

## Co-Design Research Plan

### I. Purpose and Goal of Research

The notion of developing sustainable communities is generally accepted as a way to reduce the negative environmental impacts associated with human activities, increase the health of citizens, and increase the economic vitality of communities within a country. In order to further the development of sustainable communities, federal and local governments have placed significant attention upon designing sustainability and renewable energy technologies, such as photovoltaic (solar) and grey water recycling system to reduce (1) fossil fuel based energy consumption, (2) water consumption, and (3) climate changing greenhouse gas (GHG) emissions associated anthropogenic activities.

However, the optimal strategies and decisions vary with the cultural, geographic, economic conditions of each targeted end user group, yet few sustainability assessment metrics and modeling tools take into account these local conditions and previous decisions made by the targeted end user group. The Pinoleville Pomo Nation (PPN) of Ukiah, CA, is an example of Native American governments and communities that have embarked upon an infrastructure development program to design and build culturally-appropriate, sustainable housing and energy system for its members.

### II. Research Questions

#### A. How effective is a codesign workshop in eliciting user needs from a target end user group such as a Native American nation? (Pinoleville Pomo Nation, Kashia Band of Pomo Indians, Ione Band Miwok Indians, Bridgeport Indian Colony )

- i. See Literature on focus groups and interviews (See Eliciting Users Needs Section C)
- ii. Describe an codesign workshop and how it differs from a focus group & interview
- iii. Understand that effectiveness is based on number of unique needs captured with each workshop
- iv. Compare with number of unique needs captures with each subsequent workshop

## **B. How do Native American nations define and frame sustainability?**

- i. See Literature on sustainability (See Defining and Challenging Sustainability Section A)
- ii. See Literature on measuring sustainability (See Measuring Sustainability Section B)
- iii. See Literature on defining sustainability (See Framing Sustainability in Native American Community Section C)
- iv. The PPN balance with other needs
  1. Tribal Sovereignty
  2. Economic Independence/Self Sufficiency
  3. Environmental Harmony
- v. Conclusions
  1. They define sustainability differently than “we” do
  2. They have to balance their three sets of needs/indicators as they design solutions

## **C. How effective are prioritization methodologies in establishing the relative importance of needs by target end user groups such as Native American nations?**

- i. See literature on needs prioritization (See Literature Review Section D & E)
- ii. Measuring “appropriateness”
  1. Assessment of how well it works for them
  2. Evaluate the approaches: pairwise comparison, analytic hierarchy process (AHP), voting methods, and conjoint analysis
  3. Try all three approaches.
  4. What are the criteria for determining appropriateness?
    - a. How does one balance the user needs of the general populous and the tribal council/administration?
    - b. Does one method improve communication among members or factions of the community?

## **III. Literature Review (\* denotes book, @ denotes law review)**

### **A. Defining and Challenging Sustainability and its Technology**

- i. “Sustainability and Beyond”, by Dale Jamieson, Ecological Economics Volume 24, Issues 2-3, 3 February 1998, Pages 183-192

- ii. Sustainable Development: An oxymoron comes of age by Redclift, M., Sustainable Development Special Issue: Critical Perspectives on Sustainable Development, Volume 13, Issue 4, pages 212–227, October 2005
- iii. "The Meaning of Sustainable Development", by Redclift, M., *Geoforum* 25(3):395-403, 1992.
- iv. "What Does Sustainability Really Mean? The Search for Meaningful Indicators," by Farrell, A. and Hart, M., *Environment*, Vol. 40, No. 9, pp. 4-7, 26-31, 1998.
- v. "Citizens, Experts, and the Environment: The Politics of Local Knowledge" by Frank Fischer", Duke University Press Books, November 2000\*
- vi. "Science, Technology, and Democracy (Sunny Series in Science, Technology, and Society)" by Daniel Lee Kleinman, State University of New York Press, September 2000\*
- vii. "States of Knowledge: The Co-production of Science and the Social Order (International Library of Sociology)" by Sheila Jasanoff, Routledge; 1st Edition, March 2004\*
- viii. "Democracy and Technology" by Richard E. Sclove, The Guilford Press; 1 Edition, July 1995\*

## **B. Measuring and Modeling Sustainability**

- i. "Methods of Environmental Impact Assessment" by Peter Morris and Riki Therivel, Routledge; 3 edition, April 22, 2009 \*
- ii. "Modelling scenarios towards a sustainable use of natural resources in Europe", by Stefan Giljum, Arno Behrens, Friedrich Hinterberger, Christian Lutz, and Bernd Meyer, *Environmental Science & Policy*, Volume 11, Issue 3, May 2008, Pages 204-216
- iii. "Indigenous Knowledge in Environmental Assessment", by Stevenson, S., *ARCTIC* Vol. 49, NO. 3 (September 1996) P. 278– 291
- iv. "Measuring sustainability: A time series of alternative indicators for Scotland", by Hanley, R., Moffat, I., Faichney, R., and Wilson, M., *Ecological Economics* 28 (1999) 55–73

- v. “Bottom up and top down: Analysis of participatory processes for sustainability indicator identification as a pathway to community empowerment and sustainable environmental management”, by Frasier, E., Dougilla, A., Mabeeb, W., Reeda, M., and McAlpinec, P., *Journal of Environmental Management*, Volume 78, Issue 2, January 2006, Pages 114-127
- vi. “Fundamentals of Renewable Energy Processes” by da Rosa, Aldo, Academic Press; 2 Edition (April 13, 2009)\*

