Varied community goals
- 90 Unable to participate
- 94 Inability to commit to ongoing involvement
- 101 Element availability

Discussion

Seed Bank Research Centers public facilities that conduct in-depth analysis and research related to crop, vegetable, fruit and flora seeds to develop new growing, storage, and maintenance methods. Research processes and findings are displayed and exhibited for public review and education.

Seed Bank Research Centers (SBRCs), while highly functional in nature are designed to incite public interest and intrigue. Like most banks, the primary goal of the **SBRC** is to protect a handful of assets (seeds) from potential harm and risk, as well as to invest said assets in other projects in pursuit of great rewards and advancements. Unlike most types of banks, however, **SBRCs** function as open systems where people can observe center happenings and personally engage with the facility.

Seed banks exist for a variety of reasons: to protect seeds from catastrophic events like war, famine, and devastating natural disasters; to maintain biodiversity; and to preserve a living history of seeds that may no longer be produced or face near extinction. The purpose of **SBRCs** touch upon each reason slightly, but have their focus on creating a living history of seeds, in production or otherwise, and promoting research endeavors.

Simply put, seeds are not of particular interest to most lay people. Yet, the way in which scientists, horticulturists, researchers and ultimately an average city-person benefits from the study of seeds is of notable value. The goal of the **SBRCs** is to present seed-based research in a comprehensible, accessible and meaningful way that resonates with the public. For example, as the work of **SBRCs** continue to inform urban agricultural solutions, it is not difficult to draw connections between a city-person’s culinary experiences and the work of **SBRCs**.

To engage the public in a compelling way, **SBRCs** are designed and managed much like museums. Seeds and seed-based information are displayed in specially-designed installation and exhibit pieces which can feed into **MyNature**-supported handheld devices for review and reflection at a later time. Additionally, all **SBRCs** provide visual access into research labs in effort to bring to the foreground processes that usually remain behind closed-doors.

SBRCs vary in size and project focus. Whereas a downtown **SBRC** may be working with a particular grain, a **SBRC** the town over may be studying a particular flora seed. It is in each focus area and domain of work that distinguishes and gives value to each center as city people experience individual and unique learning opportunities with

Discussion, cont

each visit.

As climate conditions shift and as the development of green spaces such as **Greenways** (described in document) and parks increases, **SBRCs** play a key role in determining the types of crops, flora and fauna that demonstrate compatibility with the local setting and environment. From this, city leadership, the private sector, neighborhood communities, etc. are able to make informed choices surrounding greening solutions.

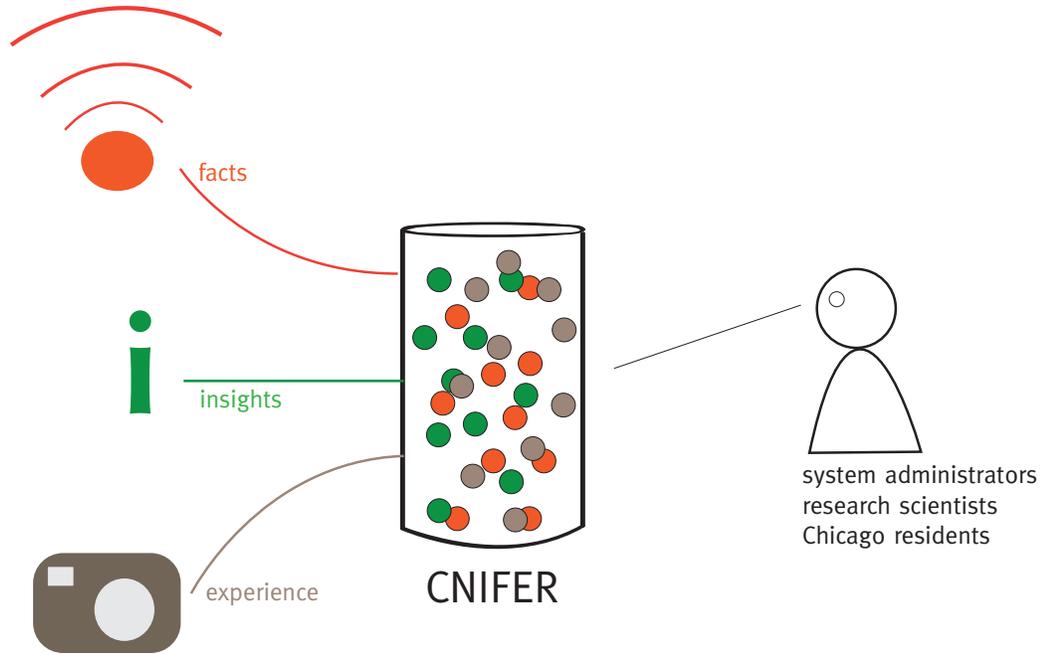
Findings originating from **SBRCs** are also shared with Link Tanks from the **Cross-Pollination Collaborative** to inspire and learn from cross-disciplinary thought and expertise.

Scenario

After having spent several months doing research in a small Daffodil **SBRC** in a Wicker Park neighborhood, Natasha was interested to see what other **SBRCs** in her area were working on. A friend from one of the **Cross-Pollination Collaborative** Link Tanks she's worked with told her about an **SBRC** doing some interesting work with fruit engineering.

The next morning Natasha traveled through a **Greenway** to Fruit SBRC to learn about their research agenda and upcoming projects. As she entered the facility, she was immediately drawn to the glass box in which the researchers and scientists were excitedly collaborating and discussing key findings from the morning's exercises. As Natasha peered in she noticed dissected fruits and next generation hydroponic growing systems. Fascinated by her experience thus far, Natasha wanted to learn more. She followed a voice emanating from one of the installation pieces and took a seat on an adjacent bench. Realizing how much her recent work overlapped, as she too was studying reproduction and cross-pollination, she quickly took out her mobile device to record and feed the information to a **CNIFER** database (described in document) stationed at the Daffodil **SBRC**.

Natasha proceeded to spend the better part of the afternoon browsing and grazing through the colorful exhibits and installations. As she left a **SBRC** member handed her a seed with instructions explaining how to plant and grow her own fruit. She thanked him and continued on her way.



CNIFER

(Chicago Nature Insight, Fact and Experience Record)

An integrated database for all things nature, accessible by the public and used to aggregate data to predict trends based on prior insights and events.

Related System Elements:

- | | |
|---------------------------------|---------------------------|
| Gather and Grow | nature.edu |
| Green you can believe in | Nature's Feelers |
| Green Conversion | Maker Your Mark |
| Cross-Pollination Collaborative | Seed Bank Research Center |
| CEAS | |

Fulfilled Functions

- 3 Monitor system components
- 4 Establish response needs
- 5 Evaluate data
- 12 Archive knowledge
- 35 Assess events
- 36 Signal significant system changes
- 37 Aggregate system data
- 38 Evaluate data
- 41 Determine action
- 44 Survey progress
- 46 Receive alert
- 47 Interpret data
- 52 Plan long-term response
- 53 Archive knowledge
- 66 Document experience
- 78 Facilitate sharing of experience
- 79 Archive experience

Properties

- A tagged database of city-wide environmental data
- A fact module that maintains data gathered by **Nature's Feelers** about the biological health of public green spaces.
- An program that aggregates data and sends alerts when pre-determined thresholds are passed
- An insight module that records both local and global events, the actions taken and outcomes.
- A semantic news crawler that collects information about global environmental events, their precursors and event response actions taken
- An interface to receive information entered by system operators about local environmental events, their

Features

- Receives information gathered from Nature's Feelers, news crawlers, users and system operators
- Sorts and tags information received
- Determines when information exceeds thresholds or reaches critical junctures
- Communicates with other system applications
- Facilitates the creation of new data mining schemes
- Allows for residents to store and access personal data
- Accesses global information concerning environmental response

Associated Design Factors

- 16 Knowledge is siloed
- 40 Symptoms of larger problems exist in multiple domains
- 43 Observed system needs aren't reported by users
- 45 Data too diffuse for quality aggregation
- 47 No clear course of action emerges
- 54 No means to determine best resources
- 56 Insufficient resources: people and tools
- 57 Uncertain of long-term plan
- 58 Insufficient or misinterpretation of data
- 57 Uncertain of long-term plan
- 59 No way to document findings/knowledge
- 80 Forgot where you were before
- 92 No place to archive

Discussion

As the cost of information continues to approach zero and the rate environmental and social change increases, facilitating the storage and use of data to provide meaningful insights will become increasingly important. CNIFER is an integrated database for all things nature that codifies nature data to allow easy access by the public and private sectors and aggregates all forms of information to assist in data prediction. Composed of three modules: Insight, Fact and Experience, CNIFER captures happenings in nature on both a personal and organic level and associates these with information and insights about past local and global occurrences.

Information within a city is often spread across multiple departments and stored in databases that do not communicate with each other. Unfortunately, environmental change signals are not distributed amongst geographies and departments, and a single department does not oversee a record of all ongoing changes. **CNIFER** overcomes this problem by aggregating information about natural spaces in Chicago and across the globe in a centralized database. Using this data, **CNIFER** helps public and private sectors understand the current state of Chicago's natural spaces, anticipate changes, and learn about event response best practices. Information can be selectively accessed to provide a more specific view of the system, or can be mined by researchers to look for new trends across data sources, locations and time.

Components of the system

CNIFER Insight Module

Our current era is often described by an increased access to information and an accelerating rate of change. On the positive side, this means we know more about the factors that influence a city and gain insight into the most effective ways to respond to events. While this access to information should facilitate improved event response and continued learning, navigating the vast body of information to find and implement successful practices is increasingly challenging.

The **CNIFER Insight Module** will aggregate data related to environmental research and programs. The insights that feed this module will come from three sources: First a semantic interpreter will scan newsfeeds and journals to search for events and programs deployed around the world. These stories will be automatically tagged for easy reference. The second source of insights comes from research and programs conducted within the system. Operators and researchers will tag events and describe the process and results of their approach. The third source will come from **CNIFER** systems in other cities, which also maintain and archive of events and responses that have occurred

Discussion, cont

within their systems.

CNIFER Fact Module

The **CNIFER Fact Module** collects data about the state of the Chicago-area green spaces. The fact module receives information gathered from **Natures Feelers** (described in document) to understand the state of the of the Chicago environment. This information will be tagged with time and location to facilitate trend analysis. The **Fact Module** includes programmable thresholds that allow the system to determine what information to promote to specific departments for action - for response both by those within the nature department as well as city emergency response personnel. These thresholds will be initially set based on analysis of the **Insight Module** and will be easily updated as new system data is added and analyzed.

CNIFER Experience Module

The final **CNIFER** Module pertains less to system infrastructure and more to the green space-user experience. The experience module allows events to be archived and accessed by the Chicago community to maintain a record memories and information about Chicago at a period in time. Recording stations within green spaces (**Make Your Mark** described in document) or users' personal recording devices will send photos, video, and sounds to the **CNIFER** database - and this multimedia will then be utilized by the **Experience Module**. The **Experience Module** serves three roles: For the user it provides storage and access to past events and memories. For the historian it provides an archive of city spaces, events and the people who lived here. For the system operator, it offers insight into how the system is being used as well as alternate perspectives through which she can understand system health.

Scenario

Cassie works in the **Green Conversion** department, making decisions about the design of new green spaces within the city of Chicago. The city has recently reclaimed four adjacent lots on the far south side and it is Cassie's job to develop some initial plans for what the park could look like to take to a community meeting for feedback.

Cassie first checks the **CNIFER Fact Module** to get soil data from these plots and determine the level of remediation necessary for the soil to support plantings. As expected, the prior development of these plots has left the soil with high levels of heavy metals, including lead. Cassie knows that this will have to be fixed before green development of the plots can begin. To figure out the best approach to soil remediation, Cassie accesses the **CNIFER Insight Module** and searches for "Remediation" and "Lead". She sees a report written by the parks system in Hamburg, Germany about the use of sunflowers as a phytoaccumulator that draws the heavy metals, including lead, out of the soil and into the roots of the plant. Cassie gathers the potential remediation solutions and their time frames to present to the community.

Cassie then pulls together her ideas for what role the park could play in the community once it has been remediated. She checks the **CNIFER Experience Module** to see what has been going on in existing parks in this neighborhood. Looking through pictures and videos she notices that there are often teams waiting to play on the soccer fields and that the work colonies are generally full. Returning to the Insight Module, Cassie looks for other parks that have integrated work and play spaces. She notes a comment on the need for more clean hubs and dual space locations and the use of greenways to define a boundary between work and play. With this information gathered she begins to draft her plans for potential ideas to take to the community.

Photo: Jerry Pos



Gather and Grow

Event response application that draws upon current data points and knowledge gained from past events to help determine appropriate action.

