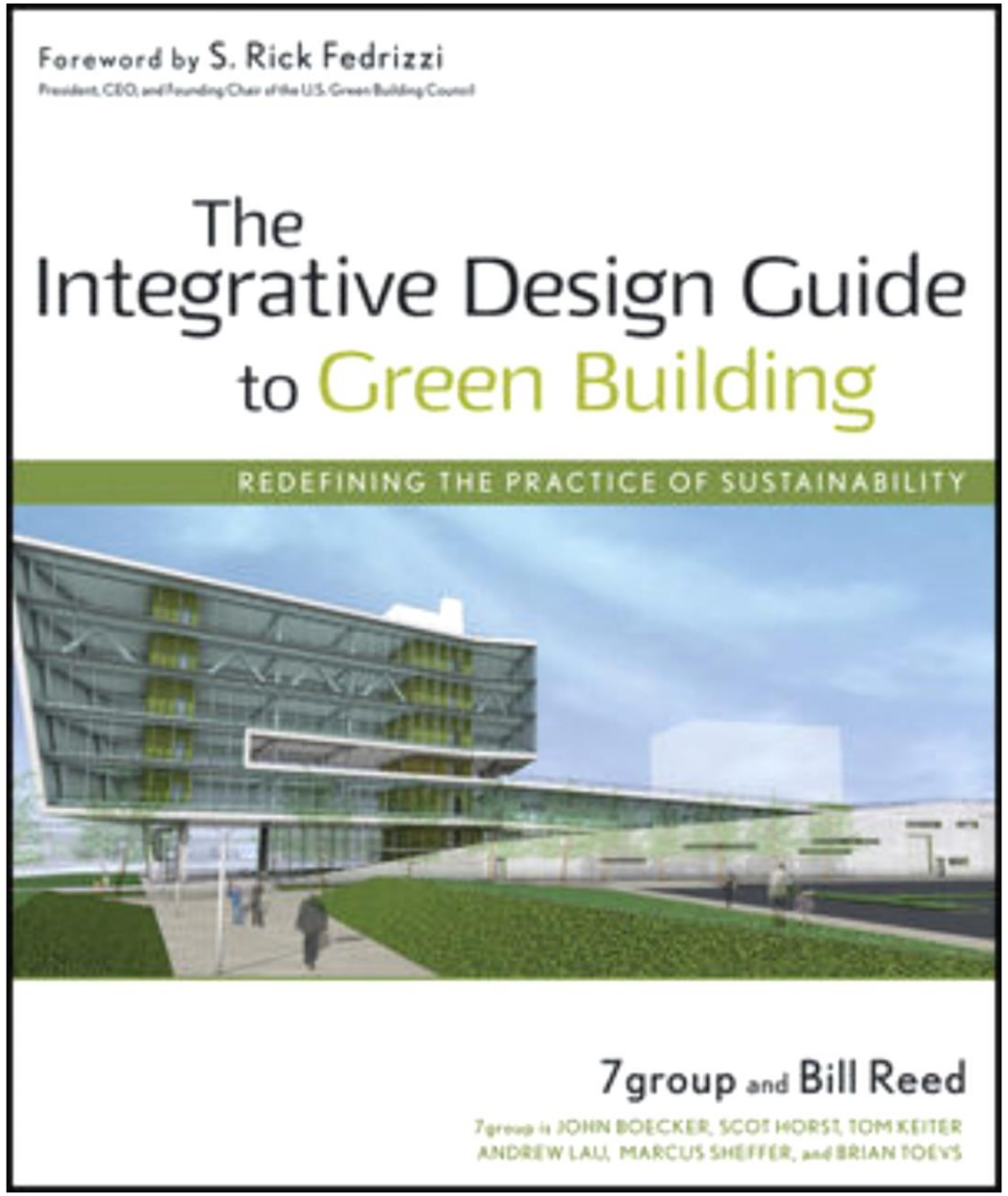
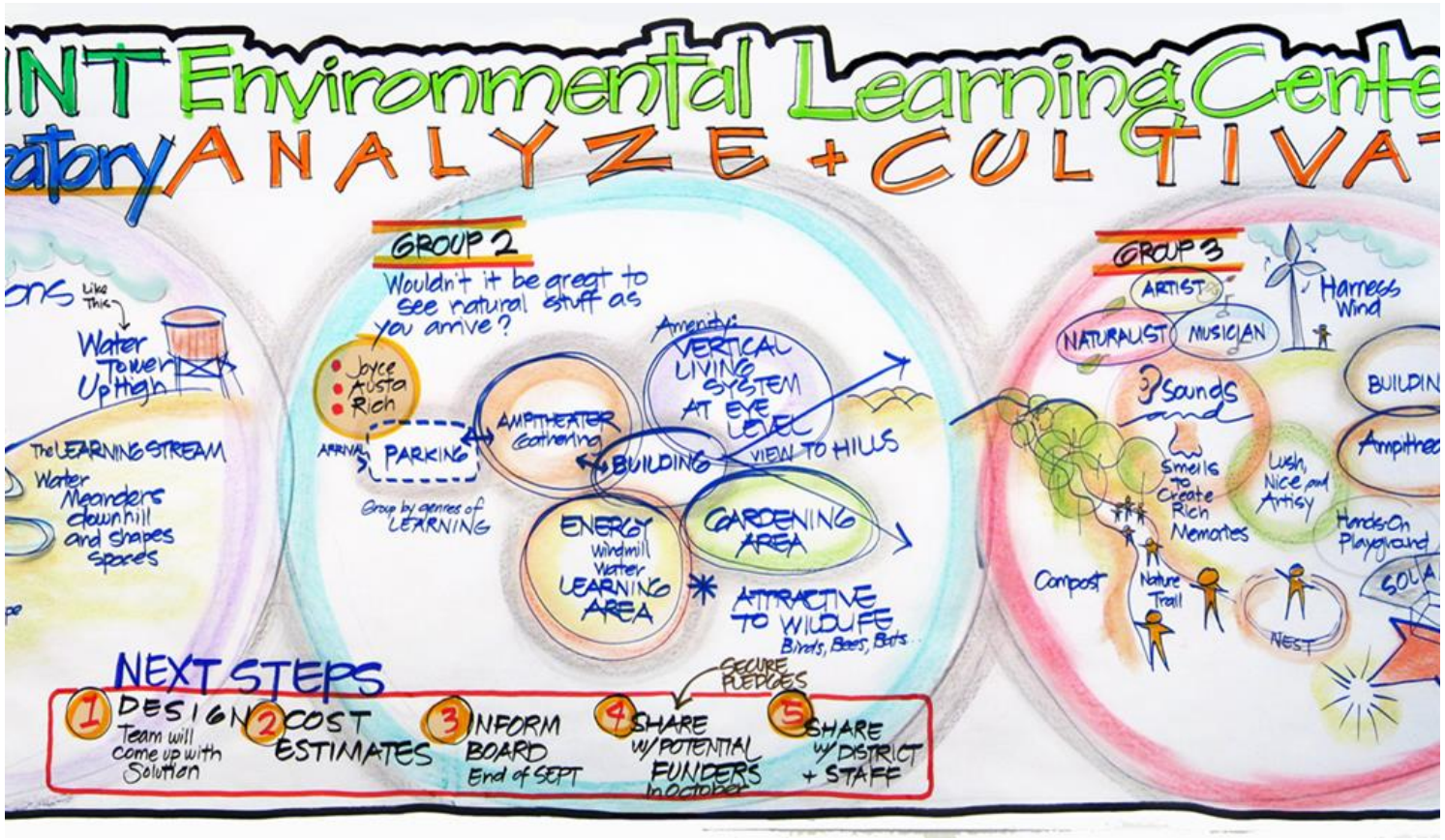
Preparation Phase

