Appendices

A: Project Charter
B: Defining Statements
C: Function Structure
D: Design Factors
E: Information Structure
F: Sample Working Forms
    2 each of the following:
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        Solution Elements
        Means/Ends Analysis
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        System Elements

A: NSI Charter

Institute of Design
Illinois Institute
of Technology

Design Thinking

A Natural Systems Institute

Charter

Background

In the 1980's, with the first comprehensive gathering of data on global warming, tangible effects of population growth began to be firmly associated with the actions of industrial society. Meeting the demands of a growing population for material goods was beginning to be seen as a two-way street. The concept of a "better life" was beginning to look like a relative one—briefly better, relative to the past, but frighteningly better, relative to a very uncertain future.

Because few listened when something might have been done about it, we are now confronted with global warming as an observable, highly threatening fact. Like many other massive events, it took a long time to gain strength, and it will take longer to lose it. It is still in a strengthening pattern, and it is hard to see how that will change in the foreseeable future.

In spite of world-wide awareness, population growth also is still in an accelerating phase. The population of the world is now 6.46 billion and rising. Just 50 years ago it was 2.76 billion. Despite the fact that almost all developed nations are at replacement-level birth rates—or lower—world population is still on a steep incline because of high birth rates in developing countries. Before world population begins to level off, we can expect to see the number rise to over 10 billion—barring catastrophic events.

And catastrophic events are distinct possibilities, growing in probability every year, all because of population growth. A better life for a growing population—even eliminating poverty, as the September 2005 issue of *Scientific American* argues as a goal—means more energy to be produced and more resources to be processed. Without sustainability, this can only mean unchecked resource depletion and uncontrolled greenhouse gas emissions. Both will generate disasters at an accelerating rate.

Global population growth and the problems it has induced—from resource depletion to global warming—are arguably the most serious threats ever to our civilization. But as we finally commit to confronting them, technologies now just evolving will put awesome new capabilities at our disposal. We may yet be able to escape the worst ravages, perhaps even bring better quality of life to our descendents. The question is, will our political decision makers have the wisdom to avail themselves of the right tools at the right time? Will we be able to avoid the worst of projected disasters and make best use of the new technologies? Decision makers will need the best of creative thinking from the science community—*and* from a design community prepared to contribute.

The evidence is that decision makers are not using—or receiving—the full range of advice they need. Advice that offers proactive, constructive, creative options for action is not being heard. The design community must assume new responsibilities and reinvent itself to fill this void. In so doing, it will have to rethink matters of education, research and professional activity, and it will have to prove to leaders that design thinking is a critically valuable asset.

Relevant Trends

Trends initiated by emerging technologies, changing environmental conditions, and evolving social change will have real impact on the situation. Among such trends are:

Food Production on Land
Food production for a growing population is an absolute requirement. In the last 50+ years, beginning with the green revolution that virtually saved India from starvation, the rise in food production has outstripped population growth. But arable land per capita continues to decrease—by 2050, it will have decreased over 62% since the 1960's—and productivity cannot increase indefinitely.

Food Production at Sea
The oceans, once thought to be a limitless food source, are fast becoming a depleted resource. Stocks of wild finfish and shellfish are declining alarmingly. The fishing industry is turning more and more to deep-water species to replace them, often with little knowledge of the biology of the replacement species.

Water Resources
Already in many parts of the world, water supplies are reaching levels of insufficiency. Complicated by agricultural needs for irrigation and the needs of urban centers becoming megacities, the fresh water resources of our lakes, rivers and subsurface aquifers are subsiding. In 2003, 9,500 children were dying daily from insufficient or contaminated water supplies. One-third of the world's population, by some experts' analysis, live in water-stressed countries now, with two-thirds of the world to share their dilemma by 2050.

Mineral Resources
Mineral resources are approaching finite limits, exhausted in some locations, more difficult to extract in others. While supplies of some minerals are in no immediate danger, others are under severe pressure. Oil is a resource of vital concern, with production expected to peak in this decade or shortly thereafter. The Hubbert Curve, long-used as a predictive tool in the petroleum industry, when coupled with modern corrective tools, predicts that we are reaching worldwide peak production *now* and face a reduction in production of approximately 3% per year very soon. Not only will that oil production have to be replaced as an energy source, additional energy sources will have to be found to keep pace with the population curve.

Population Movement
In an interesting paradox, the countryside is becoming less—not more—inhabited as we add to the population. The people are moving from the country to the cities. As of this year, 2005, the world is more urban than rural for the first time. In the next fifteen years 300 million rural Chinese will move to the cities. In 1950, only two cities in the world, Tokyo and New York City, were over 10 million in size. By 1975 there were 4 such megacities, and by 2003, there were 20. By 2015 there will be at least 22. In China alone there are between 100 and 160 cities with over 1 million inhabitants (America has 9, and Eastern and Western Europe together have 36). Cities are complex, sophisticated systems, but their managers will need all the skill they can command to deal with the great urban migration.

Climate Change
Climate and weather patterns are changing. Some regions are simply getting drier or wetter, but the greatest damage will come from sustained, severe droughts and intense, prolonged flooding. The problem is change: eco-systems confronted with wetter or drier conditions for periods far longer than the environment or its inhabitants are prepared.

Rising Ocean Levels
Ocean levels are rising. Temperature rise under global warming is greatest at the poles, and polar melting is accelerating. Melting icebergs have little effect on rising water levels because the ice is already floating, but ice melting on land, such as in Greenland and Antarctica, will contribute to rising water levels, and the thermal expansion of water as it is heated a degree at a time will also contribute. The Intergovernmental Panel on Climate Change in its 2001 report, estimates a 45 cm (18 inch) mean rise by the end of the century with a low estimate of 9 cm (3.5 inches) and a high estimate of 88 cm (35 inches). Many of the world's major cities are on ocean coasts or waterways close to the oceans.

Storm Violence
The increased heat energy created by global warming is feeding more violent storms. Storms over the water will increase in number and in violence. Storms over land, although less subject to the stimulation of ocean heat, will draw from the weather systems that build over the oceans and move readily onto land. All but the regions most remote from the coasts will be influenced. Category 4 and 5 levels can be expected increasingly for hurricanes, cyclones, typhoons and tornados.

Moving Ecological Zones
On a longer scale, climate changes are moving the zones in which species can live. Warmer winters, earlier springs and hotter summers are changing key environmental characteristics crucial for species' survival, even existence; and as ecological zones migrate northward (or southward in the southern hemisphere), they will do so at a pace too fast for plant species to follow. When species disappear, others dependent on them are also affected, and eco-systems disintegrate. Biodiversity will decrease and extinctions will take place.

Increasing Expectations
The growing availability and capabilities of communications such as cellular telephones, satellite and cable TV, and the Internet across the country (and the world) are providing people with daily knowledge of living conditions, problems, products, threats and services everywhere. The media are creating growing avenues for fast communication between protectors and populace. They are also educating the populace on the state of conditions and creating expectations that both fuel demand and create willingness to change.

Internet Penetration
Computer use and Internet access grow exponentially every year. Information of encyclopedic detail can be obtained more and more easily, and complex, sophisticated processes can be used remotely. Access to high-quality communications and sophisticated computer tools are increasingly available to individuals and groups anywhere. In the United States, Internet penetration has reached 67%.

Emerging Technologies
The pace of technological change continues to accelerate, bringing new science to commercial, institutional and industrial uses at an ever quickening pace. Most notable among many fields, major technological innovations can be expected in the new disciplines of molecular nanotechnology, robotics and the biosciences.

New Relationships
Greater public mobility and access to information is changing the nature of association for many individuals and organizations. Organizations that once operated in isolation are now players in a common environment. Sometimes the emerging relationships are competitive, sometimes cooperative. New forms of relationship can be expected and created as conditions evolve.

Project Statement

Using Structured Planning methodology, develop a proposal for a Natural Systems Institute as a 21st century evolutionary response of zoos, aquaria, conservatories and other specialized institutions to the realities of global warming and growing human population pressure on the environment. The proposal should:
1. integrate formerly separated fields into an ecologically based, whole-systems approach to the study, exposition and preservation of nature.
2. extend mandates for public education, community involvement, and active participation in the monitoring and maintenance of the environment.
3. network institutes into national, regional and global systems responding to the natural ranges of plants and animals.

Goals

As general guidelines a proposal for a Natural Systems Institute should:

• Explore a full range of possibilities, paying especial attention to appropriate technologies and user needs.

• Consider both high- and low-tech concepts as they are appropriate.

• Include ideas for content, form and structure—including procedures, policies, events, activities, organizational concepts and relevant relationships.

• Explore revolutionary as well as evolutionary ideas.

• Consider the educational process through which individuals and groups learn to participate in the Institute and use its resources.

• Accommodate all users of the system, from implementation to adaptations and provide for them in the design. Thoroughness is a step toward system integrity.

• Consider potential costs and funding thoughtfully; the proposal should not incorporate unnecessary frills, but it should not sacrifice effectiveness for low cost.

• Treat the design problem as design from the inside out; users' operational needs come first, with every attempt possible made to satisfy them in some way, even when tough design decisions must be made.

• Conceive the properties and features of the Institute and its operations as means to build trust and cooperation with the community and complementary institutions.

• Consider the project as one component of four demonstrating advanced design thinking and showing how it can be extended to decision making at the policy planning level.

Overall, the solution should:

• Assume that the proposal can be acted upon as it is conceived. Do not underpropose on the assumption that a concept might be politically opposed.

• Demonstrate what might be achieved. The value of the proposal is in its ideas, not its certain attainability. Ideas that might not be fully attainable under today's conditions may be incrementally achieved tomorrow—*if they are known.*

Resources

Resources for the project will be:

Physical:
• The facilities of the Institute of Design, including Room 514 as general meeting space at the beginning of each class session, and 5th floor for team activities.
• Computing support from the fifth floor computer facilities.
• Equipment as necessary from ID resources.

Financial:
• None

Human:
• *Planning Team:*
Joyce Chen **Henning Fischer** **Mark King**
Matthew Lennertz **Waewwan Sitthisathainchai**

•*Project Advisor:*
Charles L. Owen Distinguished Professor Emeritus

Schedule

The project will be conducted from August 30 to December 9, 2005.

Week		Phase	Activity	Product
1	**Aug 30**	Introduction	Introduce project	
	Sep 2	Project Definition	Develop Issues & Defining Statements	
2	**Sep 6**			
	Sep 9		**In-Progress Review**	Issues DefStates 1
3	**Sep 13**		Develop Modes and Activities of Function Structure	
	Sep 16		**In-Progress Review**	DefStates 2 Fn Struc 1
4	**Sep 20**	Information Development *Action Analysis*	Generate Functions, Design Factors and Solution Elements	
	Sep 23			
5	**Sep 27**			
	Sep 30			
6	**Oct 4**		**In-Progress Review**	DefStates cmplete Fn Struc 2 DesFacs 1 SolnEls 1
	Oct 7	Information Development *Action Analysis 2*	Complete Functions, Design Factors and Solution Elements	
7	**Oct 11**			
	Oct 14			
8	**Oct 18**			Fn Struc complete DesFacs complete SolnEls complete
	Oct 21	Information Structuring *Interaction*	Score Soln Elements vs Functions	

Week		Phase	Activity	Product
9	**Oct 25**	Structuring		RELATN input
	Oct 28	Concept Development	Means/Ends Analysis	Information Structure
10	**Nov 1**			
	Nov 4		Ends/Means Synthesis	Named Information Structure
11	**Nov 8**			
	Nov 11			
12	**Nov 15**		**Presentation**	Initial System Elements
	Nov 18	Communication	Refine final SysEls; write report; complete illustrations	
13	**Nov 22**			
	Nov 25	***Thanksgiving***		
14	**Nov 29**			
	Dec 2			
15	**Dec 6**			
	Dec 9		**Final Presentation**	Illustrated Report

Methodology

The project will be conducted using Structured Planning (See articles on the subject by Charles Owen at ***http://www.id.iit.edu*** under Research and Ideas: Papers). Also, see Charles L. Owen. **Structured Planning. Advanced Planning for Business, Institutions and Government**, 2005.

Issues

Consider the following topics as initial issues to be investigated. Supplement them with additional issues as information is developed during the first phase of the project.

Technology. What approach should be taken toward the incorporation of available and emerging technologies?

Adaptivity. How should elements of the system respond to evolving social, political, technological and environmental conditions?

Partnerships. What approach should be taken toward partnering with governmental/institutional organizations, suppliers of funding, educational institutions, etc.?

Time of Introduction. When should the system be ready for implementation?

Means of Introduction. How should the system be introduced to facilitate acceptance and implementation?

Inter-institutional Relationships . How should relationships with other potentially competing or cooperating organizations be developed?

Cost. How should costs and funding of the system and its operations be approached?

Geographic Concentration. How narrowly or broadly should the Institute direct its ecological focus—local, regional, continental, worldwide?

Mission. What should the balance be among research, public education, environmental stewardship, species preservation, advocacy and other possible roles?

Involvement. How active should involvement be in the observation, maintenance, management and restoration of environment and ecosystems?

B: Defining Statements

Defining Statement

Issue
Adaptivity

1

Project
Natural Systems Institute

Originator
Mark King

Question at Issue

Adaptivity: How should elements of the system respond to evolving social, political, technological, and environmental conditions?

Contributors

Position

- ☐ Constraint
- ■ Objective
- ☐ Directive

The Natural Systems Institute must be predictive, anticipating social, political, technological, and environmental trends

Sources

Jason Lowther, et al. Caught in the Web: Wildlife Trade on the Internet. International Fund for Animal Welfare (IFAW). London. July, 2005

Team deliberations

Alternative Position

- ☐ Constraint
- ■ Objective
- ☐ Directive

The NSI should follow current and future trends, reacting to peoples' desires and needs.

- ☐ Constraint
- ☐ Objective
- ☐ Directive

Background and Arguments

Environmental conditions are declining rapidly, in reaction to the increase of human populations, the rise of technology, and governments' ability (or inability) to react accordingly. Since the NSI intends to defend the world's natural environment, it will be necessary to address these issues, and even use them to its advantage in predicting trends.

Current systems of species preservation, such as zoos, aquariums, etc. are primarily reactive, educating their audiences of the plight of exotic animals and how to save their endangered numbers. This has been the traditional way of species preservation, as zoos were founded to preserve the Siberian Tiger or the African Elephant, confining them to crampted quarters, controlling their breeding, and putting them on display for the public as a reaction to their declining numbers.

The research into renewable sources of energy is a somewhat successful (and ongoing) plan of anticipating a crisis before it happens. Although not widespread, the use of renewable resources is currently being employed, including wind, solar, hydroelectric, geothermal, hydrogen fuel, etc. before the non-renewable resources are completely depleted.

As situatons worsen, with less habitable land, global warming, the increased global market, etc. any preservation model must be able to anticipate what trends are occurring worldwide, even if the focus is local. Soon, there will be no more habitat for the tiger (and many other species of plant and animal), so the NSI must provide one, resembling its natural habitat as closely as possible.

Defining Statement

Issue
Concentration

2

Project
Natural Systems Institute

Originator
Waewwan Sitthisathainchai

Contributors
26th September 2005 Henning Fischer

Question at Issue

How concentrated should the Natural Systems Institute be in its focus on specific issues?

Position

- ☐ Constraint
- ■ Objective
- ☐ Directive

The Natural Systems Institute should follow the principle of “think globally, study locally.”

Sources

CNN, Growing desert ‘a global problem,’ http://www.cnn.com/2005/WORLD/europe/06/17/desertification.report/

Alternative Position

- ☐ Constraint
- ■ Objective
- ☐ Directive

The Natural Systems Institute should focus exclusively on global issues such as climate change, ozone depletion and deforestation.

- ☐ Constraint
- ■ Objective
- ☐ Directive

The Natural Systems Institute should focus on more local issues, such as the retreat of glaciers in the Alps and wetland restoration in Lousisiana.

Background and Arguments

By the report ‘World Day to Combat Desertification’, now desertification expands worldwide up to 40 percent of overall surface of the world. By the scientist citation, the largest dry land already grew from Saharan Africa across the Middle East and Central Asia into parts of China. This Dry land, ranged from dry sub-humid to hyper arid, would be result unsuitable farming to the poorest population area. Although desertification problem is emerging as local scale problem but it impacts the world food poverty that is a global scale.

As far as the problem always happen all the time in each area. Natural system is a combination of the whole pieces because each issue can link to others. To concern just one or two problems may not solve the problem successfully. To zoom out, the institution should examine problems in a whole system and determine the most critical area. Moreover, the institution can concentrate to the methodology level in each scale.

On Implementation stage, the institute should start studying in various local areas depending on critical situation in global scale. To zoom in, the institution should study in the details of each factor that cause problem to get more insight and clearly vision. Moreover process to solve the problems step by step might be easier to control for institution.

In conclusion, the institute should concentrate in both global scale to concern the linkage between each issue, and local scale to study and understand depth of issue through details.

Defining Statement

Issue
Cost

3

Project
Natural Systems Institute

Originator
Waewwan Sitthisathainchai

Question at Issue

How should cost and funding of the system and its operation be approached?

Contributors

Position

- ☐ Constraint
- ■ Objective
- ☐ Directive

The capital should be mainly supported by government and public involvment.

Sources

Team deliberatons
http://www.defra.gov.uk/rural/default.htm
http://www.rscn.org.jo/#
www.widelifetrust.org
“How the Local trust work in UK”

Alternative Position

- ☐ Constraint
- ■ Objective
- ☐ Directive

Funding of the project should be used for critical requirement of the system (environmental controls, animal care, and conservation) as a priorities.

- ☐ Constraint
- ■ Objective
- ☐ Directive

First capital should be operated and generated to the revenue stream by the fiduciary.

Background and Arguments

The Natural System Institute has the mission to educate, exhibit, and research animal. By research, the main capital of existing of similar organizations came from governement or personal capital. They also earn from donation from the community, the admission gate, the gift shop, and books. However, they are using lots of money in the animal care problems, ecosystem control, personnel policy, governance and maintenance. It is obvious that the investment with this project hardly profit lots of money. For this reason, the cost may not directly deal with whole problem of global warming .

Therefore, the main source of the funding for this project should be support by community or cooperation between government and community at first. And then the Institute should manage this capital by funding organization as a temporary fund to the each Institute. The initial fund should be used as a main capital to run on the revenue stream. Moreover, Funding can be sponsered by the linkage business such as the animal food industry or other organization that can indirectly take benefit from the institute such as animal magazine, science organization .

Therefore,the capital of this project should be separate from the existing funding of each organization, for mainly critical action such as preserve the endanger animal, conserve the natural space ,and create new space or method to exposition and preservation of the nature.

Defining Statement

Issue
Stance on Demonstrations

4

Project
Natural Systems Institute

Originator
Henning Fischer

Contributors

Question at Issue

Will the NSI participate in demonstrations?

Position

- ☐ Constraint
- ■ Objective
- ☐ Directive

The NSI and its members/employees must not actively participate in political large-scale demonstrations

Sources

Alternative Position

- ☐ Constraint
- ■ Objective
- ☐ Directive

The NSI should plan and contribute to political demonstrations

- ☐ Constraint
- ■ Objective
- ☐ Directive

The NSI should sponsor (whether quietly or overtly) demonstrations

Background and Arguments

Political demonstrations, as have been seen at WTO meetings and in response to wars, are a double-edged sword. On the one hand, they are an easy way to make an issue known to the public. On the other hand, they tend to polarize the public.

Organizations such as Greenpeace and People for the Ethical Treatment of Animals both have benevolent missions, yet they try to force their messages upon people through several guerilla tactics, such as large-scale demonstrations. Many people are familiar with their cause, but many people are also repulsed by their methods and actions. The demonstrations therefore often do not achieve their desired outcome, as they end up pushing away as many people as they attract.

The NSI is an organization that will convince people to follow its cause in different ways (lobbying, community projects, etc.). The NSI will be an organization that everyone (or almost everyone) likes and agrees with their mission. Because of the immediacy of the NSI's cause, they do not have the luxury of being able to push people away. They must gain support from the masses and encourage people to assist in as many ways as possible, whether large or small in terms of time and money. Ideally, the NSI's will become a way of life for people.

Defining Statement

Issue
Customer Relationships

5

Project
Natural Systems Institute

Originator
Joyce Chen

Contributors
12 Sept 2005 Charles Owens

Sources
Google search: “define: customer.” <www.google.com> 8 Sept 2005.

Question at Issue

How should the Institute deal with differences in the needs of its audience and potential customers?

Position

- ☐ Constraint
- ■ Objective
- ☐ Directive

The Institute must fulfill its audience mission with integrity; customer needs, where appropriate, may then be served.

Alternative Position

- ☐ Constraint
- ■ Objective
- ☐ Directive

The Institute should give high priority to developing and serving a customer base able to support the institute’s professional and financial interests.

- ☐ Constraint
- ☐ Objective
- ☐ Directive

Background and Arguments

The Natural Systems Institute, like every specialized institution, needs customers--broadly defined as groups or individuals who receive or buy a product or service (google “define: customer”)--to help it fulfill its goal of educating the public and involving the community involved in its work of monitoring and maintaining the environment. An important distinction should be made between the terms “customer” and “audience.” “Customers” are nicely distinguished from “audience” by the following example: the automotive review company J.D. Power has paying “customers”--automotive manufacturers--that are different from its “audience”--prospective buyers. NSI is analogous as an organization because the people who require its services--various existing specialized institutions, universities, activist groups, policy makers, etc.--are often different from the people whom it aims to educate and motivate: the public at large. Thus, the way it addresses its customer base should be expectedly different from the way it addresses its audience.

While it may be good business to try to attract and serve customers, the Institute must be prudent in its relationship with its customers to avoid compromising its primary mission. In order to maintain its integrity, the Institute must not accept customers who request a service that is in conflict with any aspect of its mission. In cases where potential conflicts are not clear-cut, internal deliberations of the Institute management will be necessary to decide a course of action. Whether or not it ultimately accepts their requests, of course, the Institute should always maintain a respectful and professional relationship with its potential clients.

Defining Statement

Issue
Position on Ecological Change

6

Project
Natural Systems Institute

Originator
Joyce Chen

Contributors

Question at Issue

What is the Institute's position on ecological change?

Position

- [x] Constraint
- [ ] Objective
- [ ] Directive

The NSI must view site history and human impact as an integral and significant component of ecology.

Sources

Foster, David, Frederick Swanson, John Aber, Ingrid Burke, Nicholas Brokaw, David Tilman, and Alan Knapp. "The Importance of Land-Use Legacies to Ecology and Conservation." BioScience 53 no. 1 (2003): 77-88.

Collins, James P., Ann Kinzig, Nancy B. Grimm, Willian F. Fagan, Diane Hope, Jianguo Wu, and Elizabeth T. Borer. "A New Urban Ecology." American Scientist 88

Alternative Position

- [ ] Constraint
- [x] Objective
- [ ] Directive

The NSI should view human impact on ecosystems as unnatural.

- [ ] Constraint
- [x] Objective
- [ ] Directive

The NSI should view all human impact on ecosystems as the natural course of environmental evolution.

Background and Arguments

The question of what is "natural" when referring to ecological change is quite a controversial one. Ecologists have historically avoided studying urban areas because of the "artificiality" of humans and their impact on the environment (Collins et al, 416). Yet, even in studying so-called "pristine" environments, scientists cannot avoid the effects of human intervention, as "people mobilize nutrients and pollutants, drive species extinct, promote the survival of others, change the composition of the atmosphere and alter landscapes" (Collins et al, 416). Thus, it is actually quite unnatural to assume that the environment should be assessed without regard to human history. To do so would be to not understand an ecology as an ecosystem in the most holistic sense. Even ancient temporal use of land for agriculture or building can alter the ecology of a region by changing the chemistry in flora (Foster et al, 79).

On the other hand, human impacts on the environment cannot be viewed as simply matters of fact. While humans are a "natural" species as much as any other, the tremendous changes they have wrought through pollution, natural resource depletion, and general land use can have long-term detrimental effects on our own species' survival. The NSI must strike a balance between the extremes of unquestioning acceptance of ecological change and narrow-minded attempts to return all land to pristine, pre-human environments.

Defining Statement

Issue
Legal

7

Project
Natural Systems Institute

Originator
Joyce Chen

Question at Issue

What kind of legal entity(s) will the Natural System Institute be?

Contributors

Position

- ☐ Constraint
- ■ Objective
- ☐ Directive

The NSI should be a non-governmental nonprofit organization.

Sources

DiMaggio, Paul J. and Helmut K. Anheier. 1990. "The Sociology of Nonprofit Organizations and Sectors" [online]. Annual Review Sociology 16 (1990): 137-159. Available from < http://weblinks3.epnet.com>

Alternative Position

- ☐ Constraint
- ■ Objective
- ☐ Directive

The NSI should be a governmental organization involved with both national and international departments.