Related System Elements:

- CNIFER
- Cross-Pollination Collaborative
- Nature's Feelers

Fulfilled Functions

- 37 Aggregate system data
- 38 Evaluate data
- 39 Determine action
- 46 Receive alert
- 47 Interpret alert
- 48 Establish response needs
- 51 Evaluate data
- 52 Plan long-term response
- 53 Archive knowledge

Properties

- Application accessed by system workers
- Connection to **CNIFER** fact module
- Program for identifying critical system events and trends
- Filter of **CNIFER** insight module to produce potential solutions to a current event
- An algorithm for sorting potential solutions to identify which is most applicable

Features

- Receives information about system health
- Identifies and alerts operators to critical system events
- Offers solutions and key insights based on past analysis
- Modifies with use and additional analysis

Associated Design Factors

- 45 Data too diffuse for quality aggregation
- 47 No clear course of action emerges
- 52 Cannot receive alert
- 54 No means to determine best resource
- 57 Uncertain of long-term plans
- 59 No way to document findings

Discussion

Gather and Grow is an event response application that draws upon current data points and knowledge gained from past events to help determine the appropriate actions to be taken.

Gather and Grow is an event response and adaptation application that helps the city understand current events and determine the appropriate course of action. The **CNIFER** Fact Module (described in document) is used to understand the current state of the system. **Gather and Grow** is a set of programmable thresholds that determines when a significant environmental event is occurring within the Chicago environment. Once these thresholds are passed, system administrators are supplied with the data from the **CNIFER** Fact Module about the current environmental state. **Gather and Grow** uses this data to search for similar events and event response in the **CNIFER** Insight Module.

The system administrator uses **Gather and Grow** to understand the scope of problem and draw upon research and prior events to determine an appropriate course of action. This immediate access to research and precedent allows the system administrator to tap into

After taking actions, the system administrator documents the actions taken, the successes and challenges, links this to the initial **CNIFER** facts and current **CNIFER** facts, and enters this information into the **CNIFER** Insight Module.

Scenario

Jim, a neighborhood Green Space Ranger, receives an alert from the **Gather and Grow** program that three oak trees in the Andersonville neighborhood are showing a response associated with a gypsy moth infestation. Along side this alert, the program provides Jim with recent approaches to containing and trapping the gypsy moth before the infestation spreads to other trees. He notices a new bug band system was deployed in Maine that was effective at preventing the moths from moving to other trees, while a trapping technique in Ontario successfully removed the moths from infested trees without incurring long term damage to the tree. He decides to implement a dual attack, using each of these approaches in conjunction with each other.

Three weeks later, Jim is pleased to see that no other trees in the Andersonville neighborhood have gypsy moth infestations. One of the originally infested trees did not recover from its infestation and had to be removed. Jim notes these results and the additional steps taken to battle the moths in the fallen tree and creates a new reference for the battle against gypsy moths.



Youth Leadership Initiative

A platform for getting youth involved at a high level in nature-related learning, planning, programming, and decision-making.

Related System Elements:
nature.edu

Fulfilled Functions

- 1 Identify learners
- 2 Identify instructional goals
- 4 Construct resources
- 5 Coordinate logistics
- 6 Appraise learner knowledge level
- 7 Gauge learner needs/wants
- 8 Articulate concepts
- 9 Facilitate discussion
- 10 Synthesize concepts
- 11 Direct to additional resources
- 12 Archive knowledge
- 16 Supply feedback

Properties

- Inclusive of mid-elementary through high-school youth
- Structured, activity-centered modules based on nature-centric topics
- Dedicated agriculture curriculum
- Main 'campus' for agro development
- Mentors from ecological science, forestry, agro fields
- Partnerships with additional entities (e.g. Brookfield Zoo, Morton Arboretum and forest preserves)
- Planning program to contribute youth expertise to programming and exhibit development
- Occasional scheduled meetings across all involved youth for joint collaboration and bonding
- Scholarship opportunities for youth who may not otherwise have access to higher education

Features

- Assists in getting youth interested and involved in nature through hands-on activities
- Connects to formal CPS curriculum to provide school credits
- Leverages naturally-existing civic pride in younger generations
- Provides structured participation and leadership for young people at high levels of decision-making
- Facilitates incorporation of youth-oriented exhibits and programming in existing organizations
- Creates youth-oriented new programs in non-traditional environments
- Organizes "leadership days" in which involved youth provide programming for friends and family
- Uses nature as a basis for curriculum-based learning science, math, literature, reading, writing, and city planning

Associated Design Factors

- 1 Mixed learner group
- 2 Uneven learner/teacher ratio
- 3 Mixed educational goals
- 8 Asynchronous learners
- 9 Varied learner knowledge/needs
- 11 Limited opportunities for learning
- 13 Lack of learner engagement
- 16 Knowledge is siloed
- 21 Feedback requires additional information
- 82 Varied community goals
- 84 Lack of community interest
- 88 Lack of incentive to take responsibility
- 94 Inability to commit to ongoing involvement
- 95 Difficult to establish metrics for success
- 98 No follow up after individual event or engagement

Discussion

The Youth Leadership Initiative is a platform focused on including Chicago area youth in nature-related learning, planning, programming, and decision-making to supplement traditional school curricula. This program partners with existing organizations to identify where the younger generation’s voice may be valuable and is currently lacking, creating both structured programs and networked webs of activity to harness naturally occurring activities.

The **Youth Leadership Initiative (YLI)** is a program that functions as a kind of urban 4H, providing means for young people to participate in decision-making related to nature and environmental domains. In so doing it serves two functions: the **YLI** allows youth to participate in activities to which they might not have access, and also helps to ensure appropriately youth-focused programming and plans by including them in the process. By engaging city youth in nature-related activities, **YLI** bridges school, family, and community while also teaching broadly applicable skills like curriculum planning and fundraising, as well as hands-on skills.

Youth can participate in a variety of ways, depending on their age, interests, and abilities, through partnerships with existing nature organizations such as the Brookfield Zoo, Morton Arboretum, and forest preserves. The program supports involvement from junior high through high school aged kids, inclusive of public, private and home-schooled students, allowing participation in multiple levels of involvement, including:

- curriculum programming, in which students join education departments within existing organizations to develop exhibits and education directly aimed at young people through reviewing concepts, proposing projects, suggesting and developing alternate touch-points and youth-specific partners, and connecting fellow students.
- user experience development, in which kids test works-in-progress through hands-on exploration and design development
- behind-the-scenes training, where youth get experience with the actual workings of organizations through interning with existing departments

Highly motivated students can also join the Youth Advisory Board (YAB) to participate in city-level decision-making for parks with and without current educational programming. Through YAB, 8th to 12th graders can participate through renewable 2-year terms and meet with an executive programming board to ensure a youth-oriented voice at high levels of planning.

Discussion, cont

Components of the system

Park Leadership Days

Park Leadership Days allow youth who have participated in exhibit programming to invite friends and family for special events and interactions. In some situations these may be conducted as private events during which the park is closed to outside guests to allow a greater degree of attention to areas of interest, while others may be part of regularly scheduled hours.

In conjunction with rangers, youth lead and run programs related to nature and/or animal exhibits. A similar dynamic can be set up in less formal settings like the forest preserves where there may not be a formal education programming department or process, in which youth can develop and promote independent projects with the assistance of park personnel. In either case, invitees can participate as audience members or as participants; for example, youth could do wetlands research at Volo Bog, create signage and exhibits, then lead tours through the environment acting as experts for topics that they have studied.

Model U.N.ature

The **Model U.N.ature** program is similar to model UN, in which student participants learn about current and future environmental policy, urban planning, collaborative discussion, and communication strategies. Through pre-assigned roles and concept development, students simulate a discussion in which high-level policy decisions and down-to-earth planning models are articulated, ideally arriving at solutions that combine benefits to individuals, the environment, and civic institutions while remaining mindful of real-life constraints of development and economies. This yearly event is intended to expose youth to multi-dimensional problem-solving approaches, as well as facilitate and foster existing perspectives on nature through a high social structured interaction.

YLI Scholarships

Through participation in the **Youth Leadership Initiative**, select students who have shown high levels of achievement and promise or who might not otherwise be able to attend university-level education can apply for scholarships that provide funds in exchange for the commitment to a nature-related program of study. Applicable subject matter is intended be wide-ranging across a variety of subject domains, from traditional forestry programs to scientific involvement inspired by urban agriculture, cartography, landscape design, or other sustainability-related topics.

Scenario

Fran waited until it was her turn to speak, full of verve and gumption; although she's been a member of the **Youth Leadership Initiative** since the 7th grade, this was her first **Model U.N.ature** event. Each time a new student took the floor to introduce the topic at hand, her mind flew to how she could counteract or build on their arguments, wanting to ensure that she'd be able to confidently describe her team's position as well as cover the bases introduced by some of the others. She wasn't nervous, exactly, but she had to admit she was looking forward to chatting with new friends at dinner tonight without having to worry about time limits and the logic of her arguments!

She thought back to how this all started... had it really only been three years ago that she joined the **YLI**? It was her science teacher, Mr. Burns, who had suggested it after her science fair project about returning indigenous prairie plants to a park in her neighborhood had won 2nd place statewide! At the time, Mr. Burns had mentioned noticing her enthusiasm for nature and her comfort with taking on leadership roles—she had, after all, started the Student Mentors club at school that provided older students with means to coach younger kids by leveraging their personal interests as subject matter—and he had suggested she get involved with the **Youth Leadership Initiative** as a way to get her opinions heard.

She had been somewhat familiar with the group, since her best friend Susan's older brother Marty had been heavily involved before graduating from high school last year. He had worked a great deal with the Morton Arboretum, and described how cool it was to actually participate in decision-making about what kinds of programs teenagers would respond to. "You can see it in their eyes and the way they treat you," he had told her, "they really want to know your opinion. It's not just about saying 'I talked to young people'—I could tell they were genuinely excited about what I had to say and how it could reach other youth."

She remembered him mentioning a **Park Leadership**

Day event he had co-designed that used the arboretum for a skateboard workshop followed by an afternoon of using park areas for temporary ramps. The board had been pretty skeptical at first, worried on the one hand that it would be hard to manage, and on the other that the combination was a mismatch that was destined to fail. But Marty had won them over by explaining how he knew a bunch of students who spent their time after school on skateboards already, and this was a way to get new faces familiar with the Arboretum. By hosting an event and positioning the park as a place where all sorts of activities took place, they might be able to attract youth who would never have otherwise come out there and instill some longer term interest. Sure enough, several folks had approached Marty at the time, saying it felt different to skate in a non-urban environment and that the surroundings had inspired them to find reasons to come back and check out the rest of the park. In fact, the event had been so successful they were hosting another one this spring.

Fran smiled at the memory. The focus of her experience had been a little different, collaborating with the park rangers to set up a modular stage area in the park, built from reclaimed wood, that could serve as an open-air stage and revert to a shelter when not in use for performances. Her school theatre department had staged a bunch of shows—A Midsummer Night's Dream had been her favorite—and she always felt her best performances were inspired by the chance to perform live outside.

Speaking of performing! She was going to have to state her piece on the **Model U.N.ature** floor pretty soon and was starting to get a little excited at the prospect. This year's topic was climate change; her team was taxed with exploring how new technologies could help with natural restoration capabilities. They had done a vast amount of research over the course of the semester and had come across some really fascinating ideas... it sure wasn't just about green roofs anymore.

She realized that the concept of combining technol-

Scenario, cont

ogy with nature goals had begun to appeal to her more and more as she started to think about colleges in the past year or so. University of Wisconsin had that great agriculture program and all, but she was really excited by Cornell University's College of Agriculture and Life Sciences. The combination of hands-on opportunities and a rigorous course of Environmental Studies sounded dreamy, just what she was looking for. Fran made a mental note to look closer in the **YLI Scholarship** program when she got back. Her current teacher, Ms. Barnscomb, had already offered to write her a recommendation, which was huge. This might be the difference to get her into Cornell...

Photo: <http://artfaircalendar.files.wordpress.com/2008/02/art-n-apples.jpg>



Cultural Park Development

Means to incorporate cultural and immigrant experiences and activities in local parks + communities

Related System Elements:

- Greenways
- I Spy Nature
- Youth Leadership Initiative
- Make Your Mark

Fulfilled Functions

- 55 Identify locale
- 56 Organize participants
- 59 Secure activity space
- 60 Gather participants
- 61 Establish activity parameters
- 62 Commence activity
- 66 Document experience
- 67 Plan future activities
- 82 Determine community goals
- 83 Gauge interest
- 84 Coordinate resources
- 92 Archive experience
- 93 Share experience
- 94 Encourage ongoing involvement
- 100 Create experience

Properties

- City-level organization to provide ongoing support with flexibility for specific language and cultural needs
- Opportunities for private sector involvement in various forms
- Natural amphitheaters and other landscape features conducive to cultural events
- Awareness campaign to encourage involvement.