جلسه هفتم- مبانی طراحی محیطی، نظریه ها و روشها

اردیبهشت ماه 1398

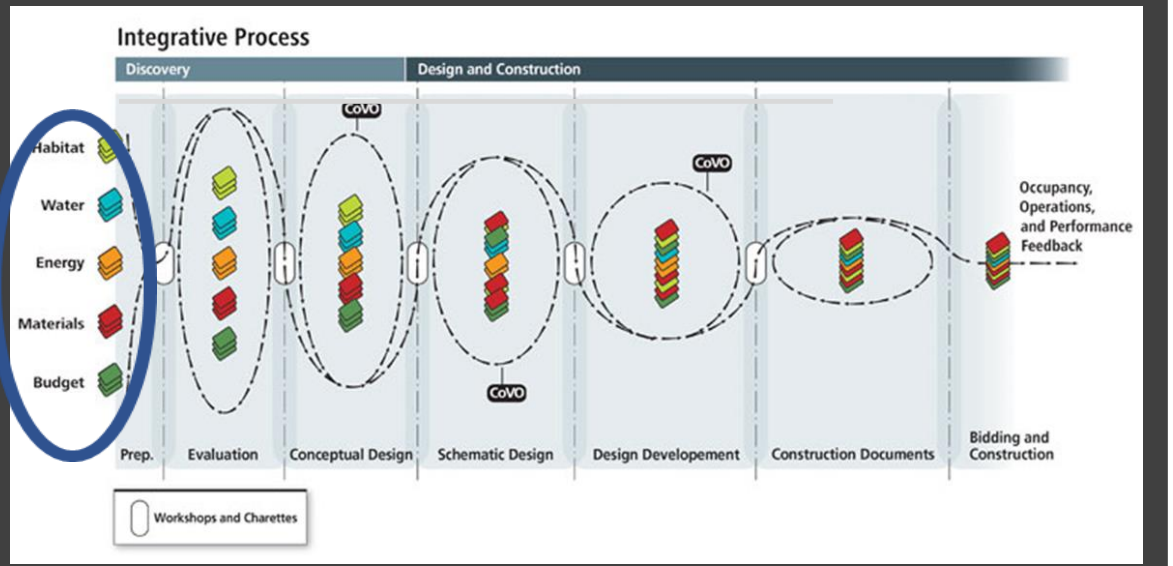




Introduction

- Preparation of proposal A
- Fundamental research for workshop No. 1
- Setting Principles and Measurements
- Cost Analysis/ Schedule and fees

Preparation Phase



Stage A.1

Research and Analysis: Preparation

A.1.0 Prepare *Proposal A*

- Establish scope and fees for initial Goal-Setting Workshop

A.1.1 Fundamental Research for Workshop No. 1

- Site selection: Assess optional sites (if not already selected)
- Context: Identify base ecological conditions and perform preliminary analysis of the four key subsystems:
  - Habitat
  - Water
  - Energy
  - Materials
- Stakeholders: Identify key stakeholders—social and ecological
- Program: Develop initial functional programmatic requirements

A.1.2 Principles and Measurement

- Select rating system and performance measurement criteria

A.1.3 Cost Analysis

- Prepare integrative cost-bundling framework template

A.1.4 Schedule and Fees

- Develop a scheduling template—a *Road Map*—for assigning tasks
- Prepare Agenda for Workshop No. 1

Preparation of proposal A

-Proposal A: Selected key consultants or team members are asked to submit a fee only for participating in the initial goal-setting workshop and preparing the background research needed.

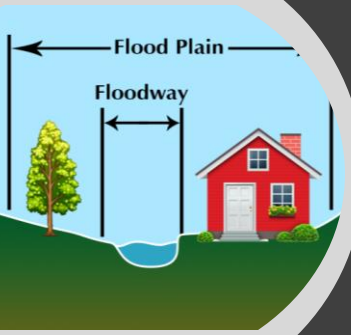
-Proposal B: With clearer understanding of scope and schedule, all team members can now assign more accurate fees to the tasks required for the remainder of the project.

Fundamental Research for workshop No. 1

- Site selection
- Stakeholders
- Programs
- Context (Habitat, Water, Energy, Materials)