- ☐ Constraint
- ☐ Objective
- ☐ Directive

Background and Arguments

Never before has anyone attempted to establish an institution with as broad scope and ambition as the Natural Systems Institute. Organizations that are similar to the NSI in one or more aspects of its mission include the National Parks Service (NPS); the Natural Resources Defense Council (NRDC); various aquariums, zoos, and conservatories; and the UK's Natural England. All of these entities are either public (government bodies) or nonprofit organizations. DiMaggio and Anheier, in their in-depth study of the sociology of nonprofits vs. for-profits, noted that nonprofits and governmental bodies were most common when the product they provided was a collective good--in this case, the natural environment (DiMaggio 1990, 141). Furthermore, the fact that nonprofits, by definition, cannot distribute their revenue to their principals may render "nonprofit organizations more likely than for profit organizations to use consumers' and donors' dollars reliably for service provision" (DiMaggio 1990, 141). There is also some evidence that for-profits might spend more money enhancing those aspects of their organization that are visible to the public, at the cost of behind-the-scenes work (DiMaggio 1990, 148). Thus, nonprofits may be more trusted by the public than for-profits to selflessly address environmental issues. A nonprofit institution may also suffer less from hierarchical slow-downs than governmental organizations.

Defining Statement

Issue
Natural Resources

8

Project
Natural Systems Institute

Originator
Joyce Chen

Question at Issue

What are the natural resources requirements for the Institute?

Contributors

Position

- ☐ Constraint
- ■ Objective
- ☐ Directive

The NSI should develop global relationships to acquire access to as many natural resources as possible.

Sources

"What is El Nino?" Tropical Atmosphere and Ocean project. Cited on 11 Sept 2005. Online at <http://www.pmel.noaa.gov/tao/elnino/el-nino-story.html>

Alternative Position

- ☐ Constraint
- ■ Objective
- ☐ Directive

The NSI should prioritize more local natural resources above more remote natural resources.

- ☐ Constraint
- ☐ Objective
- ☐ Directive

Background and Arguments

Any institution that attempts to address the broad realities of global warming and growing human population pressure on the environment faces the challenge of having to pick and choose its battles. Constraints such as budget, precariousness of a particular ecosystem, timing, etc. all factor into which issues should be publicized more than others, and this, in turn, influences which natural resources the institution will focus on at any given moment.

Because of its global scope, the Natural Systems Institute has the unique opportunity to educate the public about environmental problems occuring across the globe, and to foster cross-cultural understanding and concern for these issues. Thus, the NSI must not only have its hands in all of the natural resources in the world, but also, to a lesser degree, in the societies that make use of those natural resources.

Some might argue that such broad ambition will dilute the effectiveness of the NSI. However, by focusing only on localized natural resources and problems, the NSI will become merely another local zoo or aquarium, lacking the ability to tie issues together in the global ecosystem. We have seen how, during el nino years, a disruption of the ocean-atmosphere system in the Pacific has tremendous consequences on the weather around the world. Thus, it is important to be able to tie local circumstances with global effects with the help of global natural resources.

Defining Statement

Issue
Technology

9

Project
Natural Systems Institute

Originator
Joyce Chen

Question at Issue

What approach should be taken toward the incorporation of available and emerging technologies?

Contributors

Position

- ☐ Constraint
- ■ Objective
- ☐ Directive

The Institute should encourage the appropriate use of technologies as applied to the intended task, with a preference for the highest level of technology that fits within the budget.

Sources

Darst, Allycia, interview by the author, Chicago, IL, 4 Sept 2005.

Monterey Bay Aquarium, Monterey Bay Aquarium Foundation, www.mbayaq.org.

San Diego Zoo, Zoological Society of San Diego, www.sandiegozoo.org.

Garofalo, J., Drier, H., Harper, S., Timmerman, M.A., & Shockey, T. "Promoting Appropriate Uses of Technology in Mathematics Teacher Preparation." CITE Journal 1, no. 1 (2000): 66-88. Online at < http://www.citejournal.org/vol1/iss1/currentissues/mathematics/article1.pdf> (7 Sept 2005).

Alternative Position

- ☐ Constraint
- ■ Objective
- ☐ Directive

The Institute should allow each department to decide when and where they choose to employ technology.

- ☐ Constraint
- ■ Objective
- ☐ Directive

The Institute should focus on other issues before technology, and incorporate technology with whatever resources remain.

Background and Arguments

Technology has greatly aided the acquisition and dispensation of knowledge and information throughout society. By providing scientists with innovative methods of conducting research and experiments, technology enables them to find answers to important questions faster, more accurately, and in greater detail. Information technologies--especially the development of internet-related applications such as websites, email and e-newsletters, weblogs, animation, and webcams--have, in turn, facilitated widespread public access to these scientific discoveries. Organizations that are known for excellence in conducting and disseminating ecological research, such as the Monterey Bay Aquarium Foundation and the Zoological Society of San Diego, have award-winning, expansive websites that offer an equivalent body of virtual educational content to those who might not have the opportunity to physically visit the institution.

While utilizing new technologies is important, incorporating them into the NSI for the sole purpose of having the latest and greatest technologies, without weighing the cost-benefits of acquiring and implementing that technology, could be wasteful and detrimental to the Institute. As Garofalo et al said when explaining how technology should augment teaching, "Features of technology...should be introduced and illustrated in the context of meaningful content-based activities"--that is, technology should be appropriately applied to research and outreach activities (67). It is in the best interest of the Natural Systems Institute to approach technology such that every department keeps up with the latest technologies, but only adopts those that fit the task and within the budget.

Defining Statement

Issue
Internal Adaptivity

10

Project
Natural Systems Institute

Originator
Mark King

Question at Issue

Internal adaptivity: How will the NSI address changing environments within its realm?

Contributors

Position

- ☐ Constraint
- ■ Objective
- ☐ Directive

The NSI should be proactive in adjusting to evolving environmental operational and structural factors.

Sources

http://www.wicken.org.uk/habitat.htm

Team deliberations

Alternative Position

- ☐ Constraint
- ■ Objective
- ☐ Directive

The NSI should view human impact on ecosystems as unnatural.

- ☐ Constraint
- ■ Objective
- ☐ Directive

The NSI should view all human impact on ecosystems as the natural course of environmental evolution.

Background and Arguments

The NSI is committed to the natural environments, trying to preserve the health of as many species as possible. It therefore should take into account all changing factors when it makes decisions on how the organization should evolve.

Wicken Fen is a wetland preserve in Cambridgeshire, England, dedicated to preserving the land as such. It takes an active role in preserving this wetland, noting that if they left it to nature, it could easily evolve into a woodland. Conservation aims to slow down or hold succession at a stage that is the most beneficial for the species that are present in an area. At Wicken Fen these are early successional wetland habitats including fenlands.

Additionally, the NSI must be amenable to changing organizational structures. The purpose of the NSI is to be different from existing environmental organizations, in that it is adaptive to current trends and reacts to them, instead of designing a plan of action and not being open to change. The Institute cannot be successful in its mission without change.

Defining Statement

Issue
Means of Introduction

11

Project
Natural Systems Institute

Originator
Henning Fischer

Question at Issue

How should the Natural Systems Institute be introduced to facilitate acceptance and implementation?

Contributors

Position

- ☐ Constraint
- ■ Objective
- ☐ Directive

The introduction of the Natural Systems Institute should initially target influential individuals within the scientific, policy and environmental communities to secure "expert" support before presenting itself to

Sources
Team deliberations.

Alternative Position

- ☐ Constraint
- ■ Objective
- ☐ Directive

The Natural Systems Institute should be introduced through a "shock and awe" public relations and lobbying campaign to maximize initial exposure.

Background and Arguments

The introduction of the Natural Systems Institute should focus on two major considerations. The first is unorthodox concept behind the NSI: it is an evolutionary response of specialized institutions to the realities of global warming and the impact of population growth on the environment. The second is that many environmental organizations lack credibility with the general public due to the perception of them as environmental Cassandras.

"Shock and Awe" introductions of concepts or institutions are risky. They rely on massive budgets, coordination between multiple parties and a clear, coherent message that can easily be digested by the target audience. Oftentimes such efforts are simply viewed as marketing with little substance.

The NSI must work to gain credibility while at the same time avoiding being dismissed as alarmist or irrelevant, the fate of many environmental groups. Therefore, the NSI's introduction should be staggered to effectively capture the support of subject matter experts, policy makers and the environmental community first. In doing so, the NSI secures credibility among its three most important target audiences. A public roll out after the fact simply introduces an organization and concept that already has credibility among the leaders in the field.

Defining Statement

Issue
Language

12

Project
Natural Systems Institute

Originator
Henning Fischer

Question at Issue

What approach should a Natural Systems Institute take toward the language it uses to communicate?

Contributors

Position

- ☐ Constraint
- ☐ Objective
- ■ Directive

In its language the Natural Systems Institute ought to maintain both its scientific integrity and a rhetorical capacity suited to the level of public discourse on the environment.

Sources

Robert Gottlieb, Environmentalism Unbound: Exploring New Pathways for Change. MIT Press, 2001.

Terry Macalister, “Oil company looks beyond petroleum,” The Guardian, July 29, 2000.

Alternative Position

- ■ Constraint
- ☐ Objective
- ☐ Directive

The Natural Systems Institute must adhere to the linguistic norms that characterize the best practices of current scientific publishing.

- ☐ Constraint
- ■ Objective
- ☐ Directive

The linguistic style employed by the Natrual Systems Institute should reflect the most current trends in science -oritented rhetoric.

Background and Arguments

Science currently finds itself emboiled in political debate. Environmental science in particular tends to court rhetorical controversy. The Natural Sciences Institute team operates on the presumption that

> All participants in environmental controversies—not only advocacy groups, but also industry spokespersons, government officials, scientists and interested citizens—attempt to influence attitudes and actions, personal opinions and public decisions through the production of persuasive public discourse (Schwarze, 2002).

Political debate is only one area where the discourse is subject to varying interpretation and association. In the business world, witness British Petroleums's successful rebranding campaign into "bp,", with the tagline "Beyond Petroleum." The company spent over £100 million in 2000 to rebrand the company, recognizing that "the traditional image of the oil company has become a negative one in the hearts and minds of the consumer" (The Guardian, July 29, 2000).

According to Robert Gottlieb, "Conflicts of interpretation over the terms of environmental discourse also become debates over how to influence the language that people use in talking about the environment" (2001).

As the Natural Systems Institute represents the embodiement of a new concept in the field of environmental sciences, it will face an uphill battle in a highly dynamic rhetorical atmosphere. The current use of language by scientific institutions is often no match for finely honed political rhetoric. The language used by scientists, especially in publication is easily manipulated by hostile parties. By contrast, serious discussions of science conducted using the more traditional vocabulary and tactics of public discourse is often dismissed as bad science, or as a gross oversimplification.

If the Natural Sciences Institute presumes to be a significant participant, contributor, resource and pioneer, it must, make a significant and independent contribution to the way language is used in environmental sciences.

Defining Statement

Issue
Location

13

Project
Natural Systems Institute

Originator
Henning Fischer

Contributors

Question at Issue

Where should the NSI establish itself?

Position

- ☐ Constraint
- ■ Objective
- ☐ Directive

The NSI should position itself to have the greatest impact on the social and physical environment.

Sources

Alternative Position

- ☐ Constraint
- ■ Objective
- ☐ Directive

The NSI should be near large cities where the social impact is greatest.

- ☐ Constraint
- ■ Objective
- ☐ Directive

The NSI should be in rural areas where the land and resources are less expensive.

Background and Arguments

The NSI should establish itself in any areas where there is a physical, environmental need, but also where there is a social need.

Zoos, mostly located in or near large metropolitan areas, are helpful in educating large numbers of people (some more successful than others). However, they are often over-budget due to high operating costs; they are sometimes viewed more as amusement parks than learning centers; and do not usually address the issue of preservation, but instead confine animals in habitats very different from their natural environments.

National parks are often located in rural areas, far from large masses of people. They are fantastic areas of environmental preservation, but have difficulty attracting large numbers of people, aside from those on vacation.

The NSI must address both of these issues in order to be successful in its mission.

Defining Statement

Issue
Management Structure

14

Project
Natural Systems Institute

Originator
Henning Fischer

Question at Issue

How will the Natural Systems Institute govern the management of its operations?

Contributors

Position

- ☐ Constraint
- ■ Objective
- ☐ Directive

Because the management Natural Systems Insitute will deal with a host of issues, from scientific programs to budgets to facilities management, the NSI should govern its operations through an organizational structure that facilitates leadership (to give direction), but provides a system of checks and balances (to ensure the operating

Sources

Max Planck Institute. <http://www.mpg.de>.

Mader, Roger. “Culture: Propelling the soul of the organization.” Paper presented to the Spring 2005 Desgin Planning Implementation Class, Institute of Design, Illinois Institute of Technology, Chicago, USA, February, 24, 2005.

Alternative Position

- ☐ Constraint
- ■ Objective
- ☐ Directive

The Natural Systems Institute should be posess a strong, centralized management structure that directs and drives the people, processes and structures of the NSI in a single, cohesive direction.

- ☐ Constraint
- ■ Objective
- ☐ Directive

The Natural Systems Institute should posess a decentralized management structure to allow entities within the organization to operate with minimal bureaucratic oversight, so as not to impede the fulfillment of designated duties and functional independence.

Background and Arguments

Organizations faces specific challenges in creating their management structures. There is a dichotomy between top-down control and bottom-up power, especially in organizations focused on less well defined pursuits, as the Natural Systems Institute will be..

As the NSI is a public, scientific organization with presumable policy goals, the management thereof should provide coherent, directed leadership in managing its external affairs and strategic vision, but allow for latitude in the day to day operations of the scientific units that carry out the NSI's mission independently.

A strong, centralized management structure has the advantage of providing clear direction and effcient leadership in an organization. However, centralized management structures are often highly dependent on few individuals to drive operations forward. Organizations like IBM and General Electric have relied on strong, centralized control to manage their operations, and with great success. However, entities such as these—companies, do not, by definition, allow a large degree of operational independence to their business divisions. Scientific organizations, such as laboratories and research institutes, however, do, both out of need and out of preference.

Larger scientific organizations have different goals than profit oriented organizations like the traditional corporation. Their objectives are focused less on specific goals and more on general goals, such as increasing the corpus of scientific knowledge. Their general focus, when combined with the wide array of topics, such as biology, physics, and chemistry, has given rise to management structures that reflect the various disiplines in which the organization is involved. This leads to specialty areas to often behave as autonomous units, sometimes acting in opposition to each other, with total organizational management suffering as a result.

A management structure that incorporates the virtues of a centralized, top-down professional management structure with a system of checks and balances to ensure organizational oversight and independence is therefore optimal. There are precedents for this in the scientific community. The Max Planck Society is one, with a President, Secretary General and Executive Committee providing most of the leadership. However, the Senate of the organization decides on the establishment or closure of institutes, on the appointments of scientific members and institute directors, as well as on the budget, guaranteeing a degree of scientific independence and a check on the powers of the executive branch. A dedicated Scientific Council and Sections set the research agenda.

Defining Statement

Issue
Mission

15

Project
Natural Systems Institute

Originator
Henning Fischer

Contributors

Question at Issue

What should the balance be among research, public education, environmental stewardship, species preservation, advocacy and other possible roles?

Position

☐ Constraint
■ Objective
☐ Directive

The Natural Systems Institute should work in areas where it has a competitive advantage over other institutions. As a specialist in the integration of diverse areas of study and research-based policy-making, the NSI should focus on issues not addressed by existing scientific and policy

Sources

United Nations Environment Programme. <http://www.unep.org>.

Adam Smith. An Inquiry into the Nature and Causes of the Wealth of Nations. (New York: Penguin Classics, 1982).

Alternative Position

☐ Constraint
■ Objective
☐ Directive

The Natural Systems Institute should broadly intepret its mission and balance as many aspects of research, public education, environmental stewardship, species preservation, advocay and other possible roles as possible.

☐ Constraint
■ Objective
☐ Directive

The Natural Systems Institute should narrowly interpret its mission and focus exclusively on the most pressing environmental issues and avenues of activity related to them.

Background and Arguments

Many organizations exist to address evironmental research, public education, stweardship, species preservation and advocacy. Ranging from local, single-issue oritented groups such as the Friends of the Ventura River, to larger organizations with global scope, such as the United Nations Environment Programme, these organizations complement and co-exist with one another in all of the aforementioned specialty areas.

Each organizational mission has both advantages and disadvantages. Smaller organizations can remain focused on single issues and can nimbly shift strategies to accomodate changing conditions. On the other hand, small organizations can more easily succumb to funding, recruiting and resource challenges when faced with unfavorable conditions.

Large organizations, such as the UNEP, have the luxury of greater funding and a high profile that aids in recruiting and finding resources. However, larger organizations are often asked to confront several issues at once, and must consider larger actors than the state and local governments that small organizations routinely deal with. This can sometimes lead to a lack of strategic focus as they must grapple with multiple complex issues such as biodiversity, environmental assessment, freshwater, governance and law and ozone, all of which are areas that the UNEP deals with.

The Natural Systems Institute should operate on the principle of comparative advantage, which Adam Smith explained as "If a foreign country can supply us with a commodity cheaper than we ourselves can make it, better buy it of them with some part of the produce of our own industry, employed in a way in which we have some advantage."

Extrapolated to the concept of a Natural Systems Institute, if the NSI can produce some set of expertise with greater ease than another organization, and the other organization can produce other sets of expertise in a similar fashion, it would be in both parties' self-interest to specialize in these different areas.

As the Natrual Systems Institute proposes to integrate formerly seaprate fields of study into a new type of interdisciplinary organization, it makes sense for the NSI to specialize in exactly that— issues not addressed by existing scientific and policy communities.

Defining Statement

Issue
Partnerships

16

Project
Natural Systems Institute

Originator
Mark King

Contributors

Sep. 2, 2005 Charles Owen

Question at Issue

What is the Institute's position on ecological change?

Position

- [x] Constraint
- [ ] Objective
- [ ] Directive

NSI must develop bi-directional partnerships to help with funding and knowledge sharing

Sources

Hamilton, Joan. "Danger Ahead." Stanford, September/October 2005, 49-55.

Team deliberations

Alternative Position

- [ ] Constraint
- [x] Objective
- [ ] Directive

NSI should be independent from all other institutions, finding its own ways to generate funding and information

- [ ] Constraint
- [x] Objective
- [ ] Directive

NSI should get involved in unidirectional partnerships as means to generate funding and information.

Background and Arguments

The NSI should establish itself in any areas where there is a physical, environmental need, but also where there is a social need.

Zoos, mostly located in or near large metropolitan areas, are helpful in educating large numbers of people (some more successful than others). However, they are often over-budget due to high operating costs; they are sometimes viewed more as amusement parks than learning centers; and do not usually address the issue of preservation, but instead confine animals in habitats very different from their natural environments.

National parks are often located in rural areas, far from large masses of people. They are fantastic areas of environmental preservation, but have difficulty attracting large numbers of people, aside from those on vacation.

The NSI must address both of these issues in order to be successful in its mission.

Defining Statement

Issue
Physical Space Requirement

17

Project
Natural Systems Institute

Originator
Waewwan Sitthisathainchai

Contributors
29 th September 2005 Joyce Chen

Question at Issue

Which are the physical space requirements of the Natural System Institute?

Position

- ☐ Constraint
- ■ Objective
- ☐ Directive

The Institute should allow regional offices to decide how much physical space they need based on local research programs.

Sources

Team deliberatons

Alternative Position

- ☐ Constraint
- ■ Objective
- ☐ Directive

The Institute should allocate space equally between all of its regional offices.

- ☐ Constraint
- ☐ Objective
- ☐ Directive

Background and Arguments

The Natural Systems Institute, being a global partnership organization, will require regional offices over many continents, as well as one headquarters. The physical space required for each regional office will be determined by that region's subcommittee based on specific criteria, which the management will set. These might include number of local programs, number of regional partnerships with other institutions, expectations for future developments, funding requirements and limitations, and human resource requirements.

While it may seem more egalitarian to divide up physical space requirements equally between the different regional offices, the NSI regional centers should ultimately only use as much space and funding as they need, and not more. Therefore, it makes the most sense to allow for regional self-determination of physical space through some sort of application or bidding process.

Defining Statement

Issue
Recruiting and Human Resources

18

Project
Natural Systems Institute

Originator
Waewwan Sitthisathainchai

Contributors
27th September 2005 Mark King

Question at Issue

What kind of talent will the institute recruit and how?

Position

☐ Constraint
■ Objective
☐ Directive

The NSI should recruit employees from various disciplines to meet its needs, from both the local and global communities.

Sources

Team deliberatons

Earth institute, Training women in Etiopia, http://www.earthinstitute.columbia.edu/earthclinic/

Alternative Position

☐ Constraint
■ Objective
☐ Directive

The NSI should only recruit specialists from outside communities.

☐ Constraint
■ Objective
☐ Directive

The NSI should only focus on recruiting local employees.

Background and Arguments

The NSI should recruit employees, such as scientists and physicians, from outside resources to gain new ideas and knowledge to develop methodology for the Institute. Exchanging their knowledge and different points of view can enlighten local workers with regard to the natural systems problem.

Additionally, the NSI should recruit local people to work at each respective site. The advantage of local employees is that they have more insight into problems of their area, as well as having a vested interest in seeing improvements. The Earth Clinic trained 25,000 young women in Ethiopia as heath extension workers, to diinish the effects of malaria, tuberculosis, Aids and malnutrition in Ethiopia [http://www.earthinstitute.columbia.edu/earthclinic/].

Specialists from outside communities can aid the Institute with their knowledge about worldwide ecological issues, but are lacking in local insights and ownership of a particular community. As the mission of the NSI is to create local ecological settings, this type of employee alone will not have all of the necessary information to contribute to the success of the program.

On the other hand, hiring only from the local community will not ensure the success of the NSI's mission. While invaluable for their vested interest in seeing the benefits of the NSI for their community, they do not have the expertise or the worldwide contacts to effectively solve global problems. The NSI should therefore have a balance of local and non-local employees.

Defining Statement

Issue
Standards

19

Project
Natural Systems Institute

Originator
Henning Fischer

Question at Issue

What standards of measurement should be used by the Natural Systems Institute?

Contributors

Position

- [x] Constraint
- [ ] Objective
- [ ] Directive

As an organization focused on issues of global concern, the Natural Systems Institute must use the International System of Units (SI), specified by the International Bureau of Weights and Measures (Bureau International des Poids et Mesures). However, the NSI recognizes regional differences and will, where applicable, publish local units next

Sources

Bureau International des Poids et Mesures. <http://www.bipm.fr/en/home/>.

Alternative Position

- [ ] Constraint
- [x] Objective
- [ ] Directive

The Natural Systems Institute should use the International System of Units (SI), specified by the International Bureau of Weights and Measures (Bureau International des Poids et Mesures).

- [ ] Constraint
- [x] Objective
- [ ] Directive

The Natural Systems Institute must recognize regional differences in the measurement of units and should accomodate them in its used measurement system.

Background and Arguments

Standardized units of measurement are one of the most crucial elements of scientific inquiry. For that reason, most nations are signatories to the Convention of the Metre, which was signed in 1875 and established an internationally recognized system of weights and measures to harmonize measurement systems worldwide. This way the scientific results generated in a lab in Berkeley, California, USA, can be interpreted by another lab in Beijing, China with no need to convert figures.

The Natural Systems Insitutute must reflect the standard of international practice if it is to be considered a serious enterprise. Exclusive use of the SI system would, however, make it difficult for more general, non-scientific populations in countries like the United States to grasp the units and measures used.

However, a wholesale acceptance of local norms, such as the English System as practised in the United States of America might lead to confusion and avoidable errors.

Therefore, the NSI should adopt the SI system for all of its operations, but in applicable and non-scientific contexts, be able to publish non-SI units of measurement alongside.

Defining Statement

Issue
Position on Ecological Change

20

Project
Natural Systems Institute

Originator
Mark King

Question at Issue

What will the start-up capacity of the NSI be?

Contributors

Position

- ☐ Constraint
- ■ Objective
- ☐ Directive

The NSI ought to establish sites in as many communities as they can to have the greatest impact.

Sources
Team deliberations

Alternative Position

- ☐ Constraint
- ■ Objective
- ☐ Directive

The NSI should establish a single site and branch out subsequently.

- ☐ Constraint
- ■ Objective
- ☐ Directive

The NSi should establish sites randomly.

Background and Arguments

Aside from physical needs for startup, including capitol, resources, and an information base, the NSI will also need to decide how to commence structurally. Many businesses start with one location, assessing the population's desire for the product. They either do not have the money or the knowledge to be sure that the idea will be successful. The NSI will not have this luxury, as its services will be necessary. It must have sufficient resources and capitol to start in many locations simultaneously.