Features

- Facilitate development of installations in local greenspaces that support community cultural experiences and activities.
- Coordinate events in which neighborhoods compete for development resources by their participation in “green” tasks.
- Continue and expand cultural events and programs that take place in green spaces and outdoors.
- Provide organizational frameworks for communities to create custom made local parks-based cultural programs

Associated Design Factors

- 67 Inadequate amenities
- 70 Poor awareness of events in the future
- 82 Varied community goals
- 84 Lack of community interest
- 86 Unable to identify participants beforehand
- 88 Lack of incentive to take responsibility
- 90 Unable to participate (e.g. disability, special needs)
- 91 Difficult to collect feedback/monitor progress during event

Discussion

This is a set of programs and events designed to increase the level of community involvement with local surroundings, as well as foster a custodial relationship with the natural environment. This system element also works at the city wide level with broader series of programs and events. The goal is simultaneously to enrich the city's cultural life at the neighborhood/community /city level, as well as engage people in outdoor activity.

Cultural Parks Development (CPD), at the neighborhood, or small park level, is designed to foster a custodial relationship between green space and the people living around it. It is meant to increase a sense of ownership and pride, and increase the level of engagement that a community has with its; local green space. At the city wide level, the **Cultural Park Development** is an extension and expansion of existing events and programs that draw people into park space.

At the city level, **CPD** is an extension and expansion of the events and programs that the city already has in place. It will be a continuation of that effort and continue to bring world class entertainment of all kinds, with varying levels of.

At the neighborhood level, **CPD** will give communities the opportunity and tools they need to customize their local park to their culture and usage. Tools will also help people create digital documents that will be attached to their green space. Interactive information tools will offer a variety of capabilities. For example, people will be able to document their experiences in the park and attach the digital media to the location in virtual space. Communities will be able to use these tools to post notices and share ideas and media across the entire community. In this regard, the park serves as the focal point of a community and its internal cultural life and communications.

The information tools will take on resonance when communities have a reason to use them, and view their park as the center piece of their cultural life. Through awareness programs, community outreach, and neighborhood parks project funding, **CPD** will aim to pull communities together around their parks, engaging them with their green spaces and with each other.

Scenario

Juan and Marina live in a neighborhood on the northwest side of the city. They have just bought a single family home on a quiet street. It's a fixer-upper, and all they were able to afford for their first home. They're hoping to do the remodeling themselves, but they plan on staying a while, so they have some time. They are very interested in getting to know their neighbors, and really like the idea of getting to know their community, but have no idea how to do it. The two of them have taken to going for walks in the early evening after dinner.

One of the things that sold them on their new house was that it sits right next to a **Greenway**, and only two blocks away from their house. Juan can walk from the transit station to the park, to home without having to dodge a single car. In the course of taking their walks, Juan and Marina, have enjoyed occasionally sitting in the local park and people watching. People are friendly, and after Juan took a picture of the two of them in the park, and posted it in the digital community scrapbook, people were more forward in striking up conversations with them.

Not long after, they've made some friends in the neighborhood that they see around the area regularly. They've found out about a "day of the dead" celebration taking place in the park that's family friendly and have decided to help with the preparations and decorations. Juan and Marina don't have children yet, but hope to soon. Following the parade, they use their mobile computing devices to access photos of themselves taken by other people, tagged to that specific location and posted online. They've done the same with photos they've taken of other people. Juan and Marina are pretty sure they can get used to this neighborhood.



Photo: photos.com

Green You Can Believe In

Easy engagement to provide ongoing time or money involvement with nature-related initiatives.

Related System Elements:

- CEAS
- CNIFER
- Cultural Park Development
- myNature

Fulfilled Functions

- 17 Assess messaging opportunities
- 18 Establish scope
- 19 Identify audience
- 20 Develop content
- 21 Leverage existing touch-points
- 22 Establish new touchpoints
- 23 Coordinate release
- 24 Disseminate message
- 25 Keep content current
- 82 Determine community goals
- 83 Gauge interest
- 84 Coordinate resources
- 85 Inform participants
- 86 Communicate goals
- 87 Delegate responsibilities
- 88 Provide materials
- 89 Encourage participation
- 90 Accommodate feedback
- 91 Assess progress
- 92 Archive experience
- 93 Share experience
- 94 Encourage ongoing involvement
- 95 Publicize outcome
- 96 Communicate participant impact
- 97 Assess success

Properties

- Organization to manage Green Nature fund
- Financial back-end that can move funds from individual account to a Green nature fund
- Partnerships with ongoing initiatives or organizations to establish specific programs to fund
- Mechanism (e.g. website) to allow users to see what programs are available and where their funds are going
- Means for publicizing nature initiatives to an interested audience
- Partnerships with existing nature organizations to provide special program member benefits like free admission, previews, etc.
- Organization for identifying + developing neighborhood leadership
- Mechanism to facilitate information transfer regarding local expertise (working with CEAS)
- Ongoing initiative to support local communities in developing their area greenspaces

Features

- Allows easy access and updating to target programs
- Provides ongoing feedback about amount of money and progress of funded initiatives
- Creates visualizations for individual/community input into the program
- Connects to other eco-friendly programs (i.e. recycling) to amplify potential savings
- Develops and trains expertise related to volunteer coordination, grant-writing, planning and development, planting, outreach, and neighborhood watch.
- Identifies target demographics and create outreach to increase meaningful involvement
- Identifies funding sources and partnerships to extend capabilities at manageable costs
- Creates and publicizes short- and long-term plans that allow residents to participate at multiple commitment levels
- Connects kids, adults, families to outreach programs, training opportunities, and informal education

Associated Design Factors

- 6 Difficulty finding resources
- 13 Lack of learner engagement
- 24 Missed/unknown messaging opportunities
- 27 Unaware of existing touch points
- 34 Future resource needs can't be measured
- 82 Varied community goals
- 84 Lack of community interest
- 86 Unable to identify participants beforehand
- 87 Individual goals or tasks unclear
- 88 Lack of incentive to take responsibility
- 94 Inability to commit to ongoing involvement
- 95 Difficult to establish metrics for success
- 96 Difficult to collect participant feedback
- 97 Difficult to measure individual participant impact
- 98 No follow up after individual event or engagement

Discussion

Green You Can Believe In provides easy engagement through time or financial involvement with nature-related initiatives. Participants can sign up for a program to round up the change of everyday purchases as a hassle-free contribution to a Green nature fund, or contribute via grass-roots, bottom-up organization to grow, develop, and coordinate existing interests and skills related to nature in their own communities.

As cities become increasingly dense and heavily populated in the next century, it will be progressively more important for communities to establish a self of self and shared purpose. Green You Can Believe In leverages the inherent capabilities of existing neighborhoods and individuals to train, foster interest, and encourage participation in nature-related activities that affect the everyday lives of Chicago residents. In doing so, the program promotes a sense of community, through coordinating involvement in a variety of activities, including greenspace planting, trap-neuter-release and kitten fostering programs for feral cats, or snow volunteers to clear snow. By building on pre-existing behaviors, **Green You Can Believe In** spreads the benefit beyond individual initiatives further into neighborhoods and creates a web of local expertise.

Rather than using a top-down approach that designates leaders, but frequently leaves talented volunteers under-utilized, this program uses successful community organization as a template to make best use of the skills and enthusiasm of its members. Its goal is to allow people to rise to their level of expertise under a common goal, instilling a sense of ownership and participation. In partnership with **CEAS**, which provides formal organization and training where necessary, **Green You Can Believe In** supports initiatives through a strong volunteer network.

This can happen in a variety of ways, to best suit the range of interests and availability that exists in a community. Financial contributions, leveraged expertise through continuing education and training, and hand-on participation are all equally valuable means to supply support. Initial participation may be either formal, through membership in existing organization, or informal, through low-key exposure to nature-related activities on a casual basis. As individuals express interest and aptitude, they can be trained in more concrete roles that can include:

- nature experts (who can be called upon to offer planting advice for residents' gardens, for example)
- volunteer coordinating
- membership + donations/grant-writing
- planning + development

Discussion

- outreach and partnerships with other existing organizations
- ‘eyes and ears’ of neighborhoods to see what needs doing
- animal care

Through partnerships with existing organizations, **Green You Can Believe In** members can also access resources with preferred status or at reduced prices; individuals who trap feral cats to bring down the population, for example, can coordinate with local vets for reduced or free spaying and neutering. In a more informal way, **Green You Can Believe In** provides an infrastructure for bartering of skills, in which a community member who has had success with composting shares their stories in exchange for maintenance advice. Through the online site, members can search members for particular expertise and volunteer their own.

Components of the system

Green for Green

This financial service provides ongoing small-scale donations to nature-related initiatives by allowing participants to join a program that automatically rounds up change from everyday purchases and contributes the change to a Green nature fund. Although each donation is incremental and small, the system benefits from common pre-established behaviors and thus takes the burden off of potential donors to manually make a yearly donation. Ultimately, funds combines with community-wide ‘green for green’ contributions to fund local environmental projects.

A related program, created in conjunction with the City of Chicago, allows participants to contribute money saved from recycling to the **Green for Green** program. This can be done on an individual or building level for multi-unit structures like condos. By automatically converting behavior into contributions, the barrier to entry is significantly lowered.

Micro-Nature Funding

A second financing and development model is built on the concept of micro-lending, in which donors can choose to donate money or resources to projects in which they feel a personal investment. Rather than receiving interest and repayment on a loan, donors receive public recognition for their contributions through status updates about programs or events that have benefitted from their donations.

Green Reserves

Contribution does not have to come in a financial package. The **Green Reserves** are made up community members who commit to commitment to twice-a-year training and on-call emergency status for access to desirable system resources and stock for personal use. These volunteers work closely with **CEAS** for initial training, and serve as an important line of defense against unexpected nature-related situations like flooding or severe weather that will only become more common with ongoing climate change.

The importance for this kind of community-level engagement is all too evident in the wake of Chicago’s notorious 1995 heat wave, during which over 700 individuals, mostly poor or elderly, died due to isolation, a lack of human connection to individuals at risk, and overwhelmed infrastructure. In the aftermath, most deaths were traced back to simple social mechanisms—like checking in on isolated individuals and spreading accountability for neighbors across the community—that simply failed at the worst possible time. The **Green Reserves** are intended to combat both human -scale and natural disasters by creating a dedicated front line in these situations.

Bite-Sized Contributions

Sometimes opportunities to help are lost simply because information is hard to attain. **Bite-Sized Contributions**, a collaborative online tool housed by **CEAS**, allows members to post, find and participate in small-scale joint ventures by identifying common needs and interests that can be made easier or

Discussion, cont

more effective through piggybacking. An example is a recycling club that rotates responsibility for collection among members, thus requires a fraction of individual members' time while accomplishing the desired end goal.

The tool also offers suggestions for small but helpful activities that can be done in your home or local neighborhood by providing answers to the question "I have 30 minutes right now—what can I do?" Through GPS locators, the service can pinpoint a user's position and immediately indicate what activities are going on right now nearby, or suggest small ongoing initiatives to get in a habit of participation. Sometimes these are as simple as helping an elderly neighbor mow their lawn or shovel snow, while at others are part of more organized initiatives to clear invasive buckthorn from choked wooded areas.

Scenario

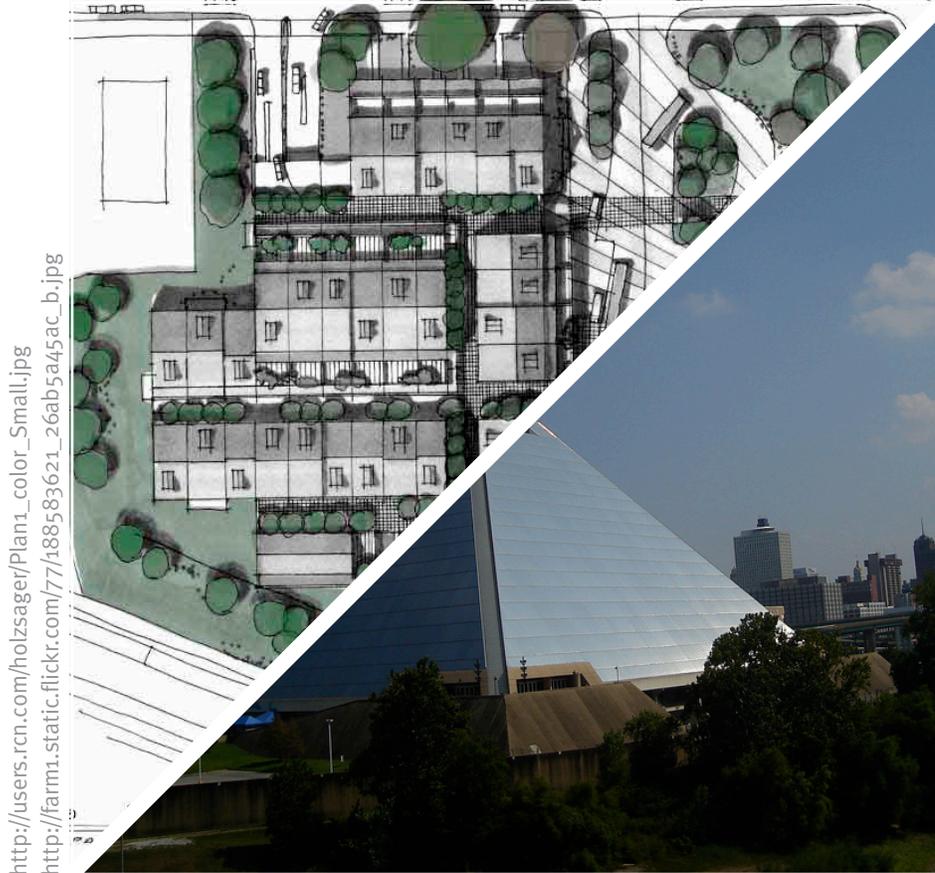
Bob brought in the last of the kittens—this was a feisty group! He'd been volunteering for the Trap-Neutral-Release patrol in his neighborhood for a year and had gotten the hang of trapping; by now the vets at the low-cost clinic recognized him and sometimes gave him a hard time, saying at the rate he brought them in he was halfway to clearing out the cat population of Chicago. He exchanged a hearty wave as he headed out the door, confirming he'd be back in the evening to pick them up after surgery.

