A Strategy for Sustainable Design

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Agenda

- About Me
- World's most powerful questions?
- Adoption of Sustainability Technology
- Technology Centered Design
- Human Centered Design
- Design for Sustainability Exercise
- ☺
- Q/A?

About Me

- Home: Letohatchee, AL
- 4th yr. Ph.D. student in Mechanical Engineering
- Research: Sustainability, Product Design, Expert Systems
- Advisor: Alice Agogino
- Graduation: May 2011

World's most powerful questions?

WHY?

WHAT IF?

Sustainability Technology

- Some technology solutions:
- Great concern about environmental impacts

Sustainability Technology

- Slow adoption by populous
- Reasoni

~11% of US households have CFLs or efficient bulbs

Technology Centered Design

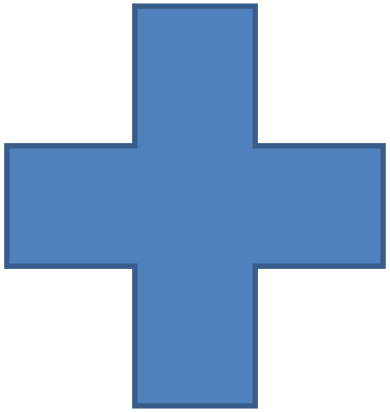
- Technology Centered Design focus:

  I. Performance
  II. Reliability
  III. Manufacturability
  IV. Price Points

Human Centered Design

- Human Centered Design focus:

  I. Meet needs of people
  II. Maintain performance and reliability



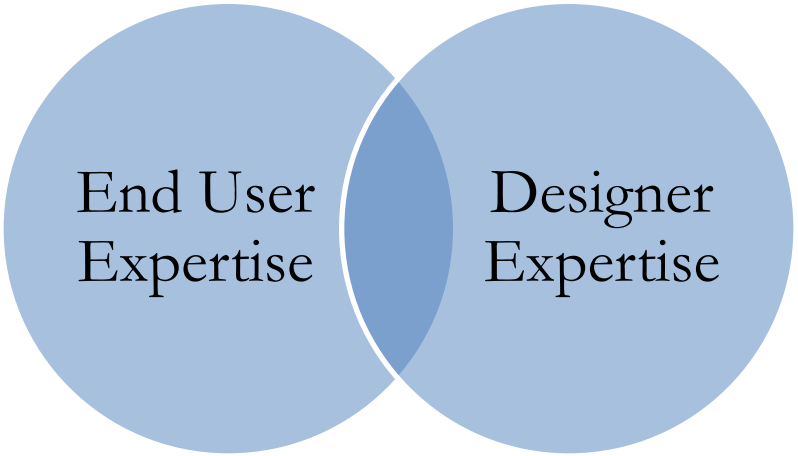
Co-Design Methodology

- Co-Design focus:

I. End user is expert on needs

II. End users and designers both control idea creation

III. Idea creation is done in the usage environment



Design for Sustainability Exercise

- A Native American community is trying to develop a sustainable community
- Heavy burden associated with energy bill, water bills, and solid waste disposal
- Want to use sustainability and renewable energy technology
- Lack resources and expertise to implement ideas
- How would you start this project????

Design for Sustainability Exercise

- **Assess the current situation**
  - What information would you need to know about the community?
  - Where would you go to get the information?
  - Who would you speak to about the information needed?

- **Design a solution**
  - How would you brainstorm designs for the community?
  - What designs would you create to address concerns?

- **Testing and selecting the solution**
  - How would you test your designs?
  - What information would you collect from your tests?

- **Gather feedback and reiteration**
  - How would you gather information on the effectiveness of the designs in the community?
  - How would you ensure adopt of the designs by community?
  - If possible, what features could be added to meet the additional concern about water pollution?

The Pinoleville Pomo Nation

- The Pinoleville Pomo Nation is a Native American tribe located in Mendocino County

The Pinoleville Pomo Nation: Ukiah Parcel

- The PPN's land reserve consists of ~106 acres on two parcels

Concerns of the Pinoleville Pomo Nation

- Rising heating and cooling costs
- Drought conditions
- HUD-financed housing provides basic necessities
- No representation of the cultural and traditional values

Pinoleville Pomo Nation and UC Berkeley Partnership

- Engineering 10 is a freshmen engineering design class

- Project goal: Assess the needs and design sustainable housing that could be integrated into the tribal community

Innovation Workshop

- Workshop held to understand needs and brainstorm concepts with PPN.

- End user is the expert!

- Engage with end user constantly!

