Hyperconnected Infrastructure

Supporting a growing population and evolving needs
Hyperconnected Infrastructure
Supporting a growing population and evolving needs
Intelligent Infrastructure

Information based utility management

- Enables universal compatibility and adaptivity

Smart Meter
Ubiquitous sensors
Smart Materials
Utility Main
Utility Main
Unified network of underground tunnels

- Coordinates utilities into one unified path
- Enables repair with minimal disruption
- Provides alternative modular surfaces for greenways, streets or canals

Modular Surfaces
Sub-Main
Shielding Compartments

Utility Main network
Street
Canal
Greenway

Alternative modular surfaces

Intelligent Infrastructure • E Pluribus Unum • Community Development • Emergency Network
Ubiquitous Sensors and Smart Materials

**Imbedded quality control**

- Monitors integrity and quality
- Measures inputs and outputs
- Maintains itself

Mone, Gregory. “Perfect Plumbing.” Popsci.com
Smart Meter
Informed consumption

- Provides information about production and consumption
- Enables citizens to manage their own resources
- Supports customization

CHICAGO: VISION FOR THE FUTURE
Hyperconnected Infrastructure

Intelligent Infrastructure • E Pluribus Unum • Community Development • Emergency Network

Consumption by Source

- Rooftop Solar: 10%
- Rooftop Wind: 16%
- Household Biomass: 20%
- Grid: 54%

www.thegreenergrass.org/2008/02/concept
E Pluribus Unum
From many, one

- Approaches utilities from a holistic perspective

- Storm water
- Drinking water
- Waste water
- Natural gas
- Renewable power
- Nuclear power
- Hydrogen
- Biomass
- Sewage
- Organic waste
- Trash
- Cable
- Fiber
Water Cycling

Storm and drinking water management

- Purifies water at centralized and distributed locations
- Prevents flooding and backflows
- Returns water to source

stormwater.wordpress.com/permeable-pavers

CHICAGO: VISION FOR THE FUTURE
Hyperconnected Infrastructure
Water Cycling

Storm and drinking water management

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- Prevents flooding and backflows
- Returns water to source

http://www.rochester.edu/news/photos/hi_res/McGrath/Nanofilter.jpg

Intelligent Infrastructure  •  E Pluribus Unum  •  Community Development  •  Emergency Network
Clean Energy
New ideas for power management

- Generates power at multiple nodes
- Enables efficient distribution
- Supports storage and sale of household production

Grant, Paul. “A Power Grid for the Hydrogen Economy.” Scientific America
Waste Cycling

Cradle to cradle waste management

- Recognizes waste as a valuable resource
- Repurposes materials for reuse
- Automates sorting and transportation

Maeda, Shingo. “Peristaltic Motion of Polymer Gels.” Angewandte Chemie International
Waste Cycling
Cradle to cradle waste management

- Recognizes waste as a valuable resource
- Repurposes materials for reuse
- Automates sorting and transportation
Pervasive Information
Universal connectivity

- Provides fiber to the premises
- Blankets the city with wireless connections
- Creates a foundation for an informed society

www.ericsson.com/campaign/towertube
Community Development
Empowered citizenship

- Integrates utilities and natural spaces
- Makes municipal actions transparent
- Enables participatory planning

Utility Park
Virtual Town Hall
Citizen Jury
Community Development

Empowered Citizenship

Utility Park

- A neighborhood space integrates beautiful utility structures into nature and provides public access to utilities.
Virtual Town Hall

- An online platform for addressing community concerns by allowing citizens to discuss and vote on local issues.
Community Development
Empowered Citizenship

Citizen Jury

- Participatory planning forums that involve citizens in important municipal decisions
Emergency Network

*Coordinated response*

- Fosters flexibility and adaptivity
- Allows customization
- Directs information to relevant parties
CHICAGO: VISION FOR THE FUTURE
Hyperconnected Infrastructure