It was a beautiful fall day and he figured he had some time before he had to be back home; he had nothing else planned so he checked his mobile device for **Bite-Sized Contributions** see what small tasks might be in need of help this morning. Honing in on his location just south of the loop, the map indicated three current activities that could use volunteers: there was a harvesting party at one of the local community gardens, seed-scattering in Nichols Park Wildflower Garden Park, and butterfly monitoring along the Burnham Prairie Path. All sounded fun, but he had harvested a few weeks before, and his wife Flora would kill him if he did butterfly monitoring without him—she fancied herself a bit of an expert lepidopterist. The Nichols Park Wildflower Garden was not far, just down in Hyde Park, and he thought that strolling through wildflowers might be just the thing for a pleasant day. Plus he'd been known to do a little seed scattering in the form of guerilla gardening as a youth back in the day, which made this task pleasantly nostalgic.

Before heading off, though, he realized he was going to need some cat food for his temporary feline boarders after he brought them back home to recover for a few days. He pulled his electric car quickly into the Pets R Us store and picked up a 20-lb bag of KittyKibble, charging it automatically with a quick swipe of his mobile device. He glanced quickly at the electronic receipt: \$17.06, it said, which meant a solid 94 cents of rounded-up change was headed to the **Green for Green** program. His contributions alone were probably going to add up to a couple of dollars by the end of the day, not too shabby for them, and way too easy *not* to do for him. He liked the

fact that donations were easy with this system, but he liked the fact that it paid for all sorts of nature-related stuff, like low-cost care for those alley cats, even more.

Entering the Park, he saw a troupe of volunteers already going about their business. Among them was Ed, an old **Green Reserves** friend. They had gotten to know each other well over the summer, which had brought on a number of floods—climate change was having its way with the water levels these days, that's for sure—when Bob and Ed had been on the on-call list to help with the aftermath of flooding in local neighborhood gardens. Really, there was nothing like standing thigh-high in mud, rebuilding erosion walls, to cement a friendship. Bob strolled over to catch up with Ed and get a hold of some of those wildflower seeds... he had some serious scattering to do.



Infused Nature Design Standards

Guidelines and goals for the architecture and development communities to facilitate the design, planning, and construction of “green” buildings.

Related System Elements:

- Outside/In
- I Spy Nature
- Make Your Mark

Fulfilled Functions

- 41 Determine action
- 48 Establish response needs
- 100 Create experience

Properties

- A set of guidelines, standards, and goals.
- Commission of public buildings
- Program of tax breaks and other financial incentives
- Highly public international design competition

Features

- Encourages the concept of infusing nature into the urban landscape through architectural design.
- Encourages the use of living materials both inside and out.
- Increases the self-sustainable functionality of buildings.
- Fosters the development of an architectural approach for the 21st century.

Associated Design Factors

- 37 Resources must be prioritized
- 41 Tools and materials need to be disposed of responsibly 99
No need identified
- 103 Infrastructure mismatch
- 112 Behavior interferes with human goals

Discussion

The system will attempt to affect a movement in approaches to architecture towards the ethos of nature infusion. The program will set out a series of guidelines, requirements and goals to the architecture and development community. The emphasis will be on materials, energy efficiency and generation, and the incorporation of living matter into buildings where possible. The goal is to encourage and facilitate the consideration of natural and the living into an overall architectural approach. The city itself would commission all municipal buildings to be designed to these standards. Various incentives would be offered to private concerns to design to these standards.

Architecture is the manifestation of human need, economic impetus, and public will. All structures, from single residence to skyscraper, are subject to codes, regulations, and guidelines. Public buildings especially, often scrutinized by the design and architecture community, as well as sitting prominently in the public eye, can represent the manifestation of collective will and public intention. Together, all of these structures serve as the set and stage of a city. How a city plans, mandates, facilitates, and fosters architecture has a dramatic effect on the life of a city. **Infused Nature Design Standards** seeks to leverage Chicago’s rich architectural heritage and continue Chicago’s place as a leader in urban design and architecture in a future where dominant concerns will be energy efficiency and generation as well as sustainable materials and methods. At this point in its history, Chicago has the opportunity to take a leadership role at a global level in setting the standard for urban design in an ever more populous, resource poor world. **INDS** expands and extends present day best-practice environmental design guidelines such as the LEEDS program.

INDS subtracts nothing from considerations embodied in the LEEDS program. It builds on LEEDS, and places an emphasis on the further use of living systems and structures, flora, and fauna, as design solutions for both aesthetic and functional purposes. The **INDS** system element sets out code, policy and guidelines meant to embody the infusion of nature into the built spaces of the urban setting. This element is an expansion of that concept in regards to an aesthetic and functional approach to how nature and natural materials are part of a building’s usage. These standards are not a mandate and do not seek to identify a single design solution. The idea is to encourage a style and approach that incorporates natural and even living materials into the fabric of structures.

At the roll out of **INDS**, the city could commission a series of public building to use as showcases for the program. The efficient functionality, aesthetic appeal, and increased inhabitant happiness

Discussion, cont

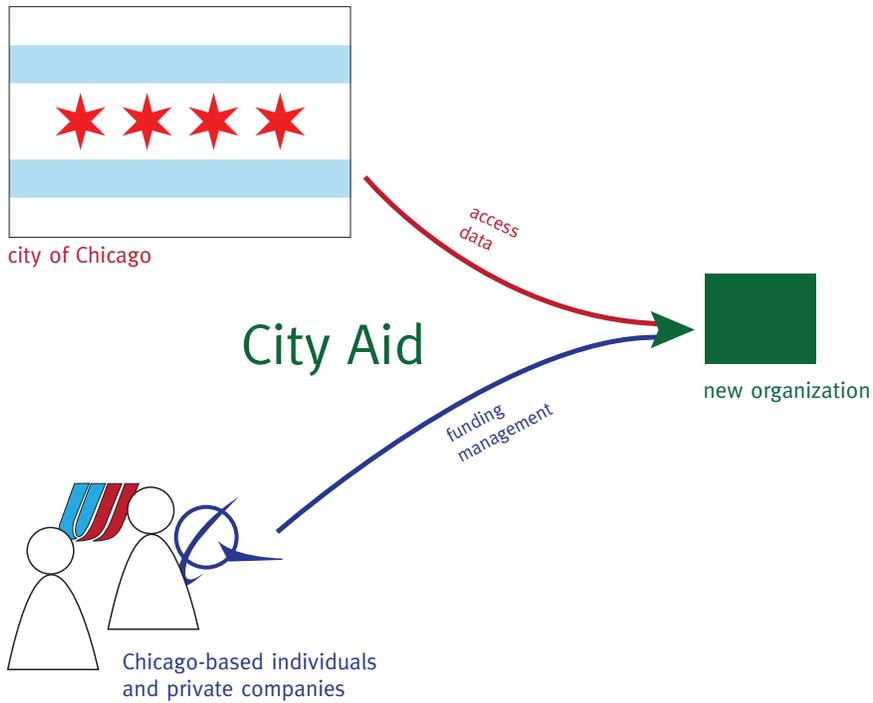
could serve as a model for other developers. Ongoing global competitive design programs for these commissions would bring the best design talent and practices to Chicago. A successful set of **INDS** would ultimately make itself irrelevant by establishing a design standard that was both irrefutable in its function and undeniable in its aesthetic.

Scenario

Erika is an architect designing a twenty story mixed use building in Chicago. She has decided, with the blessing of her firm and investors for the project, to design against the **Infused Nature Design Standards**. She has designed buildings against LEEDs certification before, and understands many principles behind living materials as architectural components.

It is an exciting challenge for her to design against the **INDS**, and envisions allowing a high degree of natural light to facilitate indoor planting, usable rooftop gardens, and vertical exterior plantings. She knows that the building adjacent has a usable rooftop garden, so she decides to create a connecting walkway. After running the numbers with an engineer, many of the solutions she is implementing offset initial cost with huge long term savings in energy and water usage.

Her firm and investors are pleased because they know that buildings living up to the highest degree of **INDS** have a high showcase value, excellent efficiency as functional buildings (often putting energy back into the grid), and are highly appealing to buyers for all of the above reasons as well as excellent aesthetics and habitability.



City Aid

City-run program to lease public greenspace assets to philanthropic agencies; competitions to encourage new ideas for public greenspace development.

Related System Elements:
Youth Leadership Initiative

Fulfilled Functions

- 30 Locate/develop additional resources
- 84 Coordinate resources
- 87 Delegate responsibilities
- 89 Encourage participation
- 95 Publicize outcome

Properties

- Public assets, such as public spaces, research data, and access rights, that could be further developed or utilized
- Staff to receive and evaluate applications
- Publicity initiative to highlight the local investment made by involved philanthropic agencies
- Legislation to allow for the lease of public assets, outlining allowed use cases

Features

- Identifies under-utilized public assets
- Publicizes asset availability to local philanthropic organizations
- Selects from organizations to utilize assets
- Awards grants for access to public assets
- Monitors grant projects
- Publicizes successes

Associated Design Factors

- 5 Policy-based constraints
- 6 Difficulty finding resources
- 38 Resources are not available
- 88 Lack of incentive to take responsibility

Discussion

City Aid encourages pride in the city and involvement in its green space by supplementing private-sector programs with public assets. The city will lease public assets (e.g. abandoned lots, equipment, data, rights of access) to philanthropic agencies interested green space advocacy programs. Additionally the city will host competition to encourage new ideas for public development of green spaces and green infrastructure changes.

Infusing nature into the city requires a coordinated attack on the public, personal and private sectors. First steps will likely come from city initiatives since these can be centrally organized and executed. Moving infusion into the personal and private spheres requires that the city remove barriers and incent participation. **City Aid** is a program designed to encourage the private sector to invest in infused nature initiatives by providing free access to public assets to private-sector sponsored non-profit organizations and publicizing the results and contribution to the city of Chicago.

The city of Chicago has many un- and under- utilized assets. These assets can take several forms, such as access to public green spaces, data and software, and connections to Chicago departments and personnel. A catalog of these assets will be collected, updated and publicized to local companies, philanthropic organizations and personalities to facilitate green space research, development, and understanding. **City Aid** staff will work with area non profits organizations to determine how to use these city assets to enrich their projects. As necessary, regulation concerning the use of these assets by non-governmental organizations will be reevaluated.

Organizations looking to participate in **City Aid** will be provided with an application, and a contact person within the City who can advise on the use of public assets. After determining the scope of the project, the outside organization will complete an application that collects information on which public assets the organization wishes to lease, how these assets would be used and how this project will further green infusion in the city.

City Aid does not directly fund projects, but rather makes funded projects richer in content and more easily executed through access to public assets. If access to a particular asset is requested by more than one agency, these requests will be prioritized based on their ability to broaden the scope and reach of green initiatives within the city.

Once selected as a **City Aid** partner, in addition to access to public assets, the organization will be publicized as a partner to the city and promoted for their engagement with the local community.

Scenario

Francisco Campos began his career as a dishwasher in one of Chicago's top restaurants. Always asking questions and finding excuses to go into the kitchen he soon found himself working his way up from dishwasher to line cook to sous chef, before finally making the leap to starting his own restaurant. His unique combination of local ingredients and food science have made not only his restaurant a must-eat for tourists, but have made him a national celebrity with successful books and cooking shows. With this notoriety has also come financial success. Recently Francisco's financial advisor mentioned to Francisco that he should increase his charitable giving in order to better manage his tax liability. Francisco has had a few pet organizations that he donates to regularly, but he has decided that this is an opportunity to start his own organization.

Francisco's financial advisor begins to collect information on how to start a non-profit and what areas could be explored. Included in this is information on **City Aid**. Having lived his whole life in Chicago, Francisco knows he wants to do something within this community. He also knows that he would like to couple his non-profit organization with the mission of his restaurants. Francisco calls **City Aid** to see if there might be an opportunity to work with the city. He and his **City Aid** advisor, Mark, begin to brainstorm ways of merging the city and Francisco's objectives. Francisco mentions how he is often dispirited when he talks with his nieces and nephews and realizes that they have very little understanding of healthy eating and the life of their food before it reaches their table. Mark suggests that Francisco begins a teacher sponsorship program.

