Chicago's Urban Forest

Research and Opportunity Identification

Summer 2009 Research Project Team:
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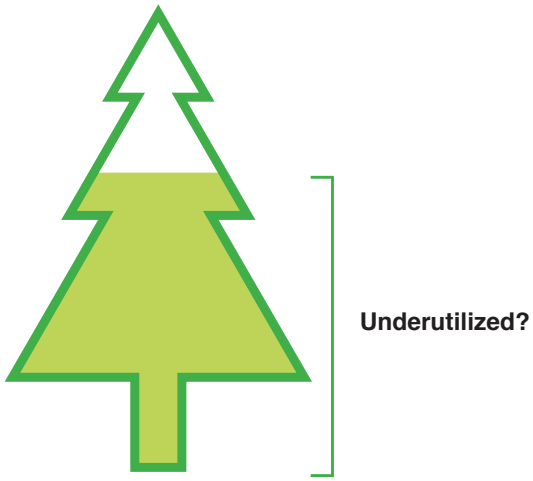
Introduction:
What is the problem?



Problem as introduced:

Urban wood is not being used to its full potential.

The Chicago Urban Forest project was led by a team of graduate students at the Illinois Institute of Technology's Institute of Design. It was an iteration on previous work done for the Illinois Institute of Technology's Interprofessional Projects Program. Previous student groups had looked at creating a business around using Chicago trees as lumber.

The initial goal was to create an actionable business plan that addressed the use of urban wood at end of life. Our research led us to new opportunity spaces around the life cycle of urban trees.

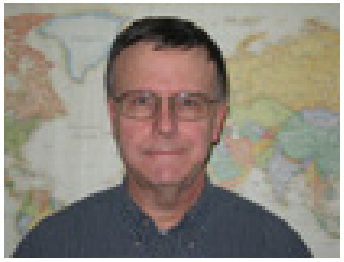
Research:
Expert Interviews and more!

We spoke to professionals and resident Chicagoans. We also conducted secondary research of urban forest data and existing initiatives.

Mike Brown
Assistant General Superintendent
Chicago Bureau of Forestry
Certified Arborist

Jim Semelka
Urban Forestry Superintendent
Village of Oak Park
Certified Arborist

Edith Makra
The Morton Arboretum
Community Trees Advocate
Certified Arborist



John Kriegshauser
Adjunct Associate Professor of Architecture
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Wood Reclaimers

JohnPaul Kusz, FIDSA, FRSA
Associate Director
Center for Sustainable Enterprise
IIT Stuart Graduate School of Business

Barbara Wood
Deputy Director of Natural Resources
Chicago Park District
Master Landscape Architect

Ed Husayko
Chicago Homeowner

Research:
Where is the urban forest?

20% **Public Trees**
Managed by

Bureau of Forrestry

Parks District

80% **Private Trees**
Managed by

Private Citizens

Commercial Tree Services

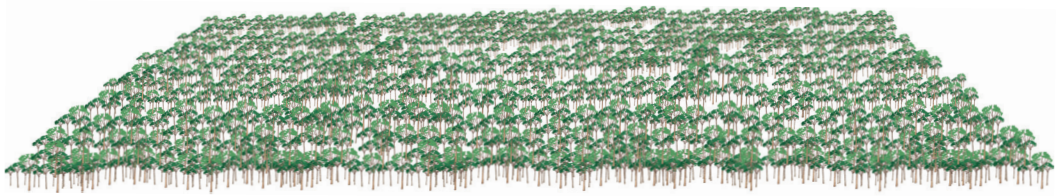
Community Tree Organizations

The Bureau of Forestry and Park District do a good job of managing their trees; but they only care for a small percentage of the tree population. Most of the trees are on private land and are cared for by private citizens, commercial tree services and community organizations.

The urban forest is fragmented.

1 Chicago's Urban Forest Ecosystem (CUFE): Results of the Chicago Urban Forest Research Project. USDA. 1994

Research:
Is the urban forest free lumber?



3.6 million
trees in Chicago [1]

57,000
trees cut in Chicago annualy [2]

5,700
trees with large enough diameter for lumber [3]

The majority of trees cut are dead, diseased or damaged[4] and not desirable as lumber (softwood, short saw length, crooked trunks, low value species).[5`]

The urban forest is not a significant source of lumber.

1 ibid.

2 Assuming comparable felling rate for trees on private property as for the Bureau of Forestry and Chicago Park District.

3 CUFE 1994.

4 The city of Chicago cuts down trees only when they are dead, diseased or damaged. We are assuming that the citizens of Chicago often do the same.

5 From CUFE 1994: 2 most popular trees in Chicago are Cottonwood and Ash. Team analysis based on interviews also confirms that most wood is not desirable for lumber.

Research:
What is urban lumber good for?

Most urban lumber is considered "character wood" because of its unique aesthetic qualities (knots, gnarls, nails) though this does not necessarily raise its market value or desirability.

Urban wood is not for structural use.[1]

Due to species diversity[2], varied lumber quality, and unpredictable volume, much of urban lumber is sold for mulch, pallets and firewood.[3]

Urban wood is not standard lumber.

1 Structural wood must go through an inspection and classification, to which urban wood is not currently subjected due to the low volume of its harvest. Furthermore, expert interviews repeatedly said they did not believe most of this wood would pass such inspections.

2 15 different species make up the majority of Chicago's tree inventory. No one species accounts for more than 14.2% of total inventory.