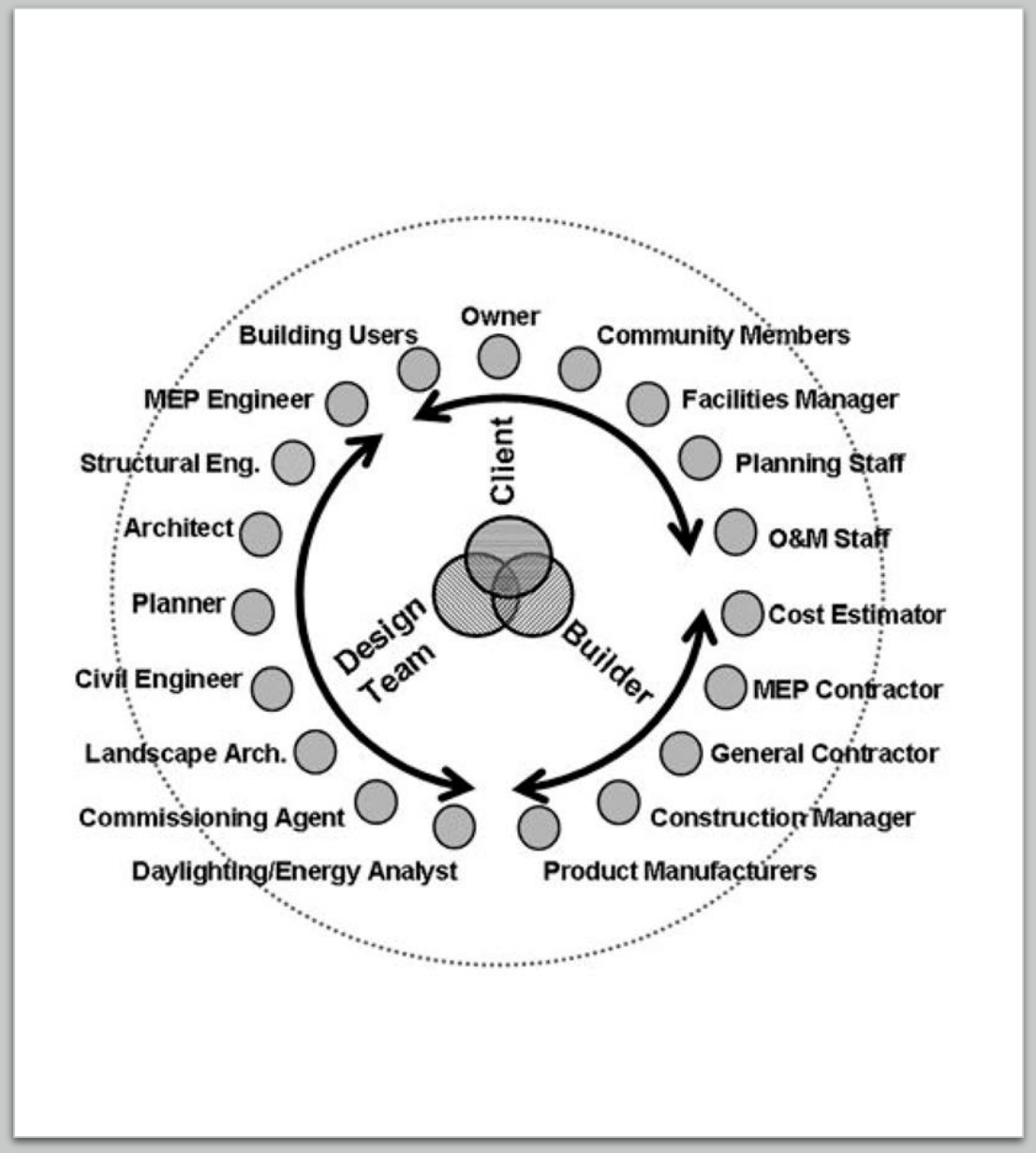
Site Selection Criteria

- Sensitive land protection: Avoid building on the following sites:
  - Prime farmland
  - Floodplains
  - Habitat for endangered and threatened species
  - Close proximity to wetlands and water body
- High-Priority site: Building on areas with development constraints and promote the health of the surrounding area:
  - Historic District
  - Priority Designation
  - Brown Field Remediation
- Building in dense areas with diverse uses
- Building close to public transportation/ bicycle network.



Stakeholders

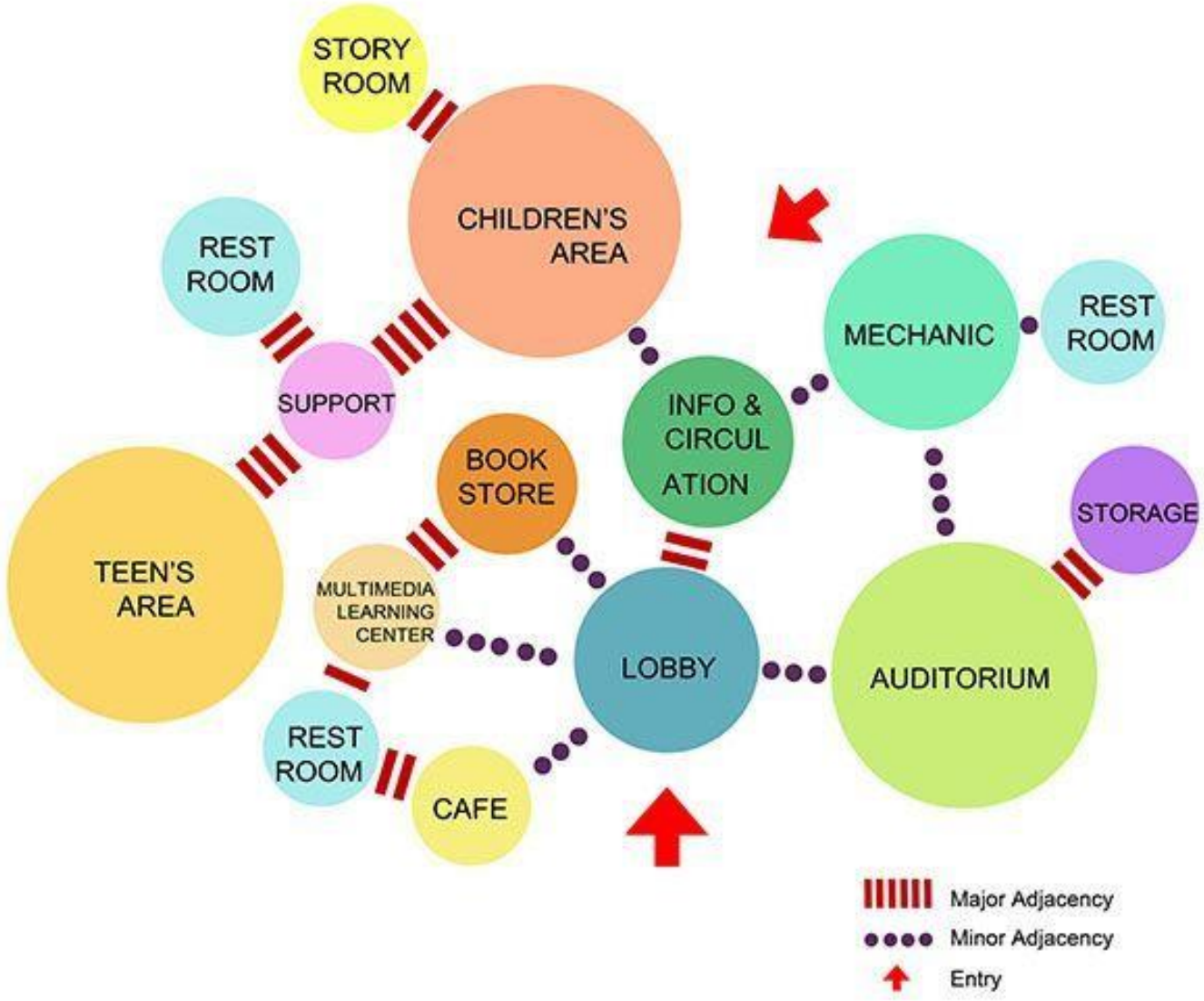
- Include everyone early- 70% of the decisions associated with environmental impacts are made during the first 10% of the design process
- Select the right team members based on expertise
- Recognize where additional expertise may be needed
- For advanced whole-systems approach additional expertise may include: a systems ecologist, geohydrologist, restoration biologist, community facilitator, social historian, etc.