With a teacher sponsorship program, Mark explains, Francisco would be teaching teachers about the benefits of eating locally from a financial, environmental, and health perspective. Francisco would develop curriculum, fund summer scholarships for local teachers, and select teachers who he feels can best integrate these concepts into their curriculum. The city will provide facilities to host classes, and access to urban gardens and seed bank research facilities for hands-on learning opportunities.

Additionally the city will feature Francisco in the Faces of Chicago campaign, which highlights some of the people who have made this city proud. Francisco thinks this sounds like a perfect marriage of his interests and talks with his financial advisor to form a non-profit to fund his teacher sponsorship.

<http://www.flickr.com/photos/wookie/93140218/>



myNature

Interactive knowledge system that helps people understand how their personal actions have a direct impact on nature.

Related System Elements:

- nature.edu
- Urban Agriculture
- Outside In
- Nature's Feelers
- I Spy Nature

Fulfilled Functions

- 8 Articulate concepts
- 11 Direct to additional resources
- 17 Assess messaging opportunities
- 22 Establish new touch points
- 26 Analyze resource use
- 27 Coordinate resource use
- 31 Monitor system components
- 36 Signal significant system changes
- 37 Aggregate system data
- 38 Evaluate data
- 82 Determine community goals
- 83 Gauge interest
- 85 Inform participants
- 87 Delegate responsibilities
- 89 Encourage participation
- 92 Archive experience
- 94 Encourage ongoing involvement
- 96 Communicate participant impact
- 97 Assess success

Properties

- Monitoring devices integrated into daily environment to track nature-related resource usage/creation
- Tracking system to track “giving back” (volunteer activities, donations)
- Real-time, point-of-use feedback to individuals about current activity’s implications

Features

- Helps individuals track and monitor utility and resource usage to facilitate long-term behavior change
- Facilitates immediate, real-time understanding of a current activity’s impact to encourage immediate behavior change
- Provides footprint calculations that can be compared with footprints of neighbors, friends, community
- Offers suggestions for how to minimize negative impact
- Allows individuals to track their positive impact (resource creation, donations, and volunteer activities)
- Facilitates positive impact by directing users to sign up for volunteer activities and initiatives

Associated Design Factors

- 25 Personalized messaging perceived as invasion of privacy
- 82 Varied community goals
- 83 Lack of time or resources required to gauge interest
- 84 Lack of community interest
- 86 Unable to identify participants beforehand
- 88 Lack of incentive to take responsibility
- 90 Unable to participate in planned activity
- 97 Difficult to measure individual participant impact
- 98 No follow up after individual event or engagement
- 99 No need identified
- 100 Comparison of options
- 102 Responsibility a turn-off
- 104 Unsettling/annoying behavior adjustments

Discussion

myNature is an interactive knowledge system that helps people understand the direct impact of their personal actions on nature and natural resources.

myNature consists of real-time, point-of-use feedback (**Immediate Impact Awareness**), aggregated data about natural resource usage (**Natural Footprint**), actionable suggestions about how to improve one's impact (**Green Your Thing**), and the ability to track and sign up for volunteer activities (**Giving Back Green**).

Components of the system

Immediate Impact Awareness

myNature connects with the **Smart Meter** [Hyperconnected Infrastructure subsystem] to track and monitor natural resource use across a wide geographic area (e.g. water usage in the Chicago region). Additionally, **myNature** receives real-time data about environmental statuses from **CNIFER's Fact Module** (described elsewhere in document); for example, levels of foliage growth. Utilizing these data sources, **myNature** compares and correlates resource usage statistics with changes in weather, foliage growth, and animal population and movement patterns to determine how resource usage affects the environment.

This real-time data analysis allows **myNature** to provide point-of-use feedback about a particular activity's impact on nature and natural resources. As an individual engages in a particular service or activity, **myNature** can provide notification if the resulting impact on natural resources exceeds a user- or system-defined thresholds. These notifications are managed and distributed using the **Instant Instructions module** [Hyperconnected Infrastructure subsystem], which issues alerts through a variety of customizable, distributed, and ambient signals.

This point-of-use feedback will facilitate immediate, real-time understanding of a certain activity's impact - and thus can encourage immediate behavior change.

Natural Footprint

In addition to point-of-use feedback, or if point-of-use feedback is not desired, **myNature** provides an overview of aggregated data related to an individual or family's impact on natural resources - a **Natural Footprint** calculation. The data will be presented in a visually compelling, easy-to-understand format, can be sliced and diced in a variety of ways, and can be correlated with other data sources (e.g. show me if I use more natural resources on the days when I have to work late).

Discussion, cont

Natural Footprint data can be accessed from a variety of touch points - including personal computers, mobile devices, or other display technologies integrated into the home. It will assist individuals in tracking and monitoring utility and natural resource usage to facilitate long-term behavior changes.

In addition, using the **myNature** system an individual or family can compare their natural footprints with those of neighbors, friends, and the larger community - to entice them to ask “How does my impact measure up against others?” This may inspire friendly competition, providing added incentive to lower one’s footprint.

Unfortunately, research reveals a known gap between a person’s possession of environmental or ecological impact knowledge and demonstrated behavior change (Agyeman and Kollmuss 2002, 239). In many cases, “other incentives (e.g. economic advantages) and cultural values can motivate people to act pro-environmentally without doing it out of environmental concern” (Agyeman and Kollmuss 2002, 250). This suggests that **myNature** should emphasize benefits beyond simply environmental impact and should include economic impact, community impact, impact on future (children’s) generations, etc. By relating environmental impact to a topic the user is particularly passionate about, the system will be more successful in inspiring behavioral change.

Green Your Thing

In addition to helping an individual or family understand their natural footprint, the **myNature** offers actionable suggestions for how to minimize that footprint. To do this **myNature** takes into account a user’s preferences, preferred activities and hobbies, lifestyle, etc. - and produces smart, customized suggestions for ways to **Green Your Thing** (your lifestyle, activities, and spaces). The system can assist in tracking progress toward greening certain things, and help you break larger greening projects into manageable pieces based on available time and

budget.

Giving Back Green

Lastly, **myNature** is not just limited to tracking and aggregating quantitative data about resource usage - it also includes a system for tracking one’s positive impact and the ways in which one gives back to the larger system (e.g. volunteer activities, donations). **myNature** makes personalized suggestions about ways to give back by highlighting and facilitating sign up for an upcoming volunteer or donation opportunities that match a user’s interests.

Scenario

Chase, a computer programmer, is enjoying an afternoon working at home. Thanks to recent technological advances, he's no longer required to put in face time at a physical office to be an effective employee, which means he can work from just about anywhere (as long as he gets his work done).

This afternoon Chase is working from his living room, writing code, when he remembers he invited some friends over for dinner that night. *Shoot* - what is he going to wear? All of his nice shirts need to be washed. Chase decides it would be a good time to take a break from work and do some laundry.

Chase loads several of his nicest shirts into the washing machine and selects a double-rinse, hot water wash, with Manly Man Super Suds detergent. Several months ago, Chase setup his home to use **myNature's Immediate Impact Awareness system**; today, the washing machine display glows red and notifies Chase that his wash cycle and detergent selections have a high impact on natural resources. In particular, his selections use additional water and require increased energy to heat the water, and the Manly Man detergent will make filtering and reusing the water later a more difficult process; in a worse-case scenario, the Manly Man detergent could seep back into the environment and contaminate the soil, potentially limiting local foliage growth.

The washing machine provides Chase with several other options that will lower his utility bill and his environmental footprint. Chase picks one of the suggested options: a single-rinse, cold water cycle, with a regular strength detergent. The machine also suggests delaying the load by an hour, as at that time resource use in his neighborhood will be lower. Chase agrees, and heads back to his living room.

On his way back to the living room, Chase notices it's a little cold in his home and decides to turn up the heat. He begins to adjust the thermostat when he receives another notification from **myNature's**

Immediate Impact Awareness system: instead of turning up the heat, Chase could minimize his environmental footprint by closing his insulating blinds. *Good thinking!* Chase decides to close the insulating blinds instead.

Now that he's been making so many smart environmental decisions lately, Chase is curious about how his **Natural Footprint** has been effected. When he first setup the **myNature** system, his **Natural Footprint** was pretty big - which surprised him.

Chase turns on a wall display and pulls up the **Natural Footprint** interface. *Well, would you look at that!* His footprint *has* gone down! Chase is able to see that, thanks to his smarter environmental decisions, and those of others in his surrounding community, strain on natural resources has declined. Additionally local foliage growth appears to be up, and air and soil contamination is down. Thanks to **myNature**, everyone seems to be more aware of how their actions impact the environment, and, as a result, they seem to be making smarter environmental choices.

Speaking of which, Chase has been curious about how he might make his working processes more environmentally friendly. Since he's a computer programmer, he usually spends a lot of time in front of his computer, and the computer is constantly using energy. While he has the **myNature** system open, Chase pulls up the **Green Your Thing** module. **Green Your Thing** conducts a quick assessment of Chase's working habits and provides a list of suggestions: use equipment with fewer environmental toxins, adjust the computer's display settings so that it turns off after several minutes of non-use, turn off the computer when not in use to save electricity, unplug certain peripheral devices, etc. **Green Your Thing** notes that the first suggestion, to purchase new equipment, might be out of Chase's price range given his current budget and bank account balance - but the other suggestions are easy to implement right away.

Later that afternoon Chase heads to the grocery

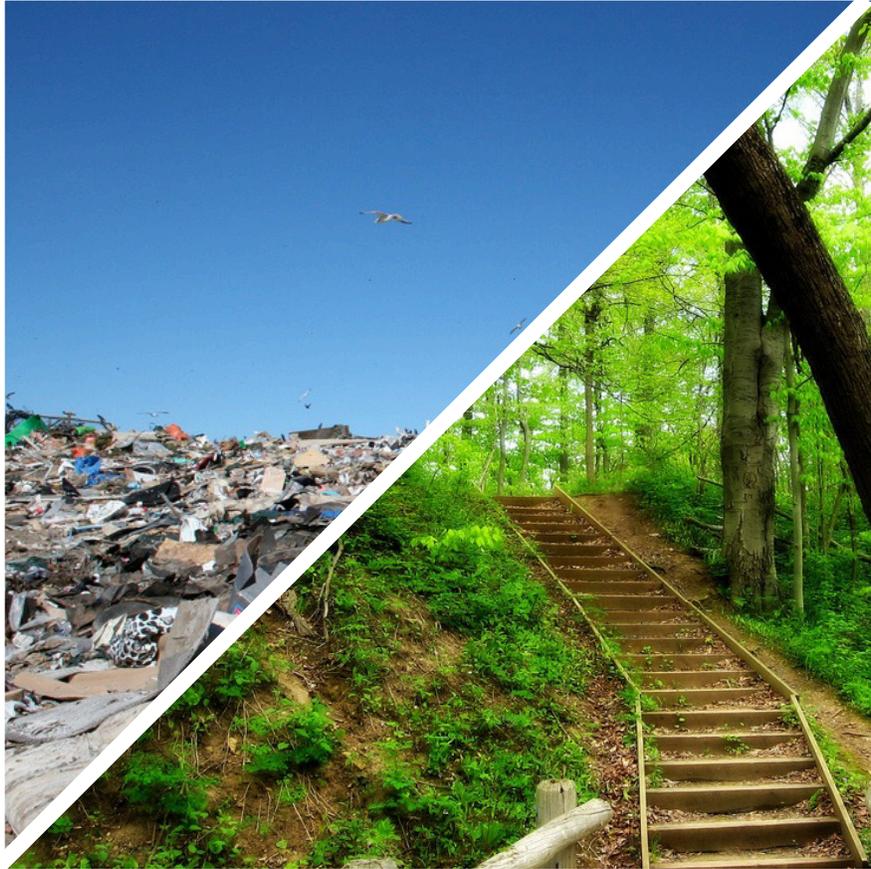
Scenario, cont

store to purchase ingredients for his dinner party. Chase enjoys trips to the grocery store: he gets to pick most of his own fruits and vegetables right off the vine (or bush or tree) inside the store, so there's usually very little mystery about where his food comes from. Plus, the fresh produce tastes great. Today, however, he needs some pasta which means he's going to purchase a pre-packaged item that may have been imported from another city, region, or even state. How can he make the decision that's best for his budget, and the environment?

Fortunately, Chase's mobile computing device can access the **myNature** system. Chase simply holds his mobile device in front of the pasta options he's considering in the grocery store aisle, and **myNature** displays an **Immediate Impact Awareness** assessment for each item - explaining where the item originated, how its components were grown and processed, how far it travelled, etc. Chase can now make an informed decision as a consumer to purchase an item that minimizes his environmental impact.