3 From interview with Mike Brown, Assistant General Super Intendant, Bureau of Forestry, City of Chicago. 06/11/2009.

Research:
What are urban trees good for?

Oak Park Chicago. Photo by team, July 2009

The canopies of urban trees clean the air, retain water, shade houses, reduce urban heat island effects, abate noise, and increase property value.[1]

The City has many constraints when choosing which species to plant. A tree's canopy, growth rate, and hardiness are considered before its end of life value as lumber.[2]

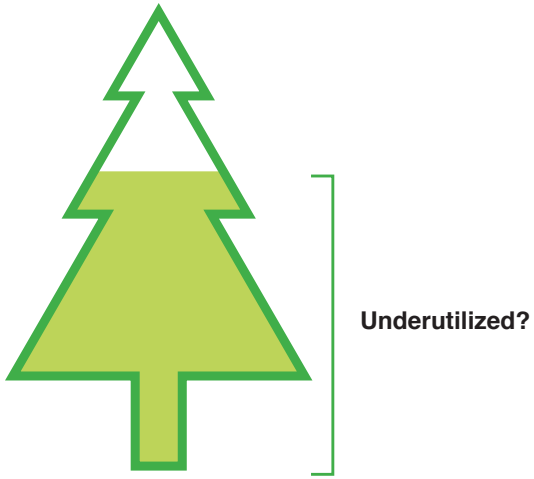
Urban trees are best while living.

1 Chicago Urban Forest Agenda. City of Chicago: 2009.

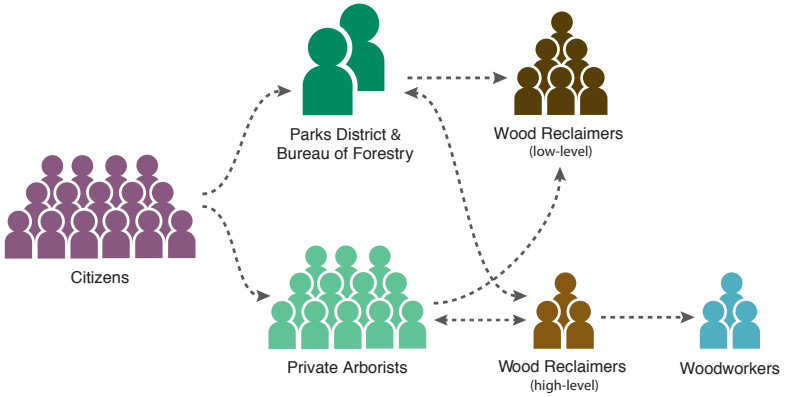
2 From interview with Mike Brown, Assistant General Super Intendant, Bureau of Forestry, City of Chicago. 06/11/2009.

Reframe:
What is the problem?

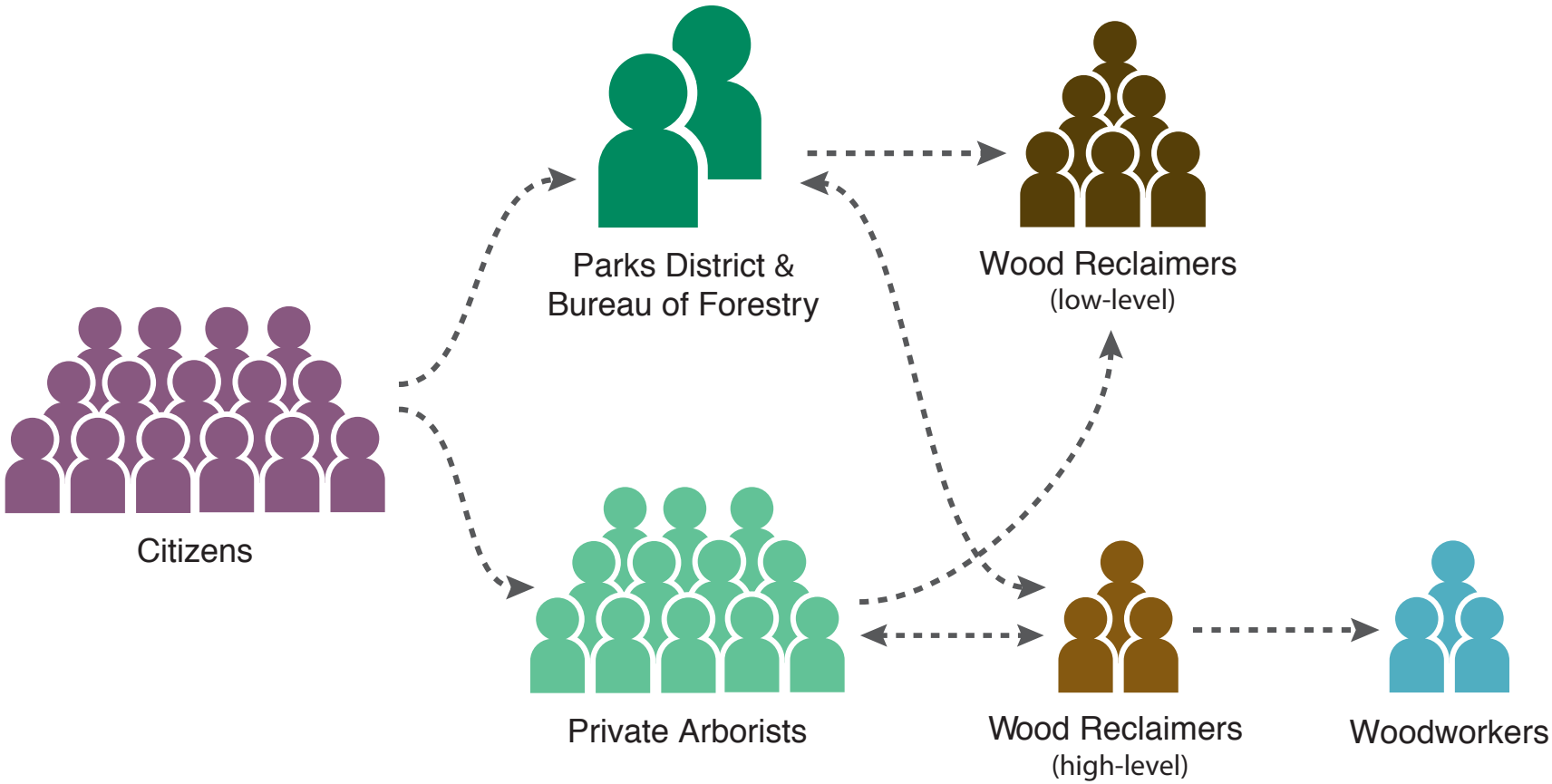
Problem as introduced:
Urban wood is not being utilized to its full potential.