Furthermore, the NSI will have to determine where the greatest need for change lies and establish a site there. This need could be a social need, where people grossly misuse natural resources, or it could be where there is a resource void and someone must step in to preserve the natural resources that remain.

Defining Statement

Issue
Time of introduction

21

Project
Natural Systems Institute

Originator
Waewwan Sitthisathainchai

Question at Issue

When should the system be ready for implementation?

Contributors

Position

- ☐ Constraint
- ■ Objective
- ☐ Directive

The system should be separately launched depending on the the critical effect and/or some warning sign?

Sources
Team deliberatons

Alternative Position

- ☐ Constraint
- ■ Objective
- ☐ Directive

The time of introduction should be defined as time intervals in each part of the world to make the most benefit to the environmental.

- ☐ Constraint
- ■ Objective
- ☐ Directive

The system should start as fast as they can to relieve or stop the global food chain inclination.

Background and Arguments

Due to the global warming problem, Climate and weather pattern are changing. The numbers of severe natural calamity are increasing every year. Hurricane Katrina Flood in New Orleans, Tsunami in Asia, and Forest fire on Sumatra Island are threaten us as very critical situation. While some
warning sign happening around the world, the moving ecology species, ocean warming up, shorted of the food production, and new diseases such as SARS are what we have to confront nowadays. Then, the Natural System Institute should confront the problem as fast as they can to intervene and alleviate the severe catastrophe.

However, some people still did not realize the danger but use the all resource as though it will not be exhausted. Time of introduction is the important factor that effect to cooperation of people around the world.

This problem is very huge as far as it could not be solved on just one part. On the other hand, to
ideally launch this project around the world would be great but too short of funding and group of awareness people might cause uneffective result to overall project.Then, this project should establish the milestone depending on warning factor to gradually launch on difference issue such as educating people, preserving endanger animal project in each area of the world.

Defining Statement

Issue
Inter-Institutional Relationships

22

Project
Natural Systems Institute

Originator
Matthew Lennertz

Question at Issue

How should a natural systems institute approach inter-institutional relationships?

Contributors

Position

- ☐ Constraint
- ■ Objective
- ☐ Directive

The NSI should approach the formation of interinstitutional relationship building with a look towards Institutional trust and coopera¬tion to improve transaction costs and increase performance across operational units.

Sources

Russ, Andrej; Iglic, Hajdeja, “Trust, Gover¬nance and Performance: The Role of Institu¬tional and Interpersonal Trust in SME Devel¬opment.” International Sociology, Sep2005, Vol.20, Issue 3

Team deliberations

Alternative Position

- ☐ Constraint
- ■ Objective
- ☐ Directive

Because of the continuing disintegration of the worlds ecosystems the Natural Systems Institute should maintain symbiotic relationships with any institution that can aid in its mission..

- ☐ Constraint
- ☐ Objective
- ☐ Directive

Background and Arguments

The NSI faces the daunting task of working in several areas of research and attempting to achieve measurable levels of change. The Institute aims also to play a critical role in educating policy makers and the general public about the state of local, regional and global ecological change. The success of these functions may depend heavily upon the development of strong interinstitutional relationships.

The approach of relationship building should be based upon a theory of Institutional trust (Rus; Iglic, 2005.) According to the Rus and Iglic, an institution has the ability to generalize trust across an orga¬nization eliminating the need for close ties based on familiarity. The relationship based on institutional trust lowers transaction costs and directly contributes to the increase of performance due to the lower cost of transactions between the institutions and allows for a wider range of choice in the governance mechanisms of the relationships. This approach can provide a deeper level of cooperation between parties and develop stronger ties in the long term.

It is insufficient then to simply attempt to maintain symbiotic relationships. This approach does not address the need for trust across Institutions. It is believed that the NSI’s mission is critical enough to demand the best possible method for relationship building. This approach will lead to measurable progress in the NSI’s areas of influence.

Defining Statement

Issue
Involvement

23

Project
Natural Systems Institute

Originator
Matthew Lennertz

Contributors
Mark King, Henning Fischer
Joyce Chen,Waewaan

Sources
Monterey Bay Aquarium web page
http://www.mbayaq.org/cr/
Max Planck INstitute for Informatics
www. http://www.mpi-sb.mpg.de/

Team deliberations

Question at Issue

Adaptivity: How should elements of the system respond to evolving social, political, technological, and environmental conditions?

Position

- ☐ Constraint
- ■ Objective
- ☐ Directive

The Institute should maintain a level of involvement that allows it to become a leader in its areas of concentration

Alternative Position

- ■ Constraint
- ☐ Objective
- ☐ Directive

The Institute must play an active roll in conservation efforts.

- ☐ Constraint
- ■ Objective
- ☐ Directive

The Institute should involve itself in direct observation of the ecosystems it wishes to maintain or conserve.

Background and Arguments

The Institute will face a serious question regarding its level of involvement in all areas of operation. If the Institute does not plan its level of invovlvement correctly, it faces a real possibility of ineffective¬ness.
Like many institutions, the NSI could content itself with playing an active role in conservation efforts and as such realize some level of success in thier efforts. However, given the scope of th NSI's mis¬sion, this position would prove inadequate to pursue the breadth of goals set forth. Likewise, simple observation of ecosystems fails to realize any level of change.
In order to maintian any level of leadership the NSI should not only actively observe environments and ecosytems, but maintian a level of involvement that allows them to lead in all areas of focus. The Monterey Bay Aquarium and the Max Planck Institute for informatics are excellent examples of a high level of involvement in an area of research producing a leader. The Monterey Bay Aquarium involves itself in industry leading research in the worlds oceans, lakes and rivers, while the Max Planck In¬stitute works tirelessly to develop cutting edge algorithms to realize significant change in computing technology. Following the model of these two Institutes, the NSI can reach levels of involvement that will allow it to make significant impacts in its mission goals.

Defining Statement

Issue
Geographic Concentration

24

Project
Natural Systems Institute

Originator
Matthew Lennertz

Contributors
Mark King, Henning Fischer
Joyce Chen,Waewaan

Question at Issue

What should the geographic concentration of a natural Systems Insitute be?

Position

- ☐ Constraint
- ■ Objective
- ☐ Directive

The geographic concentration of the institute should be decided by the areas of research in which the NSI engages.

Sources

Monterey Bay Aquarium
http://www.mbayaq.org/
Shedd Aquarium
http://www.sheddaquarium.org

Team deliberations

Alternative Position

- ☐ Constraint
- ■ Objective
- ☐ Directive

The institute should focus its geographic concentration to the region in which it is esstablished.

- ☐ Constraint
- ☐ Objective
- ☐ Directive

Background and Arguments

The question of geographic concentration is critical as it speaks to the reach the NSI will try to achieve in its research. If the Institutes areas of research involve varied locations of the ecosystem then it is in the Institutes best interest to operate in those locations.
It is not enough for the Institute to operate in a strictly regional capacity as the problems that it aims to ame¬liorate affect the entire planet. It would be too little affect in too little an area. The better course of action is to develop sound research directions and follow them to the geographic locations that arise from those decisions. Institutes like the Monterey Bay Aquarium involve themselves in areas far removed from their regional homes. The Aquarium could chose to focus on the immediate waters and rivers surrounding its home, instead they operate in a much larger ecosystem-the Pacific Ocean. Likewise the Shedd Aquarium involves itself in several international projects such as Project Seahorse (a project aimed at conserving seahorses against their me¬dicinal trading in the waters of Southeast Asia) and Iguana Research (a program to breed and then conserve Iguana species from the Bahama Islands).
These efforts should be seen as encouragement for the NSI to extend itself into diverse ecosystems for the purpose of research and conservation. It is not enough to think globally, acting globally will provide a much deeper understanding of the worlds ecosystem and insights towards serious conservation of the worlds natural resources.

Defining Statement

Issue
Outputs

25

Project
Natural Systems Institute

Originator
Matthew Lennertz

Contributors
Mark King, Henning Fischer
Joyce Chen,Waewaan

Question at Issue

What should the Institute consider its outputs to be?

Position

- [x] Constraint
- [ ] Objective
- [ ] Directive

The Institute must produce knowledge that is actionable.

Sources

Max Planck Institute for Informatics
http://www.mpi-sb.mpg.de/about/mission.html

Team deliberations

Alternative Position

- [ ] Constraint
- [x] Objective
- [ ] Directive

The institute sholuld produce scientific research suitable for publication.

- [ ] Constraint
- [ ] Objective
- [ ] Directive

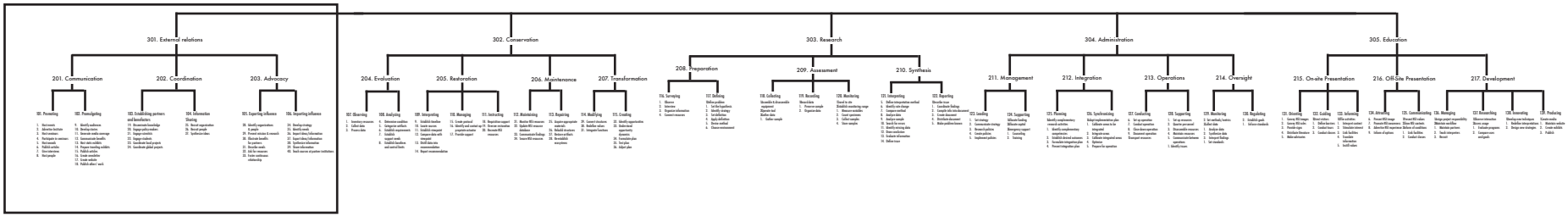
Background and Arguments

The Natural Systems Institute will engage in extensive research in areas that coincide with its goals. It is then up to the NSI to decide what form their outputs will take. It is possible that the knowledge gained through extensive research be collected and published. Following this path, the institute will build a suitable scientific body of knowledge. This position is not pervasive enough with regards to the project goals because it is far too passive a roll.

The NSI should produce knowledge that is actionable and aimed at practically effecting any goal it has set for itself. Some institutions have followed this model in an effort to make a larger impact. The Max Planck Institute for Informatics conducts deep scientific research involving informatics. The re¬search, which focuses specifically on new algorithms, find their way into realistic applications such as computer graphics, database and information systems and computational biology. This strengthens the MPI's ability to function in an increasingly competitive world.

When outputs are considered as actionable, it will allow NSI to reach measurable results in many areas and allow for continued support and growth. Actionable results will prove the worth or NSI more effectively than a collection of outputs characterized by theoretical scientific knowledge.

C: Function Structure



301. External relations

201. Communication

101. Promoting

1. Host events
2. Advertise Institute
3. Host seminars
4. Participate in seminars
5. Host awards
6. Publish articles
7. Give interviews
8. Host people

102. Promulgating

9. Identify audiences
10. Develop stories
11. Generate media coverage
12. Communicate benefits
13. Host static exhibits
14. Prepare traveling exhibits
15. Publish articles
16. Create newsletter
17. Create website
18. Publish others' work

202. Coordination

103. Establishing partners and benefactors

19. Disseminate knowledge
20. Engage policy-makers
21. Engage scientists
22. Engage students
23. Coordinate local projects
24. Coordinate global projects

104. Information Sharing

25. Recruit organization
26. Recruit people
27. Synthesize ideas

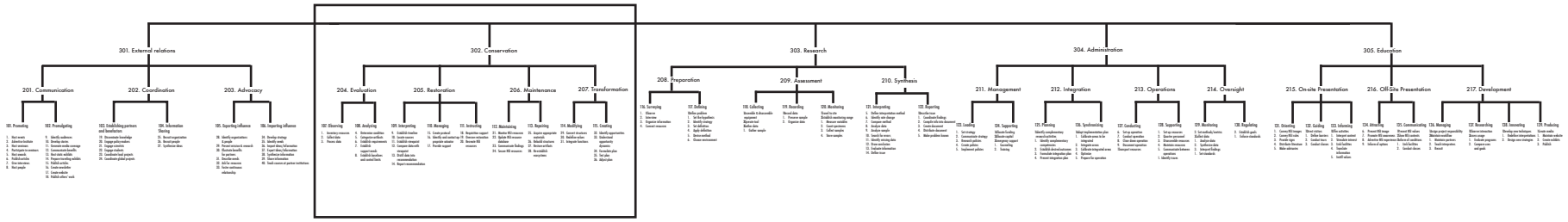
203. Advocacy

105. Exporting influence

28. Identify organizations & people
29. Present mission & research
30. Illustrate benefits for partners
31. Describe needs
32. Ask for resources
33. Foster continuous relationship

106. Importing influence

34. Develop strategy
35. Identify needs
36. Import ideas/information
37. Export ideas/information
38. Synthesize information
39. Share information
40. Teach courses at partner institutions



302. Conservation

204. Evaluation

107. Observing

41. Inventory resources
42. Collect data
43. Process data

108. Analyzing

44. Determine condition
45. Categorize artifacts
46. Establish requirements
47. Establish support needs
48. Establish baselines and control limits

205. Restoration

109. Interpreting

49. Establish timeline
50. Locate sources
51. Establish viewpoint
52. Compare data with viewpoint
53. Distill data into recommendation
54. Report recommendation

110. Managing

55. Create protocol
56. Identify and contact appropriate actuator
57. Provide support

111. Instructing

58. Requisition support
59. Oversee restoration
60. Recreate NSI resources

206. Maintenance

112. Maintaining

61. Monitor NSI resources
62. Update NSI resource database
63. Communicate findings
64. Secure NSI resources

113. Repairing

65. Acquire appropriate materials
66. Rebuild structures
67. Restore artifacts
68. Re-establish ecosystems

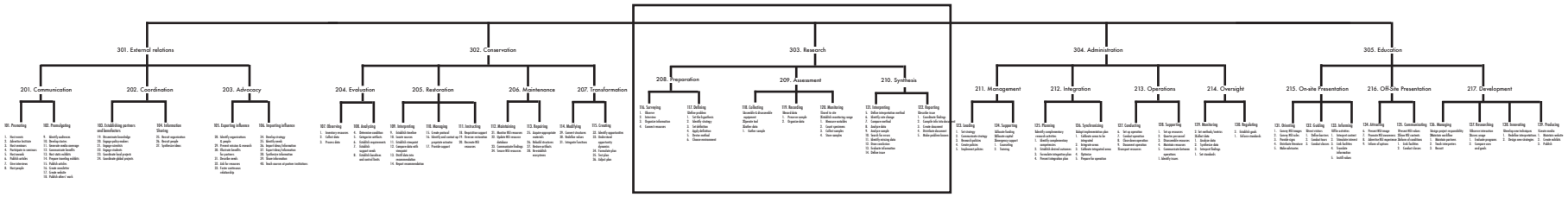
207. Transformation

114. Modifying

69. Convert structures
70. Redefine values
71. Integrate functions

115. Creating

72. Identify opportunities
73. Understand opportunity dynamics
74. Formulate plan
75. Test plan
76. Adjust plan
77. Execute plan



303. Research

208. Preparation

116. Surveying
78. Observe
79. Interview
80. Organize information
81. Connect resources

117. Defining
82. Define problem
83. Set the hypothesis
84. Identify strategy
85. Set definition
86. Apply definition
87. Devise method
88. Choose environment

209. Assessment

118. Collecting
89. Assemble & disassemble equipment
90. Operate tool
91. Gather data
92. Gather sample

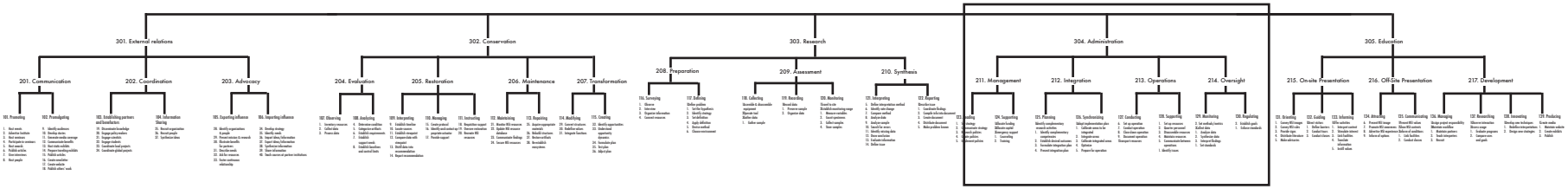
119. Recording
93. Record data
94. Preserve sample
95. Organize data

120. Monitoring
96. Travel to site
97. Establish monitoring range
98. Measure variables
99. Count specimens
100. Collect samples
101. Store samples

210. Synthesis

121. Interpreting
102. Define interpretation method
103. Identify rate change
104. Compare method
105. Analyze data
106. Analyze sample
107. Search for errors
108. Identify missing data
109. Draw conclusion
110. Evaluate information
111. Define issue

122. Reporting
112. Describe issue
113. Coordinate findings
114. Compile info into document
115. Create document
116. Distribute document
117. Make problem known



304. Administration

211. Management

123. Leading
- 118. Set strategy
- 119. Communicate strategy
- 120. Research policies
- 121. Create policies
- 122. Implement policies

124. Supporting
- 123. Allocate funding
- 124. Allocate capital
- 125. Emergency support
- 126. Counseling
- 127. Training

212. Integration

125. Planning
- 128. Identify complementary research activities
- 129. Identify complementary competencies
- 130. Establish desired outcomes
- 131. Formulate integration plan
- 132. Present integration plan

126. Synchronizing
- 133. Adopt implementation plan
- 134. Calibrate areas to be integrated
- 135. Integrate areas
- 136. Calibrate integrated areas
- 137. Optimize

213. Operations

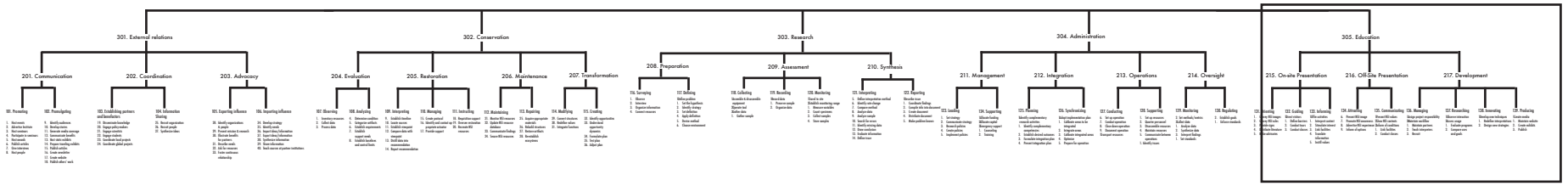
127. Conducting
- 138. Prepare for operation
- 139. Set up operation
- 140. Conduct operation
- 141. Close down operation
- 142. Document operation

128. Supporting
- 143. Transport resources
- 144. Set up resources
- 145. Quarter personnel
- 146. Disassemble resources
- 147. Maintain resources
- 148. Communicate between operations

214. Oversight

129. Monitoring
- 149. Identify issues
- 150. Set methods/metrics
- 151. Collect data
- 152. Analyze data
- 153. Synthesize data
- 154. Interpret findings

130. Regulating
- 155. Set standards
- 156. Establish goals
- 157. Enforce standards



305. Education

215. On-site Presentation

131. Orienting
158. Convey NSI images
159. Convey NSI rules
160. Provide signs
161. Distribute literature
162. Make advisories

132. Guiding
163. Direct visitors
164. Define barriers
165. Conduct tours
166. Conduct classes

133. Informing
167. Offer activities
168. Interpret content
169. Stimulate interest
170. Link facilities
171. Translate information
172. Instill values

216. Off-Site Presentation

134. Attracting
173. Present NSI image
174. Promote NSI awareness
175. Advertise NSI experience
176. Inform of options

135. Communicating
177. Present NSI values
178. Show NSI contents
179. Inform of conditions
180. Link facilities
181. Conduct classes

217. Development

136. Managing
182. Assign project responsibility
183. Maintain workflow
184. Maintain partners
185. Teach interpreters
186. Recruit

137. Researching
187. Observe interaction
188. Assess usage
189. Evaluate programs
190. Compare uses and goals

138. Innovating
191. Develop new techniques
192. Redefine interpretations
193. Design new strategies

139. Producing
194. Create media
195. Maintain website
196. Create exhibits
197. Publish

D: Design Factors

Design Factor

Title: Activity offerings are unclear

1

Project
Natural Systems Institute

Mode
Education

Activity
Orienting

Originator
Matthew Lennertz

Contributors

Sources
Personal observation

Associated Functions

167. Offer activities

Observation

Any visitor that arrives at the institute must be able to decipher the offerings presented to them.

Extension

If a visitor is unable to unable to clearly understand the offerings of the NSI, they may fail to fully engage with the exhibits, tours or classes offered. If they do not engage fully, they will not have been informed and educated by the NSI and thus not act on behalf of the environment.

Design Strategies

Develop brochure higlighting offerings
Communicate offerings clearley
Link activities where applicable
List offerings on web site

Solution Elements

S Activity menu
S NSI Press
S Menu Compliment
S NSI Web

Design Factor

Title: Articles are not fit to publish

2

Project
Natural Systems Institute

Mode
Education

Activity
Orienting

Originator
Matthew Lennertz

Contributors

Sources
Personal observation

Associated Functions
197. Publish

Observation

There are times when an institution wishes to publish the work of it's leading researcher but can't because of poor quality.

Extension

If the NSI faces senior researchers that are simply not very good at writing about the research that they have conducted it is in its best interest to develop some type of solution. The problem is multilayered because the communication of vital projects not only benefits peer researchers, but the public as well. There then needs to be a focus on translating research to a more common level..

Design Strategies

Pair researchers with science writers —— S Write corps
Develop inhouse publishing —— S NSI Press

Solution Elements

Design Factor

Title: Ambiguous ROI to partners/benefactors

3

Project
Natural Systems Institute

Mode
External Relations

Activity
Establishing partners & benefactors

Originator
Mark King

Contributors

Sources

Associated Functions
Illustrate benefits for partners

Observation

Partners & benefactors often want to know what their ROI will be.

Extension

Especially at the beginning, the NSI will have difficulty convincing their patrons what their ROI will be. We will be targeting not only people and organizations who traditionally give to similar environmental organizations, but also corporate investors and people. As the NSI is a NFP, investors will want to know why they should help us.

Design Strategies

Benefits package
Pamphlet of environmental causes
"Profit" sharing
Tax benefits

Solution Elements

M	Goodwill gesture appreciation
M	Empowering pamphlet
M	Monetary ROI
S	Environmental tax laws

Design Factor

Title: Unable to determine most beneficial medium

4

Project
Natural Systems Institute

Mode
External Relations

Activity
Promoting

Originator
Mark King

Contributors

Sources

Associated Functions
Advertise institute

Observation

When the NSI is creating advertising and determining through which medium to promote it, it is difficult to know which will be the most beneficial and effective.

Extension

Advertising is expensive and not always effective. Sometimes, advertising campaigns end up doing more harm than good, as they induce public bias that may be negative.

It is clear that the NSI will have to create compelling advertising. However, through which medium is not as clear. In targeting local and global communities, some forms may get the NSI's mission to the people more effectively than others.

Design Strategies

Segmented campaign
Pilot campaigns
Focus groups/demographic research
Secondary research

Solution Elements

E Target selector
E Target practice
E Advertising research
E Background verifier
M Advertising bullseye

Design Factor

Title: Can't decide on classification method

5

Project
Natural Systems Institute

Mode
Research

Activity
Recording

Originator
Waewwan Sitthisathainchai

Contributors

Sources

Associated Functions
Record data
Preserve sample
Organize data

Observation

Too many method of classification might confuse inside the institute

Extension

Different methods of classification cause confusion, inability to compare between each research centers and errors in different information. There are many ways to classify things in the natural. Because the NSI settle in overall parts of the world, there are many standards such as different units, and different perspective.

First, The NSI should set the standard of the organization by using the same Unit in overall center, wherever continent and must inform the workers to use same standard.

Second, because cultural factors, there are different perspective of people to divide things. The NSI research center should use the science standard or set the "Standard NSI" to category things in research.

Design Strategies

Define classification as standard
Use Classification experts to define
Adjust standard classification oftenly

Solution Elements

Catalog definition
Expert wanted
Catalog running

Design Factor

Title: Can't find an exhibit

6

Project
Natural Systems Institute

Mode
Education

Activity
Orienting

Originator
Matthew Lennertz

Contributors

Sources

Associated Functions
Advertise institute

Observation

Visitors to many Institutes often miss exhibits they may find engaging because they simply can't find them.

Extension

In order for the NSI to maximize the impact of it's exhibits, it must provide the ooportunity for all visiotors to find all exhibits during any specific visit. While it may appear to be a simple matter, it is very important that all visitors can find all exhibits during their visit.