Emergency Network
Coordinated response

My ID

- An implantable RFID chip that monitors health
Emergency Network

Coordinated response

Hot Route

• Traffic coordination for emergency vehicles
Emergency Network

Hot Route

- Traffic coordination for emergency vehicles

Sylvia Morrow: minor heart attack
blood pressure: 150/90
heart rate: 116 bpm

1542 West Fry
Apartment 32

Turn into the alley after the building and use the side entrance. Elevator B will be held for you.
Emergency Network

Coordinated response

Instant Instructions

• A communication system between emergency response and affected parties
Emergency Network

Coordinated response
Emergency Network

Coordinated response

My Emergency

- Customized emergency response based on a citizen-created profile
Emergency Network

Coordinated response

Occupancy: 1 feline
Identity: Mr. Butterscotch
Temperature preference: 60
Lights: none
Security Access: Lois Wincott
# Roll-out of Hyperconnected Infrastructure

## Three-phase plan

<table>
<thead>
<tr>
<th>Phase I: 2010 - 2025</th>
<th>Phase II: 2025-2075</th>
<th>Phase III: 2075-2110</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preliminary set-up</td>
<td>Interconnectivity</td>
<td>Hyperconnectivity</td>
</tr>
</tbody>
</table>

### Utility Main
- **Brownfield Pilot**: Initial roll-out
  - All new structures are Utility Main ready
  - All heritage construction is connected

### Supergrid
- **Technology Pilot**: Long-distance Pilot
  - Chicago Main line is installed
  - City-wide roll-out

### Broadband
- **Wireless Broadband**: Temporary fiber network
  - Telephone poles are removed
  - Ubiquitous broadband

### Distributed Nodes
- **Regulations embrace distributed generation**
  - Buildings begin to produce more than they consume
  - Zero-net-output of energy and carbon

**CHICAGO: VISION FOR THE FUTURE**
Responsive Transport

Overview

http://flickr.com/photos/eole/
Responsive Transport

Objectives

- Encourage urban connectedness
- Make the transportation system accessible and understandable
- Serve current and future generations while respecting Chicago’s past
Responsive Transport

Solutions

- New Connected Infrastructure
- Evolutionary Maintenance
- Optimization
- Travel Experience

http://flickr.com/photos/eole/
New Connected Infrastructure

Types of Infrastructure

Shift from hub-and-spoke to distributed web
New Connected Infrastructure

Types of Infrastructure

Shift from hub-and-spoke to distributed web

- Vertically Layered Thruways
New Connected Infrastructure

Types of Infrastructure

Shift from hub-and-spoke to distributed web

- Vertically Layered Thruways
- Secondary Express Routes

CHICAGO: VISION FOR THE FUTURE
Responsive Transport

Vertically Layered Thruways
Secondary Express Routes
Local On-Demand Services
Underground Freight Grid
New Connected Infrastructure

Types of Infrastructure

Shift from hub-and-spoke to distributed web

- Vertically Layered Thruways
- Secondary Express Routes
- Local On-Demand Services
New Connected Infrastructure

Types of Infrastructure

- Shift from hub-and-spoke to distributed web
- Vertically Layered Thruways
- Secondary Express Routes
- Local On-Demand Services
- Underground Freight Grid
New Connected Infrastructure

Vertically Layered Thruways

- Vertically Layered Thruways serve as major arterial corridors
- Thruway layout based on current elevated train & highway layouts
- At least 1 layer is dedicated to public and/or shared transportation
- Greenways incorporated to improve travel experience and buffer system output
New Connected Infrastructure

Vertically Layered Thruways

- 2-4 person vehicles wait at each station
- Vehicles travel directly to requested destination without intermediate stops
- Station stops are off of main line for pick-up and drop-off

faculty.washington.edu/jbs/itrans/PRT/
New Connected Infrastructure

Secondary Express Routes

- Lighter infrastructure allows for adaptive and flexible development of new routes and transport technology
- Surface-level mass transit mode
- Dedicated express lanes
- Easy-Entry Bus Stops
- Trials & adjustments for new express route service without the initial investment into heavy infrastructure

www.transitchicago.com
New Connected Infrastructure

Local On-Demand Services

- Point-to-point service within specific local boundary area
- User requests specific pick-up & drop-off locations
- Ride is shared or private depending on other requests