Program

Develop initial functional programming requirements (briefing package):

- Basic areas
- Functions
- Proximities
- Adjacencies



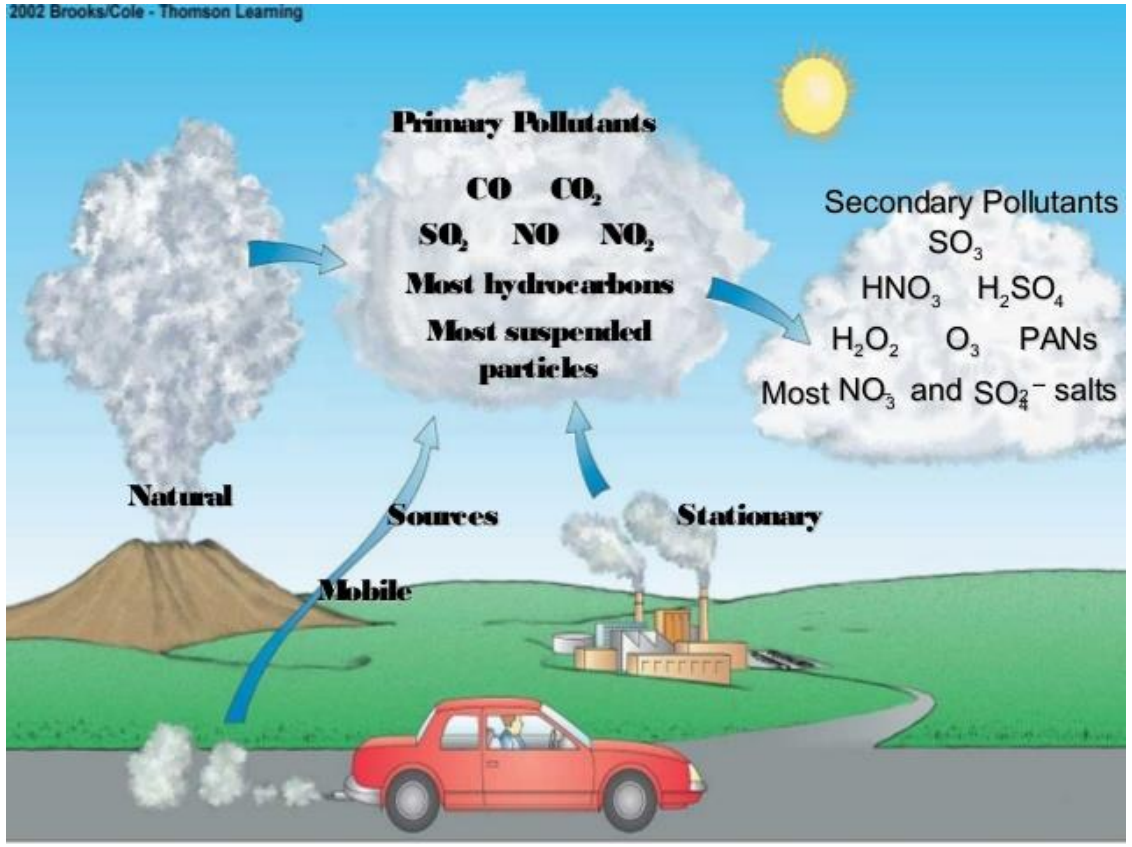
Think about Joint Use of Facilities!

Think about ways to integrate the school with the community by sharing the building and its playing fields for non-school events and functions.

Option 1. make building space open to general public

Option 2. Contract with specific organizations to share some building spaces

Option 3. Use shared spaces owned by other organizations



Air Quality Index	Descriptor	Actions to protect your health from pollution: Ozone	Particulate matter
0 to 50	Good	None	None
51 to 100	Moderate	Unusually sensitive people should consider reducing prolonged or heavy outdoor activity	Unusually sensitive people should consider reducing prolonged or heavy activity
101 to 150	Unhealthy for sensitive groups	The following groups should reduce prolonged or heavy outdoor activity: People with lung disease (e.g., asthma) Children and older adults People who are active outdoors	The following groups should reduce prolonged or heavy outdoor activity: People with heart or lung disease Children and older adults Everyone else should limit prolonged or heavy activity
151 to 200	Unhealthy	The following groups should avoid prolonged or heavy outdoor activity: People with lung disease (e.g., asthma) Children and older adults People who are active outdoors Everyone else should limit prolonged outdoor activity	The following groups should avoid all physical activity outdoors: People with heart or lung disease Children and older adults Everyone else should avoid prolonged or heavy activity
201 to 300	Very unhealthy	The following groups should avoid all outdoor activity: People with lung disease (e.g., asthma) Children and older adults People who are active outdoors Everyone else should limit outdoor activity	The following groups should remain indoors and keep activity levels low: People with heart or lung disease Children and older adults Everyone else should avoid all physical activity outdoors

Habitat

Research outdoor air quality issues

Habitat

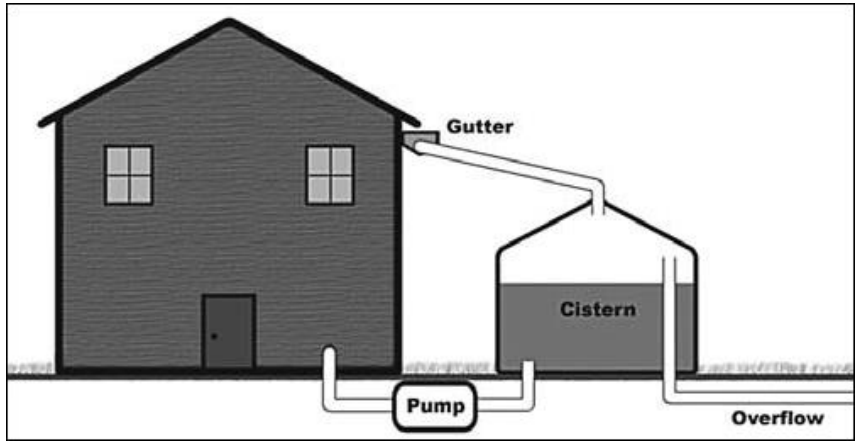
- Investigate human, earth, and biotic systems to understand the patterns of place
- Research both ecological systems (geohydrology, soils, local habitat, etc) and social systems (history, settlement patterns, etc.)

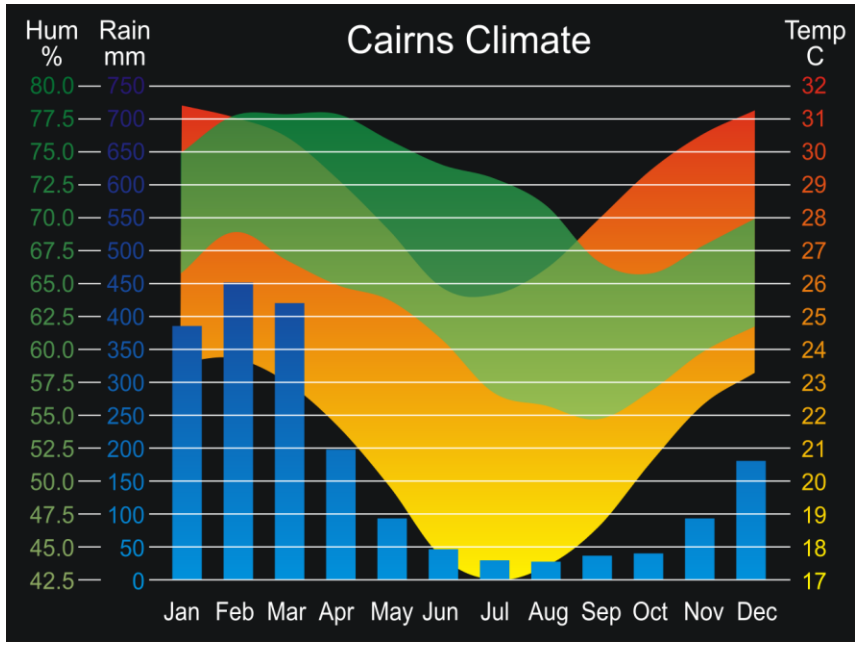
Community and watershed Living-system patterns

- Have a team member (e.g. system ecologist, permaculturist, biologist, …) present to the team an assessment of site and neighborhood interrelationships.
- **Permaculture** is a system of agricultural and social design principles centered around simulating or directly utilizing the patterns and features observed in natural ecosystems.
- By understanding the patterns of living systems and how they worked in the past, we can look to create, or rediscover, potentially healthier and mutually beneficial future relationships between the site's habitat and cultural aspects, building occupants, visiting users, the community, and the watershed.