Design Strategies

Develop distinct facility signage
Distribute electronic facilities map

Solution Elements

S NSInage
E Electronic map

Version: 1

Date: October 16, 2005

Date of Original: October 16, 2005

Design Factor

Title: Conflicting agenda / influences

7

Project
Natural Systems Institute

Mode
Conservation

Activity
Managing

Originator
Joyce Chen

Contributors

Sources

Associated Functions
Recruit organizations
Recruit people
Recruit instutions
Develop partnerships & alliances
Recruit ideas

Observation

People, organizations, and institutions often have conflicting agendas and influences that may interfere with their ability to effectively aid the NSI.

Extension

The NSI is a new mode of preservation, in that it incorporates many previous models. The NSI will need to acquire information from outside sources in order to gain a wide knowledge base and support.

It will therefore be necessary to choose people, organizations, and institutions that will support NSI's mission, regarding it as the ideal means to ensuring the health of the environment.

Design Strategies

Identify institutions with similar missons
Partner with organizations with environmental concerns
Identify experienced persons who could contribute as advisors

Solution Elements

Historical analysis
Environmental scale
Concept value examination

Design Factor

Title: Content is misinterpreted

8

Project
Natural Systems Institute

Mode
Education

Activity
Informing

Originator
Matthew Lennertz

Contributors

Sources
Personal observation

Associated Functions
Interpret Content

Observation
If content is misinterpreted then people will be reluctant to cooperate with NSI goals.

Extension
The NSI faces a real possibility of it's information being misinterpreted. If people misinterpret the content, the NSI must be prepared to handle the misinterpretation and answer questions with evidence that is clear and can not be misinterpreted. This is going to require cooperation between research and communication divisions.

Design Strategies

Develop response plan — S REply
Coordinate information between units — S Inter-link

Solution Elements

Design Factor

Title: Outreach is time-consuming & expensive

9

Project
Natural Systems Institute

Mode
External Relations

Activity
Exporting influence

Originator
Mark King

Contributors

Sources
Team deliberations

Associated Functions
Coordinate local projects
Recruit organizations
Recruit people

Observation

The time and money it takes to reach out to the public and partners is great.

Extension

In order to fully reach all of the communities, coordinate global projects among those communities, and recruit benefactors and partners, the NSI will have the problem of time constraints and expenses.

Design Strategies

Volunteer corps
Experimental projects with communities
Split time between community and NSI

Solution Elements

E Volunteer corps of outreach personnel (NSIVCOP)
S Public interest guage
S Time sharing

Design Factor

Title: Data is not recorded

10

Project
Natural Systems Institute

Mode
Research

Activity
Recording

Originator
Waewwan Sitthisathainchai

Contributors

Sources

Associated Functions
Record data
Preserve sample
Organize data

Observation

Unrecorded data defect research standard. It make uncertainty and confusing while analyzing data.

Extension

The NSI research has the function to conduct research in different time and places. Faulty in recording data while operating might change overall form of the results. Losing data in one period or one place might affect the overall system. There are many factor that cause unrecorded data such as; defective tools, surrounding, unskilled users or incautious workers.

Then, the researchers or the observers should realize and prepare for using recording tools. To repair the losing data we might recollect the data again. However, times are importance factors that make it difficult to recollect the same data.

Design Strategies

Prepare for unexpected situation
- S Ready step
- S Double check

Invent alerting tools
- S Alert recorder

Solution Elements

Design Factor

Title: Defective equipment

11

Project
Natural Systems Institute

Mode
Research

Activity
Collecting

Originator
Waewwan Sitthisathainchai

Contributors

Sources

Associated Functions
Assemble & disassemble equipment
Operate tool
Gather data
Gather sample

Observation

Not ready tools can obstruct the task flow. Researchers have to skip important steps while operating task.

Extension

Tools and equipments that are unusable impede effective task. First Unusable tools may lead to accident or injury to the tools operators. Second, tools with dysfunction cause time increasing and ineffective results.

There are two main reasons that lead to ineffective tools, lacking of maintenance in keeping stage and incautious using while operating. Initially, Tools should be checked, clean, and maintenance after using to protect error and destruction of tools. However, some kinds of tools that is hard to maintain to former condition because they was designed to use in short time.

Incautious using is also the reason that researchers cannot reuse the tools. Tools usually be ruined or useless in some function in operating moment. Some tools was ignored while using because the users did not feels take care of the public tools. Moreover, using tools in wrong tasks results bad conditions to the equipments.

Design Strategies	Solution Elements
Inform user to know the usage of different kinds of tools	Tools tags Equipment expertise Usage diagrams
Create the environment and tools belonging to the tools user	Extra fee for tools care Set name for tools
Create extra opportunity for using tools	Smart equipment
Establish tools maintainance dapartment	Tools checking systems Annual tools checking
Set method to check tools before and after use	Clean mandatory

Design Factor

Title: No appropriate actuators are available

12

Project
Natural Systems Institute

Mode
Conservation

Activity
Managing

Originator
Joyce Chen

Contributors

Sources
Team deliberations

Associated Functions
Identify and contact appropriate local actuators

Observation

After the protocol has been established, it may still be difficult to find a party who will take responsibility for fulfilling the task.

Extension

Because the NSI will be working in partnership with many other institutions and research organizations, it will rely on these partnership to accomplish certain tasks. In the event that no local or regional partner is available to complete a certain restoration initiative or collaborate on a given project, it is important that the NSI have a contingency plan.

Design Strategies	Solution Elements
Establish set group of actuators within the NSI	S Restoration task force
Rotate through a group of actuators turn by turn	S Restoration duty
Have actuators bid for the job	S Restoration auction
Look to international organizations	E The World Conservation Union (IUCN)
Postpone the project	E The World Wildlife Fund (WWF)

Design Factor

Title: Artifacts fit under multiple categories

13

Project
Natural Systems Institute

Mode
Conservation

Activity
Analyzing

Originator
Joyce Chen

Contributors

Sources
Team deliberations

CNN, "Predators in Paradise," CNN online, http://www.cnn.com/2004/TECH/science/10/22/predators.in.paradise. (Accessed on 9 Oct 2005)

Associated Functions
Categorize artifacts

Observation
Sometimes an artifact will fit under multiple categories, making it difficult to store and retrieve in a database.

Extension
The establishment of the Burmese python in Everglades National Park (freed snakes who were able to survive and propagate in the wild) makes it an artifact of the international pet trade. Although Everglades rangers are attempting to eradicate the nonnative species, the fact that it has been able to survive so well could mutate the Everglades ecosystem. Categorizing this species--now thriving on two continents--in the NSI database requires consideration and clarity so that researchers who wish to access the data later will be able to distinguish the two circumstances and find the appropriate information.

Design Strategies		Solution Elements
Label, instead of categorize, each artifact or species	M	Artifact Labeling System
Categorize artifact 1st with respect to its most outstanding qualities & mention minor categories	M	Artifact Reference Manual
Extinguish the artifact from its other possible categories	M	Resource Elimination Team

Design Factor

Title: Artifacts fit under multiple categories

14

Project
Natural Systems Institute

Mode
Conservation

Activity
Repairing

Originator
Joyce Chen

Contributors

Sources
United Nations Food and Agriculture Organization Document Repository, < http://www.fao.org/documents/show_cdr.asp?url_file=/docrep/X5318E/x5318e07.htm> Accessed online on 17 Oct 2005.

Associated Functions
Rebuild structures
Re-establish ecosystem

Observation
In some cases, the ecosystem has cannot be restored or repaired to its desired state.

Extension
When the process of destruction cannot be reversed due to natural, political, social, economic, or technical reasons, the NSI must understand that their interventions are not guaranteed to succeed. The United Nations Food and Agriculture Organization has an online repository of documents detailing the successes and failures of land conservation in Africa. The NSI should be well-versed in historical cases relating to its intervention project, but must also be prepared to consider contingency plans.

Design Strategies
Establish the area as protected
Change the intervention so that a new goal is achieved
Document efforts for later groups to work from
Give up on that project

Solution Elements
M Habitat Repurchase
M Proposal Revision
M Intervention Assessment

Design Factor

Title: Convince decision-makers

15

Project
Natural Systems Institute

Mode
Conservation

Activity
Maintaining

Originator
Joyce Chen

Contributors

Sources

Associated Functions
Report recommendations
Communicate findings

Observation

Scientists and project managers must convince the decision-making body at NSI and in the government that the recommendations made should be implemented. The decision-makers will then have to determine which changes to make.

Extension

With the NSI scientists constantly gathering data, conducting research, and designing ways to restore, maintain, and create within environments, they must compete with other groups from within and outside of the NSI for funding and permission to implement. Policy-related issues will need to be publicized so that changes can be enacted in government. The public may need to be convinced if the proposed policy requires a vote. The decision-makers of interest may be NSI managers, policy-makers, the public, or any other partner institutions.

Design Strategies		Solution Elements
Provide a structured proposal for internal NSI requests	— M	NSI Proposal Template
Create review board to read proposals	— M	Internal Review Board
Start a campaign group to publicize policy-related issues	— M	NSI Campaign Group
Start a newsletter to educate the public	— M	Eye on the Earth

Design Factor

Title: Missing criteria to determine significance of data

16

Project
Natural Systems Institute

Mode
Conservation

Activity
Observing

Originator
Joyce Chen

Contributors

Sources

Associated Functions
Collect data
Process data

Observation

In order for data to be useful, we must know what we are looking for, why we want the data, and how we plan to use it.t

Extension

In addition to a scientific plan, scientists must know the relative significance of the data they are collecting. Moreover, they must be able to articulate this significance in order for the researchers and interns who are collecting the data to know what do to with it.

Design Strategies

Spell out importance of data in research plan — M Data Expectations Section
Attach weights to data — M Data Decoder

Solution Elements

Design Factor

Title: Data disagrees with or contradicts viewpoint

17

Project
Natural Systems Institute

Mode
Conservation

Activity
Interpreting

Originator
Joyce Chen

Contributors

Sources

Associated Functions
Compare data with viewpoint
Distill data into recommendations

Observation
Sometimes the data collected contradicts the initial hypothesis made.

Extension
Since scientists are only making educated guesses about the type of data they will acquire, there is a good chance that their hypotheses will not be supported by the data collected. It is important to have a protocol in place so that a definitive conclusion may be drawn from this contradiction, and so that the data is neither wasted nor the original hypothesis immediately overturned.

Design Strategies

Redo the experiment
Process the data using a different method — M Data Resubmission

Reassess the value of the original viewpoint — E Scientific Review Board

Conduct a new experiment in the series with a new hypothesis to collect the same kind of data — S Science Assist

Solution Elements

Design Factor

Title: Data disagrees with or contradicts viewpoint

18

Project
Natural Systems Institute

Mode
Conservation

Activity
Observing

Originator
Joyce Chen

Contributors

Sources

Carney, Don et al. "Monitoring Streams - A New Class of Data Management Applications." Brown Computer Science Technical Report TR-CS-02-04 (2002): 1-14 [cited 14 Sept 2005]. Available online at < http://www.stoev.org/redbook/aurora_tr.pdf>

Associated Functions
Monitor NSI Resources

Observation

The vast amount of data that is collected by NSI computers and scientists everyday is difficult to parse through to isolate the signficant pieces.

Extension

With data about climate, species location and breeding patterns, tectonic movement, temperature levels, resource depletion, etc. entering the NSI everyday, it is difficult to isolate the significant pieces of data that are either positive or negative indications of change requiring action. Traditional means of processing large data streams have used database management systems (DBMSs) to aid in the identification of significant data. However, these methods make it difficult to compare current data with previously obtained data, and do not accomodate a large number of triggers (Carney et al 2002, 1).

Design Strategies

- Better DBMS software
- Hire large team to decode data
- Collect less data
- Stop collecting data

Solution Elements

- E Aurora DBMS
- S Data Decoders Initiative
- M Data Requirements Documents
- S Datafill Manager

Design Factor

Title: New functions are not easily integrated

19

Project
Natural Systems Institute

Mode
Conservation

Activity
Modifying

Originator
Joyce Chen

Contributors

Sources

Associated Functions
Integrate functions

Observation

Once structures have been modified, it will then be necessarily to reassess and possibly integrate their functions in new ways.

Extension

Because transformation involves the creating of new structures or the converting of old ones in a particular environment, the functions of these structures may be new or changed. Discoveries may be made along the way as to how the functions can integrate so as to improve the performance of the environment. Thus, scientists will work with designers to integrate the functions in a way that seems most beneficial to the transformed area.

Design Strategies

Use iterative design process to test integrations in labs or on a small scale
Integrate in parallel with the transformation

Solution Elements

M Concept Prototyping Team
M Integrations Lab
S In-Field Integration

Design Factor

Title: Exhibits not timely

58

Project
Natural Systems Institute

Mode
External Relations

Activity
Promulgating

Originator
Mark King

Contributors

Sources
Team deliberations

Associated Functions
host static exhibits

Observation

Many times static exhibits are not timely in their message to generate curiosity and support.

Extension

When organizations decide to host exhibits, there is always the risk that the content is not appropriate to outside factors and audiences. This could lead to a general lack of interest in the exhibit, and ultimately the lack of interest in the NSI's mission.

Design Strategies

Exhibits change every few months
Exhibit designers change every few months
Solicit outside ideas for exhibits
Solicit outside designers/scientists
Create exhibits within exhibits, and as one moves out, the others get bigger and a new one comes in

Solution Elements

E Exhibit rotation
M Exhibit revolving door
E Exhibit idea
M Prominent exhibits
S Exhibit vacuum

Design Factor

Title: Materials not available

21

Project
Natural Systems Institute

Mode
Conservation

Activity
Repairing

Originator
Joyce Chen

Contributors

Sources

Associated Functions
Acquire appropriate materials
Execute plan

Observation

The necessary and appropriate materials needed to repair an object or resource may not be available.

Extension

Very specific materials, chemicals, and tools may be needed to repair an object or habitat. These may not be immediately available due to scarcity, distance, or financial reasons. Not being able to obtain the necessary materials may hinder progress and cause inefficiencies within the NSI system. Therefore, a solution should try to make the materials available as needed.

Design Strategies

Don't repair the object/resource
Create a repository to store a collection of potentially useful materials
Borrow materials from other sources

Solution Elements

M Materials Library
S NSI Trading Post
M Partnership Contract

Design Factor

Title: No recipients for recommendations

22

Project
Natural Systems Institute

Mode
Conservation

Activity
Interpreting

Originator
Joyce Chen

Contributors

Sources

Associated Functions
Report recommendations

Observation

In rare cases, a recommendation for restoration intervention may have no obvious recipient.

Extension

Perhaps the timing's not right, or the resources are not currently available, or there simply are not enough project managers to go around. Whatever the case, there may be times when scientists' recommendations cannot be put into action immediately. For these particular situations, the NSI should take care not to lose the recommendations, but to put them aside in a safe place for future reference, or devise a solution so that all recommendations are equally recognized.

Design Strategies

Create group whose main task is to review all recommendations

Create a repository for all recommendations awaiting review

Priority system to allow most urgent recommendations to be reviewed first

Solution Elements

E Restoration Review Committee

M Sci-Rec Drop Box

S Restoration Priority System

Design Factor

Title: NSI support contributes to inefficiency

23

Project
Natural Systems Institute

Mode
Conservation

Activity
Managing

Originator
Joyce Chen

Contributors

Sources

Associated Functions
Provide support
Oversee restoration

Observation

When the NSI gets involved with managing and overseeing restoration, it may contribute to operating inefficiency.

Extension

In some cases, the NSI will partner directly with a regional or local group to conduct research or accomplish an intervention. Depending on where the research plan was originated, the local group or the NSI may be the leading partner on the project. In either case, it is possible that the NSI's support will interfere with the efficiency of the project if it has regulations or addition interests to investigate.

Design Strategies

Specify each partner's involvement before entering the agreement

Give authority to NSI research groups to conduct research autonomously of the larger organization

Solution Elements

M Partnership Contract

M Autonomous Research Group

Design Factor

Title: Research partners want to oversee themselves

24

Project
Natural Systems Institute

Mode
Conservation

Activity
Modifying

Originator
Joyce Chen

Contributors

Sources

Associated Functions
Provide support
Oversee restoration

Observation

When the NSI partners with other institutions, those partners may want to oversee their own research even if NSI is the lead partner.

Extension

In some cases, the NSI will partner directly with a regional or local group to conduct research or accomplish an intervention. Depending on where the research plan was originated, the local group or the NSI may be the leading partner on the project. Whether the NSI plays a large or small role in the research, the partner may wish to oversee itself instead of having the NSI instruct the process. This may be because the partner institution is more familiar with the target environment/species, or more friendly with the community involved in the project.

Design Strategies

Specify each partner's involvement before entering the agreement

Make an agreement in the middle of research to turn over management to the partner institution

Solution Elements

M Partnership Contract

M Midterm Transfer Contract

Design Factor

Title: Political barrier to converting structure

25

Project

Natural Systems Institute

Mode

Conservation

Activity

Modifying

Originator

Joyce Chen

Contributors

Sources

Lee, Jim. "Database archiving versus backup: complementary practices." Storage Networking World Online, 11 July 2005. <http://www.snwonline.com/tech_edge/best_practices_07-11-05.asp?article_id=575> Accessed on 15 Oct 2005.

Associated Functions

Convert structure

Observation

Often there will be a political reason why the NSI cannot accomplish its modification of the environment.

Extension

The extent to which our natural resources should be protected and restored has been a controversial issue in this country for decades, especially if we rely on the depletion of those natural resources in our daily lives. If the NSI decides it is important to create a preserve in an area that is currently the site of an important factory or neighborhood, for example, the community will undoubtedly object, and the measure will face great challenges in congress. Aligning the NSI's goals with the public and corporate lobbyists' interests will be difficult.

Design Strategies

NSI should have its own means to lobby for policy changes

Attempt to choose politically neutral projects only

Use strategies based on known group psychology to introduce new measures in a way that the public will be more receptive to them

Solution Elements

M NSI Campaign Group

M Internal Review Board

S Policy and Strategy Group

Design Factor

Title: Need to preserve database capacity

26

Project
Natural Systems Institute

Mode
Conservation

Activity
Observing

Originator
Joyce Chen

Contributors

Sources

Lee, Jim. "Database archiving versus backup: complementary practices." Storage Networking World Online, 11 July 2005. <http://www.snwonline.com/tech_edge/best_practices_07-11-05.asp?article_id=575> Accessed on 15 Oct 2005.

Associated Functions

Inventory resources

Observation

In order to continue adding data to a database, the data must be archived for easy management and server memory may need to be expanded.

Extension

Data collected from laboratories and in the field will need to be stored in an easily-accessible database. Moreover, the NSI will need multiple database servers in order to accomodate increasing amounts of data, and efficient archiving algorithms so that data may be retrieved quickly. Successful archiving can only be achieved when implemented with database backup; archiving--removing rarely accessed data--helps speed up the backup process, and backed up data is essential to maintaining a reliable database.

Design Strategies

Schedule regular archiving and backup

Purchase new servers as database expands

Store data more efficiently

Solution Elements

E Autoarchive

E Database Backup

S CondensData

Design Factor

Title: Scarce resources

27

Project
Natural Systems Institute

Mode
Conservation

Activity
Maintaining

Originator
Joyce Chen

Contributors

Sources

Smithsonian National Zoological Park, "Conservation GIS," National Zoo, http://nationalzoo.si.edu/ConservationAndScience/ConservationGIS/projects/mongolian_gazelle/. (Accessed 8 Oct 2005)

Wildlife Conservation Research Unit, "The Animal Welfare Implications of Conservation Research," University of Oxford Department of Zoology, http://www.wildcru.org/research/other/welfare.htm. (Accessed 8 Oct 2005)

Associated Functions
Convert structures

Observation

A specific natural resource may be so scarce that the NSI will not be able to maintain it.

Extension

When a species is becoming extinct due to its declining habitat or a shift in the food chain, that particular resource may become so scarce that the scientists will have a hard time studying, securing, and keeping track of it. For example, the ivory-billed woodpecker was thought to be extinct more than 60 years ago; now that there have been recent sightings of the species in the Arkansas bayou, scientists and conservationists must determine how to maintain the species and prevent it from actually becoming extinct.

Design Strategies

Protect and reclaim the species' habitat
Capture and breed the species in captivity

Solution Elements

Habitat Repurchase
Bayou Act
Endangered Species Program

Design Factor

Title: Plan requires too many resources

28

Project
Natural Systems Institute

Mode
Conservation

Activity
Creating

Originator
Joyce Chen

Contributors

Sources

Associated Functions
Test Plan
Adjust Plan
Execute Plan

Observation

Upon testing, scientists and designers may discover that the transformation plan will require more resources than they can acquire.

Extension

Often an idea seems feasible until it is actually tested. The resources required to realize the project may be initially underestimated. These may be human, financial, natural, or material resources. It is important to address this problem in the testing phase, before the plan is actually implemented, or else the project risks failure or incompletion.

Design Strategies

Redesign the plan to use less resources, and resubmit the plan
Find/borrow resources
Scale down the plan
Design and create alternative resources

Solution Elements

E Internal Review Board
S Material Trading Post
S Resource Alliance
S Creation Lab

Design Factor

Title: Difficult to determine which opportunity should be pursued

29

Project
Natural Systems Institute

Mode
Conservation

Activity
Creating

Originator
Joyce Chen

Contributors

Sources

Associated Functions
Identify opportunities
Understand opportunity dynamics

Observation

With designers coming up with many solution ideas, it is often difficult to determine which opportunity should be pursued.

Extension

There are many ways to create new structures, processes, and systems within an environment. Designers should thrive during transformation because opportunities will abound and new ideas can be considered. However, it will be important to be able to pick the most viable opportunity from the many that are found or generated. Different opportunities may require different time frames, financial resources, human resources, cause different levels of human impact on an environment, and elicit different reactions from the public.

Design Strategies

A software program helps to weight the many benefits and drawbacks for each solution

Designers and scientists model/simulate a few of the best ideas

Solution Elements

M Relatn II

S Creation Lab

Design Factor

Title: Difficult to observe discreetly

35

Project
Natural Systems Institute

Mode
Education

Activity
Researching

Originator
Matthew Lennertz

Contributors

Sources

Associated Functions
Observe Interaction

Observation

Wars may prevent the NSI from carrying out its mission.

Extension

Although unavoidable by the NSI, wars will occur in nations where we have branch sites that could hinder:

1. Peoples' commitment to the NSI
2. NSI land/physical resources
3. NSI funding

Design Strategies

Maintain central office in neutral country
Maintain neutrality of organization

Solution Elements

E Neutral HQ
E Organizational neutrality

Design Factor

Title: Structures are too fragile to convert

31

Project
Natural Systems Institute

Mode
Conservation

Activity
Modifying

Originator
Joyce Chen

Contributors

Sources

Smithsonian National Zoological Park, "Conservation GIS," National Zoo, http://nationalzoo.si.edu/ConservationAndScience/ConservationGIS/projects/mongolian_gazelle/. (Accessed 8 Oct 2005)

Wildlife Conservation Research Unit, "The Animal Welfare Implications of Conservation Research," University of Oxford Department of Zoology, http://www.wildcru.org/research/other/welfare.htm. (Accessed 8 Oct 2005)

Associated Functions
Convert structures

Observation

Converting structures in the natural environment is a difficult task when the act of changing the status quo could threaten a species' survival.

Extension

A delicate balance between welfare and intervention must be struck in the act of conserving species and environments. Nonetheless, it is undeniable that intervention is necessarily and appropriate under specific circumstances, i.e. to save a species from extinction caused by human destruction of its habitat. The challenge in changing the structure of an environment is readjusting the ecosystem in a way that will not destroy the way the species interrelate or depend on one another. Sometimes, a component of the ecosystem is too fragile to change in the most efficient manner, and other measures must be considered to achieve the desired outcome.

Design Strategies

- Convert surrounding infrastructure instead
- Remove structure entirely
- Remove surrounding structures
- Increase robustness of the structure
- Don't convert, allowing structure to meet its fate

Solution Elements

- Resource Acquisition Protocol
- Resource Relocator
- Resource Elimination Team
- Gene therapy

Design Factor

Title: Environment is not appropriate to monitor

32

Project
Natural Systems Institute

Mode
Research

Activity
Defining

Originator
Waewwan Sitthisathainchai

Contributors

Sources

Associated Functions

Define problem
Set the hypothesis
Identify strategy
Devise method
Set definition
Apply definition
Choose environment
Define interpretation method

Observation

Unreachable environment lead to difficulties to get inside for the overall research.

Extension

The environment monitoring results directly to global scale project of the natural System Institute. Some forbidden areas, by government policy or area configuration, might important to the overall data. It is hard for researcher to get some data or sample and also hard to get insight of overall factors in different areas .This may result error in data analyzing. In this case, the NSI research groups might need support from the local governments or local communities to lead the research operation instead.

In addition, some kind of area is tough for researchers to monitor such as under the sea or in the dark cave. The researchers need some specific tools to get into this space and capture the picture or some substance with out destroying the overall environment.