On-Demand Pickup Requested:
LaSalle Avenue to Oak Street

New Connected Infrastructure
Local On-Demand Services

- Shared storage units located throughout the city
- Coordinated use with Intellicard unified pay system
- Point-to-point pick-up & drop-off
- Personal & private use
- Reduces individual user’s burden of storage, cost & maintenance

www.zipcar.com
www.igocars.org
www.bikedispenser.com

electric car dispenser

CHICAGO: VISION FOR THE FUTURE
Responsive Transport

Local On-Demand Services
New Connected Infrastructure

Underground Freight Grid

- Relieves surface traffic congestion
- 2 primary exchange points for regional freight transfer
- Several local pick-up & drop-off points within the city
- Coordinated by Intelligent Transportation System
Evolutionary Maintenance

Malfunction Cues

- Human attention limited for scanning and monitoring tasks
Evolutionary Maintenance

Malfunction Cues

- Human attention limited for scanning and monitoring tasks
- Emphatic cues make problems visible
Evolutionary Maintenance

Automated Repairs

- Self-healing materials reduce need for repair
Evolutionary Maintenance

*Automated Repairs*

- Self-healing materials reduce need for repair
Evolutionary Maintenance

Automated Repairs

- Self-healing materials reduce need for repair
- Automatic Replacement prevents deterioration and allows System Biopsies
Evolutionary Maintenance

Automated Repairs

- Self-healing materials reduce need for repair
- Automatic Replacement prevents deterioration and allows System Biopsies
Evolutionary Maintenance

Automated Repairs

- Self-healing materials reduce need for repair
- Automatic Replacement prevents deterioration and allows System Biopsies
- Automated Mechanics reduce human risk
Evolutionary Maintenance

Documentation

- Tooltracker equips tools with data storage capabilities
- Records time and location of repair
- Data reveals patterns of structural weakness
Evolutionary Maintenance

Sustainability

- Maintains its own energy sources
- Converts waste and movement within system back into fuel

Generative Braking
Evolutionary Maintenance

Sustainability

- Maintains its own energy sources
- Converts waste and movement within system back into fuel
Evolutionary Maintenance

Sustainability

- Maintains its own energy sources
- Converts waste and movement within system back into fuel
Optimization
Technology and Intelligence Driven

- Real-time Shared Awareness

CHICAGO: VISION FOR THE FUTURE
Responsive Transport
Optimization
Technology Driven

- Sensing Systems

www.its.dot.gov
Optimization

Technology Driven

• Sensing Systems

• Embedded Sensors

www.its.dot.gov
Optimization
Technology Driven

- Sensing Systems
- Embedded Sensors
- Floating Cellular

www.its.dot.gov


- Sensing Systems
- Embedded Sensors
- Floating Cellular
- WAVE/DSRC
Optimization
Intelligence Driven

• Real-time Shared Awareness

Roadway Activity

Neighborhood/Jurisdiction Activity

System-wide Activity

www.its.dot.gov
• Adaptive Signal Controls

www.its.dot.gov
Optimization

Intelligence Driven

- Adaptive Signal Controls
- Reversible Lane Flow

www.its.dot.gov
CHICAGO: VISION FOR THE FUTURE
Responsive Transport

- Adaptive Signal Controls
- Reversible Lane Flow
- Variable Speed Limits

www.its.dot.gov

New Connected Infrastructure • Evolutionary Maintenance • Optimization • Travel Experience
Travel Experience

Included Cab Fare

- On-demand free cab ride to nearest CTA station
**Travel Experience**

**Cargo Assistant**

- Automatic carts carry bags for people inside the CTA station
InfoBoard features:

- Find the fastest way to destination
- Train/bus departure time
- Purchase or refill the IntelliCard
- Interactive map of city, transit routes & stations
- Hotel and restaurant info
Travel Experience

IntelliCard

- Unifies payment method between all transits
- Animated arrow guides the user to the platform
- Displays arrival time of the train or bus selected
Travel Experience
IntelliCard / Targeted Scanner / Delightful Travel

• Waterfall wall with info projection
• IntelliCard is passively scanned for transaction as people walk through the corridor.
• People and bags are scanned for potentially harmful materials
Travel Experience
Cargo Assistant / Personal Mass Transit

- Cargo assistant stores itself as passenger boards the vehicle
Travel Experience
Onboard Communication System

Onboard info shows:
• Current position & speed
• Arrival time & distance
• CO₂ reduced
• Emergency notice
Travel Experience

Auto Rerouting

• Automatic rerouting using data from ITS
• Red windshield indicates mechanical failure
Travel Experience

CTA Storage Platform / Assisted Loading

- Standard storage space at all train stations
- Vertical lockers with assisted loading
Travel Experience

Enter waiting

• Clean waiting areas in CTA stations with food and beverage vendors

• Use display embedded in glass table to check email and surf the web
## Roll-out of Responsive Transport system

**Three-phase plan**

<table>
<thead>
<tr>
<th>New Connected Infrastructure</th>
<th>Evolutionary Maintenance</th>
<th>Optimization</th>
<th>Travel Experience</th>
</tr>
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<tbody>
<tr>
<td><strong>Car &amp; bicycle shares</strong></td>
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**Phase I**

**Phase II**

**Phase III**

---

*CHICAGO: VISION FOR THE FUTURE*

Responsive Transport
Redefining the role of the river and lake in Chicago
“The people of Chicago have ceased to be impressed by rapid growth or the great size of the city. What they insist on asking now is, **How are we living?**”

- Daniel Burnham
Featured Environment :: Principles
The principles behind the Featured Environment vision

Vitalize urban life
Unify elements of the city
Celebrate natural and human values
System Elements

01 RiverWalk
02 Canals
03 Islands
04 RiverHaven
RiverWalk :: Zoning

Zones divide the RiverWalk into four distinct experiences

RiverWalk
• Canals • Islands • RiverHaven
RiverWalk :: Turning Basin

Gateway to the RiverWalk

- Sits at convergence point of the North, South, and Downtown branches of the river
- Offers spectacular views of the river skyline
- Symbolizes entrance to river and lake system
- Offers significant focal point on the river
RiverWalk :: Lookout Point
The focal point of the RiverWalk

- Lookout Point reclaims undeveloped, under utilized land
- Celebrates convergence of three river branches
- Offers stunning views of the skyline, river branches, and downtown river walk
- Incorporates park land into downtown area
- Establishes focal point at entrance to RiverWalk
- Commemorates Chicago’s 2016 Olympic bid
RiverWalk :: Lookout Point

The focal point of the RiverWalk
RiverWalk :: Arcade District

The cultural stream of the RiverWalk

- Expanded walkways create continuous path along river and under bridges
- Accommodates greater pedestrian use
- Offers gallery and retail attractions
- Adaptable architecture and barges offer great flexibility in narrow river footprint
- Revitalizes downtown river stretch
RiverWalk :: Koolhaalf Tube

Minimizing noise to maximize RiverWalk enjoyment

- Current bridge and traffic noise preclude opportunities for respite and leisure on the river walk below
- Tubes dampen bridge sounds and utilize noise cancelling technology to mask unwanted environmental noise
- Semi-circular form blocks sound without obstructing views from bridge
- Fuses Chicago historical and modern bridge architecture

Image courtesy Creative Commons
RiverWalk :: Mobi- Mods
Adaptable floating architecture for river amenities