Innovation Workshop: Top Needs and Metrics

- Energy Conservation
- Learn and Use Traditional Techniques (Cultural Values)
- Privacy
- Exercise
- Storage
- Safety
- Comfort
- Lower Energy Costs
- Space

Yurt Style Home Prototype

About CARES

- Goal: to establish and maintain a reliable, region specific online community in which users can:

Core Features of CARES

1. Sustainability database
2. Region-specific cases studies and suggestions
3. Interoperable sustainability assessment tools
4. Listings of solution vendors and manufacturers
5. Economic, energy, water, and green house gas emissions return on investment data
6. Community of users

News Articles

A Real-life Lesson in Design

What started as a six-week project for freshmen engineering students may create culturally sensitive and energy-efficient housing for a small California Indian tribe.

A roundhouse-style design conceived in last spring's E10 Engineering Design and Analysis course has been embraced by members of the Pinoleville Pomo Nation. The tribe plans to submit the UC Berkeley concept when it applies for federal funding to build up to 25 new homes in the Mendocino County community of Ukiah.

"There's an acute need for housing here," says David Edmunds, environmental director for the tribe, which has about 300 members scattered throughout Northern California. "Housing is considered a linchpin for a lot of things the tribe wants to accomplish."

Student design embraced by Pinoleville Pomo Nation

Engineering students working on a balsa wood model of their design for Pinoleville Pomo Nation homes

What started as a six-week project for engineering freshmen is helping to create culturally sensitive and energy-efficient housing for a small California Indian tribe.

A yurt-style house design conceived in last spring's E10, Engineering Design and Analysis, was used as the base concept for several successful housing grant applications by members of the Pinoleville Pomo Nation (PPN), who will use the funds to build up to 26 new homes in the Mendocino County community of Ukiah, California.

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Real-life lessons in native design

PHOTO COURTESY OF RYAN SHELBY

COLLABORATIVE: Students work on a Pomo tribe house design for E10.

What started as a six-week project for freshmen engineering students may create culturally sensitive and energy-efficient housing for a small tribe of California Indians.

A roundhouse-style design conceived in last spring's E10 Engineering Design and Analysis course has been embraced by members of the Pinoleville Pomo Nation. The tribe plans to submit the UC Berkeley concept when it applies for federal funding to build up to 25 new homes in the community of Ukiah.

Outcomes of Partnership

- Empowered the PPN to make informed decisions about various renewable energy options

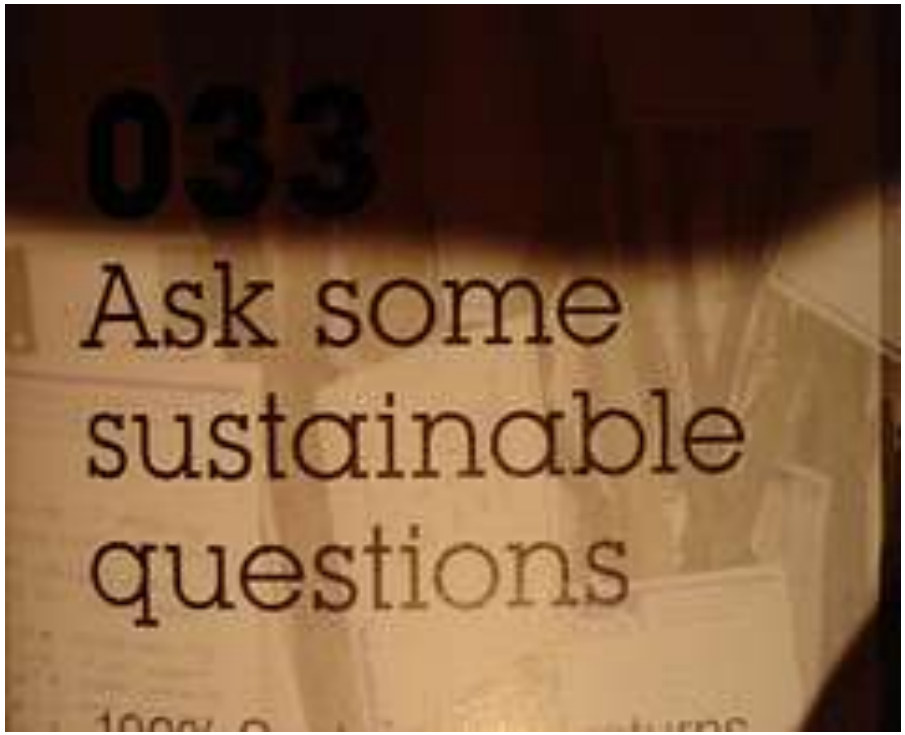
- Initiated discussion within the PPN about other ways to implement sustainability best practices in the community

- Federal funding sought to build culturally inspired sustainable homes and buildings

Final Thoughts

- Successful products/projects must have constant user interaction
- Human centered design: needs of community are the priority
- Power dynamics are equal or shifted towards the community
- Co-designing → Best solutions → Willingness to Adopt
- A model for future collaboration between Native Americans tribes and universities

Q/A?



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