Design Strategies

Contact with the global organization

Build close connection directedly to each government

Invent some specific tools that can monitoring in specific area

Solution Elements

Global organization

Falcon wing
win-win situation

Virtual camera
Virtual guildcam

Design Factor

Title: Work is too esoteric

33

Project
Natural Systems Institute

Mode
External Relations

Activity
Information Sharing

Originator
Mark King

Contributors

Sources

Associated Functions
Present mission and research

Observation

Scientific knowledge is often too esoteric for the public to understand.

Extension

The NSI will discover information that is scientifically based, yet needs to be distributed to the public in order to take effect. If it is too simple, the NSI will not be taken seriously. More importantly, though, the NSI runs the risk of alienating people because they cannot understand the NSI's research.

Just as doctors give diagnoses in "plain language", the NSI must be careful about giving the public too much information with terminology that they do not understand.

Design Strategies

Language system	M	Scientific / lay person translator
Guidebook on speaking to public	M	Public guide
Public training programs	M	Language information classes
Human interaction training	M	Regular person training
Widely distributed informative pamphlet	M	NSI helpful hints
NSI/public liaison	S	NSI translator

Solution Elements

Design Factor

Title: Exhibits are not engaging

34

Project
Natural Systems Institute

Mode
Education

Activity
Producing

Originator
Matthew Lennertz

Contributors

Sources

Associated Functions
Create Exhibits

Observation

Many institutions struggle to develop exhibits that fully engage and teach their visitors and protect any resources contained within. Their attempts often result in exhibits that are not engaging.

Extension

The purpose of drawing visitors into the Institute is to expose them to features of the ecosystem that are in need of attention and in some cases delicate protection. The visitors will play a passive role moving through the facilities unless the exhibits are engaging. If they succeed in capturing the attention of visitors, they can then capitalize the opportunity and actually educate them.

Design Strategies

Create interactive exhibits — S NSI Interact
Catalog successful engagement methods — S NSI Engage

Solution Elements

Design Factor

Title: Geopolitical instability

35

Project
Natural Systems Institute

Mode
External Relations

Activity
Promulgating

Originator
Matthew Lennertz

Contributors

Sources

Associated Functions
Coordinate global projects

Observation

Wars may prevent the NSI from carrying out its mission.

Extension

Although unavoidable by the NSI, wars will occur in nations where we have branch sites that could hinder:

1. Peoples' commitment to the NSI
2. NSI land/physical resources
3. NSI funding

Design Strategies

Maintain central office in neutral country — E Neutral HQ
Maintain neutrality of organization — E Organizational neutrality

Solution Elements

Design Factor

Title: What do you choose to supplement primary work?

36

Project
Natural Systems Institute

Mode
External Relations

Activity
Information Sharing

Originator
Mark King

Contributors

Sources

Associated Functions
Present mission and research

Observation
How will the NSI know what it is missing in order to solicit additional references?

Extension
It is a common problem with any organization: how do you know what you don't know?

Design Strategies

Invite experts from different fields to serve on board of directors
Research team
Traveling branche liaisons

Solution Elements

M Diversified board of directors
E Unknown research
S Information couriers

Version: 1 Date: October 17, 2005 Date of Original: October 17t, 2005

Design Factor

Title: Ill-feeling towards environmental org.

37

Project
Natural Systems Institute

Mode
External Relations

Activity
Information Sharing

Originator
Mark King

Contributors

Sources

Associated Functions
Recruit organizations
Recruit people
Recruit institutions

Observation

Many people have negative feelings towards environmental groups and stereotypes about their work.

Extension

Due to some environmental groups controversial tactics, such as Greenpeace and PETA, many people are unwilling to listen to other environmental groups messages.

Design Strategies

Community involvement
Grassroots effort
Carefully choose spokespeople
Segmentation of populous

Solution Elements

Community involvement	E	Community Care
Grassroots effort	E	Emergence
Carefully choose spokespeople	E	Foundation Face
Segmentation of populous	M	Outreach planning

Design Factor

Title: Insufficient space

38

Project
Natural Systems Institute

Mode
External Relations

Activity
Promoting

Originator
Mark King

Contributors

Sources

Associated Functions
Host events

Observation

Land and resources to build physical structures are scarce.

Extension

There are two main goals of the NSI:

1. To preserve and maintain ecological areas
2. To inform the public and encourage them to do #1

Land will be necessary for ecological preservation areas. However, land will also have to be designated for physical buildings to house research, classes, events, etc. The NSI will have to figure out how much land can be taken away from nature and given to buildings.

Additionally, the structures that the NSI builds must not conflict with the natural landscape.

Design Strategies

Portable structures
Environmentally-friendly structures
Structures that integrate outside & inside
Dual purpose community centers

Solution Elements

EcoStructure

Design Factor

Integration plan cannot be executed

39

Project
Natural Systems Institute

Mode
Administration - Integration

Activity
Planning

Originator
Henning Fischer

Contributors

Sources

Associated Functions
Formulate integration plan

Observation
Plans cannot always be executed.

Extension
That plans cannot always be executed is self evident. This arises due to several reasons. The plans may be factually incorrect. The plans may not be detailed enough. The plans may be unclear. The plans may be unrealistic.

The creation of plans that cannot be executed can be mitigated by careful foresight and planning, which is the nature of this problem.

Design Strategies	Solution Elements
Complete plans to a standard level of detail	S Standard Planning Templates
Check plans for clarity	M Universal Planning Vocabulary (UML)
Check plans for accuracy	S Interdisciplinary Planning Teams
Incorporate individuals who will execute into the planning process	S Plan Check Process

Design Factor

Conflicting competencies

40

Project
Natural Systems Institute

Mode
Administration - Integration

Activity
Planning

Originator
Henning Fischer

Contributors

Sources

Associated Functions
Identify complimentary competencies

Observation

Different groups within organizations may have similar capabilities that lead to redundancy.

Extension

Redundancy with an organization causes inefficiency. This is frowned upon in management literature, but commonly accepted as the price of doing business. However, redundancy becomes an issue when trying to operate a lean organization (its inefficient) or when trying to integrate formerly separate functional groups (turf battles). And that's only if you are actually able to identify them.

The problem is manifold. One must identify conflicting competencies and then resolve them in a manner that is acceptable to both parties.

Design Strategies

Identify conflicting competencies.

Reduce the number of conflicting competencies.

Solution Elements

S Operations Oversight Team

S Operations Matrix & Assessment

S Centralized Common Operations

Design Factor

Inability to establish desired outcomes

41

Project
Natural Systems Institute

Mode
Administration - Integration

Activity
Planning

Originator
Henning Fischer

Contributors

Sources

Associated Functions
Identify complimentary competencies

Observation

NSI groups may find complementary activities and competencies, but may not be able to agree on what the desired outcome of the collaboration will be.

Extension

Groups that have complementary research activities and competencies will want to work together because it is mutually beneficial. However, each may have different goals. For example, one may have equipment the other needs, while the other has access. However, neither wants to work together towards one goal and they therefore may compete, even if after agreeing to collaborate.

The problem is one of alignment between the two parties

Design Strategies		Solution Elements
Build cooperation through trade-offs	E	Quid Pro Quo Collaboration
Align desired outcomes between teams	E	Team Workshops
Negotiate	E	Negotiatiors

Design Factor

Inefficient integration

42

Project
Natural Systems Institute

Mode
Administration - Integration

Activity
Planning

Originator
Henning Fischer

Contributors

Sources

Associated Functions
Optimize (integrated areas)

Observation

Integration succeeds, but areas that have been integrated prove to be unharmonized and very inefficient— costly, time consuming, bad for morale.

Extension

Sometimes your best just isn't good enough. NSI may succeed in integrating areas, but it may be more trouble than it is worth from an operational point of view.

What should NSI do with integrated groups that simply underperform and cannot be fixed?

Design Strategies

Continue to try an optimize operations. — S Management SWAT

Abandon operations. — E Operational Rationalization

Solution Elements

Design Factor

Identify too many complimentary research activities

43

Project
Natural Systems Institute

Mode
Administration - Integration

Activity
Planning

Originator
Henning Fischer

Contributors

Sources

Associated Functions
Identify complimentary research activities

Observation

Too many areas for collaboration between disciplines may be identified, making it necessary to decide how to allocate scarce resources.

Extension

If the identification of compimentary lines of scientific inquiry is successful, the NSI will fulfill one of its primary missions. However, if the NSI is too successful, it may stretch past its capacity to carry out new and innovative research. If this is the case, the NSI must allocate decide which collaborations it can feasibly support. Furthermore, worthy areas of inquiry may be identified but may not make the "cut." These ideas should be preserved to be pursued later or by groups with sufficient resources.

The problem is one of selecting the collaborations that have the highest cost/benefit ratio compared to the others.

Design Strategies

Have proposals for collaboration compete against each other.

Save proposals that are not chosen.

Limit the number of proposals submitted.

Raise the quality of the proposals submitted.

Solution Elements

S Collaboration Competition

S NSI Proposals for Collaboration

S Open Proposals for Collaboration

Design Factor

Cannot identify complimentary research activities

44

Project
Natural Systems Institute

Mode
Administration - Integration

Activity
Planning

Originator
Henning Fischer

Contributors

Sources

Associated Functions

128. Identify complimentary research activities

Observation

Identifying complimentary research activities within an organization is difficult. The right hand may not know what the left hand is doing.

Extension

Large organizations often face the problem of knowledge management. They may have great collective knowledge, but have difficulty being aware of the knowledge in their posession. This may occur in areas that have the same focus as well as across disciplines. There may be obvious connections that could be made, but the awareness of the potential is the missing element.

The NSI will face a similar challenege as it begins to integrate disparate fields of study under its unbrella. For example, marine biologists may benefit greatly from collaboration with atmospheric scientists, but unless both sides can see the potential upsides of such a partnership, nothing may come of it.

The problem is one of awareness. There is little doubt that scientists will find fruitful areas for collaboration. The questions is how they will become aware of the possibility.

Design Strategies		Solution Elements
Alert scientists of possible collaboration opportunities.	S	NSI Research Knowledge Net (NRK)
List projects in central location.	S	Research Project Profiles (RPP)
List competencies in central location.	S	Research Skill Profile (RSK)
Match complementary research activities.	S	Research Coordination Staff
Standardize descriptions	S	Research Profile Match

Design Factor

Title: Too many departments to coordinate

45

Project
Natural Systems Institute

Mode
External Relations

Activity
Exporting influence

Originator
Mark King

Contributors

Sources

Associated Functions
Synthesize information

Observation

When sending out NSI representatives and presenting NSI findings to the public, it is difficult to get all departments' input to disseminate complete knowledge and data.

Extension

Inter-departmental communication is a difficulty for many organizations. Often each department works on their individual tasks, only requesting information from other departments when a problem occurs.

The result is incomplete information. For example, an economics department at a university that does not closely coordinate with the political science or the mathematics departments will end up spending considerably more time and being less prepared to present a cohesive document or presentation to the public.

Not coordinating with other departments is counterproductive and could lead to problems within an organization and how that organization is perceived by the public.

Design Strategies

- Inter-departmental meetings
- Non-departmental buildings
- "fishbowl" classrooms
- Encourage visitors
- Require inter-departmental publishing
- Identify people who work well together and have them be "flagship" coordinators

Solution Elements

- S Fishbowl
- M NSIpublishing
- S System Integration

Design Factor

Title: Lack of means to apply definition in organization

46

Project
Natural Systems Institute

Mode
Research

Activity
Defining

Originator
Waewwan Sitthisathainchai

Contributors

Sources

Associated Functions

Define problem
Set the hypothesis
Identify strategy
Devise method
Set definition
Apply definition
Choose environment
Define interpretation method

Observation

Lack of means to apply definition in organization might results low standard research to the NSI that might build some problems later.

Extension

Definition of each factors are important to do research. Lacks of appropriate means to define definition to the researchers might cause error in operation stages such as collecting wrong types of the animals or might cause higher cost to doing research by recollect the right information. Also, lack of attraction means cause uneffiecient workers in the institute.

Therefor, before doing the research, the NSI should apply the definition to overall workers in the organization. In order to inform the meaning and set the boundary or edge to over all factors, the NSI might use the former methods, do the experiment, or learn new methods from other organization.

Design Strategies

Compare means with other org
Testing means in small group

Solution Elements

means search
means experiment means search
means experiment

Design Factor

Title: Lacking knowledge to use tools

47

Project
Natural Systems Institute

Mode
Research

Activity
Collecting

Originator
Waewwan Sitthisathainchai

Contributors

Sources

Associated Functions
Assemble & disassemble equipment
Operate tool
Gather data
Gather sample

Observation

Lack of knowledge to use tools cause ineffective results, or might unintentionally destroy some information while operating data.

Extension

Using tools happens all the times of conducting research. Tools are all different in usages and types of each task, collecting, finding and gathering information

When users ignore or lack of knowledge to use tools in the right task, it might bring some problems to the tools conditions, information, and user themselves. The tools users might have not enough skill to operate tools because too much types of tools in each steps cause confusing to the tools operators.

Design Strategies

Leverage different regional tools abilities that approriate to local area

Inform users to match the right tools to the right tasks.

Solution Elements

3 expertise reponsible

Prototype magazine
Smart attribute scanner
Classroom like
locality

Design Factor

Title: Language Barrier

48

Project
Natural Systems Institute

Mode
External Relations

Activity
Exporting influence

Originator
Mark King

Contributors

Sources
Team deliberations

Associated Functions
Coordinate global projects

Observation

As the NSI's mission is partially global, there will be a language barrier between the NSI and other chapters of the NSI and outside parties.

Extension

The NSI will hope to set up in as many countries as possible, as there is nowhere in the world that does not suffer from humans' poor treatment of the environment. Not everyone speaks the same language, though, and communication could therefore be difficult.

Design Strategies

Choose official lanugage
Invent new language
Translators (people)
Translators (computers)

Solution Elements

E	English
S	NSIme
E	Language corps
S	GeekSpeak

Version: 1

Date: October 14, 2005

Date of Original: October 14, 2005

Design Factor

Unable to create an appropriate research protocol to manage the collection of data

49

Project
Natural Systems Institute

Mode
Administration - Oversight

Activity
Monitoring

Originator
Henning Fischer

Contributors

Sources
Personal observation

Associated Functions
Collect data

Observation

Insights are easier to obtain from data when the collection of data is done in a structured manner with later analysis in mind.

Extension

Research protocols provide a framework for data collection that supports later analysis and synthesis. Data collection depends on what data is collected and how. The type of data that is desired should be determined before considering the most effective way to acquire it. For example, when surveying employee satisfaction, organizations generally wish to record the thoughts and feelings of their workers vis a vis the work environment. These are often collected through surveys and formal interviews with staff. The throughts and feelings are the data, the surveys and formal interviews are elements of the research protocol.

An iteration-focused interface may be a possible point of departure.

The problem is one of matching the appropriate research method to the task at hand. Generally, this activity requires a degree of specialization and a thorough understanding of research methods, which may not always be available.

Design Strategies

Match the selected metrics to an appropriate
method of observation

Provide a list of research methods

Solution Elements

S MetricAide

Design Factor

Unable to record data

50

Project
Natural Systems Institute

Mode
Administration - Oversight

Activity
Monitoring

Originator
Henning Fischer

Contributors

Sources
Personal observation

Associated Functions
Collect data

Observation

Data from observation, especially field observation, can be difficult to capture effectively for later analysis.

Extension

Observation yields large quantities of data. It can be quantitiative, such as how much time it takes each employee to complete a task, or it can be qualitative, such as employee's remarks about working conditions. Both types of data are valuable when conducting management anaysis. They can be difficult to record effectively though, especially when on the move.

There are many alternatives for data recording, from audio and video recoding devices to task orriented sensors that record only individual things, such as keystrokes. When doing both qualitative and quantitative research it often becomes difficult to keep all the obervational data organized for later use. Moreover, some forms of data are far more portable than others. Digital data, in the form of files is realtively easy, while artifacts can be more challengeing.

The problem is one of capturing data in thoroughly and with adequate enough resolution to be of use during analysis.

Design Strategies

Digitally record as much data as possible

Store data that cannot be collected digitally in a centralized location

Make data storage as portable as possible

Solution Elements

S Management Memory

Design Factor

Unable to identify which metrics are most useful for measuring a given activity

51

Project
Natural Systems Institute

Mode
Administration - Oversight

Activity
Monitoring

Originator
Henning Fischer

Contributors

Sources

Associated Functions
Set methods/metric

Observation

When setting out to monitor or measure something, one must first determine the units with which that thing will be monitored or measured. If one chooses an inappropriate measure, the utility of the observation will be severly compromised.

Extension

Establishing appropriate measures when monitoring a process, performance or properties is a crucial first step in analyzing any given subject. However, determining the most appropriate unit or units of measure can be difficult in diverse situations, as there is a lack of standard measurements for many things, especially intangibles such as organizational effectiveness.

The problem is one one of choosing the appropriate metric for the task at hand.

Design Strategies

Match thing to be measured with appropriate measurement metric.

Match data to be measured with appropriate protocol.

Solution Elements

S AnalysisAide

S MetricAide

Design Factor

Title: Mishandling of samples

52

Project
Natural Systems Institute

Mode
Research

Activity
Monitoring

Originator
Waewwan Sitthisathainchai

Contributors

Sources

Associated Functions
Travel to site
Establish monitoring range
Measure variables
Count specimens
Collect samples
Store samples

Observation

Mishandling sample cause problems such as losing or destroying samples or causing uncomplete data in research

Extension

The diversity of the sample depends on types, species, characters and different area effect to the global research. The Mishandling samples might cause difficulties to the collectors to move it efficiently without destroying or changing the natural cycle. Mishandling samples such as the heavy or big sample, live animals, might cause 10 times cost more than normal to collects those samples. Because the researchers should have the proper tools to move or reach those areas, they might find sample values, compare with similar sample and plan before collecting those samples to avoid losing money and time and also to not disturb natural environment unnecessary.

Design Strategies	Solution Elements
Separate data to small piece before moving	Sample divider
Movable research center	Movable research center

Design Factor

Analysis tools inappropriate for data

53

Project
Natural Systems Institute

Mode
Administration - Oversight

Activity
Monitoring

Originator
Henning Fischer

Contributors

Sources

Associated Functions
Analyze data

Observation

Data has been collected, but the tools selected to analyze it are insufficient.

Extension

Oftentimes data can be collected that represents a new category of observation that cannot be easily analyzed using exissting tools. It becomes incumbent upon the user to create new metods of undertanding the data.

Sometimes the user has data and has tools, but is looking for an outcome that the tool cannot provide. It could be provided by another tool, but he (or she) is not aaware of it and therefore becomes stuck in the problem.

The problem is one of identifying which analysis method is most suitable for the desired outcome. If there is none, the user then must create a new framework.

Design Strategies

Match data to analysis methods

Solution Elements

S AnalysisAide

Design Factor

Unable to identify appropriate issues to be monitored and analyzed

54

Project
Natural Systems Institute

Mode
Integration - Operations

Activity
Supporting

Originator
Henning Fischer

Contributors

Sources

Associated Functions
149. Identify Issues

Observation
What should be monitored?

Extension
The first step of any research effort is to determine the questions to be answered. However, there may be multiple and even conflicting questions that the researcher may want to answer. One could compare the questions and decide on the most important issues and then pursue them in order of importance.

Determining what you want to know and reaching a consensus on that within a larger group is the problem at hand.

Design Strategies

Compare questions against each other and determine which is most important.

Systematically go through issues from most important to least important

Solution Elements

S Issue Monitoring Decision Tree

Design Factor

Unable to store data

55

Project
Natural Systems Institute

Mode
Administration - Oversight

Activity
Monitoring

Originator
Henning Fischer

Contributors

Sources

Associated Functions
Collect data

Observation

When setting out to monitor or measure something, one must first determine the units with which that thing will be monitored or measured. If one chooses an inappropriate measure, the utility of the observation will be severly compromised.

Extension

Establishing appropriate measures when monitoring a process, performance or properties is a crucial first step in analyzing any given subject. However, determining the most appropriate unit or units of measure can be difficult in diverse situations, as there is a lack of standard measurements for many things, especially intangibles such as organizational effectiveness.

The problem is one one of choosing the appropriate metric for the task at hand.

Design Strategies

Match thing to be measured with appropriate measurement metric.

Match data to be measured with appropriate protocol.

Solution Elements

S AnalysisAide

S MetricAide

Design Factor

Unable to determine appropriate standards

56

Project
Natural Systems Institute

Mode
Administration - Oversight

Activity
Monitoring

Originator
Henning Fischer

Contributors

Sources

Associated Functions
155. Set standards

Observation
Objective performance standards are hard to set.

Extension
Performance standards are hard to set. Set them too high and you create a failure prone environment, which can easily demoralize teams. Set them too low and you encourage complacency. The goal is to create standards that are high enough to push teams past their natural ability and encourage them to learn, while still being realistic.

The problem is one of calibration.

Design Strategies

Ensure that standards are set according to what has been observed during monitoring.

Set standards that are neither too high nor too low.

Solution Elements

S Performance Analysis and Standards Staff

Design Factor

Title: Outside work does not align with NSI mission

57

Project
Natural Systems Institute

Mode
External Relation

Activity
Promulgating

Originator
Mark King

Contributors

Sources
Team deliberations

Associated Functions
Publish others' work

Observation

It is difficult to identify and choose others' work that would properly align with the NSI mission.

Extension

In order to get good coverage of scientific ideas and cultural trends, the NSI will publish the work of people outside the organization. When we do this, it will sometimes be difficult to clearly define what kind of information we need, as well as if it will be properly aligned with our mission.

Additionally, we do not want to alienate people who are important to our cause by not publishing their work or modifying it to suit our desires.

Design Strategies

Publishing panel
Call for abstracts
Sabbatical works

Solution Elements

E Panel of esteemed colleagues
E Call for abstracts
S Sabbatical publishing

Design Factor

Title: Exhibits not timely

58

Project
Natural Systems Institute

Mode
Education

Activity
Attracting

Originator
Matthew Lennertz

Contributors

Sources
Team deliberations

Associated Functions
host static exhibits

Observation

It is difficult to identify and choose others' work that would properly align with the NSI mission.

Extension

In order to get good coverage of scientific ideas and cultural trends, the NSI will publish the work of people outside the organization. When we do this, it will sometimes be difficult to clearly define what kind of information we need, as well as if it will be properly aligned with our mission.

Additionally, we do not want to alienate people who are important to our cause by not publishing their work or modifying it to suit our desires.

Design Strategies

Publishing panel
Call for abstracts
Sabbatical works

Solution Elements

E Panel of esteemed colleagues
E Call for abstracts
S Sabbatical publishing

Design Factor

Title: NSI image is unclear

59

Project
Natural Systems Institute

Mode
Education

Activity
Attracting

Originator
Matthew Lennertz

Contributors

Sources
Team deliberations

Associated Functions
Present NSI image

Observation
If the image of an institution is unclear it can hamper the effectiveness of it's programs.

Extension
There are a number of environmental organizations that struggle with images that are unclear and misunderstood. If the NSI is able to clarify it's image it will retain a steady level of visitors and have the opportunity to make considerable ground in the fight against global warming.

Design Strategies

Standardize image
Communicate image clearly
Differentiate image from others

Solution Elements

S Image definer
S Ima-clear

Design Factor

Title: Old strategies are no longer effective

60

Project
Natural Systems Institute

Mode
Education

Activity
Innovating

Originator
Matthew Lennertz

Contributors

Sources
Team deliberations

Associated Functions
Design new strategies

Observation

As the world changes and people continue to encroach across the globe, previous strategies may no longer function as effectively as before.

Extension

With the rapid expansion of human population centers, challenges to the current group of strategies will become readily apparent. The NSI will be at the forefront of the fight to maintain the environment and conserve resources. If it does not develop new strategies as the environment and circumstances change then they will be rendered ineffective.

Design Strategies

Determine ineffective strategies
Identify possible strategies
Chart unclear strategy directions

Solution Elements

E Group Meetings
S Strategy Cauldron
S Strate-gation

Design Factor

Don’t know how to set up operation

61

Project
Natural Systems Institute

Mode
Integration - Operations

Activity
Conducting

Originator
Henning Fischer

Contributors

Sources

Associated Functions
Set up operation

Observation

Operations often times include members with no previous experience that require assistance.

Extension

There's a first time for everything, especially in science. Newer or less experienced team members may not have the required skill sets to establish a proper operation (or field site), but may be asked to do so nonetheless.

The problem is one of learning on the job.

Design Strategies

Provide a complete list of instructions

Provide a guide to lead people through most situations

Solution Elements

S NSI Field Operations Manual

Design Factor

Maintenance equipment inadequate

62

Project
Natural Systems Institute

Mode
Integration - Operations

Activity
Supporting

Originator
Henning Fischer

Contributors

Sources

Associated Functions
Maintain resources

Observation

Operation staff may not be enough to complete set up.