Problem re-framed:
The system is fragmented and communication between parties is lacking.



Reframe:
Existing System of Relationships



The arrows represent the flow of communication between parties. This directly affects how wood flows through the system.

Citizens contact either private arborists or call 311 depending on the location of trees. High-level wood reclamation (for furniture etc) relies on personal relationships with private arborists and municipal services. After processing, this wood is sold to woodworkers. Low-level wood reclaimers (mulch, chips, pallets) have a much less demanding and more systematized process of accepting tree debris. Consequently most wood goes through this channel.

Reframe:
Barriers Within the System

Existing System

One of the biggest barriers to using urban wood as an industrial lumber source is that the current system is working. Most urban trees are used even if the final product Is not glamorous. A large portion of the wood is mulched, chipped, used for firewood, or made into pallets. There is a large need for these products. And in reality, very little urban wood is wasted.

Many of the organizations and departments that deal with tree removal have little incentive to make higher use of this wood. Chicago's Bureau of Forestry is experiencing budget cuts while still having more work than they can handle. Under current conditions, it is not possible for the Bureau of Forestry to use any more time or manpower to devote to cutting trees into saw-logs or sorting the different types of wood. Private arborists do not sell enough wood to reclaimers to justify cutting and sorting trees properly.

Another obstacle in using urban wood is Chicago's unknown tree inventory. The Bureau of Forestry does a 100% tree census every few years, however it only covers street trees and does not include trees on private and institutional lands. Also, this inventory changes every year due to planting and storm damage. For highest utilization of Chicago's trees, there must be an accurate inventory of all trees, especially those on private property.

Culture

Although America is seeing an increase in demand for sustainable, environmentally friendly products, lack of awareness is a major hurdle in promoting urban wood. When questioned, interview subjects perceived bamboo as the primary source of sustainable wood. Creating awareness of urban wood will help create a sustainable business based on this resource.

Communication

Another barrier to urban wood utilization is the complex communication between the different parties involved. The Bureau of Forestry, the Park District, and the Chicago Department of Transportation are three separate entities that must be involved with the planting and removal of trees in the public sector.

On the private side, social networks between arborists who cut trees and wood reclaimers are informal and take time to develop. In order for the different parties to better communicate, a transparent system with a low-barrier to entry is needed.

Policy

Chicago has made great strides in creating policies that promote a cleaner environment, including the 1990 Green Streets Ordinance and the 1991 Landscape Ordinance. But there are other policies keeping urban wood from being used. For instance, in order to get LEED certification, a lumber company must be able to show a chain of custody for each tree and prove that it was grown in a sustainable forest. This certification limits urban lumber usage because of the difficulty in proving a chain of custody. Old policies will need to be looked at and re-evaluated while new policies may be needed to increase the acceptance and use of urban lumber. The success of the Green Streets and Landscape Ordinances has shown that policy is an effective way to change how we deal with urban trees.

Opportunity Spaces:

5 Key Areas to Explore

- Put a Quantitative Value on Living Trees
- Increase Tree Capacity
- Maintain Trees with Fewer Resources
- Create Demand for Urban Wood
- Improve the Supply Chain

Opportunity Space :

Put a Quantitative Value on Living Trees

There is a lot to measure when it comes to the benefits of trees. Unfortunately, there are few tools for this.

Findings

People do not realize the total value trees provide.

The City of Chicago does not have an accurate inventory of trees on private and institutional lands.

Opportunity

- Create a way to quantify trees' value.
- Find a way to encourage citizens to quantify and share their tree data.

Opportunity Space :
Increase Tree Capacity

Urban forestry is physically and financially constrained by real estate.

Findings

There is little room left on parkways for more trees.[1]

Chicago wants to increase its canopy cover from 14.6% to 17% by 2020.[2]

Greatest amount of available land is privately owned.

Trees provide intangible values to neighborhoods.