- Mobile and modular architecture offers flexible space for cafés, restaurants, light retail, and entertainment
- Barges transport Mobi- Mods to different river locations
- Maximizes usable river space by while preserving valuable land
RiverWalk :: Market District
The potential for a new downtown destination

- Market District offers great nature and greenery in the heart of downtown
- Can accommodate multi-level architecture
- Rests at the intersection of downtown, the river, and the lake
- Potential for a new downtown destination
RiverWalk :: Market District

A new downtown destination for work and play

- Adaptable Mobi-Mods reconfigure to offer greater space for providers
- Accommodates recreation, leisure, dining and personal work spaces
- Multi-level configurations afford personal space and shade
- Minimizes harmful impact caused by full-scale development and preserves natural setting
Canals

Extending the river experience

- Extends the reach of the Chicago River
- Increases Chicagoans exposure to water
- Reinforces the character of the city
Canals
Extending the river experience

- Extends the reach of the Chicago River
- Increases Chicagoans' exposure to water
- Reinforces the character of the city
Canals :: Brooks
*An intimate canal experience*

- Enables visitors to engage more closely with water
- Creates park space on banks
- Provides more personal experience with the water
Canals :: Brooks
An intimate canal experience

- Allows for easy manipulation of water characteristics
- Transforms characteristics of water through flow diversion and slight elevation changes
- Engages the senses more actively
Canals :: Watercourses
Utility and recreation

- Acts as extension of Chicago river for boat traffic
- Allows for scenic boat loop
- Manages diverted storm water from surrounding streets and buildings
Canals :: Watercourses

Utility and recreation

- Provides space for kayaking, canoeing, and touring the city
- Enables year round use by accommodating ice skating or cross-country skiing
System Elements

CHICAGO: VISION FOR THE FUTURE
Featured Environment

Islands
Islands

*Balancing urban development with natural development*
Islands

Guiding questions

How can we transform urban areas
Islands

Guiding questions

How can we transform urban areas
How can we create new areas
Islands :: Burnham Island

*Burnham Island provides ample recreational area near downtown*

- Burnham Island situated in close proximity to downtown area
- Water-taxis and ferry boats provide easy access
- Creates approximately 1 square-mile of new land
- Utilizes land displaced from city projects such as Deep Tunnel
Islands :: Burnham Island

Several features make the island an attractive destination

- RiverWalk
- Canals
- Islands
- RiverHaven

- Park
- Beach
- Festival area
- Observation Tower
- Restaurants
- Levelator Pier
- Integrated Museum
Islands :: Burnham Island

Pier and Museum provide transition between city and nature

- Restaurants on Levelator Pier provide the best view of Chicago
- Underwater museum galleries enable visitors to explore life and treasures in the lake
Islands :: Burnham Island

*Beaches offer refreshment and isolation from the city*

- Newly created beaches provide refreshment to the growing population in an increasingly hot climate
Islands :: Burnham Island

Natural zones create full immersion with the environment

- Northern part of the island serves as a recreational park
- Certain areas support both winter and summer activities
**Islands :: Beaches**

*Small islands provide additional beach areas*

- Additional beaches create a new coastline
- Expanded beach areas accommodate more people and provide a better beach experience
Islands :: Beaches

Wave breakers and sand bars combine functionality with relaxation

- Wave breakers protect beach islands from erosion caused by water currents and waves
- Sandbars connect wave breakers, islands, and mainland
- Sandbars encourage interaction with water
RiverHaven

People won’t have to leave the city to escape it.