On the way home, Chase walks by his neighborhood's local park and pauses to admire the community garden - at the same time his mobile device vibrates to let him know he's received a new message. Chase pulls the device out of his pocket and sees that he's received an alert from the **myNature's Giving Back Green** module about an upcoming volunteer event at this park: apparently there will be a community gardening activity on Saturday. Chase can easily RSVP for the event, and track his involvement in other volunteer activities, by using the **myNature** system on his mobile device. Looking forward to the event on Saturday, Chase heads home to cook a delicious dinner for his friends.

Photos: D'Arcy Norman, Indy Kethdy



Green Conversion

A city-wide program of reuse, recycling, and re-purposing.

Related System Elements:

- nature.edu
- Nature's Feelers
- Vertical Farms
- Clean Hubs
- Cultural Park Development
- City Aid
- Greenways

Fulfilled Functions

- 20 Develop content
- 21 Leverage existing touchpoints
- 22 Establish new touchpoints
- 54 Determine location
- 55 Identify locale
- 98 Maintain baseline status
- 99 Sense presence
- 101 Sense reaction
- 102 Accommodate reaction
- 103 Return to baseline
- 104 Identify need
- 105 Procure element
- 106 Integrate element
- 107 Tend to element
- 109 Recycle failed components

Properties

- Repurposed and reclaimed land, particularly brownfields and landfills
- Uncontaminated layers of soil and lining
- A system connected to sensors that monitor gas and leachate levels
- On-site versatile signage for education

Features

- Supports healthy green spaces for activities
- Supports non-toxic surfaces
- Alerts system of gas emissions or toxic liquid runoff from landfill
- Educates users of site health
- Supports community needs
- Makes use of natural strengths and qualities of a site to reduce waste and discourage excessive use of resources

Associated Design Factors

- 6 Difficulty finding resources
- 7 Conflicts of information
- 15 Resource information unrecorded/lost
- 16 Knowledge is siloed
- 19 Insufficient incremental assessment
- 24 Missed/unknown messaging opportunities
- 46 Conflicting adaptation priorities
- 47 No clear course of action emerges
- 103 Infrastructure mismatch
- 108 Recycling is difficult
- 109 Failure of maintenance
- 110 Interference prevents sensory input
- 111 Mechanism displays unexpected behavior
- 112 Behavior interferes with human goals

Discussion

Green Conversion is a city-wide initiative that reclaims and repurposes landfills, brownfields, and abandoned lots to create usable green and park spaces.

Green Conversion is a city-wide initiative that reclaims and repurposes landfills, brownfields, abandoned lots, etc. into usable green space. **Green Conversion** is supported by two solutions: **Landfill Parks** and **Brown to Green**, which give new meaning and value to destitute and rejected corners of the city.

The history of Chicago is largely defined by its industrial past. Before transforming into a city-beautiful, Chicago was considered one of the filthiest cities in the industrial world. Separating a site's history from its future is the key objective of **Landfill Parks**. More specifically, **Landfill Parks** are parks, green spaces and **Greenways** that sit atop of closed and inactive landfills. Through sophisticated engineering techniques, landfills can remain completely isolated beneath the surface of the parkland with which people interact.

The parks developed through the program are closely tied to other city-wide initiatives and **Landfill Parks**. For example, the **Cultural Park Development** system (described in document) designs programs to inform city residents and park users of the site's history and transformation process. As city residents interact with **Landfill Parks**, they can be reminded of the site's safety and health through informal learning opportunities via **Nature Goggles** and formal tours and activities. Additionally, as **Landfill Parks** grow and develop over time, **Nature's Feelers**-supported technology can quantify the parks' positive impact in terms of carbon sequestration, human activity, etc. For regulatory purposes, **Nature's Feelers**-supported technology also feeds reports to a central maintenance staff describing the status and health of the underlying layers and lining separating park from landfill below.

Similar in spirit to **Landfills Parks, Brown to Green**, most generally, is a city-wide initiative that converts unhealthy, unused sites into green spaces and natural environments. As development land grows increasingly scarce, brownfields and abandoned lots offer unique opportunities for growth and progress.

Informing designs for **Brown to Green** initiatives are the needs and interests of the immediate community and neighborhoods, as well as the existing capabilities of the reclaimed space. Like **Landfill Parks, Brown to Green** projects seek to build upon the natural strengths and qualities of a site to reduce waste and discourage excessive use of resources. For example, certain sites may possess features and

Discussion, cont

properties aligned with **Vertical Farming** needs, and therefore should be developed as such.

Both **Landfill Parks** and **Brown to Green** projects work in conjunction with city-wide infrastructure systems that use landfills and brownfields as sources of energy and recyclable materials.

Scenario

As Jack sat on a grassy knoll in the park, he remembered a time when no one would think of journeying to this particular part of town. Before being converted into a **Landfill Park**, River Park was nothing more than a heaping mound of waste, trash and toxins. Since its reclamation by the city, however, there is no trace of its filthy past. Looking out across the park, Jack sees children playing soccer, commuters crossing through **Greenways**, hikers weaving in and out of activity trails, and dogs running loose in the dog park.

Interested in learning more about the transformation process, Jack activated his **Nature Goggles** to access visual images of the site's history, its transformation process, and current status as a contributor to the health of the immediate natural environment. He scanned the surrounding vegetation with his **Nature Goggles** to determine what is growing and prospering in the soil and an explanation for why those particular plants and flora were chosen for the site. As luck would have it, Jack saw a park tour, led by a **CEAS Green Space Ranger** (described in document), about to commence and joined in.

Midway through the tour, the guide mentioned a similar project, sponsored by a corporation, underway at a nearby brownfield. Like River Park, he learned, the brownfield possesses similar site features and properties, making it an ideal location for a park. Due to be completed by the year's end, Jack made a note on his mobile device to plan a visit.



Photo: Justin Ruckman

Yard Connections

A program aimed at changing attitudes and behaviors concerning residential property usage, with an emphasis on sustainable, less water-intensive, and indigenous planting.

Related System Elements:
Greenways

Fulfilled Functions

- 39 Prioritize adaptation opportunities/needs
- 86 Communicate Goals
- 89 Encourage participation
- 94 Encourage ongoing involvement
- 104 Identify need
- 106 Integrate element

Properties

- Research about lawn alternatives
- Friendly (indigenous) planting guidelines
- Publicity campaign highlighting yard options
- Water management and waterway construction guidelines
- New residential construction codes
- Tax-breaks for healthy green space development costs

Features

- Encourages the planting of indigenous and sustainable lawns
- Mandates increased viewable green space in new development
- Provides information and incentives to convert developed land and greedy species
- Builds visible green presence
- Encourages community building

Associated Design Factors

- 88 Lack of incentive to take responsibility
- 102 Responsibility is a turn-off
- 103 Infrastructure mismatch
- 105 Lack of care-taking knowledge
- 107 Availability of replacements

Discussion

Yard Connections is a program designed to expand the effective sense of green space in residential environments. Yard Connections aims to change attitudes and behaviors concerning residential property usage. With an emphasis on both planting content, land configuration, and a de-emphasis on fencing and enclosures Yard-Life aims to create tracts of residential private properties that feel like contiguous green space. The planting content emphasis is meant to move property owners to more sustainable, less water-intensive, and indigenous planting. In addition, gardening would be encouraged for recreation and food production. Along with the benefit of an increased sense of green space, Yard Connections aims to enhance and encourage neighbor interaction by placing their outdoor activity in a semi-public sphere.

Chicago is currently in the happy state of having an abundance of water that can be used for drinking, cleaning and watering. In the next 100 years, though, water will become increasingly precious as the water levels in Lake Michigan fall and periods of extended draught become more common (Hayhoe et al. 2007). As water becomes more precious we will look towards ways of conserving its use and using it more effectively. Right now, 30% of the water use of a family of four is used outdoors - largely on lawns and gardens (US Environmental Protection Agency 2007), making this outdoor space a focal point for future water conservation.

While lawns are a large source of water use, they are also the largest source of personal green space. The pride people take in the upkeep of their lawn and gardens is a sentiment to maintain and grow into community space. This accomplishment is often hidden in backyards and blocked with fences so from the outside, the neighborhood flaunts its buildings and greyscape. In addition to encouraging responsible construction and maintenance of private green space, to build the sense of infusion, the system will encourage and mandate some of the private green space be publicly viewable.

Components of the system

Rethinking Grass

The most commonly planted yard-grass is Kentucky Bluegrass (KB). Despite its name, it's not indigenous to Kentucky or even to the US, but rather brought over from Europe (Russel 2008). KB has become the dominant US grass in part because of its ability to withstand colder temperatures, but being a prairie, Chicago has no shortage of indigenous grasses that can also withstand the winter. The KB domination is in large part set based on a European concept of what a yard should look like. Local pride aside, the trade off to planting this imported grass is that it requires frequent watering and does

Discussion, cont

not withstand draught - KB has a very shallow root system that does not hold on to water well. Especially as the climate of Chicago changes, KB will require increasing resources and time to maintain. **Yard Connections** will encourage the use of native grasses and planting to reduce resource use and build sustainable lawns. This encouragement will take the form of information about what grasses are more suited for our changing climate, how to make this transition, and the personal financial benefits of doing so. Additionally, public spaces will highlight native landscaping to provide inspiration for what this local lawn could look like.

Design for Water

While the shallow root system of KB is one of the reasons for water use outdoors, it is by no means the largest. The U.S. E.P.A. estimates that 50% of outdoor landscape watering is wasted through overwatering, improper design, and wind and evaporation. **Yard Connections** first addresses the watering practices through information about how to determine when watering is necessary and aides that could facilitate appropriate watering schedules. Using already existing soil moisture sensors to activate and deactivate watering systems when needed, should ultimately eliminate water loss due to inappropriate watering.

The water we put on our lawns is only part of the problem. The other is the water we lose from our lawns through improper design that flows rainwater into storm drains. **Yard Connections** introduces tax incentives for rain barrels that collect storm water from roofs, and the design of driveways and walkways that direct water to the lawn. Overtime, as water scarcity becomes a larger issue, designs that maintain local rain water will be mandated on all new construction.

Back to Front

As the culture of what lawns look like changes, **Yard Life** pushes for the culture around where lawns are to change as well. While respecting the need for private and enclosed space, a com-

munity around nature starts in the homes and neighborhoods. To build this sense of abundant greenscapes in the private space, **Yard Connections** encourages the reallocation of land and attention from the back to the front yard. Sidewalks will become grey boulevards between front yards and city green shoulder. **Yard Connections** will increase the mandated distance from the sidewalk for new building construction. Established buildings will be given tax incentives to encourage planting and landscaping of the front yard.

Scenario

Jens and Mitali have just moved into their first home in Bronzeville. Built in 1972, they enjoy the vintage details of the home but knew when they bought the place that it was not up to current yard standards. Between the tax incentives for yard renewal and the appreciation the house will show with a modern yard, they know that this is an investment sure to show returns when it comes time to sell.

When looking at houses they had an opportunity to see a lot of yards, and Jens has a pretty strong sense of what he wants the front yard to look like. Since the size of the yard is much smaller than new builds, he knows it's essential to maximize the perceived size of the yard. This can be done by introducing connections to the green shoulder - in this case reflecting the wild flower border along the sidewalk. The garden is placed near the front door, so it's easy to pick ingredients to cook with. The rest of the yard, Jens wants to have grass for front yard picnics, croquet, and lounging with Mitali.

While Jens looks at the landscaping, Mitali is concerned with the water management to reduce their water spending. She replaces the driveway and walk way with pavers that drain water to the ground underneath and redirect through channels into the lawn. She borders the lawn with deep-rooted indigenous shrubs that will hold on to the bulk of water and is happy to see that the lawn has already been reseeded with local, water storing grasses. Mitali connects the drainage spout to her water barrel and attaches her auto water sprinkler. She places sensors throughout the yard that will signal when the sprinkler needs to be turned on and directed to them.



Green Information Identity

A combination of a graphic identity system, interactive and static display technology, and parkwide signage

Fulfilled Functions

- 4 Construct resources
- 5 Coordinate logistics
- 20 Develop content
- 86 Communicate goals
- 95 Publicize outcome

Properties

- Comprehensive visual (and aural) identity system
- Signage and display system
- Graphic framework for media display

Features

- Provides a consistent identity for all system communications and information displays.
- Provides coherent and user friendly experience in navigating all system information services
- Provides immediacy and authority to system communications.

Associated Design Factors

- 10 Technical language comprehension
- 24 Missed/unknown messaging opportunities
- 26 Unknown or large audience
- 27 Unaware of existing touch points
- 28 Existing material not in re-usable format
- 29 Unable to predict audience reaction
- 30 Last minute change required
- 63 Universal accessibility problematic
- 70 Poor awareness of events in the future

Discussion

The Green Information Identity is the combination of a graphic identity system, interactive and static display technology, and park-wide signage. It is intended to create a highly recognizable and consistent system of communication that would demarcate trails, describe usage, and offer other information. This system has both visual and audio elements (for accessibility purposes), as well as interactive elements.