Water

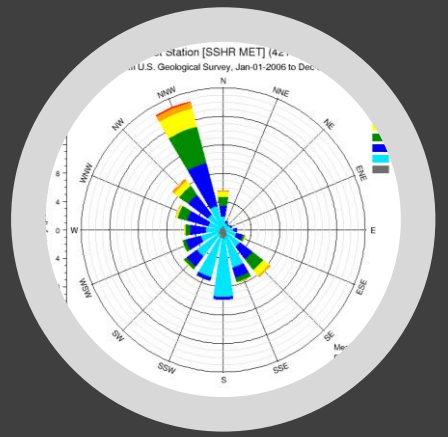
- Gather the following basic data
  - Annual rainfall
  - Average monthly rainfall
  - location of sewage treatment plan facilities (map and distance from site)
  - Water sources
  - Groundwater depth and flow at site
  - Average water treatment cost
  - Quality of the groundwater
  - Average potable water supply cost
- Investigate water flows, water quality, conservation methods, topography, geohydrology, soils, wetlands, adjacent bodies of water.
- Research rainfall rates and perform a basic water-balance study.

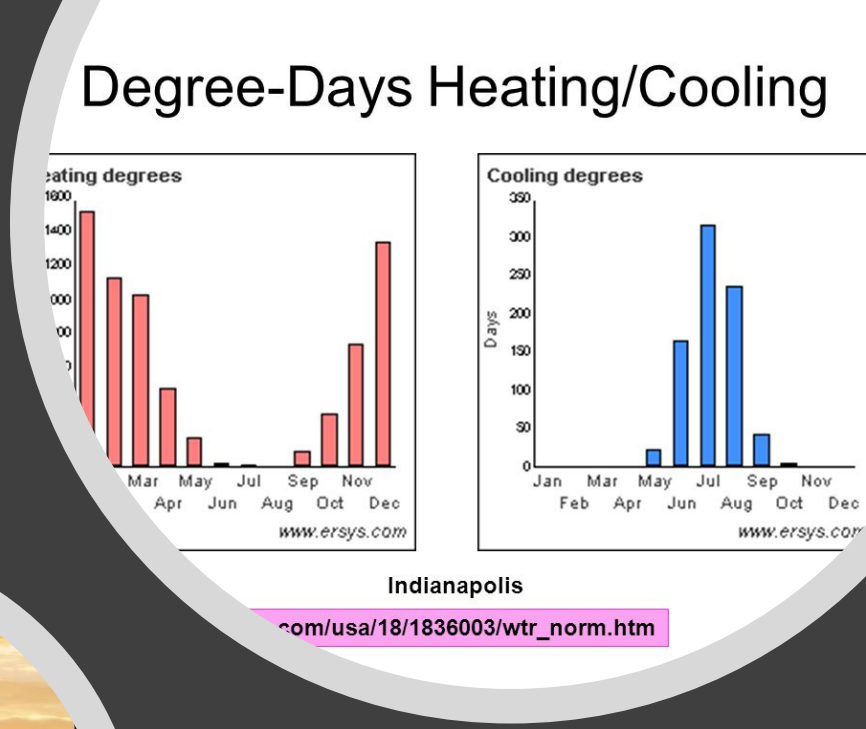




Energy

- Understand the climate of the place; gather available climatic data:
  - -solar and wind capacity
  - -Heating degree days
  - -Cooling degree days
  - -Windrose…
- Investigate Energy sources, microclimates, utility providers, potential financial incentives, …



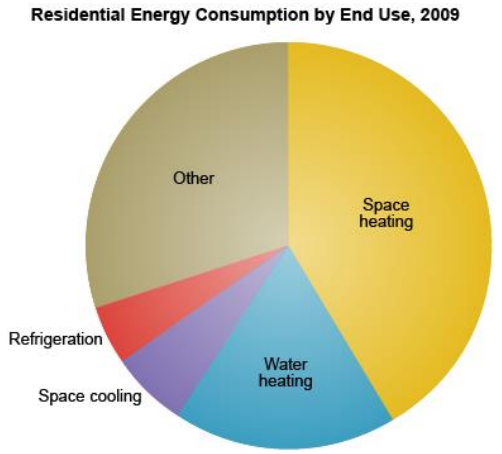


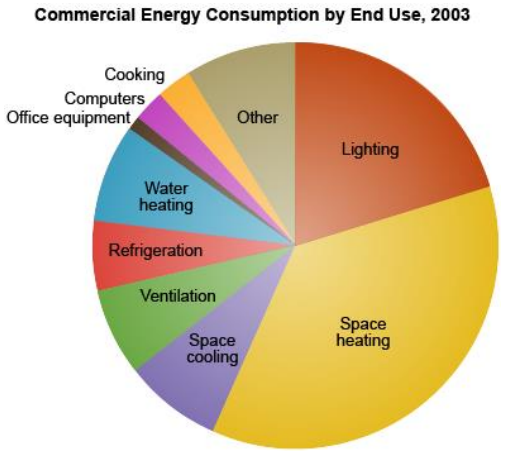
Energy

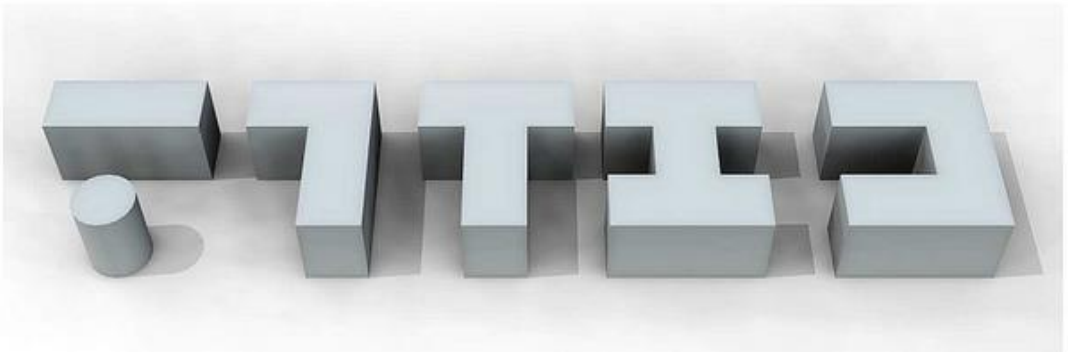
- Understand the building's likely distribution of energy consumption by end use