Extension

Manpower shortages generally have two consequences. First, the project may not be competed on time. The people present at the site may simply be unable to complete the work. Second, the team on site may be able to complete the work, but at considerable expense to themselves as well as the quality of the job.

The problem is one of allocating the correct amount of resources.

Design Strategies

Allocate the correct number of people to a project.

Scale back operational demands

Solution Elements

S NSI Project Management

S Operational Scale Back Plans

Design Factor

Don't have the human resources to set up the operation

63

Project
Natural Systems Institute

Mode
Integration - Operations

Activity
Conducting

Originator
Henning Fischer

Contributors

Sources

Associated Functions
Set up operation

Observation
Operation staff may not be enough to complete set up.

Extension
Manpower shortages generally have two consequences. First, the project may not be competed on time. The people present at the site may simply be unable to complete the work. Second, the team on site may be able to complete the work, but at considerable expense to themselves as well as the quality of the job.

The problem is one of allocating the correct amount of resources.

Design Strategies

Allocate the correct number of people to a project.

Scale back operational demands

Solution Elements

S NSI Project Management

S Operational Scale Back Plans

Design Factor

Title: People are apathetic

64

Project
Natural Systems Institute

Mode
Education

Activity
Orienting

Originator
Matthew Lennertz

Contributors

Sources
Team deliberations

Associated Functions
Stimulate interest

Observation
Many people are apathetic to the conditions of the natural world.

Extension
There many not be a cure-all solution for the apathy that afflicts large swaths of the population, however it is possible to better communicate the institute's goals and capture the attention of a larger portion of the populace.

Design Strategies

Create excitment about ~~NSI~~

Solution Elements

- S Eco-party
- S NSI Vibe
- S NSI Live

Design Factor

Title: People are not aware of NSI

65

Project
Natural Systems Institute

Mode
Education

Activity
Orienting

Originator
Matthew Lennertz

Contributors

Sources
Team deliberations

Associated Functions
Promote NSI awareness

Observation
Many people are apathetic to the conditions of the natural world.

Extension
There many not be a cure-all solution for the apathy that afflicts large swaths of the population, however it is possible to better communicate the institute's goals and capture the attention of a larger portion of the populace.

Design Strategies

Non-traditional awareness ~~program~~
heavy web pressence

Solution Elements

S NSI Roots
S NSI web

Version: 1 Date: October 17, 2005 Date of Original: October 17, 2005

Design Factor

Title: People attempt to touch flaura or fauna

66

Project
Natural Systems Institute

Mode
Education

Activity
Orienting

Originator
Matthew Lennertz

Contributors

Sources
Team deliberations

Associated Functions
Define barriers

Observation
People may attempt to enter exhibits and other dangerous areas.

Extension
There are people that are curious and others that do not know how to behave in an environment containing captive wild animals and flaura. Clearly definned barriers will help minimize the chance of injury to the visitors and damage to the captive specimens.

Design Strategies

Design distinct barriers — S Persa-barrier
Incase all exhibits in glass — S Clarity-closure
Develop exhibit systems — S Xibit

Solution Elements

Design Factor

Title: People don't share NSI's values

67

Project
Natural Systems Institute

Mode
Education

Activity
Innovating

Originator
Matthew Lennertz

Contributors

Sources
Team deliberations

Associated Functions
Instill values

Observation
There are individuals that will not share the NSI's values.

Extension
It is a challenge to gain adherents to your value system. While attmpting to avoid the cult-like demeanor of many environmental groupd, it is in the Institutes best interest to have as many people accept and share their values as possible.

Design Strategies

Communicate values — S NSIdea
Provide ownership of values — S NSI share

Solution Elements

Design Factor

Title: Programs are difficult to evaluate

68

Project
Natural Systems Institute

Mode
Education

Activity
Orienting

Originator
Matthew Lennertz

Contributors

Sources
Team deliberations

Associated Functions
Evaluate programs

Observation

Any institution that offers educational programs faces the task of assessing the effectiveness of the programs. This may be a difficult task.

Extension

The evaluation of educational programs has been long debated and there is no single correct solution to evaluate a programs effectiveness. This difficulty does not however, preclude the institute from the need. It must develop its own system to determine the efficiency of individual programs.

Design Strategies

Develop evaluation program — S Cornerstone
Standardize expectations — S Resultnt

Solution Elements

Design Factor

Title: Project responsibilities are unclear

69

Project
Natural Systems Institute

Mode
Education

Activity
Managing

Originator
Matthew Lennertz

Contributors

Sources
Team deliberations

Associated Functions
Assign project responsibilities

Observation

Because of the size of the NSI it is difficult for staff and management to delineate their individual and group responsibilities.

Extension

The complexity of the projects the Institute will engage in will require an extensive level of discipline and cooperation within and between teams. More importantly, it will be necessary for managers and staff to understand their responsibilities. If the members of the project do not understand this, they run the risk of wasting valuable time and energy duplicating work or missing important components of the project.

Design Strategies

Tie responsibility to incentives — E Performance reviews
Publicize responsibility — S Project-track
Avoid micro-management — E Lead role

Solution Elements

Design Factor

Title: Lack of public interest

70

Project
Natural Systems Institute

Mode
External Relations

Activity
Exporting influence

Originator
Mark King

Contributors

Sources
Team deliberations

Associated Functions
Generate media coverage

Observation

The media will not pay attention to the NSI if the public does not care.

Extension

The NSI is reliant on the public's support in order to halt detrimental environmental trends. One way for us to get support and explain our message is through media coverage (magazines, newspapers, television, etc.). However, most media outlets are committed to their audiences, and if the NSI is not interesting to their segment, we will not be able to generate sufficient media coverage.

The NSI is not all about the mission: it must appeal to the people and inspire them to want to help.

Design Strategies

- Good PR
- Interesting message
- Interesting presentation
- Media kits
- Partnerships with orgs. that have good media coverage

Solution Elements

- E Eco-Relations
- M Strategic partnering

Design Factor

Title: Sample not preserved properly

71

Project
Natural Systems Institute

Mode
Research

Activity
Recording

Originator
Waewwan Sitthisathainchai

Contributors

Sources

Associated Functions
Record data
Preserve sample
Organize data

Observation

Not well preserve sample cause losing data to the reserach project and might increase task by recollect sample

Extension

Some natural samples are perishable. There are many reason that sample is not preserve properly. First, the sample is hardly preserve in human environment. Some sample such as live animals or trees might hard to preserve. In this case, the scientist should control times and surrounding to keep these sample carefully.

Second, the researchers don't know how to collect sample in the proper way. In this case, the researchers or sample collectors should be informed right methods and practise before collecting sample to reduce destroyed to the natural environment.

Third, the researchers don't have proper tools to using in collecting and keeping samples. In this case, the NSI might offer each research center proper tools and also let the local create tools that proper to each environments.

Design Strategies	Solution Elements
Define and apply the proper surrounding	Fence control
Collect sample again	Recollect sam
Design moving method	moving concern

Design Factor

Title: Students don't care

72

Project
Natural Systems Institute

Mode
External Relations

Activity
Exporting influence

Originator
Mark King

Contributors

Sources
Team deliberations

Associated Functions
engage students

Observation

Many students do not have the desire, energy, knowledge, or will to care about the environment.

Extension

Accessing students is a very difficult thing, yet vitally important to the NSI's mission. Young children can rally behind causes, but they are at the mercy of their parents and rarely truly understand what they are doing.

Older students, while frequently able to comprehend issues, often do not have the energy or desire to do anything about them.

Design Strategies		Solution Elements
Specialized curricula	E	NSI curriculum
Off-site visits representative to kids	M	Ecoman
Advertising	M	NSI Ads
Partnerships with youth/teen-oriented activities and groups	M	Synergy
Specialized newsletters	M	Eco-Times

Design Factor

Don't have the necessary tools to set up the operation

73

Project
Natural Systems Institute

Mode
Administration - Operations

Activity
Supporting

Originator
Henning Fischer

Contributors

Sources

Associated Functions
Set up resources

Observation

Settting up research sites often involves building things, which requires the appropriate tools for the job.

Extension

The ability to set up field research sites is oftentimes limited by the available tools at hand to aid in the establishment of the site. This is particularly the case when field research sites are remote. Lost or forgotten tools can critically slow a stite's establishement if equipment cannot be set up without them.

The problem is one of having the right tools for the job at hand.

Design Strategies

Incorporate tool storage into transport containers.

Have operations planners specify tools required for set up

Multifunctional tools that can serve as back ups for tools that are not at hand

Solution Elements

S BuildPak

E Operations Manual

M MultiTools

Design Factor

Title: Unable to reach target audience

74

Project
Natural Systems Institute

Mode
External Relations

Activity
Promulgating

Originator
Mark King

Contributors

Sources
Team deliberations

Associated Functions
Coordinate local projects
Create website
Present mission & research
Publish articles

Observation

Various factors can prohibit the NSI's message from reaching its intended audience(s).

Extension

The NSI will rely heavily on community involvement, word of mouth, and advertising to spread the NSI's mission and recruit people to help. However, if these messages cannot get through, the messages themselves become worthless. Some hindrances to this include:

1. Lack of internet access
2. Illiteracy
3. Community disinterested
4. Poor physical location

Design Strategies

Community outreach
Location planning
Simple seminars
Variety of media outlets

Solution Elements

E Community coordination
E Site surveyors
M Simple seminars
E Blanket advertising campaign

Design Factor

Title: Too many departments to coordinate

75

Project
Natural Systems Institute

Mode
External Relations

Activity
Promulgating

Originator
Mark King

Contributors

Sources

Associated Functions
Prepare traveling exhibits

Observation

Many fragile artifacts and objects are at risk of being damaged when transporting them from one location to another to show audiences the NSI mission.

Extension

There are many materials used for packing costly, fragile, or precious goods that the NSI could use, but they are generally not environmentally-friendly. As the NSI is committed to preserving the environment and not creating further harm. it will have to create a system of packing methods and materials that will safely transport their exhibits to their next destination that will fall in line with their mission.

Design Strategies

Create environmentally-friendly packing materials — M EcoPack

Control transport in every step — E NSItransport

Solution Elements

Design Factor

Title: Unable to formulate research plan

76

Project
Natural Systems Institute

Mode
Research

Activity
Defining

Originator
Waewwan Sitthisathainchai

Contributors

Sources

Associated Functions
Define problem
Set the hypothesis
Identify strategy
Devise method
Set definition
Apply definition
Choose environment
Define interpretation method

Observation

Unable to formulate plan cause poorly organizing to research project that may bring some problems such as losing time, unworkable method or the lack of link between the each research level.

Extension

The research plan helps the scientists to control the results of the research on times. Plan cannot be formulated might because the research project is too broad. Too much level on variable in the research models might also lead to confusion of the person who identify the strategy. The research methods are not accept worldwide or lack of the method that prove the good results.

Design Strategies

Reduce NSI size project
Link peoject

Solution Elements

project divider
project linkage

Version: 2

Date: November 20, 2005

Date of Original: October 21, 2005

Design Factor

Title: Unable to set hypothesis

77

Project
Natural Systems Institute

Mode
Research

Activity
Defining

Originator
Waewwan Sitthisathainchai

Contributors

Sources

Associated Functions

Define problem
Set the hypothesis
Identify strategy
Devise method
Set definition
Apply definition
Choose environment
Define interpretation method

Observation

Unable to set hypothesis lead confusion to the research direction and increase confusion and uncertainty to the project.

Extension

To set hypothesis is an important level of science study to guide and set the boundary to create problem solving. Research is a part of the science study to prove the hypothesis, then research without hypothesis conduct too broad purpose, and not constructive structure that may result time lose and resource.

Hypothesis is the tool to helps researcher to understand and bound project results. Sometimes the scientists cannot set the hypothesis because they don't have enough knowledge or information. Lacking of confidence, creativity, or experiences also result the inability to set the hypothesis.

Moreover, to set unreasonable hypothesis also bring problems to the research by following in the wrong direction or unworthy.

Design Strategies

Learn from case study

Let the young scientists learn from the older scientist
Set the hypothesis brainstroming

Increase knowledge and experience to the scientists

Recruit experts

Solution Elements

Case comparing
Case database

Ages triple

Expert wanted

Design Factor

Title: Unable to set up partnerships

78

Project
Natural Systems Institute

Mode
External Relations

Activity
Establishing partnerships & benefactors

Originator
Mark King

Contributors

Sources
Team deliberations

Associated Functions
Generate media coverage

Observation

When trying to establish organizations and people with whom to partner, it can be difficult to identify and contact decision-makers.

Extension

The NSI will set up partnerships with different organizations, both in terms of money and information sharing. Many times it is difficult to find and maintain a relationship with the decision-makers in order to establish and continue our relationship.

Design Strategies

Sponsorship mediator
Limited partnerships
Celebrity liaison
Board meetings at NSI at fixed times

Solution Elements

E Partner mediator
E Selective partnerships
M Celebrity liaison
E Eco-meetings

Design Factor

Title: Unable to reach intended audience

79

Project
Natural Systems Institute

Mode
External Relations

Activity
Promulgating

Originator
Mark King

Contributors

Sources

Associated Functions
develop stories
generate media coverage
communicate benefits
host static exhibits
prepare traveling exhibits
publish articles
create newsletter

Observation

It is vitally important that the NSI tailor its mission for its intended audience in order to make its message clear

Extension

The NSI will be targeting many different groups with different sorts of media. We might target school children with videos, scientists with research articles, or working adults with a newsletter. Each segment of the population will have different needs and wants, and the NSI must accommodate them.

The message from the NSI is so important, yet it will be difficult to make everyone “hear” what we are saying. For this reason, great care must be taken to ensure that each segment that we target will have powerful, interesting, and reliable data, as well as inspiring for their interests and needs.

Design Strategies

Community involvement
Partner with design instutions known
for doing this type of work
Public relations
Surveys
Interviews

Solution Elements

S Community liaison

S Environmental issues census

Design Factor

Title: Unskilled observers

80

Project
Natural Systems Institute

Mode
Research

Activity
Monitoring

Originator
Waewwan Sitthisathainchai

Contributors

Sources

Associated Functions
Travel to site
Establish monitoring range
Measure variables
Count specimens
Collect samples
Store samples

Observation

Unskill observers cause lacking of information, unreliable research and might cause dangerous to themselves while operating research.

Extension

The observers' skill in research is the main factors in observing level because the observers use their abilities to observe and recorded data to the research. Also, they might cause problem to the overall natural systems by unintentionally disturbing. There are may reason that result unskilled observers.

First, there are lacks of teaching and practicing workers methods in the NSI before conducting research. The observers should practice to use their sensitiveness. The workers who lack of this observing skill might face the hard time to observe things around themselves.

Second, there are lacks of interesting of the observers while practicing how to observe. In this case, the NSI might improve the teaching methods, or recruit people who interest to work for the NSI.

Third, the workers don't have enough experiences in observing things. They might need some suggestion form others.

Design Strategies	Solution Elements
cknowledge observers before observe	kick off meeting
Set group of observer that have skill	Ages triple
Practice the observers skill	
Use tools instead of the observers skill	

Design Factor

Title: Visitors don't know what/hwo to take action

81

Project
Natural Systems Institute

Mode
Education

Activity
Orienting

Originator
Matthew Lennertz

Contributors

Sources
Team deliberations

Associated Functions
Make Advisories

Observation
Many people fail to act because they do not know how or what to do.

Extension
If the NSI makes advisories, it will provide poeple with guidance. This guidance may prove to be the simplest key to motivating a public that is otherwise inactive.

Design Strategies

Provide action plans — S Ecoplan
Suggest positive alternatives — S AlterNSI

Solution Elements

Design Factor

Title: Undetermine what you know, what you dont know

82

Project
Natural Systems Institute

Mode
Research

Activity
Defining

Originator
Waewwan Sitthisathainchai

Contributors

Sources

Associated Functions
Define problem
Set the hypothesis
Identify strategy
Devise method
Set definition
Apply definition
Choose environment
Define interpretation method

Observation

In Defining process, the strategy person should assume what they know and know what they don't know to avoid the deteriorate from apply what they do not know to the strategy.

Extension

There are a lot of people in the research department who conducted research by lot of data all the time. In some case, the scientists ignore to determine what they know because they do not know or unsure to determine enough data. Moreover, lack of criteria to decide and time to process are also the reason that obstruct this determination.

To identify strategy, the scientist should assess the information they have and information that they lack to identify the method that proper to the information they want such as should they research more, or should they concentrate on analysis data that they already have.

Design Strategies

Inform work through inside Organization

Determine know and dont know issue

Solution Elements

Annual conference
Briefly report

Determination department

Version: 2

Date: November 20, 2005

Date of Original: October 21, 2005

Design Factor

Title: Worldwide distribution is expensive for some format

83

Project
Natural Systems Institute

Mode
Research

Activity
Reporting

Originator
Waewwan Sitthisathainchai

Contributors

Sources

Associated Functions
Define issue
Describe issue
Coordinate findings
Compile info into document
Create document
Distribute document
Make problem known

Observation

If worldwide distribution is expensive, it obstruct the NSI to promote and spread out important information to every parts of the world that might cause ineffective results to overall project.

Extension

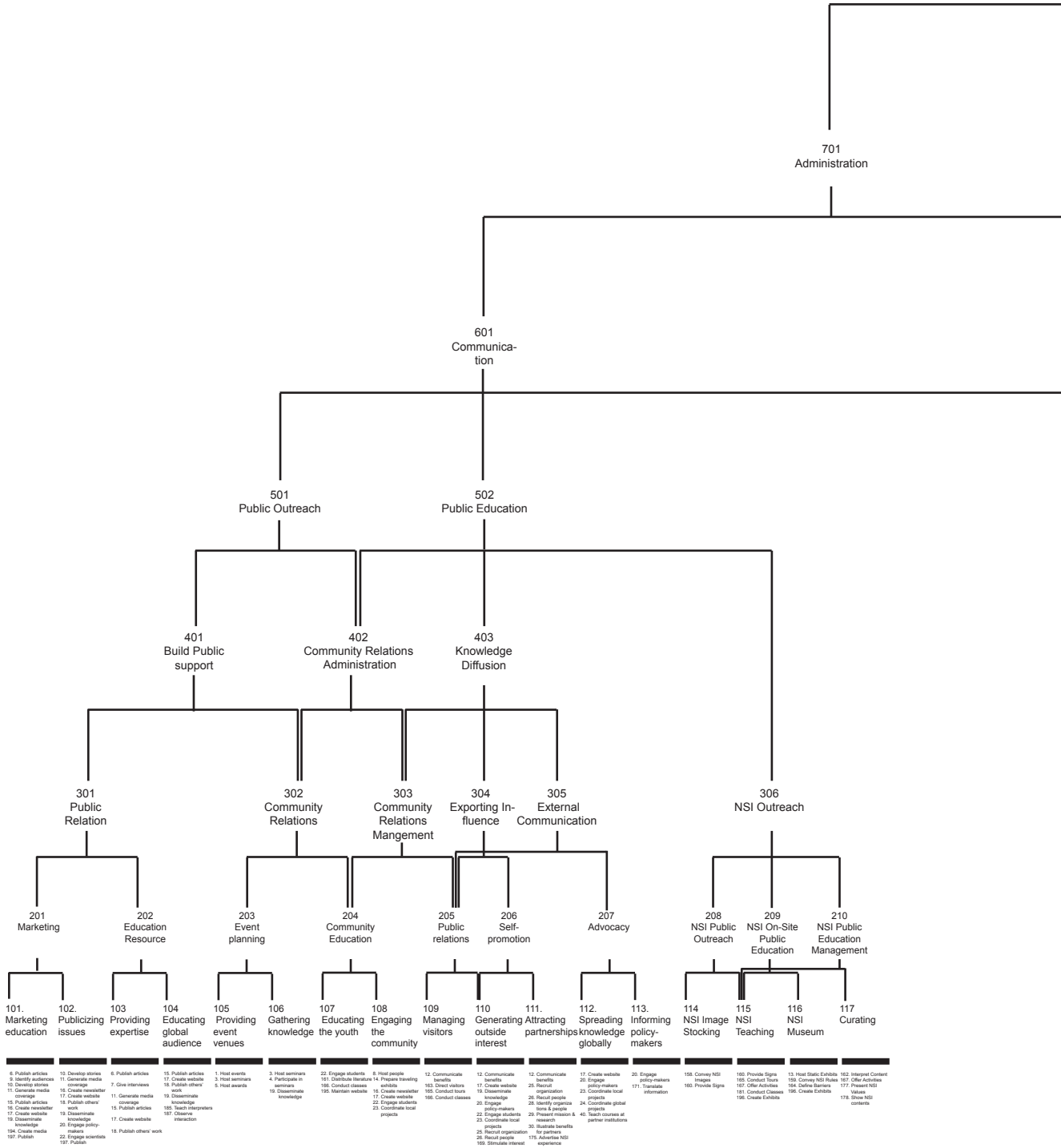
Because the NSI think globally and work locally, the global issue and how to share out is very important to the NSI. After finishing research, the NSI has a role to make it take place on the physically world. However, the global issues can not be solved by just one or two groups; instead, the NSI has to build lots of attention from the whole by sending message to all communities.

Medias are the important factors to levels. Because media is depends on community, The NSI has to controls the cost by using the most proper and powerful media that is not too much expensive. The high cost expenditure in printing and broadcasting might block other distribution methods.The NSI might use it connection by communities itself to support this issues.