The system design for Infused Nature spans a wide variety of solutions. It has a large number of elements and players that operate in a wide variety of capacities. For this complexity to operate smoothly, effective communications are vital. For communication and electronic information structuring to be successful across an entire system, it requires a consistent identity and architecture. Information is much easier to comprehend when it is presented in such a way that is well ordered and familiar. This consistency also communicates an implicit source, or authority. To these ends, the development of a comprehensive identity system and style guide is vital.

Identity systems are often thought of as solely attending to the visual, or graphic component of communications. In this case, the ID system will need to address the various incarnations of information and communications. Appearance will be an important component of this system, but modalities of interaction and interface for information systems, as well as information architecture will come into play as well. The goal is to present users with immediacy, clarity, and authority. In addition, developing a consistent architecture for information lends itself to both user-friendly interfaces as well as a more rapid deployment of future information products.

With a well designed information ID system, user’s familiarity will grow over time. That familiarity contributes to both a sense of a trusted source in communications, and an understanding of navigation and hierarchy in information products. The creation of an Information Identity system also allows communications and information products to be crafted by any number of players in a way that is consistent system wide.

The **Green Information Identity** system has a number of components and guidelines that outline graphic treatment of all Infused Nature system communications and information products or services. This includes typographic treatment, iconography, color, graphic element placement, illustration and photography guidelines, and content ordering. In addition to guidelines for static graphic elements and treatment, guidelines will also be set for dynamic graphic elements for interactive media and dynamic content.

Discussion, cont

The Information Identity system will also define an information architecture against which information products and services can be structured. This offers users an easy to use and intuitive interface for interacting with information. It will define modes of interface and navigation that are consistent system wide. Different users and functions across the system will demand a high degree of flexibility, but the goal is to create a seamless user experience regardless of the operation.

While much of this system element manifests in external communications to the public, **Versatile Signage** is the on-site, physical manifestation of system communications. **Versatile Signage** is a system of signs and interactive information displays throughout the parks and Greenways that offer timely, relevant and location specific information. In addition to basic facts about a given location, interactive displays will offer access to maps, schedules with reservation capabilities, archived information about the surroundings (and larger ecosystem information), and options for depositing or retrieving personal media. Assuming the ubiquity of mobile computing devices and connectivity, this system will allow direct upload or download of media to personal devices, and will allow opt-in services for location or media specific mobile alert messages. **Versatile Signage** also enables people to communicate with the system, opening a channel for user feedback, maintenance notifications, and emergency alerts.

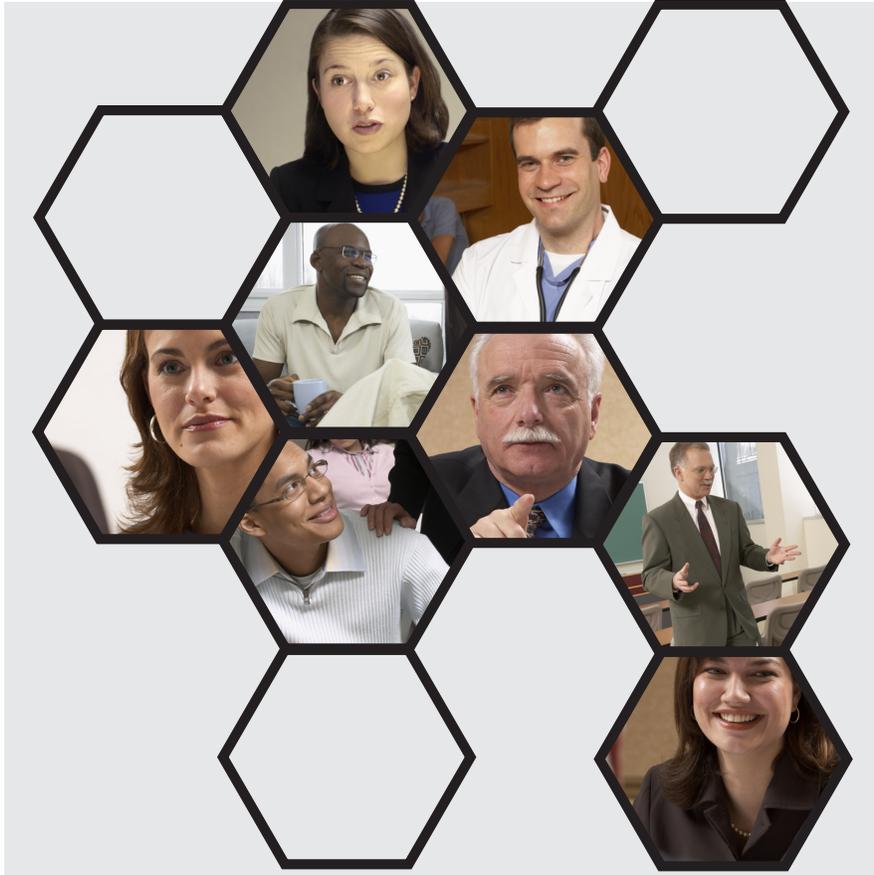
Scenario

Chuck is the chief of communications for the events planning committee for the city of Chicago. He is presently engaging a mid-sized advertising agency to do a series of print ad and a website advertising an upcoming concert series in Grant Park.

The ads are specific to the series, which is in one month's time. He directs the agency to the online version of the **Green Information Identity** system. Using this as their guide, the agency crafts the ads and website in a manner consistent with all other Infused Nature communications.

A month later, two friends, Pip and Amber, are walking through Grant Park. They've seen an advertisement for the concert series and are planning on attending. They take a moment to refer to an interactive map of Grant Park on their handheld computer to identify exactly where the concert is located in the park. They recognized immediately the icon for the stage, as they noticed it in the ad. Navigating the map is a snap as well, as they planned their trip at home, and the Infused Nature website looks and operates the same on their mobile device as their computer at home.

After the show, they upload their photos of the show to a sign that is part of the **Versatile Signage** system. Now, everyone who visits that location will be able to view some event specific photos from that park. In addition, Pip and Amber smile to themselves, knowing that when people who are on their "friends" list will get a buzz on their mobile device when they walk by the sign, and Pip and Amber's private photos from the show will give the sillier side of Pip and Amber's visit to the park.



Cross-Pollination Collaborative

A collaborative, cross-domain “link tank” that facilitates cross-discipline problem solving and information-gathering.

Related System Elements:

CNIFER
nature.edu
Seed Bank Research Center
Eco-Extensions

Fulfilled Functions

- 4 Construct resources
- 5 Coordinate logistics
- 8 Articulate concepts
- 9 Facilitate discussion
- 10 Synthesize concepts
- 11 Direct to additional resources
- 12 Archive knowledge
- 15 Identify misunderstandings
- 16 Supply feedback
- 82 Determine community goals
- 83 Gauge interest
- 84 Coordinate resources
- 85 Inform participants
- 86 Communicate goals
- 87 Delegate responsibilities
- 88 Provide materials
- 89 Encourage participation
- 90 Accommodate feedback
- 91 Assess progress
- 92 Archive experience
- 93 Share experience
- 94 Encourage ongoing involvement
- 95 Publicize outcome
- 96 Communicate participant impact
- 97 Assess success

Properties

- Loose affiliation of organizations and individuals with rotating central board
- Innocentive-style problem-solving mechanism that connects people to solutions
- Mechanism for investigating long- and short-term initiatives related to nature + the environment
- Sponsored salons to encourage discussion and complementary or contradictory viewpoints around knotty problems
- Rotating board to get varied opinions cycled in
- Members vetted through outreach
- Public, searchable archive of solutions and ideas regarding nature integration to facilitate the spread of successful ideas
- Mandate to coordinate, study, and track environmental developments in- and out-side of Chicago

Features

- Facilitate meeting of the minds through regular interactions and panel discussions
- Encourage layperson participation through public conferences
- Spur public conversation around critical topics
- Supplement expertise with research and bottom-up opinions
- Coordinate opportunities for continuing education at area universities
- Provide ongoing archive of materials and organized help network through publicly accessible web site

Associated Design Factors

- 1 Mixed learner group
- 3 Mixed educational goals
- 7 Conflicts of information
- 8 Asynchronous learners
- 9 Varied learner knowledge/needs
- 10 Technical language comprehension
- 11 Limited opportunities for learning
- 12 Format discourages questioning/discussion
- 13 Lack of learner engagement
- 15 Resource information unrecorded/lost
- 16 Knowledge is siloed
- 37 Resources must be prioritized
- 46 Conflicting adaptation priorities
- 47 No clear course of action emerges
- 82 Varied community goals
- 84 Lack of community interest
- 86 Unable to identify participants beforehand
- 88 Lack of incentive to take responsibility
- 92 No place to archive
- 93 Nobody documented experience at the time
- 95 Difficult to establish metrics for success
- 97 Difficult to measure individual participant impact

Discussion

The Cross-Pollination Collaborative (CPC) is a network-based, cross-domain “link tank” that facilitates cross-discipline problem solving and information-gathering across varied domains. Through identifying nature-related issues, facilitating active debates to ensure inclusion of controversial ideas, and culling disparate opinions into actionable opinions, the CPC strives to look long-term in developing Chicago’s nature-related policies.

The **Cross-Pollination Collaborative** functions as a clearinghouse of environmentally-oriented ideas, providing a forum through which individuals and organizations can connect and create disciplined approaches based on an open exchange of ideas and information. While not positioned as any kind of one-stop shop for problem-solving, the organization does provide a setting for cross-discipline conversation that might not otherwise occur.

The **Collaborative** is structured as a loose network of affiliated individuals and organizations, in which the main purpose of the central organizing entity is to link existing groups and provide a structured opportunity for discussion, rather than functioning as a coordinating body that runs projects from beginning to end. The other primary responsibility of the central organizers is to identify and cultivate key topic areas as the basis for debate and conversation by culling and synthesizing critical, resonant themes in the overall zeitgeist of nature-related interest; these can be wide-ranging, from development of new green roof technology, to sustainable practices specific to suburban living, to cultural and behavioral nuances that affect the use and perception of nature in an urban environment.

Fostering a broad sense of problem-solving, from individual-level to organized activities and discussion, serves as the foundation for these ongoing initiatives. Through these additional mechanisms the **Collaborative** also feeds information back to community and civic organizations through partnerships with **CEAS**, **CNIFER**, and the **Seed Bank Research Center** (described in document) in order to feed learnings back at a more actionable level, and also to continually scan for topic areas that are of interest to the overall Chicago community.

While some activities occur behind-the-scenes in a more project-focused manner, the intent of the **Collaborative** is also predicated on opening discussion to the city at large through a variety of touch-points, including one-off meetings held jointly with community organizations, conferences, and partnerships with private entities.

Discussion, cont

Components of the system

Roundtable Salons

More informal discussion related to environmentally-related topics can be continued through **Roundtable Salons**, sponsored and issue-specific events that allow individuals to participate in casual exchange of information, such as successes in sustainability, community-specific concerns and ideas, and opinions on overall nature policy. Coordinated through **CEAS** rangers, the **Salons** provide opportunities for open-ended discourse and traditionally feature a guest speaker or panel discussion with expertise in the focus area. Panel discussions and presentations are cross-linked, archived and stored on the **Cross-Pollination'Net**, providing a long-term means to access material.

Cross-Pollination'Net

To ensure that ideas raised in the **Collaborative** forums get a better chance at gaining traction outside of one-off intellectual exchanges, the **Cross-Pollination'Net** supports archiving and searching for subject areas of interest. Through the creation of personal profiles, users can exchange suggestions for activities or guidance about nature-related topics, creating a living database and public, searchable archive of solutions and ideas vis-a-vis nature integration. The **'Net** is designed to facilitate the spread of successful ideas by making them accessible to all.

In addition to its archiving capacity, the **Cross-Pollination'Net** capabilities also includes 3D modeling software that allows people to visualize and study the future state of the natural environment based on input variables. These visual projections can be used across both large and small projects, such as civic organizations trying to make large-scale planning decisions or individuals who need help selecting appropriate landscaping. The functionality is supported by extensive data collected by **CNIFER**, as well as images contributed via **natu•recorder** (described in document). In conjunction, these data and image artifact provide the raw material to depict current states and future projections of natural environments.

Nature-related Continuing Education

In conjunction with local area universities and higher education institutions, the **Collaborative** also contributes to learning in a more formal way through continuing education classes. In a more directed way than the learning that occurs in the **Salons, Nature-related Continuing Education** positions nature within an adult curriculum, allowing individuals to learn additional skills and knowledge as an older student. When expertise does not reside at local universities, **Cross-Pollination Collaborative** members are tapped to teach courses as adjunct professors. Classes span a range of disciplines and class structures, from comparative literature that delves in nature-inspired works, to bird-watching outings and botany labs that study local flora and fauna.