Opportunity

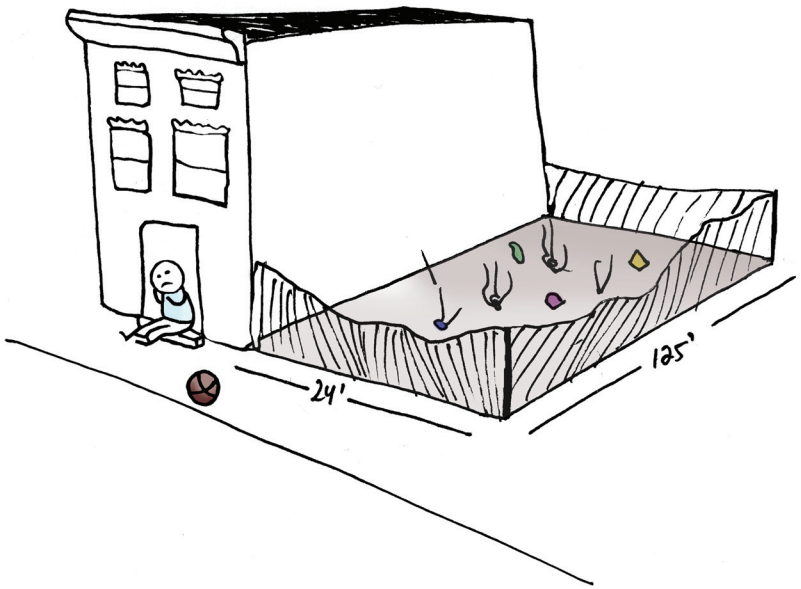
- Concentrate tree planting efforts on private and abandoned property.

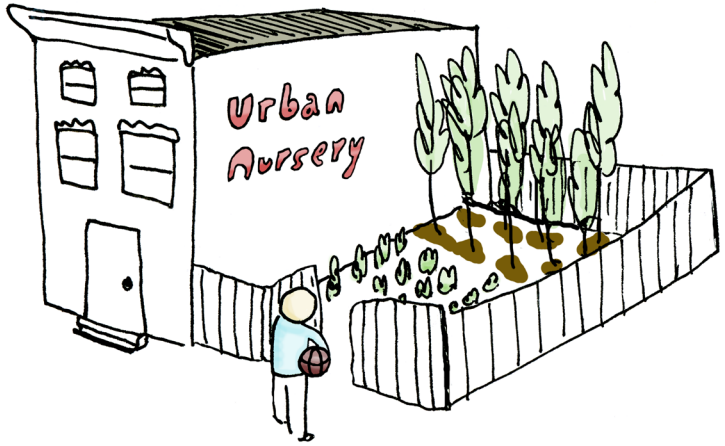
1 In 1995, 64% of all parkway space had been planted (Chicago Urban Forest Agenda. City of Chicago: 2009.) According to Mike Brown, of the Bureau of Forestry, in 2009 nearly all the available locations have been covered. According to Jim Semelka, of Oak Park Bureau of Forestry, trees are being planted too close together.

2 Chicago's Urban Forest Agenda: Result of Chicago's Urban Forest Effects (UFORE) model study 2007

How Might We Increase Tree Capacity?

Urban Nursery





There are 70-80,000 vacant lots in Chicago
15,000 are city owned.[1]

Aldermen decide if they want to use the lot for community development.

Each lot could fit 83 trees[2]

1 Chicago Abandoned Lot Project. http://seanparnell.com/CALP/CALP.html

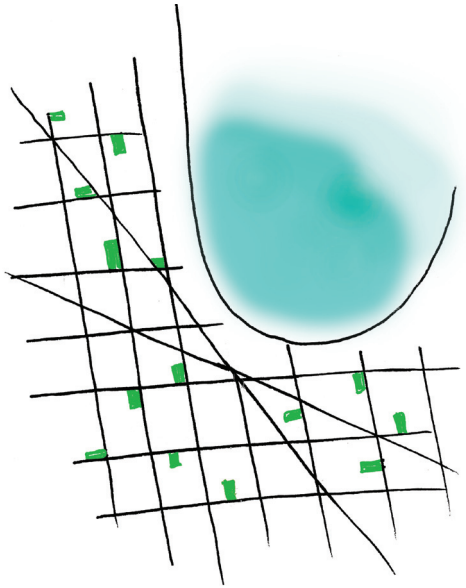
2 At a standard plant density of trees planted in 6 ft rows. http://www.bar.ncsu.edu/programs/extension/ag-inv/nursery/plant_density.html

How Might We Increase Tree Capacity?

Urban Nursery

A manager oversees the garden and nursery.[1] Training is provided by OpenLands' Tree Keepers program.

Local gardeners use the land to grow food and residents enjoy the urban oasis.



Locally grown trees are acclimated to Chicago's harsh weather and would enjoy longer lives.[2]

1 Over 600 active community gardens in Chicago across 50 wards, including 9 in Englewood and a Cabrini Green Chicago Ave Garden. Green Net Chicago. http://greennetchicago.org/map.html. 2005.

2. Suggestion by Mike Brown of the Bureau of Forestry during workshop, July 2009.

How Might We Increase Tree Capacity?

Urban Nursery

Business Model

501(c)3 corporation whose mission is to engage the community in the beautification of its landscape while creating local jobs.

Modeled on the community garden which is partially subsidized by a municipality i.e. NYC. Urban gardens are managed by the Parks and Recreation Dept program “Green Thumb,” which provides water, compost, and fences to the gardens. Local gardeners are charged a small fee to user the land.

Partner with Arbor Day Foundation for purchase of seedlings, Openland’s Tree Keepers for management, and the Bureau of Forestry and Park District as the end customer.

Benefits

Use vacant lots in a manner beneficial to the community: aesthetically and environmentally.