- Many Chicagoans travel over 5 hours to Door County to escape the city.
- RiverHavens allow for an escape from the city within the city.
- “A region that is better designed for its residents will also have a stronger economy” - Metropolis Plan 2020

Images: google maps
RiverHaven

Art is reflected best in an environment that is designed for it

- Designed to fit the specific location (Chicago’s South Lagoon is a great option)
- Offers a focused experience with nature
RiverHaven

*Complete immersion in nature provides respite*

- Replaces high rises with vertical gardens, living bridges and large trees as the statuesque elements in the skyline
- Shifts the point of view of Chicago to include nature as a primary feature

Photo: Amanda McKown
RiverHaven :: Terraced land

*Undefined open space celebrates human values*

- Creates natural boundaries for multiple activities
- Allows for customization
- Celebrates the hobbies and interests of residents through series of outdoor classes
- Offers a low maintenance alternative to grass turf through use of clover

Images: James Corner for Toronto Riverfront
Flickr: Taoist Tai Chi Belgium
http://www.wikihow.com/Grow-a-Clover-Lawn
RiverHaven :: Scalloped pavement

*Scalloped pavement makes the river more approachable*

- Eases interaction with river
- Expands the riverbed
- Serves as protection against flooding

Images: James Corner for Toronto
flickr: david collins
flickr: jiformales
RiverHaven :: Natural jungle gym

Natural jungle gyms encourage youth engagement with nature

- Celebrates play through low hanging branches and sturdy vines
- Offers a place for families, creating a natural zoning in the RiverHaven

Images: flickr: saraide
flickr: megyn.ohara
flickr: julius.hibbert vine
RiverHaven :: Living bridge

Living Bridges encourage interaction through exploration

- Offers views by leveraging height of bridges
- Increases access to both sides of the river
- Extends park space
- Celebrates human desire to explore

Photo: Amanda McKown
Wood: www.buzon.ae/html/the_pedestals.html
Bridge: Flickr: thingermejig
RiverHaven :: Framed entrance

Archway reinforces the haven as a destination space

- Acts as a landmark to provide navigational support and signal arrival
- Signifies a transition between environments
- Enables the system to frame views of the RiverHaven

Images: West8 for Budapest Danube Waterfront
Jim Colyer
http://is.gd/ajkW
flickr: seier+seier+seier
Featured environment :: The river and lake

Building a more complete relationship between the city and nature

- RiverWalk and Canals create permeable boundaries to encourage people to easily pass between the city and nature.
- Islands and RiverHavens create more rigid boundaries to offer views from a distance of the city and immersive natural experiences.
## Featured Environment :: System Roll-out

*The system will be implemented in three phases*

<table>
<thead>
<tr>
<th>Phase I: Enhancing current natural assets</th>
<th>Phase II: Creating new natural assets</th>
<th>Phase III: Fully featuring natural assets</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>RiverWalk</strong></td>
<td><strong>Canals</strong></td>
<td><strong>Islands</strong></td>
</tr>
<tr>
<td>- expansion of river walk</td>
<td>- begin road demolition for canals</td>
<td>- reclaim land for islands</td>
</tr>
<tr>
<td>- improve the quality of the river water</td>
<td>- build canals</td>
<td>- commence island formation</td>
</tr>
<tr>
<td></td>
<td>- develop cultural attractions</td>
<td>- establish natural ecosystems</td>
</tr>
<tr>
<td></td>
<td>- increase landscaping and greening</td>
<td><strong>RiverHavens</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>- build infrastructural support for recreation</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- enhance landscaping and waterscaping</td>
</tr>
<tr>
<td><strong>RiverHavens</strong></td>
<td><strong>Build out south lagoon</strong></td>
<td></td>
</tr>
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<td>- improve the quality of the river water</td>
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<td></td>
<td></td>
<td>- reclaim and develop new RiverHavens</td>
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<tr>
<td></td>
<td></td>
<td>- continue evolution of sculptural landscape</td>
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*CHICAGO: VISION FOR THE FUTURE*
Overview

Infused Nature

Networks

Contextual integration

Personal growth

Infrastructure

Greenways

ParkLife

Outside In

nature.edu

Urban agriculture

CEAS
(Community Environmental Action System)
Infused Nature

Greenways

Infused nature

Networks

Contextual integration

Personal growth

Infrastructure

Greenways • ParkLife • CEAS • nature.edu • Urban Agriculture • Outside In

CHICAGO: VISION FOR THE FUTURE
Infused Nature
Greenways
Point to point equipment rental
Greenways