Design Strategies	Solution Elements
Supported by government	Falcon wing
Use the NSI network or partnerships	Lion crawl

E: Information Structure

Information Structure



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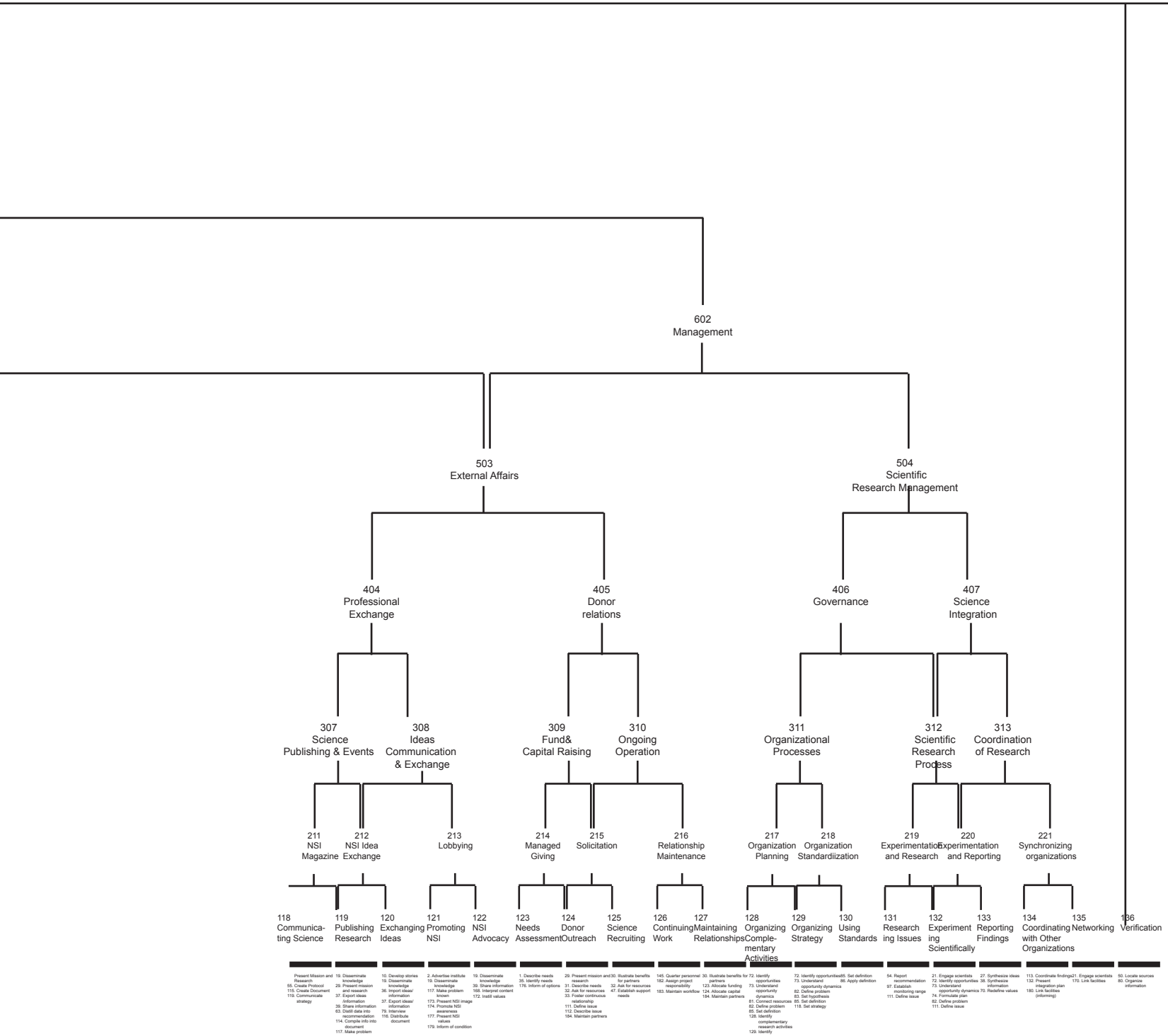
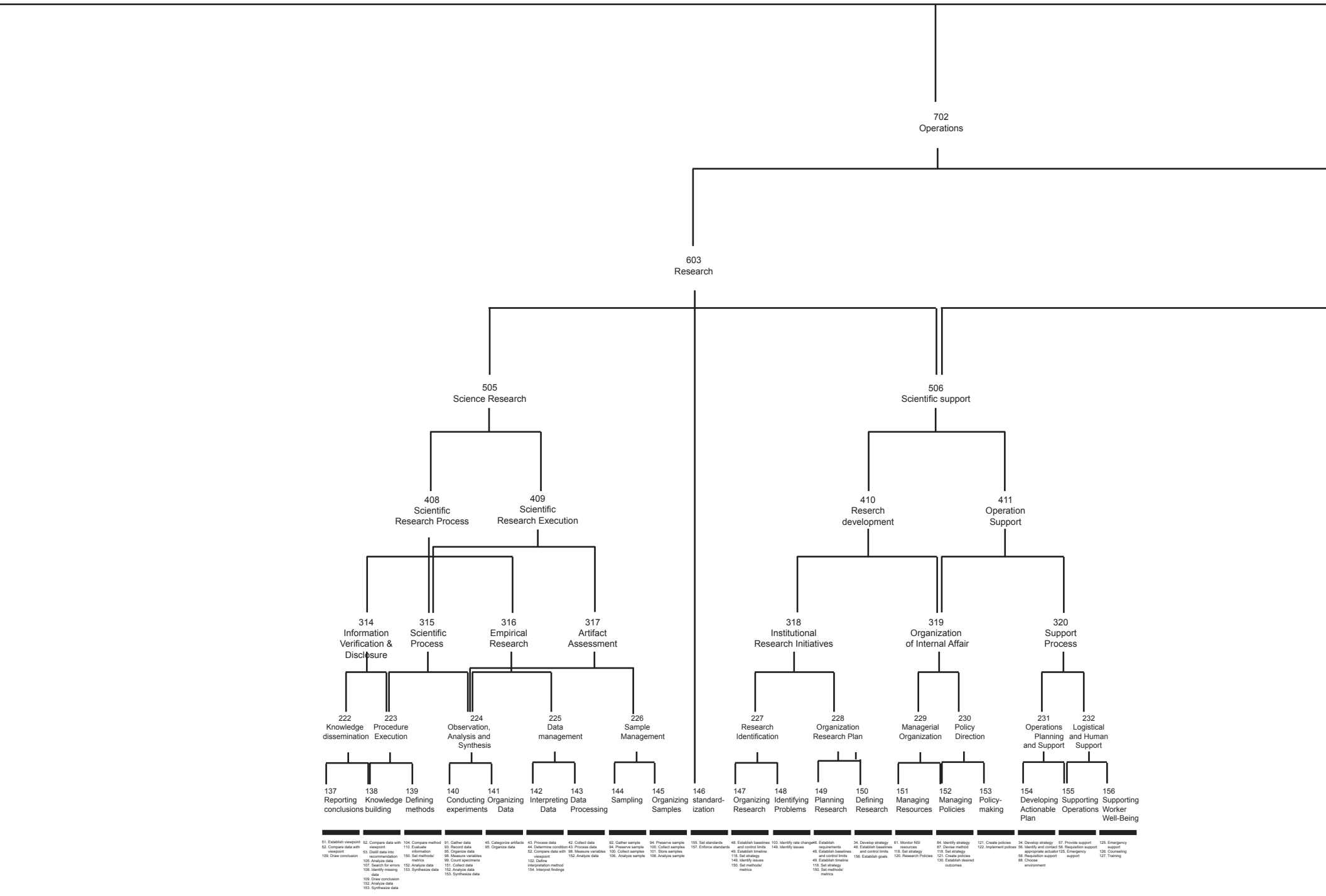
Natural System Institute

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Operations
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Scientific support
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Scientific
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Research Execution
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411
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Institutional
Research Initiatives
319
Organization
of Internal Affair
320
Support
Process
222
Knowledge
dissemination
223
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Execution
224
Observation,
Analysis and
Synthesis
225
Data
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226
Sample
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227
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Organization
Research Plan
229
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Organization
230
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Direction
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Operations
Planning
and Support
232
Logistical
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137
Reporting
conclusions
138
Knowledge
building
139
Defining
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140
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experiments
141
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Data
142
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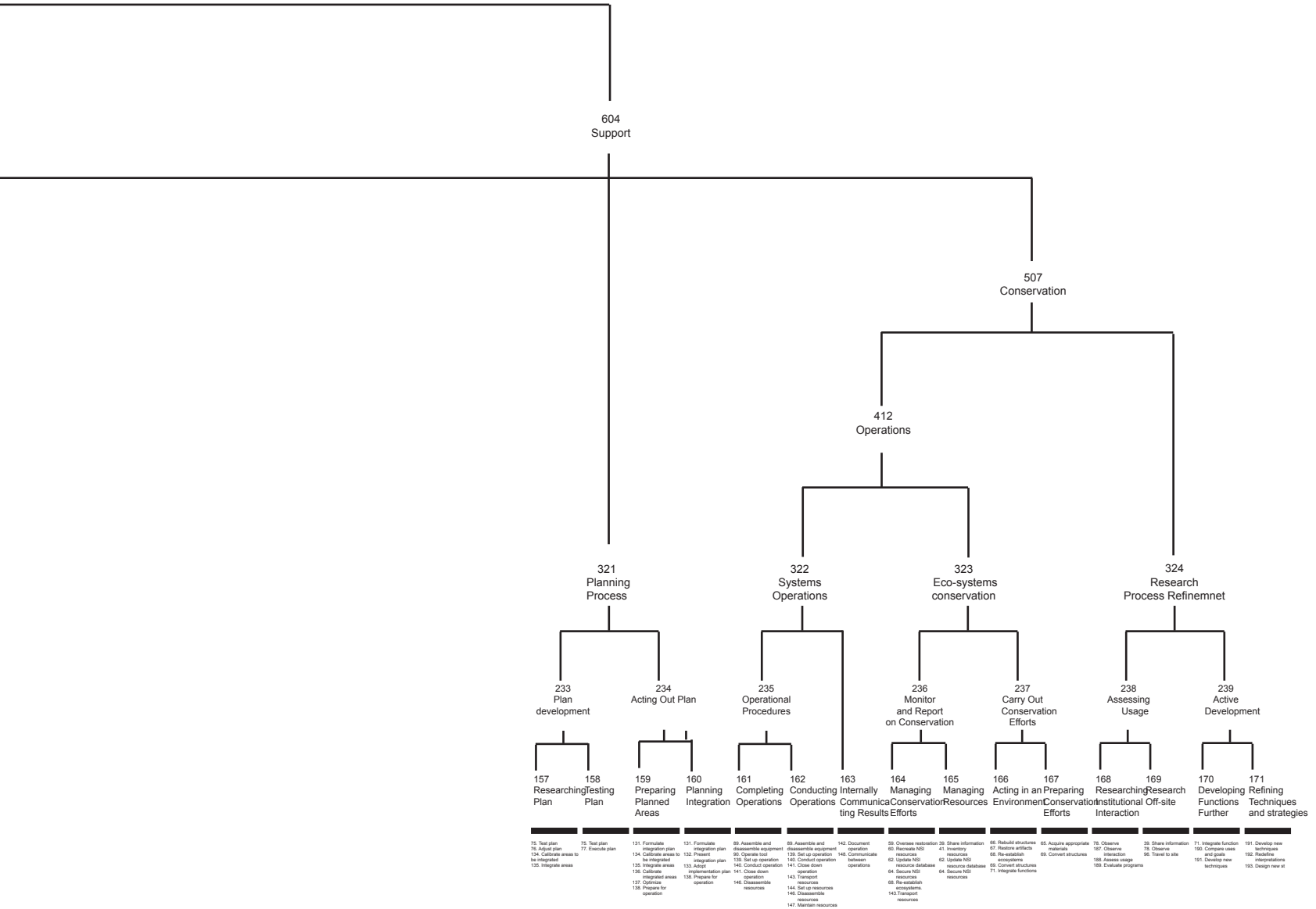
143
Data
Processing
144
Sampling
145
Organizing
Samples
146
standard-
ization
147
Organizing
Research
148
Identifying
Problems
149
Planning
Research
150
Defining
Research
151
Managing
Resources
152
Managing
Policies
153
Policy-
making
154
Developing
Actionable
Plan
155
Supporting
Operations
156
Supporting
Worker
Well-Being
51. Establish viewpoint
52. Compare data with viewpoint
109. Draw conclusion
52. Compare data with viewpoint
53. Distill data into recommendation
105. Analyze data
107. Search for errors
108. Identify missing data
109. Draw conclusion
152. Analyze data
153. Synthesize data
104. Compare method
110. Evaluate information
150. Set methods/ metrics
152. Analyze data
153. Synthesize data
91. Gather data
93. Record data
95. Organize data
98. Measure variables
99. Count specimens
151. Collect data
152. Analyze data
153. Synthesize data
45. Categorize artifacts
95. Organize data
43. Process data
44. Determine condition
52. Compare data with viewpoint
102. Define interpretation method
154. Interpret findings
42. Collect data
43. Process data
98. Measure variables
152. Analyze data
92. Gather sample
94. Preserve sample
100. Collect samples
106. Analyze sample
94. Preserve sample
100. Collect samples
101. Store samples
106. Analyze sample
155. Set standards
157. Enforce standards
48. Establish baselines and control limits
49. Establish timeline
118. Set strategy
149. Identify issues
150. Set methods/ metrics
103. Identify rate change
149. Identify issues
46. Establish requirements
48. Establish baselines and control limits
49. Establish timeline
118. Set strategy
150. Set methods/ metrics
34. Develop strategy
48. Establish baselines and control limits
156. Establish goals
61. Monitor NSI resources
118. Set strategy
120. Research Policies
84. Identify strategy
87. Devise method
118. Set strategy
121. Create policies
130. Establish desired outcomes
121. Create policies
122. Implement policies
34. Develop strategy
56. Identify and contact appropriate actuator
58. Requisition support
88. Choose environment
57. Provide support
58. Requisition support
125. Emergency support
125. Emergency support
126. Counseling
127. Training


604
Support
507
Conservation
412
Operations
321
Planning
Process
322
Systems
Operations
323
Eco-systems
conservation
324
Research
Process Refinemnet
233
Plan
development
234
Acting Out Plan
235
Operational
Procedures
236
Monitor
and Report
on Conservation
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Efforts
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157
Researching
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158
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Plan
159
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Areas
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Planning
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161
Completing
Operations
162
Conducting
Operations
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Communica
ting Results
164
Managing
Conservation
Efforts
165
Managing
Resources
166
Acting in an
Environment
167
Preparing
Conservation
Efforts
168
Researching
Institutional
Interaction
169
Research
Off-site
170
Developing
Functions
Further
171
Refining
Techniques
and strategies
75. Test plan
76. Adjust plan
134. Calibrate areas to be integrated
135. Integrate areas
75. Test plan
77. Execute plan
131. Formulate integration plan
134. Calibrate areas to be integrated
135. Integrate areas
136. Calibrate integrated areas
137. Optimize
138. Prepare for operation
131. Formulate integration plan
132. Present integration plan
133. Adopt implementation plan
138. Prepare for operation
89. Assemble and disassemble equipment
90. Operate tool
139. Set up operation
140. Conduct operation
141. Close down operation
146. Disassemble resources
89. Assemble and disassemble equipment
139. Set up operation
140. Conduct operation
141. Close down operation
143. Transport resources
144. Set up resources
146. Disassemble resources
147. Maintain resources
142. Document operation
148. Communicate between operations
59. Oversee restoration
60. Recreate NSI resources
62. Update NSI resource database
64. Secure NSI resources
68. Re-establish ecosystems.
143.Transport resources
39. Share information
41. Inventory resources
62. Update NSI resource database
64. Secure NSI resources
66. Rebuild structures
67. Restore artifacts
68. Re-establish ecosystems
69. Convert structures
71. Integrate functions
65. Acquire appropriate materials
69. Convert structures
78. Observe
187. Observe interaction
188. Assess usage
189. Evaluate programs
39. Share information
78. Observe
96. Travel to site
71. Integrate function
190. Compare uses and goals
191. Develop new techniques
191. Develop new techniques
192. Redefine interpretations
193. Design new st

F: Sample Working Forms

Activity Analysis

Activity: Instructing

111

Project

Natural Systems Institute

Mode: Conservation
Submode: Restoration

Originator

Joyce Chen

Contributors

7 Oct 2005 Mark King

Scenario

Because the NSI will utilize its partnerships to restore resources, its primary role will be to oversee restoration and provide support to independent local and regional groups.

Users

Scientists/researchers
Managers
Liasons

System Components

Computers
Database software
Email
Websites

Environmental Components

Office
Natural spaces, i.e.
fisheries, reefs, mountain ranges, grasslands, lakes, ponds, forests, etc.

Functions

Requisition support
Oversee restoration
Reestablish NSI resources

Associated Design Factors

Lack of support
Research partners want to oversee themselves
Resources cannot be reestablished

Version 2 Date: 8 Oct 2005 Date of first version: 27 Sept 2005

Activity Analysis

Activity: Modifying

Project

Natural Systems Institute

Mode: Conservation
Submode: Transformation

Originator

Joyce Chen

Contributors

Scenario

The NSI may need to modify ecosystems and structures as appropriate to achieve immediate and long-term goals.

Users

Scientists/researchers
Managers
Construction/field workers

System Components

Chemicals
Construction tools and machinery
Computers and software

Environmental Components

Natural spaces, i.e. fisheries, reefs, mountain ranges, grasslands, lakes, ponds, forests, etc.
Office space
Laboratories

Functions

Convert structures
Redefine values
Integrate functions

Associated Design Factors

Structures too fragile to convert
Political barrier or other objection
Disagreement on how values should be redefined
New functions are not easily integrated

Solution Element

Status: ☐ Existing ☐ Modified ◉ Speculative

Title: Inventory bot

Project
Natural Systems Institute

Mode: Conservation
Submode: Evaluation

Activity
Observing

Originator
Joyce Chen

Contributors

Description

A robot that performs natural resource inventory for the NSI and is capable of outputting formatted information to the Virtual Resources Library.

Source

New concept.

Properties

- A powerful software tool
- A mobile, self-sufficient robot
- A data collector and processor
- A huge collection of sensors
- Artifially intelligent
- Maintained by the Inventory Bot Research Group (IBoRG)
- A scanner
- A large computer with limited storage capacity but superior processing capabilities

Features

- Gathers environmental data by connecting with remote sensors and reading output from Aurora Database
- Travels throughout each regional office to read output from various sensors
- Maintains an inventory of all resources belonging to the NSI
- Can be programmed by IBoRG to collect all sorts of data
- Organizes the data into a searchable database, outputting this information into the Virtual Resource Library
- Reads OCR documents
- Organizes the inventory based on a serious of algorithms to help it categorize each piece of data
- Constantly updates itself, keeping track of different versions

Version 1 Date: 9 Oct 2005

Date of first version: 9 Oct 2005

Solution Element

Status: ☐ Existing ◉ Modified ☐ Speculative

Title: Virtual Resource Library

Project
Natural Systems Institute

Mode: Conservation
Submode: Maintenance

Activity
Maintaining

Originator
Joyce Chen

Contributors

Description

An online library containing all known information about every NSI resource, for easy access from all over the world.

Source

- Various University online libraries
- Google Earth (http://earth.google.com)

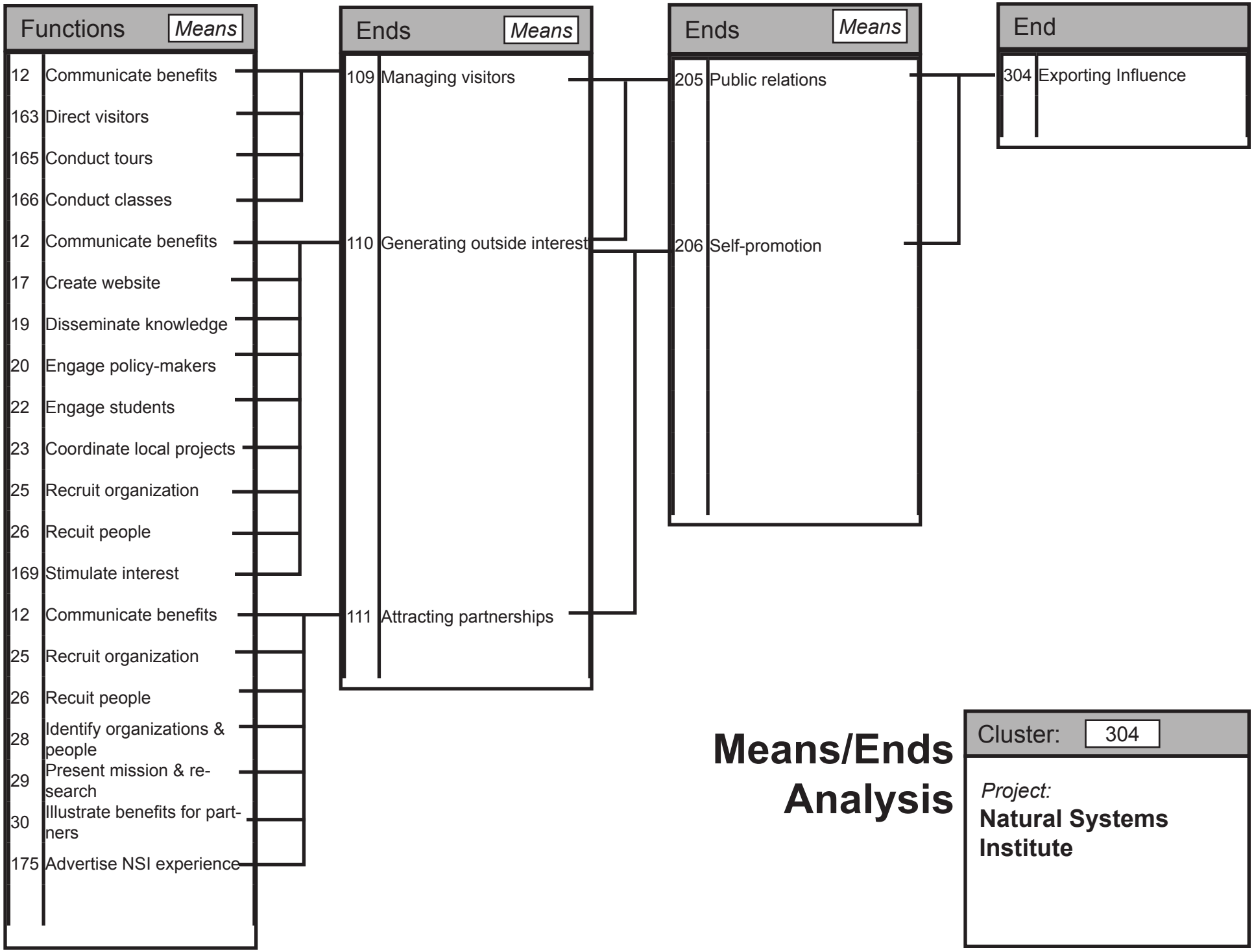
Properties

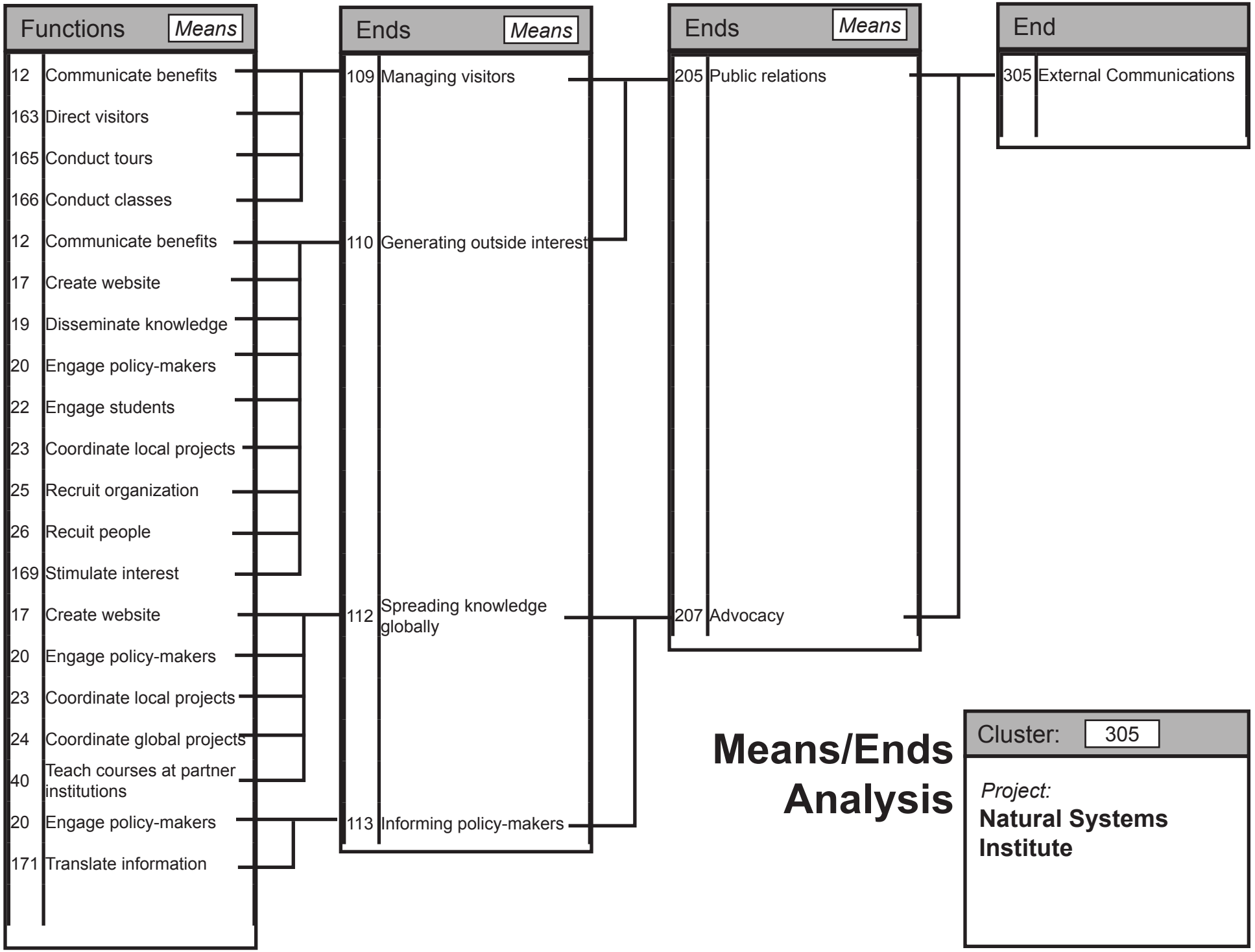
- A database of natural resource information
- A resource for students
- An organized repository for scientific studies
- Electronic journals
- Electronic books
- Network of websites
- Catalog of contents

Features

- Database searchable by author, title, topic, location, species, date, continent, country, etc.
- Easy-to-use virtual interface for navigating the library
- Uses multimedia to demonstrate and teach about ongoing and completed studies
- Uses multimedia to educate students about global environments
- Well-tested information architecture helps users find exactly what they are looking for
- Paying members of NSI can download electronic copies of published journals
- Links to conferences, curricula, seminars, maps, and partner institutions/organizations
- Offers virtual tours of NSI headquarters and regional facilities
- Free library “card” allows temporary free access to copyrighted materials
- Enables users to take “virtual” tours across the surface of the world and deep into the seas

Version 1 Date: 9 Oct 2005 Date of first version: 9 Oct 2005


Functions
Means
12 Communicate benefits
163 Direct visitors
165 Conduct tours
166 Conduct classes
12 Communicate benefits
17 Create website
19 Disseminate knowledge
20 Engage policy-makers
22 Engage students
23 Coordinate local projects
25 Recruit organization
26 Recuit people
169 Stimulate interest
12 Communicate benefits
25 Recruit organization
26 Recuit people
28 Identify organizations & people
29 Present mission & re-search
30 Illustrate benefits for part-ners
175 Advertise NSI experience
Ends
Means
109 Managing visitors
110 Generating outside interest
111 Attracting partnerships
Ends
Means
205 Public relations
206 Self-promotion
End
304 Exporting Influence
Means/Ends Analysis
Cluster: 304
Project:
Natural Systems Institute