Trees grown locally have a higher chance of survival when replanted than imported trees.

Obstacles

Securing leases for lots from Aldermen, who may be waiting for more profitable offers.

Next Steps

Identify desirable vacant lots in residential neighborhoods with usable soil and access to water.

Meet with Aldermen to determine how the lots could be made accessible as community spaces.

Determine if Park District and the Bureau of Forestry will purchase trees.

Research how to prepare the lot for growing and how to train volunteer managers.

Calculate capital needed to purchase trees, growing containers, and other utilities.

Stakeholders

Alderman who control the vacant lots and are the main entry point into a community.

Streets and Sanitation Department and Park District who are already working with neighborhood groups. These groups would be future purchasers of the trees.

Community Organizations who have established themselves in their communities, are dedicated to enriching them, and are a good resource of networking.

Opportunity Space :

Maintain Trees With Fewer Resources

The Bureau of Forestry has a 20 million dollar budget and selling its lumber makes up for a tiny fraction of this budget. Modernizing and distributing maintenance tasks to third parties might help cut costs.[3]

Findings

Only 1/3 of '311' requests in the City for tree removal are legitimate.[1]

There are approximately 30 Chicago organization that work with the urban forest but their efforts are largely uncoordinated.

The City of Chicago would like more people to work with the Openlands' TreeKeepers and other forest stewardship programs.[2]

Chicago receives over 10,000 tree related 311 calls a year.

Opportunity

- Improve the efficiency of the tree complaint system.
- Create a combined effort to maintain trees.
- Take advantage of city interest to identify funding opportunities.
- Aggregate 311 complaints to track trends in tree issues.

1 Quote from Mike Brown of City of Chicago Bureau of Forestry. Jim Semelka, Urban Forestry Superintendent,Village of Oak Park puts his legitimate calls at 10% of the total volume.

2 Chicago's Urban Forest Agenda: Result of Chicago's Urban Forest Effects (UFORE) model study 2007

3 Currently, trees cut by the Bureau of Forestry are sold for appx $150,000 annually. From interview with Mike Brown, B. of F.,

Opportunity Space :
Create Demand for Urban Wood

Products made from urban wood will sell at a premium, but currently there is little understanding or appreciation of the environmental value of this material.

Findings

Does sustainable mean bamboo? - Chicago citizen
From interviews on the street, we found there is a low awareness of urban wood - what it is and its value.

I could process a lot more, but there isn't the demand
-Bruce Horigan, Chicago wood reclaimer
We found that there isn't a market for reclaimed wood.

Urban wood products are likely to be more expensive than comparable products because of scattered wood source and poor economies of scale.[1]

Because urban wood varies in species, quality, and size, processing urban wood without sorting is more efficient.

Opportunity

- Increase awareness of the sustainable aspects of urban wood.
- Give incentives for woodworkers to use urban wood.
- Legitimize the higher price by packaging it with a green incentive and compelling story.
- Develop processing methods that would result in a high-value product from a mixed batch of wood.

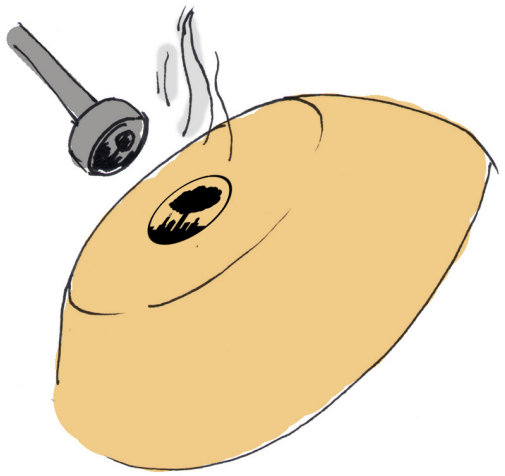
1 Team analysis based on interviews

How Might We Create Demand for Urban Wood?

Downtown Timber

Downtown Timber brands wood products made from urban lumber.

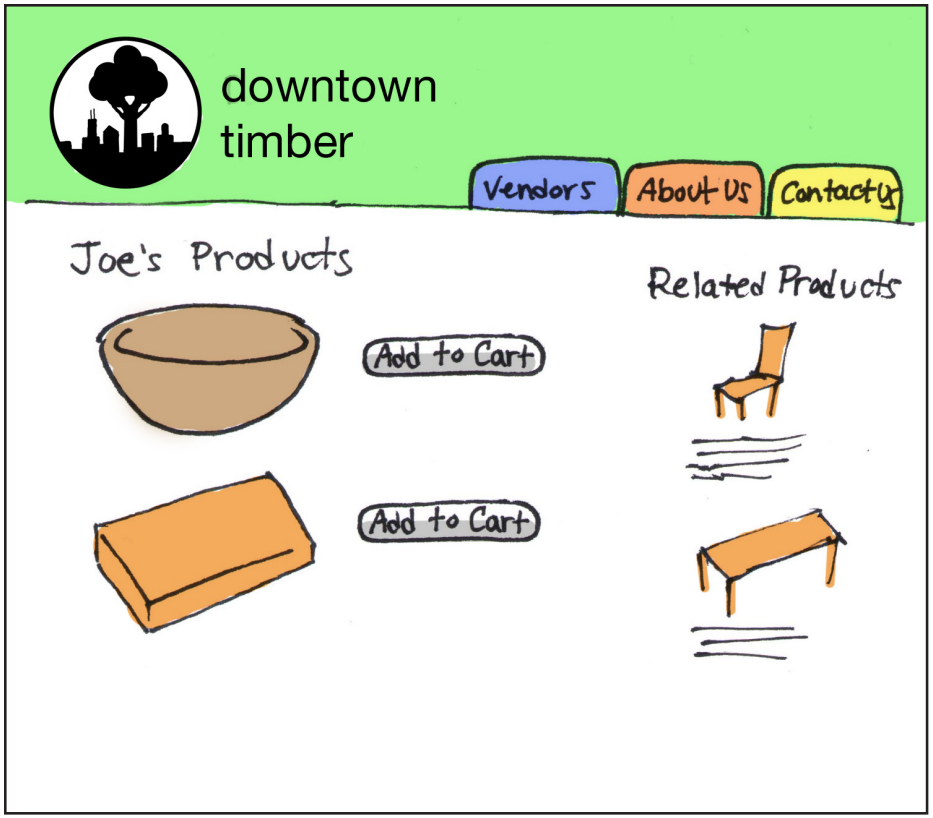
Woodworkers join DT because it promotes their work, gets it in stores, and helps them reach a wider audience.