Scenario

This was Harvey's first **Roundtable Salon**; he had been attending **Cross-Pollination Collaborative** discussions on and off for a while and had contributed his expertise more than once, but the subject matter today had really caught his eye. As an experienced architect, he was quite familiar with green roofs, of course, and had designed a number of residential buildings that pushed the concept even further with vertical gardens attached to thing, flexible scaffolds that climbed easily up high-rise walls, like Spiderman leaving a trail of green. So the **Salon** theme of the night—Urban Structures as Animal Habitats—was intriguing; he'd never thought of architecture primarily as animal condos, that's for sure.

He arrived early, unsure how crowded these things got, but there were already a few dozen people there. He recognized Sally, a colleague from a previous job, and approached her to say hello. With a welcoming arm she introduced him to a few new folks: Yolanda, an ornithologist; her husband Mark, a landscape architect; and Helen, a structural engineer. They were all interested for various reasons: Yolanda, naturally, wanted to make sure the birds got a voice, while Mark was intrigued by the possibilities for creating more animal-friendly green roofs and Helen was curious about the structural ramifications of planned habitats where they hadn't yet been established before.

Sally then explained to Harvey how these things typically worked: a moderator introduced the topic, along with a panel of informally designated experts who had prepared some material to share. But the majority of the evening was dedicated to informal exchange facilitated by the moderator. In a way it was like being back in a graduate school seminar, except in this case everyone was majoring in something different. Just then, the moderator stood up and started to speak...

Two hours later on the way out the door, Harvey was still on a bit of a high. "But don't forget that an urban environment is practically defined by its skyline, especially at night. It needs light," he said

urgently to Yolanda. "We need to find a way to prevent birds from flying into tall buildings while still maintaining a certain amount of urban landscape. Maybe if we did something with the windows..." Yolanda agreed, nodding her head, then paused. She had just gotten involved in a project, coordinated by the **Cross-Pollination Collaborative**, that dealt with urban bird habitats. They were currently focusing on non-traditional structures, like bridges, but lacked general expertise on architecture that he could bring to the table. Would he be willing to join? His expertise would be invaluable, and if they published a paper he'd get partial author credit as well. Sally had mentioned he was teaching Green Architectural History through IIT's School of Architecture, as part of the **Nature-related Continuing Education** program, and it never hurt to have more publications if he was ever thinking of switching to academics in the long term. And a mechanical engineer who was also working on the project might be the perfect resource for Harvey's project on floating gardens that lived in Lake Michigan.

Harvey eagerly nodded and agreed to be in touch the following day with more specifics. Upon arriving at home he logged into the **Cross-Pollination'Net** to look up some of the content that had come up during the **Salon**. He has used the **'Net** many time before; the 3d modeler was an incredible tool, allowing him to create projections for environments before the ideas were much more than a twinkle in the back of his mind. His architectural practice was built heavily on pushing the "greenification" of built structures, and seeing if that ivy was going to be too heavy for the scaffold, or fail miserably in high winds on the 30th floor was critical to his designs. He'd initially been suspicious, it's true: how well could software project what was going to happen in 10 years, let alone 30? But the database, collected through a variety of sources and stored by **CNIFER**, was incredibly robust, and even if it couldn't predict exactly what was going to happen, it did a fabulous job of identifying where potential issues might be.



Plant

An interactive planning system that facilitates activity planning and way-finding prior to and during a nature-related activity.

Related System Elements:

- ParkLife
- Nature's Feelers
- Youth Leadership Initiative
- Green Info Identity
- Greenways
- I Spy Nature

Fulfilled Functions

- 27 Coordinate resource use
- 28 Manage resource schedules
- 37 Aggregate system data
- 38 Evaluate data
- 54 Determine location
- 55 Identify locale
- 56 Organize participants
- 57 Assemble materials
- 58 Transport to locale
- 59 Secure activity space
- 60 Gather participants
- 61 Establish activity parameters
- 62 Commence activity
- 66 Document experience
- 67 Plan future activities
- 68 Communicate location offerings
- 69 Select destination
- 70 Plan route
- 71 Determine materials needs
- 72 Travel to destination
- 74 Provide wayfinding
- 76 Accommodate multiple paths
- 79 Archive experience
- 81 Encourage further exploration

Properties

- An intelligent activity planning wizard
- A back-end system that interacts with CNIFER to collect/maintain data about ongoing activity options, transportation, personal preferences, and past activity history
- Interactive in-park or in-context touch points

Features

- Allows access from a variety of technology-enabled devices
- Manages expectations - provides visualizations or “previews” of activity/park so people know what to expect, what to bring
- Makes intelligent suggestions about spaces that should be used for an activity, based on real-time usage data (to prevent over-use of popular nature spaces)
- Makes intelligent suggestions about activities an individual might like based on current weather/season, your stated preferences, your past activities, etc.
- Assists with route planning and making transportation arrangements
- Allows access via interactive touch-points during the activity (via versatile park signage, eMaps) to facilitate wayfinding, exploration, and plan alterations

Associated Design Factors

- 42 Popular activities and grounds get over used and abused
- 60 Conflict of site usage
- 61 Damaged resources
- 62 Inter-activity transition is difficult
- 63 Universal accessibility problematic
- 65 Activity did not fulfill user's recreational expectations
- 66 Lack of Entry/Exit transactions occasionally confusing
- 67 Inadequate amenities
- 68 Safety as a concern
- 69 Inadequate information for future plan
- 70 Poor awareness of events in the future
- 71 Don't know what to do or where to go
- 72 Limited transportation options
- 73 Get lost en route
- 75 Limited time to wander
- 76 Whose park is it?
- 80 Forgot where you were before
- 81 Stuff adds clutter
- 86 Unable to identify participants beforehand
- 90 Unable to participate in planned activity
- 98 No follow up after individual event or engagement

Discussion

PlanIt is an interactive planning system that facilitates activity planning and wayfinding prior to and during a nature-related activity.

PlanIt consists of two main components: a personalized planning wizard and in-park touch points.

Personalized planning wizard

The personalized planning wizard is an intelligent tool that assists in planning a nature-related activity or outing from the comfort of one's home or from the convenience of one's mobile device. It helps you choose from a variety of nature-related activities that match your desired activity criteria, and makes intelligent suggestions about activities you might like based on current weather/season, stored preferences, and past activity history. Using PlanIt, individuals and groups can make reservations for tool and facility usage - such as **ParkLife** Working Hubs (described elsewhere in document) and **CEAS** maintenance tools (also described elsewhere in document).

PlanIt's personalized planning wizard service is accessible from a variety of technology-enabled devices, which in the future may include any type of object or material that has connectivity, display, and input capabilities. Today this includes any type of personal computer (e.g. laptop) or mobile device (e.g. iPhone).

Behind the scenes, the personalized planning wizard interacts with **CNIFER** (described elsewhere in document) to retrieve real-time data about ongoing park and weather status, activity options, and available transportation. It also uses **CNIFER** to store and maintain data about the user's personal activity and transportation preferences, as well as past activity history.

Since it utilizes real-time data, **PlanIt's** personalized planning wizard can help manage a user's expectations about a particular nature-related activity or experience; it can provide real-time visualizations or "previews" of an activity or park space so people know what to expect, can decide what materials or clothing to bring, etc. These previews could take place on large-scale 2D or 3D holographic displays or smaller-scale, personal viewing devices.

Additionally, the personalized planning wizard makes intelligent suggestions about spaces that should be used for an activity, based on real-time usage data. For example, if dozens of people are currently visiting park X today, **PlanIt** may suggest you visit park Y. This encourages diverse experiences and prevents over-use of popular nature spaces.

Discussion, cont

The personalized planning wizard also assists with route planning and transportation arrangements. It provides access to public transportation schedules, and suggests the most nature-friendly routes through the city. It can also suggest enjoyable detours to other nature-related activities or events along the way.

Lastly, the personalized planning wizard takes advantage of an individual's social network. The planning wizard can be used to coordinate event plans with family and friends, and can provide a notice if a friend will also be at a certain event or activity at the same time.

In-park touch points

PlanIt also features interactive in-park or in-context touch points that are accessible during an activity. These touch points include interactive signage, utilizing the **Green Information Identity** (described elsewhere in document) and eMaps - interactive, dynamic maps printed on electronic paper. The **PlanIt** system can also be accessed at any point using one's existing personal technology or mobile device.

These in-context touch points assist with way finding at the park or activity space, and can also be used to facilitate exploration or changes to plans during an event.

Scenario

Jacob and Mark are sophomores in high school. Today they have the day off from school, and they're trying to figure out what to do with their free time.

They're hanging out at Jacob's house, sprawled across his living room couches, tossing out ideas that might cure their boredom: Video games? No. Watching a movie? Nah. It's a grey day outside, and there's a definite chill in the air, but the boys are itching to get out of the house.

Suddenly Mark has a great idea - he suggests they go for a bike ride! Jacob agrees that would be cool, plus, he's been looking forward to try out his new self-healing mountain bike tires. The boys turn on an interactive wall display and pull up the **PlanIt** interface to plan their outing.

PlanIt already knows Jacob's activity preferences - that he likes to mountain bike and skateboard, and that he prefers walking or riding instead of taking public transportation. **PlanIt** also recognizes that Jacob's friend Mark is here, and takes into account Mark's preferences. The boys' profiles are already loaded onto the display when the system turns on. Jacob and Mark interact with the display to tell **PlanIt** what type of activity they want to do today: mountain biking.

PlanIt uses its real-time knowledge of environmental status to detect that it's rainy outside, which isn't ideal for mountain biking. As a result, **PlanIt** suggests three mountain biking trails with known coverage from the rain; it also suggests a skate boarding park that just opened nearby that the boys might want to try as an alternative. **PlanIt** ranks the biking trails in terms of current usage in case the boys want to go to a less (or more) populated site.

The boys decide to check out one of the less populated biking trails, and maybe stop by the skate boarding park on the way home - **PlanIt** helps them create an itinerary that includes both destinations and calculates the best route to take, taking into

account Jacob and Mark's transportation preferences. It turns out the boys can ride their bikes along several connected **Greenways** (described in document) to make their way through the city to the park where they'll be biking. This sounds good - so they port the plan to Jacob's hand-held computer by swiping it in front of the display, and head off to get their bikes.

While riding through the **Greenways** en route to the park, the boys run into a friend, Annette, who suggests they grab a bite to eat at a nearby restaurant. The boys like Annette and decide to adjust their plans. Jacob pops open the **PlanIt** service on his hand-held device and is able to easily adjust the itinerary. He also double checks the park's open hours to make sure they'll still have time to get there and ride before it's too dark.

After lunch with Annette they make their way to the park where the biking trails are. An interactive sign at the entrance tells them various trails' levels of difficulty, and notifies them of added risks due to the rainy weather. The sign also notifies them that a particular trail has been reserved for foot traffic only today, to avoid collisions between bikers and joggers/walkers.

The boys interact with the sign to figure out how to plan their trail route through the park. They decide on a route that connects several medium level trails, which are most appropriate for their ability levels. **PlanIt** sends the route to Jacob's mobile device so he can reference it as they make their way through the park.

Thanks to the presence of trees and the bi-level trails, the drizzly rain doesn't bother them much as they begin their ride. After a few minutes they come to a fork in the road, and aren't sure which direction to go. To the right is a gentle sloping trail, but to the left there's a rather steep decline. Jacob pulls out his mobile device and references **PlanIt** to see their planned route - *ah, it's left here*. The boys share a grin and take off down the trail.

Conclusion

To envision a future Chicago, we peered back into the city's transformative past. The Burnham Plan of 1909 sought to convert industrial Chicago into a livable and healthy city that would enhance the quality of life of its residents. Of the designs that were proposed and realized—many of which leverage the natural setting—a handful remain to be some of Chicago's most noteworthy and admirable features. Posed with the challenge to infuse nature into the daily lives of Chicago residents over the next one hundred years, our group took cues from the Burnham Plan, as well as created new solutions to uphold and further develop nature's role in the cityscape.

As country life and city life grow more disparate, and as technology maintains a stronghold on mediating many of our daily interactions and experiences, our connections to nature and natural processes grow increasingly tenuous. Furthermore, existing city processes that are “infused with nature” and employ sustainable ideals offer little transparency and learning opportunities. Central to our team's approach is the intention to bring nature to the forefront of the city's consciousness—not merely to those predisposed to pro-environmental internal characteristics—to demonstrate how nature and nature-based processes support and enhance city services, infrastructure, culture, community, recreation, education, communication and other pillars of city life.

Furthermore, the solutions captured in this plan strive to maintain the “natural-ness” of nature by resisting copious technology-based solutions that might undermine personal interactions with or harm the natural world. That being said, it would be negligent to ignore the value and role of technology in future cities; therefore some of our solutions leverage the strengths, reach and prevalence of technology to support and encourage meaningful and distinctive interactions with nature.

As we commemorate the 100th anniversary of the Burnham Plan, we encourage our fellow neighbors to take a moment with us to envision the future Chicago. What will it look like? What will it feel

like? How will it support the needs and interests of its residents? How can the city's past shape its the future? It is our hope that as you reflect on some of these questions, the role of infused nature is considered.