### **C. Framing Sustainability in Native American Communities**

- i. “History of Federal Policy for Native American” by Montana Legislative Council, September 1993
- ii. “DOE Environmental Management (EM) American Indian & Alaska Native Policy” by United States Department of Energy, 2006
- iii. “Hunters And Bureaucrats: Power, Knowledge, And Aboriginal-State Relations In The Southwest Yukon” by Nadasdy, P. Vancouver: UBC Press, 2003 \*
- iv. “Meaningful Consideration? A Review of Traditional Knowledge in Environmental Decision Making”, by Ellis, S., *ARCTIC* Vol. 58, No. 1 (March 2004) P. 66–77
- v. “Breaking the Iron Bonds: Indian Control of Energy Development” by Ambler, M., University Press Of Kansas (December 19, 1990)
- vi. “Native American Control of Tribal Natural Resource Development in the Context of the Federal Trust and Tribal Self-Determination” by Allen, M., 16 *Boston College Environmental Affairs Law Review* 857 1988-1989 @
- vii. “Murray River Country: An Ecological Dialogue with Traditional Owners” by Jessica K. Weir, Aboriginal Studies Press, September 2009\*
- viii. “Land, Wind, and Hard Words: A Story of Navajo Activism” by John Sherry, University of New Mexico Press, March 2002

#### **D. Processes for Generating Sustainability Plans**

- i. “Scenario workshops: A participatory approach to sustainable urban living?”, by Street, P., *Futures*. Vol. 29. No. 2. pp. 139-158. 1997
- ii. “Conflicting views of sustainability: The case of wind power and nature conservation in Denmark”, Christensen, P. and Lund, H., *European Environment* Volume 8, Issue 1, pages 1–6, January/February 1998
- iii. “Scenario visualisation for participatory landscape planning—a study from Denmark”, by Tress, B. and Tress, G., *Landscape and Urban Planning* Volume 64, Issue 3, 15 July 2003, Pages 161-178
- iv. “The problem of the future: sustainability science and scenario analysis”, by R.J. Swarta, P. Raskinb, and J. Robinson, *Global Environmental Change* 14 (2004) 137–146

#### **E. Eliciting Users Needs: ethnography, focus groups, and interviews effectiveness in eliciting unique needs**

- i. “Successful Focus Groups: Advancing the State of the Art” by Morgan, D., Newbury Park, CA: Sage Publications, 1993\*
- ii. “Constructing Grounded Theory: A Practical Guide Through Qualitative Analysis” by Charmaz, K., Sage Publications Ltd, 2006\*
- iii. “Qualitative Interviewing and Grounded Theory Analysis” by Charmaz, K, In *Inside interviewing: New lenses, New Concerns*, (pp. 311-330) Sage Publications, Inc, 2003\*
- iv. “Sources of Innovation” by Von Hippel, Eric, Oxford University Press, USA, 1994\*
- v. “An Ethnographic Approach to Design” by Blomberg, J., Burrell, M., & Guest, G., In J. A. Jacko & A. Sears (Eds.), *The Human-computer interaction handbook: fundamentals, evolving technologies and emerging applications*. (pp. 964-986). Mahwah, New Jersey: Lawrence Erlbaum Associates, 2008

#### **F. Needs Requirements, Hierarchies, and Prioritization: pairwise comparison, analytic hierarchy process (AHP), voting methods, and conjoint analysis validity of these methods under different conditions**

- i. “The Voice of the Customer” by Griffin, A., Hauser, J.R., Marketing Science 12(1), 1-27, 1993
- ii. “Serial Hanging Out in Mongolia: Information, Design & Global Health” by Sandhu, J., 2008
- iii. “Discrete Choice Modeling: Understanding a ‘Better Conjoint than Conjoint’” by Steven Struhl
- iv. “Using the Delphi Technique to Search for Empirical Measures of Local Planning Agency Power” by Am al K. Ali
- v. “The Analytic Hierarchy Process: Planning, Priority Setting, Resource Allocation.” by Saaty, T, McGraw-Hill, 1980\*
- vi. “Deriving weights from pairwise comparison matrices” by Barzilai, J

#### **IV. Methodology & Metrics**

##### **Research Question A**

I will have the end user list all the needs generated during the Codesign Workshops & compile using case study methodology

- i. Metric: number of needs generated

I will code and plot the number of unique user needs

- ii. Metric: number of duplicate needs
- iii. Metric: Percentage change in the number of needs generated from the Codesign Workshops
- iv. Metric: Qualitative comments about the Codesign Workshops

##### **Research Question B**

I will meet with the tribal council and administration separately from the community

- i. Metric: Recorded number of needs from the tribal council and administration
- ii. Metric: Comparison of the needs to those of the community; Focus on duplication of needs

I will have the end user establish express what concept of sustainability means to them

- i. Metric: Document analysis to look for frequency of words
- ii. Metric: Qualitative comments from interviews and participant observation

I will embed the needs gathered in the framework established by the end user group

- i. Metric: Qualitative comments from the end user about the appropriateness of how the needs were embedded

### **Research Question C**

I will have the end user establish the relative importance of the end user needs by directly ranking the needs, pairwise comparison, and Weiger's method

- i. Metric: Comparison of the weights and/or order assigned to the user needs
- ii. Metric: Qualitative comments about end user comfort with using the above mentioned methods

## **V. Expected Findings and Conclusions**

- A. Determine if Codesign Workshops are an effective approach for eliciting user needs and brainstorm concepts for Native American communities
- B. Determine which prioritization methods are most appropriate
- C. Describe how the co-design methodology worked in these applications (case studies)
- D. Describe how one Native American community frames sustainability and if this framework is transportable to other Native American communities (case studies)