DT creates awareness of urban wood as a sustainable wood source by mimicking the marketing that has worked effectively for bamboo.

How Might We Create Demand for Urban Wood?

Downtown Timber

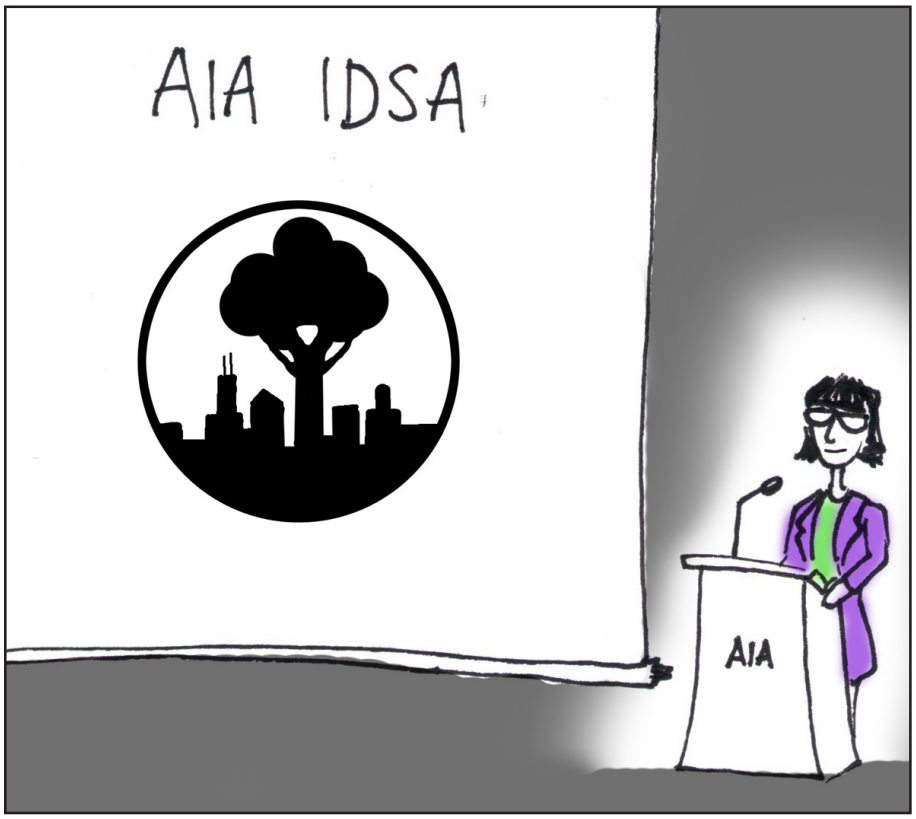


The Downtown Timber website consolidates urban wood products to attract more buyers.

Partnerships with stores and booths in markets promote the brand and its products.

How Might We Create Demand for Urban Wood?

Downtown Timber



DT raises awareness through professional organizations.

Consumers value the story behind Downtown Timber and recognize its brand name.

How Might We Create Demand for Urban Wood?

Downtown Timber

Business Model

A for-profit business, Downtown Timber (DT) promotes and distributes woodworkers' goods for a cut of sales.

To develop awareness of urban wood products, DT would be promoted through professional organizations such as IDSA and the American Institute of Architects (AIA).

DT would distribute these products nationally through its website and locally through venders (i.e. stands at farmers' markets and boutiques).

Benefits

Provides exposure and a wider distribution channel for woodworkers.

Build awareness among consumers of urban wood.

Obstacles

Create interest among consumers prior to the existence of demand.

Provide enough promotional power for woodworkers to justify the cost of distributing through Downtown Timber.

Next Steps

Conduct primary research with woodworkers to determine their general needs and objectives.

Research current customers of sustainable, locally produced products to gauge the size of potential customer base.

Assess the potential for growth of interest in sustainable wooden products nationally.

Research professional organizations for potential partnerships to build awareness of the Downtown Timber brand.