Green Line and Versatile Signage
Infused Nature overview

**ParkLife**

- Greenways
- ParkLife
- CEAS
- nature.edu
- Urban Agriculture
- Outside In
ParkLife
Microclimates

Photos: Steve Kelly, Martin Liebermann
ParkLife

Clean Hubs
Infused Nature overview

CEAS

Infused nature

Networks

Contextual integration

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Infrastructure

CEAS
(Community Environmental Action System)
CEAS  Community Environmental Action System

CHICAGO: VISION FOR THE FUTURE
Infused Nature

photo: Nikki Pfarr
CEAS Community Environmental Action System
Nature in neighborhoods

- Conducts maintenance in localized regions by green space rangers
- Fosters community through neighborhood activities and know-how
- Provides assistance necessary for behavior change
CEAS  Community Environmental Action System
Maintenance determined by need

photo: Nikki Pfarr
CEAS Community Environmental Action System
Automated maintenance

CHICAGO: VISION FOR THE FUTURE
Infused Nature

photo: Nikki Pfarr
CEAS Community Environmental Action System
Ranger station resource center

photo: Nikki Pfarr
CEAS Community Environmental Action System
Tool and equipment library

photo: Vanessa Pike-Russel (flickr)
CEAS  Community Environmental Action System
Communication screen

photo: Vanessa Pike-Russell (Flickr)
Infused Nature overview

CHICAGO: VISION FOR THE FUTURE

Infused Nature

Nature integration

Contextual networks

Personal growth

Infrastructure

nature.edu

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Pushes information based on personal preferences

The Lurie Wildflower Garden is nearby...

Photo: Nikki Pfarr
nature.edu
Provides information on demand

- Allows for creation of preferences for personal interests
- Provides both place- and topic-specific information through database and archive
- Creates platform to share images, sounds, and media with friends or with the public

Photo: fireflythegreat (Flickr)
nature.edu
Provides information on demand

- Allows for creation of preferences for personal interests
- Provides both place-and topic-specific information through database and archive
- Creates platform to share images, sounds, and media with friends or with the public

Photo: fireflythegreat (Flickr)
nature.edu
Enables exchanging of information through social networks
Infused Nature

- Leverages ubiquitous computing for more flexible future uses
- Requires “opting-in” to access content
- Ensures persistence of unmediated experience with nature as the default mode

Cherry Sage

Salvia pratensis ‘Pink Delight’
Grows to 3’
Attracts Bees
Requires Full Sun
Blooms in Summer
more...

Photo: fireflythegreat (Flickr)
nature.edu
Allows unique views into content through public archive
nature.edu

Allows unique views into content through public archive
nature.edu
Archives temporal and spatial artifacts

Photo: fireflythegreat (Flickr), photos.com, wikipedia

CHICAGO: VISION FOR THE FUTURE
Infused Nature

Barn owl

Photo: fireflythegreat (Flickr), photos.com, wikipedia
Archives temporal and spatial artifacts

Photos: DazzieD (Flickr), Ann Hintzman
Archives temporal and spatial artifacts

Photo: Ann Hintzman
Leverages crowd-sourcing: Asian long-horned beetles
Infused Nature overview

Urban Agriculture

CHICAGO: VISION FOR THE FUTURE

Infused Nature

- Networks
- Contextual integration
- Personal growth
- Infrastructure

Urban Agriculture

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Urban Agriculture

Vertical Farms

CHICAGO: VISION FOR THE FUTURE
Infused Nature

www.googleearth.com
Urban Agriculture

Vertical Farms

www.googleearth.com
Urban Agriculture

Vertical Farms

Urban Agriculture

Community Coop

source: www.googleearth.com, Robert Kimberly
Nick, it’s good to see you. How are the kids? Did you grow those peppers?