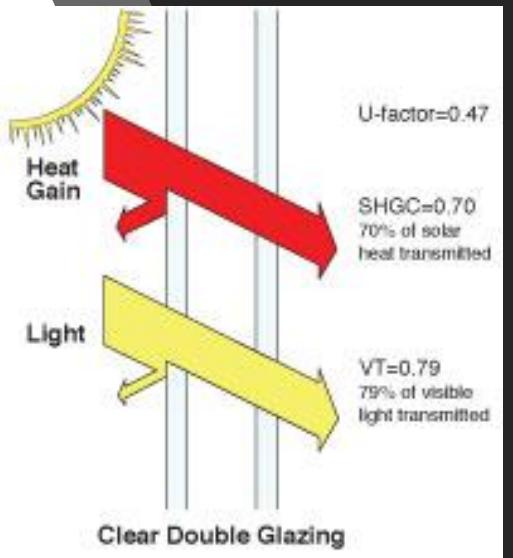
-produce base-case energy model

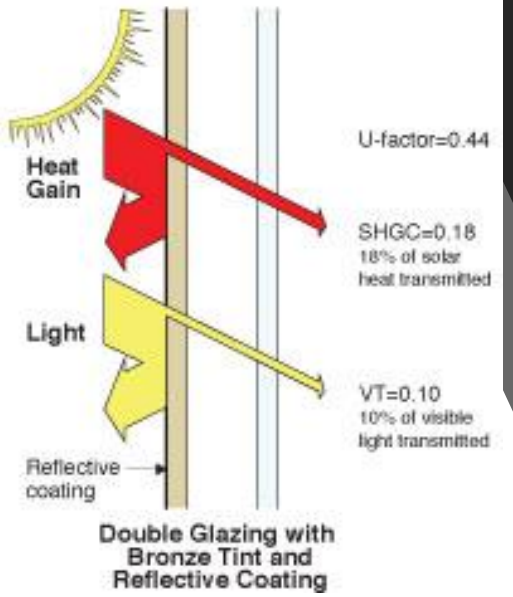
-produce an energy-load-distribution chart











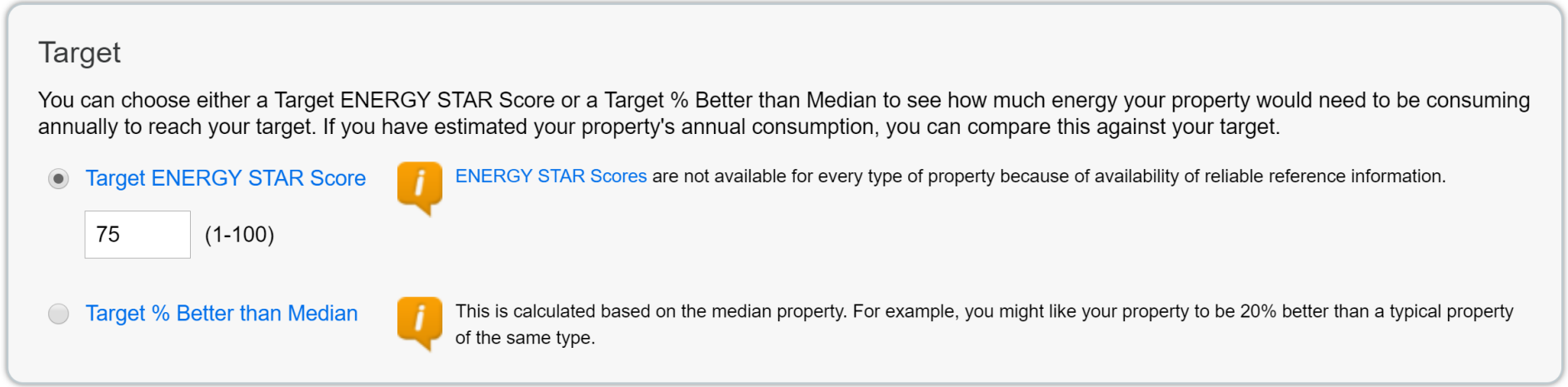
Energy- Building Massing Model

- Initial evaluation of potential overall energy strategies:
  - -solar orientation
  - -Insulation values
  - -Window performance levels
- Initial modeling iterations could include:
  - -Building-rotation evaluations
  - -Walls and roof R-value
  - -window-size variations
  - -window evaluations with performance criteria for both solar heat gain coefficients and overall U-values
  - -A matrix that shows the differences in energy use for each of the above envelope performance parameter levels.
  - -Report results in kBTU/square foot/year.

Energy

- Understand the building's heating and cooling loads based on the above analysis.
  - Determine if the project is likely to be an internal- or external-load dominant building.
  - Benchmark energy performance of similar buildings (using Target Finder tool).
  - An energy-performance report

ENERGY STAR® Portfolio Manager®



Materials

- Identify local building materials
- Identify alternative and indigenous building materials and building techniques used historically in the place.
- Identify local recycling infrastructure to determine capabilities for recycling construction and demolition waste.
- Evaluate alternative transportation resources and potentially, investigate options for locating the project
- Research potential for obtaining life cycle inventory data for various likely materials.

Other Activities During the Preparation Phase

- Selecting Principles & Measurement systems
- Cost Analysis
- Determining Schedule & fees

Principles and Measurements

- Select rating system and performance measurement criteria

-LEED

-Green Globes

-LivingBuilding Challenge

-Labs21

-Ecological footprint

-CO2 balancing

-Life cycle assessment (LCA)

-BREEAM (UK)

Cost Analysis/Schedule & Fees

- Prepare integrative cost-bundling framework template

-A framework of costs listed or grouped by broad functions.

- Develop a scheduling template- a road map- for assigning tasks.

-The detailed scope of integrative design work (interactions and tasks) for the project

-The issues that will need to be addressed

-The specific tasks and interactions between team members. So that proposal B can be written more accurately and fairly.