Stakeholders

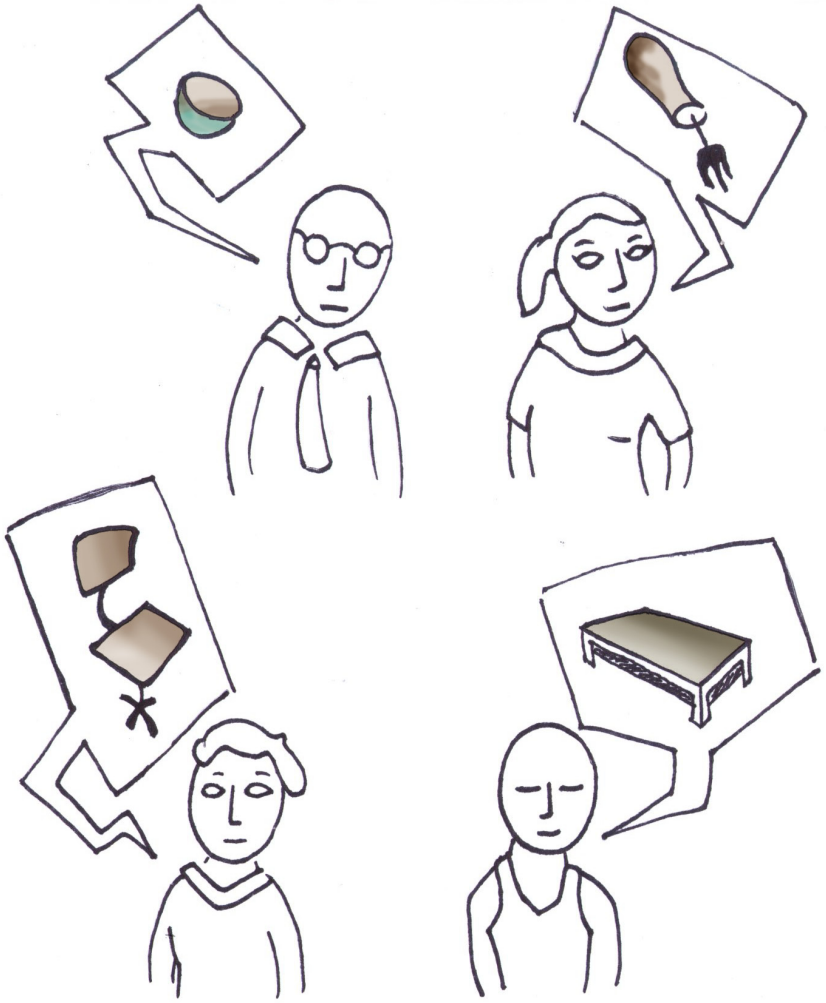
Downtown Timber shareholders

Woodworkers who would get larger audience for their work.

Urban wood reclaimers who would sell more wood.

How Might We Create Demand for Urban Wood?

Muni



Muni is modeled on American Apparel - a brand that sells basic, well-designed local products at a premium.

Muni will commission designers to create lines of products from urban wood exclusively for their retail outlets.

How Might We Create Demand for Urban Wood?

Muni

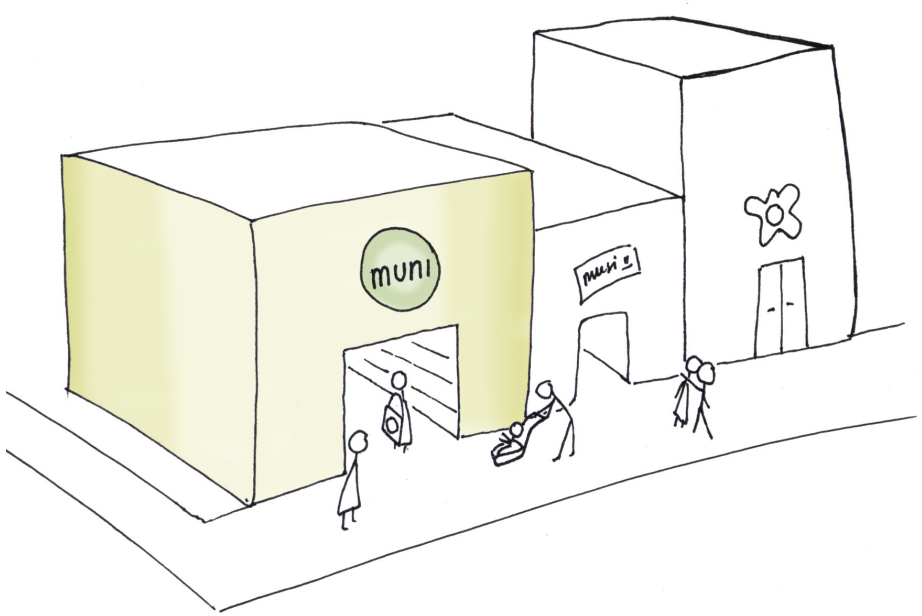
Chicago's premiere local & sustainable store.

Has a boutique shop & booths at Chicago events.

Located in upscale neighborhoods, such as Lincoln or Wicker Park.

Caters to locavores and, by extension, tourists.

Sells at a premium because of its green story.



From left to right: Muji, Green Concept, Crate & Barrel, Crate & Barrel

How Might We Create Demand for Urban Wood?
Muni

Business Model

Muni is a for-profit business that hires established designers to develop housewares and other small products to be manufactured locally and distributed directly through a Muni store.

Modeled after companies such as Green Concept UK and Design Within Reach, and Muji, Muni employs designers to create wood products with lasting value. Production would be done locally by Midwestern manufacturers.

Products would be sold through Muni boutiques in Chicagoland and marketed towards urban locavores and tourists.

By partnering with groups such as the Alliance for American Manufacturing and the Green Product Alliance, Muni would build awareness of both the local and environmental benefits of supporting Chicago manufactured urban wood products.