source: www.googleearth.com, Robert Kimberly
Hey, Ron. Family is doing well. Yours?
Actually, Janet just brought these in!

source: www.googleearth.com, Robert Kimberly
Urban Agriculture

Community Coop

• Supports food story
Urban Agriculture
Community Coop

- Supports food story
- Provides source information
Urban Agriculture
Community Coop

- Supports food story
- Provides source information
- Isolates and reduce contamination
Infused Nature overview

Outside In

Infused nature

Networks

Contextual integration

Personal growth

Infrastructure

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Outside In

*Merging indoor and outdoor spaces*

- Building features and materials
- Breaks down barriers between the indoor and outdoor worlds
- Helps people appreciate the nature around them
- Extends indoor living spaces into the natural environment

Photo sources:
Karla Kaulfuss (Flickr)
Rob McCready (Flickr)
takomabibelot (Flickr)
Outside In
*Merging indoor and outdoor spaces*

- Building features and materials
- Breaks down barriers between the indoor and outdoor worlds
- Helps people appreciate the nature around them
- Extends indoor living spaces into the natural environment

Wall tiles with controllable opacity

Photo sources:
Karla Kaulfuss (Flickr)
Rob McCready (Flickr)
takomabibelot (Flickr)
Outside In

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Rob McCready (Flickr)
takomabibelot (Flickr)
Outside In
Harnessing natural processes

- Maintains a comfortable and clean indoor environment
- Supplements filtration and insulation utilities
- Can be featured in transparent exhibits

Photo sources:
Abigail Elder (Flickr)
Casey Yancey (Flickr)
Nikki Pfarr
Outside In
Harnessing natural processes

- Maintains a comfortable and clean indoor environment
- Supplements filtration and insulation utilities
- Can be featured in transparent exhibits

Green walls filter air, provide insulation

Photo sources:
Abigail Elder (Flickr)
Casey Yancey (Flickr)
Nikki Pfarr
Outside In
Harnessing natural processes

- Maintains a comfortable and clean indoor environment
- Supplements filtration and insulation utilities
- Can be featured in transparent exhibits

Water features filter water for reuse

Photo sources:
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Nikki Pfarr
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Outside In

Bringing nature indoors

- Ready-made toolkits that facilitate bringing nature indoors
- Encourages ownership on a smaller scale
- Serves food provision and aesthetic purposes

Photo sources:
John Philip Green (Flickr)
Juliana Duffy (Flickr)
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Nikki Pfarr

Integrated hydroponic growing solutions
Outside In
Psychological and physiological benefits

- Creates ambient effects in the built environment
- Passive stress-relieving benefits

Photo sources:
Andrew Rivett (Flickr)
jaliyaj (Flickr)
**Outside In**

*Psychological and physiological benefits*

- Creates ambient effects in the built environment
- Passive stress-relieving benefits

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*Bioluminescent plant installations*

Photo sources:
Andrew Rivett (Flickr)
jaliyaj (Flickr)

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Outside In

Psychological and physiological benefits

- Creates ambient effects in the built environment
- Passive stress-relieving benefits

Photo sources:
Andrew Rivett (Flickr)
jaliyaj (Flickr)
Infused Nature: Rollout
Three-phase plan

**Phase I:**
- Encourage participation in nature
- Personal growth
- Introduce neighborhood Coops
- Build CleanHubs
- Opportunistic development of unused land as Greenways
- Develop CEAS neighborhood maintenance staff

**Phase II:**
- Integrate nature into daily life
- Contextual integration
- Connect nature.edu to database via GPS
- Vertical farms introduced in downtown Chicago
- Modular Gardens available for home use
- Connection of greenspace pockets with nature thruways
- Introduce neighborhood tool library

**Phase III:**
- Blur boundary between nature and the built environment
- Networks
- Create Working Colonies in parks
- Incorporate Outside In into building codes
- Greenways system
- Modular Gardens available for home use
- Connection of greenspace pockets with nature thruways