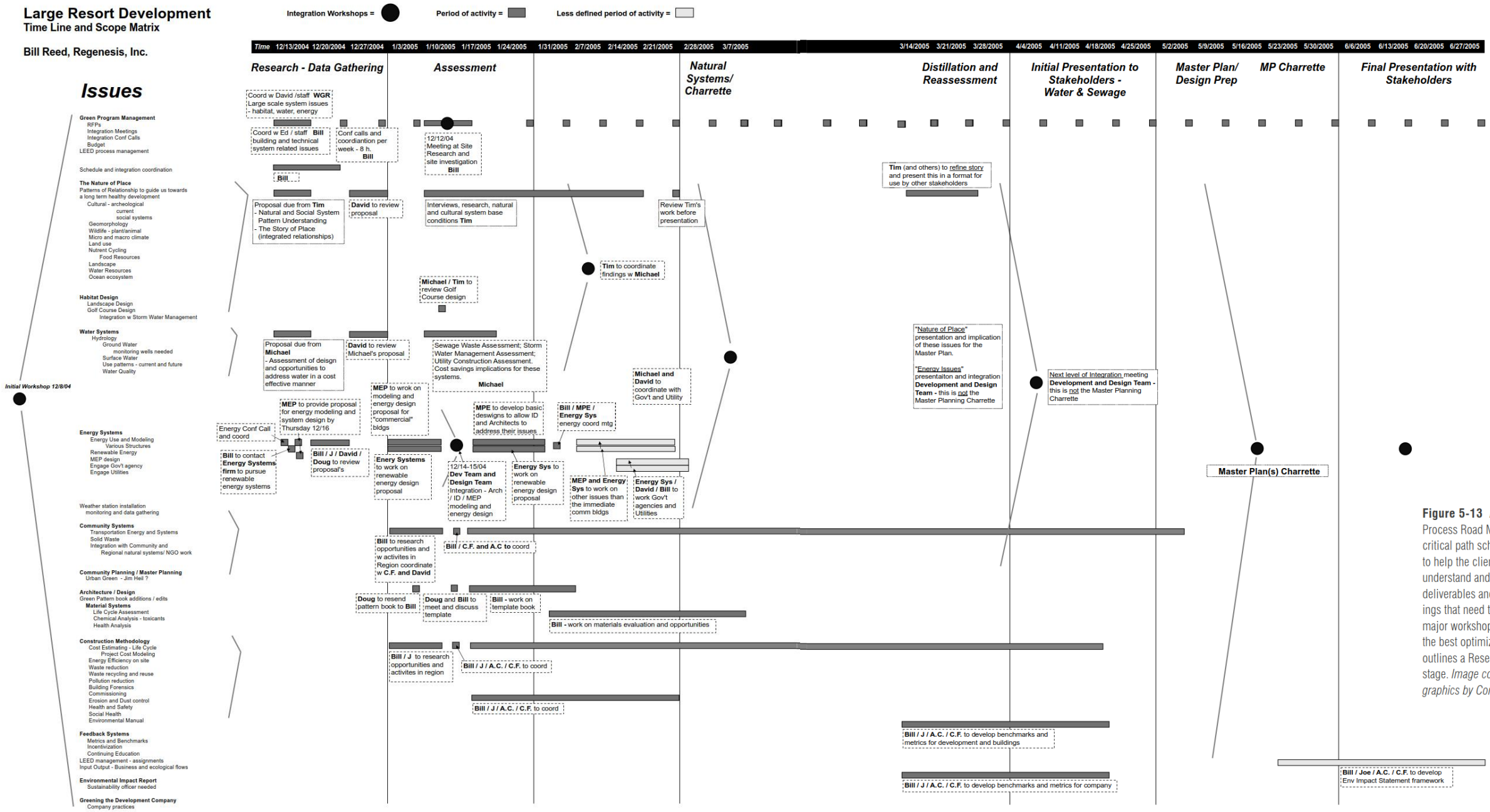
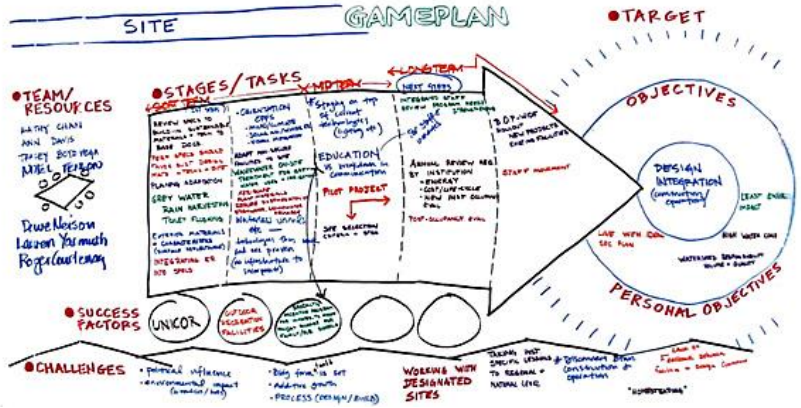


Figure 5-13 A sample Integration Process Road Map. This is not a critical path schedule; it is designed to help the client and design team understand and schedule the various deliverables and integration meetings that need to occur between major workshops in order to achieve the best optimization. This example outlines a Research and Analysis stage. *Image courtesy of Bill Reed; graphics by Corey Johnston.*

Prepare Agenda for workshop No. 1

- Include input from the primary team members
- Could be accomplished by scheduling a conference call
- Slavish adherence to established agenda activities and time frames can stifle valuable discussions.
- “Follow the energy in the room.”
- Establish and outline the purpose and objectives of the workshop.



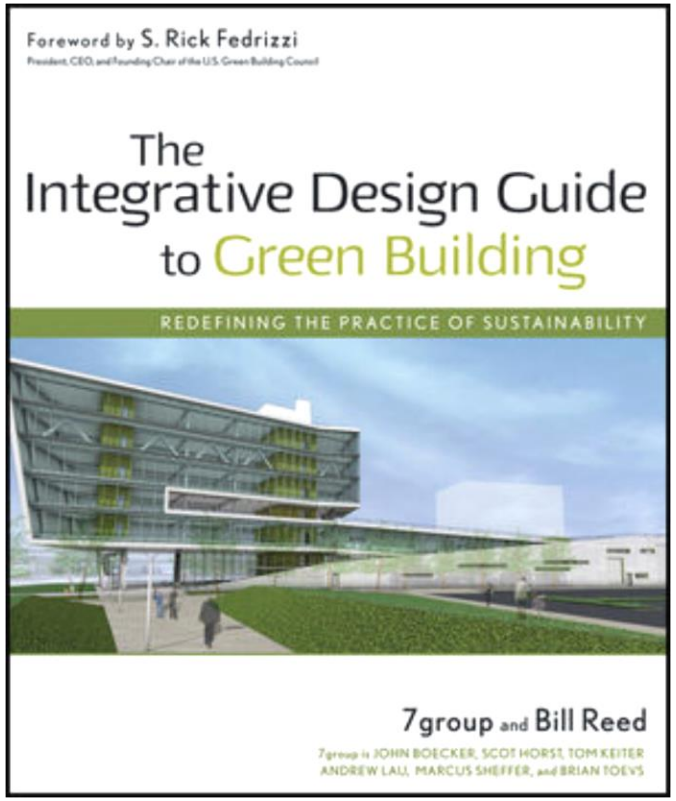
Questions to Consider for writing the Reflections:

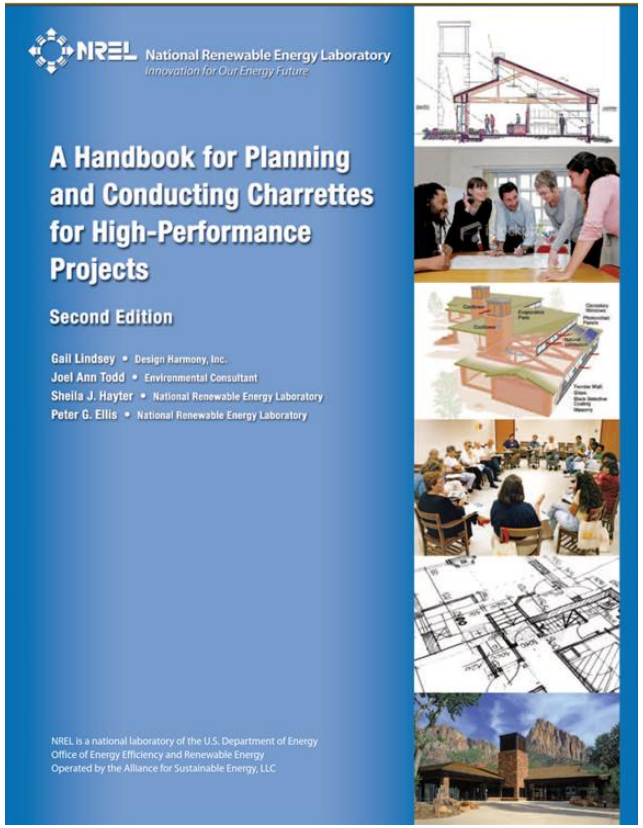
1- FOR ONE OF THE DISCUSSED SUBSYSTEMS (HABITAT, ENERGY, WATER, MATERIALS) PERFORM THE STEPS DESCRIBED IN THIS SESSION ON YOUR STUDIO PROJECT. SUBMIT YOUR REFLECTION ON THE ACTIVITY & SUPPORTING MATERIALS.