Benefits

Uniquely differentiated product with a strong story.

Scalable to include other urban areas and local wood sources.

Obstacles

Developing desirable designs that can be manufactured from an unpredictable variety of lumber.

Acquiring seed money required by high startup cost.

Finding affordable local manufacturing.

Next Steps

Conduct primary research with current customers of household products to gauge desirability of sustainable wood items.

Look at history of urban wood supply to estimate the feasibility of having high enough quantities for industrial production.

Build awareness of urban lumber as a sustainable manufacturing material to build interest with both consumers and designers.

Create catalog of product ‘types’ that can be manufactured from a variety of different woods.

Stakeholders

Muni shareholders

Designers who have opportunity to create sustainable products to add value with their already established name/brand.

Local Manufacturers who want to increase their business.

Retail Franchisees who want to scale the business across the country.

Urban Wood Reclaimers who would see increased demand for their lumber.

Opportunity Space :
Improve the Supply Chain

There is poor communication between the parties that own, maintain, cut and reclaim trees.

Findings

The Bureau of Forestry cuts down 7,000-8,000 of their 500,000 trees annually. Sorting is not cost-effective for the city, so the wood is processed for low-level uses.

Arborists who cut trees on private property will sometimes call reclaimers to pick up the wood for free. This transaction is based on personal relationships.

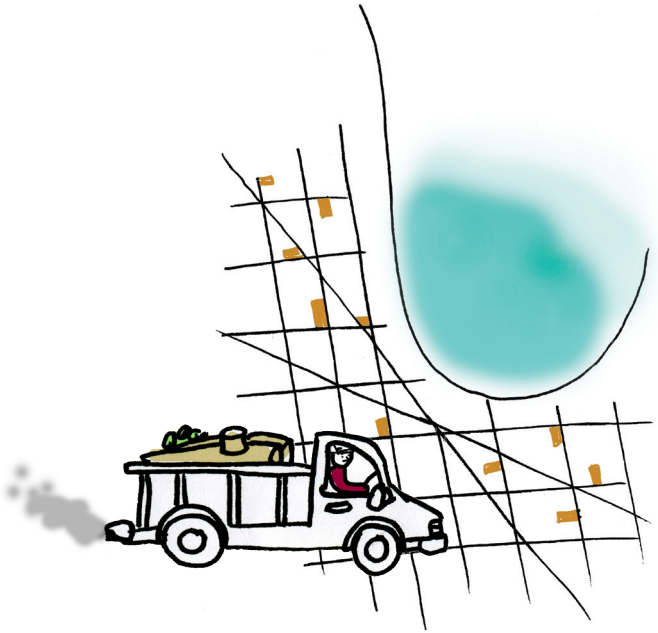
The urban forest is fragmented by location, ownership, and species.

Opportunity

- Create a system where the wood is sold at site of felling, cutting the City's transport and storage costs.
- Create an accessible network so business relationships can be established outside the arborists' immediate social circle.
- Aggregate wood sources to more effectively convert wood to lumber.

How Might We Create Demand for Urban Wood?

Open Tree



Commercial tree services remove 80% of felled trees in Chicago.

Because of unexpected surges in felled trees, such as after storms, wood reclaimers are often unprepared to store the wood.

Consequently, most of this wood is taken to a tree recycler where it is mulched.

By marshalling unused brown lots throughout Chicago, Open Tree can rent space to wood reclaimers when there is a surge in felled trees.

These marshalled brown lots can act as lumber supply yards for reclaimers and allow for a more consistent wood supply.

How Might We Create Demand for Urban Wood?

Open Tree

The Open Tree website connects arborists and reclaimers, saving the arborist money and time in tree removal.

On the site, Open Tree gives reclaimers a comprehensive view of logs available for reclamation.

How Might We Create Demand for Urban Wood?

Open Tree

Business Model

A for-profit business, Open Tree takes a commission from every transaction on its website.

It maintains a series of vacant lots around Chicago, which can be leased by reclaimers as temporary storage.

Modeled on eBay and Craigslist which facilitate distributed markets by giving them an online space.

The leasing of vacant lots is based on the public storage business.

Benefits

Increase amount of reclaimed wood.

Promote new social networks between arborists and reclaimers.

Obstacles

Build awareness of service.

Acquire brown lots.

Current players have established connections.

Next Steps

Determine if there is a significant market for wood reclamation.

Interview arborists and reclaimers about what they would want from Open Tree.

Find land for marshalling lots.

Discover other possible benefits of using Open Tree as a way encourage arborists and reclaimers to use the site.

Stakeholders

Open Tree shareholders

Urban Wood Reclaimers who want access to the wood and need storage space.

Arborists who save time and money by giving wood to reclaimers instead of paying to recycle.

Woodworkers who will have greater supply of wood.

Conclusion:
What is next?

Our research and analysis leads us to believe that urban lumber:

1. **Has low profit margins** – the high price of processing diminishes returns on sale.

2. **Is difficult to process** – cutting, collecting, storing, drying, milling, and selling wood in an urban environment presents many unique challenges for which the industry is not equipped.

3. **Is not under-utilized** – the current system of dealing with urban refuse is not wasteful. While higher uses may be desirable, they are not needed.

However, the opportunity spaces we have identified may provide more viable businesses, especially when the whole life of the tree is considered and not just after life use.

Contact Info:

For further information

For additional information on ongoing urban wood utilization efforts in Chicago please contact:

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