Functions
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19 Disseminate knowledge
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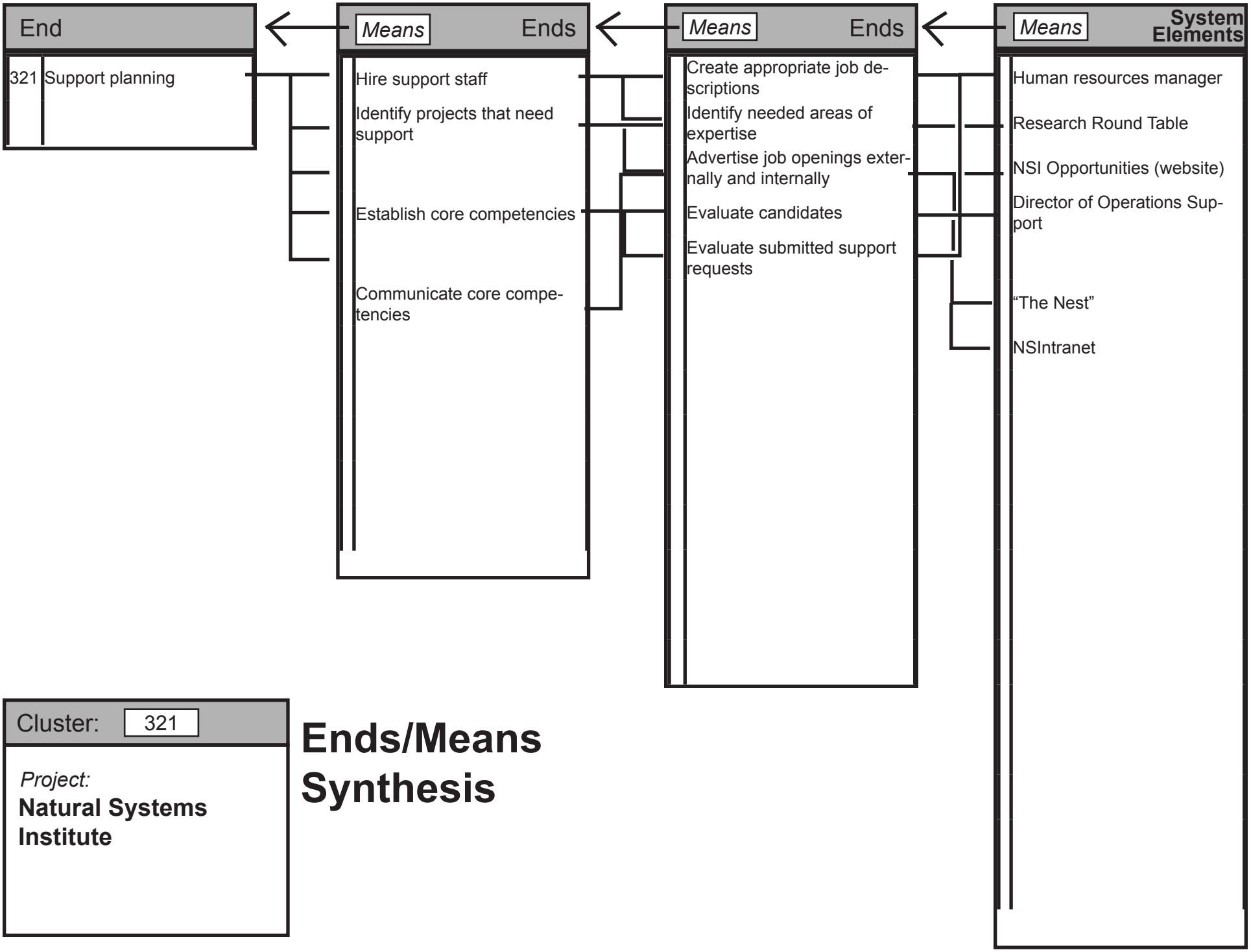
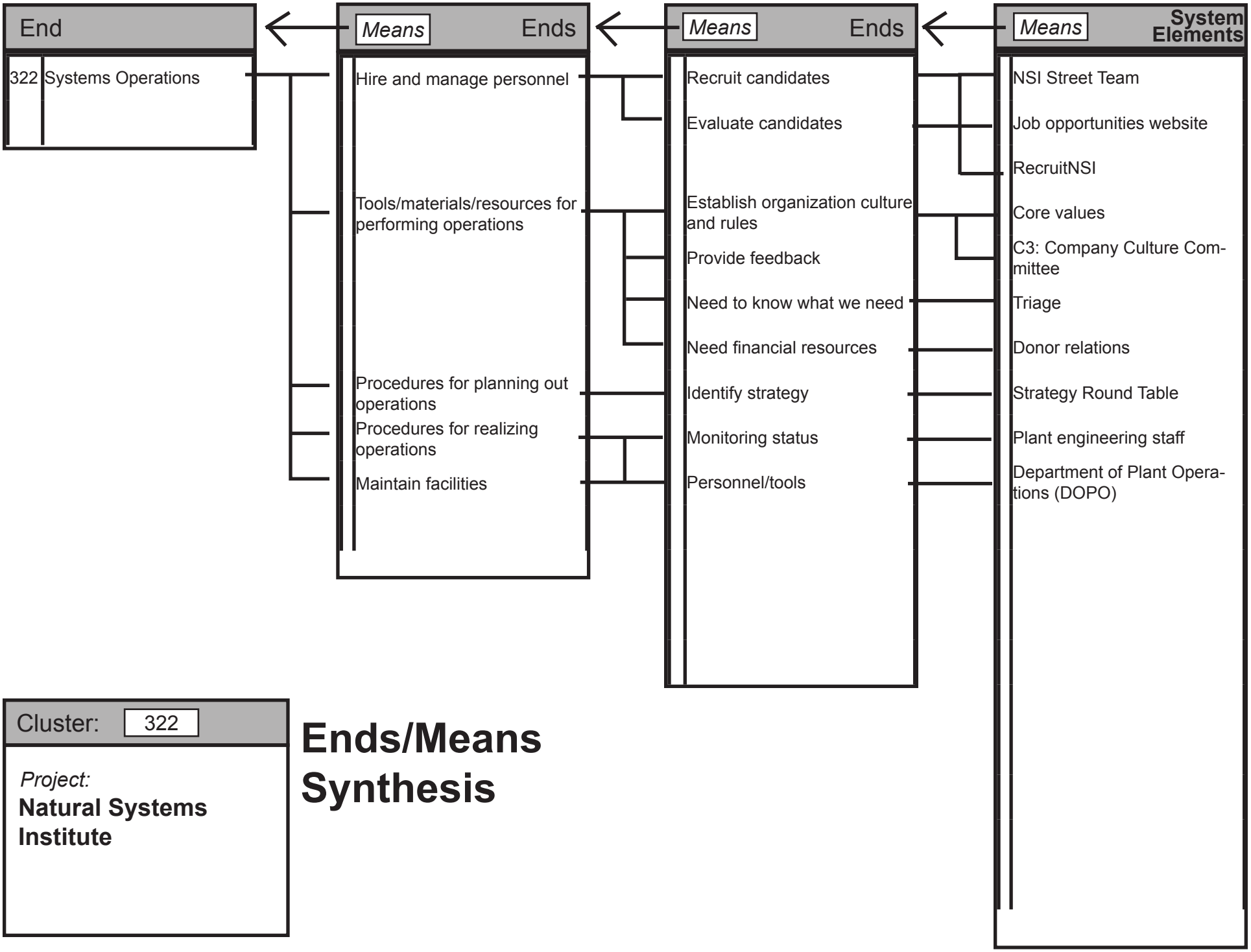
23 Coordinate local projects
25 Recruit organization
26 Recuit people
169 Stimulate interest
17 Create website
20 Engage policy-makers
23 Coordinate local projects
24 Coordinate global projects
40 Teach courses at partner institutions
20 Engage policy-makers
171 Translate information
Ends
Means
109 Managing visitors
110 Generating outside interest
112 Spreading knowledge globally
113 Informing policy-makers
Ends
Means
205 Public relations
207 Advocacy
End
305 External Communications
Means/Ends Analysis
Cluster: 305
Project:
Natural Systems Institute



Cluster: 321

Project:
Natural Systems Institute

Ends/Means Synthesis



Cluster: 322

Project:
Natural Systems Institute

Ends/Means Synthesis

Project: Natural System Institute | Cluster: 314 | Page: 1

System Elements	NSI Publications									Toolkit			Event Planning Office													
Features	01	02	03	04	05	06	07	08	09	01	02	03	01	02	03	04										
Functions																										
51 Establish viewpoint						■			■					■	■											
52 Compare data with viewpoint					■																					
53 Distill data into recommendation						■	■								■	■										
104 Compare method																										
105 Analyze data					■																					
107 Search for errors					■																					
108 Identify missing data		■																								
109 Draw conclusion					■											■										
110 Evaluate information					■	■										■										
150 Set methods/metrics															■											
152 Analyze data																										
153 Synthesize data		■			■	■			■					■	■											

■ Strongly supports fulfillment of the Function ■ Supports fulfillment of the Function

Project	Natural System Institute	Cluster	316	Page	1

System Elements	Toolkit			Eco-Survey			
Features	01	02	03	01	02	03	04
Functions							
42 Collect data	■		■	■			
43 Process data	▪		■	■	■	■	
44 Determine condition	▪	■		■		■	■
45 Categorize artifacts	■	■		■			
52 Compare data with viewpoint	■	■	■	■		▪	
91 Gather data	■		■	■			
93 Record data				■			
95 Organize data	■		■	■			
98 Measure variables				▪			
99 Count specimens				■			
102 Define interpretation method	▪	■	▪	■			
151 Collect data	■		■	■			
152 Analyze data	▪		■	■			
153 Synthesize data	▪		■	■			▪
154 Interpret findings	■	■	■	▪	▪	▪	▪

▪ Strongly supports fulfillment of the Function ■ Supports fulfillment of the Function

System Element Relationships

Natural Systems Institute
System Elements Pairing #1 - #4 with #5 - #8

1

1 Formal Expert Discussions	Formal Expert Discussions may be held at the NSI HQ 1			
2 Informal Discussions	Informal Discussions may be held at the NSI HQ 1	Informal Discussions and the Toolkit are both used to facilitate knowledge sharing 1		
3 Research Knowledge Net	The Research Knowledge Net is the knowledge database for the NSI HQ and all of its regional offices. 1	Research Knowledge Net contains information about and links to the Toolkit 2	Research Roundtable determines the projects that will eventually feed information into the Research Knowledge Net 2	
4 Eco-Survey	Eco-Survey findings may be displayed at the NSI HQ 1	Toolkit may inform many of the techniques used in Eco-Survey 1	1. Research Roundtable determines who works on Eco-Survey and what kind of research it will conduct 2. Eco-Survey reports to Research Roundtable 3	Alliance Network aids the Eco-Survey effort so as to cover a broad range of ecosystems 2
	5 Natural Systems Institute Headquarters	**6 Toolkit**	**7 Research Roundtable**	**8 Alliance Network**

Scoring
3 Critical Relationship
2 Strong Relationship
1 Slight Relationship
0 No Relationship

System Element Relationships

Natural Systems Institute
System Elements Pairing #9 - #12 with #13 - #16

9 Publications	Public Education Pamphlets and Magazine will be used by the Policy Desk to influence the public and policy makers (2)			
10 Donor Relations	(0)	Donors mildly influence overall NSI Strategy (1)		
11 Environmental Action Initiative	(0)	Strategy Roundtable determines what kinds of Environmental Action Initiatives are most important and timely (3)	The Event Planning Office will plan award ceremonies to honor Scholarship and Micro Grant recipients (2)	
12 Leader Programs	Some of the Leader Education includes policy-related material (1)	Strategy Roundtable may determine what types of lessons are taught to participants in the NSI Leader Programs (2)	The Event Planning Office will plan awards ceremonies and events for Scouts/Explorers/Corps/ Generations (2)	(0)
	13 Policy Desk	**14 Strategy Roundtable**	**15 Event Planning Office**	**16 Face of NSI**

Scoring
3 Critical Relationship
2 Strong Relationship
1 Slight Relationship
0 No Relationship

System Element

EMS

Environmental Action Initiative

11

Originator
Joyce Chen

Contributors
Team members

SuperSet Element(s)

Related Elements
Leader programs
Event Planning Office
Community Liaisons

Sources

SubSet Element(s)
Scholarship Program
Micro Grants
Starter Kits
Distributed Volunteer Research

Description

A group of programs specifically targeted at empowering communities to participate in research and projects that improve the health of the earth.

Properties

- cluster of educational initiatives for the community
- a commitment to outreach

Features

- provides members in the community with resources to pursue their interests in environmental work
- empowers the public to get involved with environmental action

Fulfilled Functions

9 Identify audiences
12 Communicate benefits
19 Disseminate knowledge
22 Engage students
23 Coordinate local projects
24 Coordinate global projects
26 Recruit people
28 Identify organizations & people
29 Present mission & research
32 Ask for resources
37 Export ideas/information
39 Share information
56 Identify and contact appropriate actuator
72 Identify opportunities
92 Gather sample
97 Establish monitoring range
100 Collect samples
116 Distribute document
117 Make problem known
119 Communicate strategy
123 Allocate funding
127 Training
151 Collect data
159 Convey NSI rules
161 Distribute literature
167 Offer activities
169 Stimulate interest
172 Instill values
174 Promote NSI awareness
177 Present NSI values
182 Assign project responsibility
193 Design new strategies

Associated Design Factors

11 Unskilled observers
17 Costly Outreach
18 NSI too esoteric for general audiences
21 Ill-feeling towards NSI
27 Public Support
28 Students don't care
29 Target Audience
40 no appropriate actuators available
51 requires too many resources
66 Identify too many complimentary research activities
68 Don't have the human resources to set up the operation

Discussion

The Environmental Action Initiative is a strategic program in the Office of Outreach and Education, aimed at putting the power to change the world in the hands of communities and young people. It includes several different sub-initiatives that provide opportunities for various members of a community. These include a Scholarship Program for undergraduate students, Micro Grants for community members to conduct their own ecological research, Starter Kits that make it easy for communities to improve the health of their local surroundings, and a Distributed Volunteer Research initiative.

The Scholarship Program is funded by the Office of Donor Relations and provides full tuition for two juniors or seniors within the NSI region who are studying any one of the following disciplines: Earth Science, Plant Science, Environmental Science, Earth Systems, Ecology, or Evolutionary Biology. These students may apply online for the highly competitive scholarship and must demonstrate a long-standing commitment to bettering the state of the environment. The Scholarship provides full tuition for an academic year, and students cannot reapply. However, upon being NSI Scholars, they have access to NSI people and resources.

Micro Grants are small sums of money awarded to individuals or groups who are interested in conducting ecological research on a local level, with the stipulation that the NSI will share the rights to the results of the research with the grantee(s). Grant money will be provided by the NSI donors and will cover budgets of up to $30,000 per year. Applications and proposals must be submitted via the NSI website. Micro Grants are appropriate for short-term research projects that require limited resources. Only new research projects will be accepted; continuing applications will not be accepted.

Starter Kits are packages of materials and information that the NSI provides communities in order to get them started on improving their environment. For example, the NSI might give away free compost Starter Kits that provide compost bins, earthworms, and instructions on how to maintain the compost pile and reap its benefits.

Distributed Volunteer Research is a way to get important research done with the help of a large number of volunteers. NSI and affiliated scientists may never have enough manpower to collect samples from every beach on the Pacific Coast of the United States, but they can increase their sample collection by enlisting the help of interested volunteers and distributing the research tasks among these volunteers. This research effort intends to use the power of numbers to broaden the scope of the scientific process and enable the NSI to gather as much data as needed. As a result, the NSI will be able to have a much more detailed understanding of the environments it monitors.

SCENARIO

Candace Brooks first learned about the Natural Systems Institute in a speech given by renowned architect and environmental thinker William McDonough. On the NSI website, she found that there were many opportunities to get her students involved in environmental service. Besides teaching a section on current sustainability issues and basic ecology, Candace also challenges her students each year to design and propose a simple

Discussion

research or restoration project for the Micro Grant competition. Last year, her students won for the first time, and received a $5000 grant to study the effects of pollution on - and actively clean up - the River Avon system. With the grant money, the school was able to buy a new set of science tool and laboratory instruments, as well as waders for the students, not only for the river system study, but also for the other science labs in the school. Candace also attended an awards event at the NSI regional office in London with a few of her top students, and traveled to Beijing for the NSI International Film Festival last year.

Candace has spread the word about NSI to the rest of the teachers and administrators in her school system. Recently, one of the alumni from the local high school was awarded a Scholarship from the NSI to study Plant Sciences as a fourth year student at Oxford University. Candace was particularly proud, even though she was never this student's teacher, because she recalled the day when the student came to her classroom at the end of the school day to ask her about the NSI Environmental Action Initiatives.

Outside of her role as teacher, Candace and her husband have actively participated in Distributed Volunteer Research for the NSI. For their region, this has primarily entailed collecting water samples from the river, labeling them, and sending them to the Swiss NSI office every month. All of the materials are provided by the NSI each cycle and include detailed background information about the project and instructions on when to collect, from where, and how to look for the best samples.

Someone else in her community learned about the Starter Kits that the NSI distributes and obtained a set of the "Compost Kit" for her neighborhood. An avid gardener for many years, Candace was delighted to discover that keeping a compost bin was so easy and rewarding; her vegetables have never been healthier, tastier, or more abundant! Some other neighbors in her community choose to get the "Solar Kit" in order to install solar panels on their roofs and save money on their energy bills. Candace and her husband are very interested in acquiring this Starter Kit as well—if only they had the time!

System Element

EMS

NSI Leaders Program

12

Originator

Joyce Chen

Contributors

Team members

SuperSet Element(s)

Related Elements

Environmental Action Initiative
Event Planning Office
Community Liaisons

Sources

"Boy Scouts of America - BSA - National Council." www.scouting.org.
Bennett, Ian. Interview by Joyce Chen. Email exchange. World Wide Web, 16 Nov 2005.
Henderson, Scott. Interview by Joyce

SubSet Element(s)

NSI Scouts
NSI Explorers
NSI Corps
NSI Generations
Certificate

Description

The **NSI Leaders Program** is a curriculum for preparing people to become leaders of the **NSI Family Adventures**, **NSI Scouts**, **NSI Explorers**, **NSI Corps**, and **NSI Generations**. Offering courses in leadership training, wilderness maintenance, first aid, team-building, counseling and teacher-training, the **NSI Leaders Program** provides Leaders with the in-depth knowledge and skills that they will need to not only lead NSI programs, but also pass on the knowledge.

Properties

- training program for leaders of **NSI Corps**, **NSI Scouts**, and **NSI Generations**
- collection of volunteers and full-time NSI employees
- traveling training program, classes held at local educational institutions
- led by a core group of NSI employees in Office of Outreach and Education (Programs Desk)
- collection of courses that may be required to lead NSI outreach groups

Features

- **prepares volunteers and NSI employees to lead groups of kids and adults in a number of outdoor activities, including camping and hiking**
- **teaches team-building**
- **teaches wilderness first aid along with methods for teaching safety**

Fulfilled Functions

19 Disseminate knowledge
22 Engage students
26 Recruit People
27 Synthesize ideas
29 Present mission and research
33 Foster continuous relationship
37 Export ideas/information
39 Share information
40 Teach courses at partner institutions
42 Collect data
43 Process data
44 Determine condition
88 Choose environment
93 Record data
95 Organize data
96 Travel to site
110 Evaluate information
126 Counseling
127 Training
128 Identify complementary research activities
149 Identify issues
156 Establish goals
161 Distribute literature
166 Conduct classes
167 Offer activities
169 Stimulate interest
177 Present NSI values
189 Evaluate programs
191 Develop new techniques
194 Create media

Associated Design Factors

17 Costly Outreach
18 NSI too esoteric for general audiences
21 Ill-feeling towards NSI
27 Public Support
28 Students don't care
55 NSI values are misunderstood
68 Don't have the human resources to set up the operation

Discussion

A major goal of the NSI is to educate the public and get them involved with sustaining their natural surroundings through hands-on experience and appreciation. In order to do this, the NSI must maintain a talented and skilled core group of program Leaders that continually educate interested volunteers and past program participants, as well as scientists who will be guest teachers/leaders, to lead new groups of participants into the field. These Leaders will need to grasp a basic understanding of the ecology of the region, master wilderness safety skills, develop counseling skills, and be able to inspire and empower people of all ages to become leaders.

The NSI Leaders Program will have a permanent staff within the Office of Outreach and Education's Program Desk that is charged with the tasks of recruiting candidates, writing application forms, reviewing applicants, and teaching the courses. It is unique from other outdoor leadership and science training programs in that tuition is covered entirely by the NSI's endowment; to avoid an overflow of students, the Program Desk limits the size of the candidate pool via a rigorous application process. Graduates of the program receive a Certificate and may subsequently reapply to be a program Leader as often as they want without retaking courses, so long as they skip no more than one; Wilderness First Aid must be taken every two years regardless of activity. These Certificates may also be used to pass out of certain courses at other institutions teaching offering similar curricula.

NSI Family Adventures are a series of 1- to 2-week long trips to various exotic locations around the world where either the local community leaders have done an exceptional job at creating environmentally sustainable communities and infrastructure, or there is a rare species of plant or animal, or habitat, whose survival is endangered. Families, including children as young as 5 years old, participate in various service activities and explore local culture and recreation. Leaders will develop programming for specific age groups in order to engage all levels of intellectual capacity; adults will have the opportunity to hear lectures and conduct experiments with experts in the field, and children will discover the joy of understanding how ecosystems work through hands-on projects.

NSI Scouts are the youngest age groups of children who participate in an outdoor leadership and science program that teaches them the basics of ecology, how climate works, how pollution affects the environment, and how to recreationally appreciate natural environments. The Scouts range in age from 8 to 14, with age groups separated by 2 year intervals. They conduct community service tasks and simple science experiments in the field while performing a variety of fun outdoor activities, such as fishing, boating, hiking, and camping.

NSI Explorers is the teenaged version of NSI Scouts, with ages ranging from 14 to 18. Corps members get involved more deeply with the science behind ecological processes, design their own community service projects, as well as experience more challenging outdoor recreation, such as snow-camping, snowshoeing, and multi-day backpacking trips.

NSI Corps is a service-oriented program that connects adults of all ages with environmental service opportunities across the globe. Interested individuals can find a database of international opportunities and apply on

Discussion

the NSI Corps website by specifying the areas of work they are interested in—areas such as trail maintenance, ecosystem restoration, urban planning, environmental education, activism, sustainable farming, appropriate technologies, etc.—and the countries they would prefer. The Programs Desk has a dedicated staff that utilizes a powerful database to review applicants and match them up with available opportunities. International governments work closely with local NSI offices and participating organizations to determine the financial, education, and professional benefits that each Corps volunteer will obtain. NSI Corps members serve for 1-2 years at a time.

NSI Generations is a localized adult ecology and environmental service program. Welcoming adults of all ages, these groups of 10-12 people meet weekly to perform various activities, including trail maintenance, beach clean-ups, species analysis and collection, pollution testing, etc.

SCENARIO

Jennifer was fifteen when her mother enrolled her in the local chapter of the NSI Explorers, where she and a group of ten other teenagers met twice a month for one year to perform a variety of activities, including backpacking trips, trail restoration, snow camping, community service at local zoos, canoeing and fishing trips, with various scientific studies of water, soil, flora and fauna along the way. She learned to see the natural world through new eyes and became keenly aware of how so many everyday activities destroy little pieces of the environment. At school, she started an environmental action group at her high school called Jersey Shores, which actively participated in cleaning up and protecting the beach ecologies along the New Jersey coast from contamination and erosion.

Now that she is eighteen and a high school graduate, Jennifer is eager to postpone her enrollment in college for one year in order to give back to the community. She will start a 9-month internship in the New York office of the Natural Resources Defense Council and is currently training to become an NSI Leader for an NSI Scouts group. For the next month, she will meet with other aspiring Leaders and take intensive courses in Wilderness First Aid, Leadership Theory and Group Dynamics, Team-building, Plant and Animal Ecology, Ecosystems, Research Methods, In-field Teaching Methods, and History and Ecology of the Adirondacks. The curriculum includes three overnight trips to different preserves and parks in New York , including a four-day backpacking trip in the Adirondacks.

At the end of the course, she will receive a Certificate as well as a Leader Course Pack for the NSI Scouts, which provides recommended activities and projects, safety reminders, cheat sheets, local resources, maps, etc. Other fellow leaders may receive similar course packs for leading NSI Corps and NSI Generations.