Preparation Reading for Next Class:

Subject:

Design Charrettes- The Goal Setting Workshop in IDP Process





Additional Slides

The story of “Chartwell School”

- **Chartwell’s mission:** to provide students with specific learning difficulties (dyslexia and related symbolic language processing problems) the learning tools and personal support they need to operate effectively in “real world” situation. The single most important component of chartwell’s philosophy can be stated simply as **“educating the whole child”.**

The building Goal

Early on in the process our goal was not first and foremost to build green, but rather to build the best educational facility that would lead to positive education outcomes and experiences for our students. So, we began to look for the best approach to accomplish that. As we worked toward this goal, it turned out that the green building and integrative design process led us down a sort of reflective investigation of our own core values.

Programming Effort

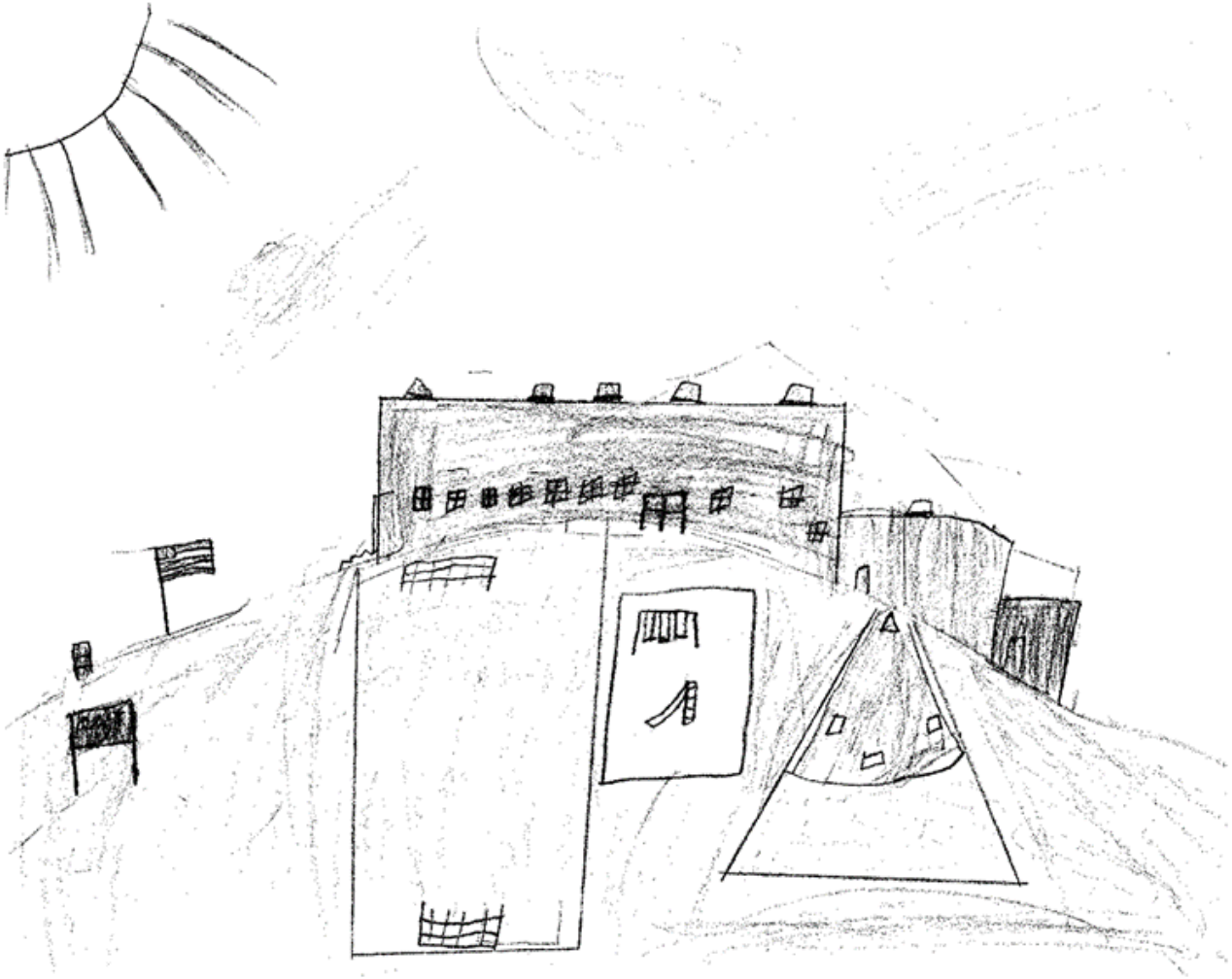
- 9 conferences aimed at investigating the school's vision for its facility including teachers and faculties.
- The collective responses, creating a tension, a fertile complexity, from which creative solutions can emerge and evolve.
- Merged with LEED framework

Sample Questions

- Describe Chartwell's Mission Statement; how can this project enhance that mission?
- What do you think the school's program will look like in 5 years? 10? 20?
- What is your vision for the new campus?
- What is the most important aspect or component of Chartwell's educational philosophy?
- Can you identify specific teaching principles employed by Chartwell?
- In order to support these principles, how can the design of the building's spaces and site and their interrelationships promote these principles?
- How can provisions best be made for:
  - "decompressing" space?
  - promoting relationships to exterior spaces?
  - providing the potential for multiple ways of grouping students?
  - maximizing natural daylighting and indirect lighting strategies?
  - augmenting acoustical properties and performance?
  - augmenting indoor air quality and ventilation?
  - integrated design strategies that utilize the model of "building as organism" to eliminate redundancies and components or downsize systems in order to reduce energy and operations costs?
- How best are spaces, functions, and buildings clustered and/or nested on and with the site to create healthy relationships?
- How can synergies occur between instructional spaces and "community" spaces?
- Could the building itself serve as a teaching tool by providing inherent learning opportunities in its design by:
  - utilizing circulation spaces as an opportunity for learning by creating a heightened sense of awareness that stimulates receptivity?
  - utilizing circulation spaces serve as galleries for student work and art?
  - providing visual and physical contact with natural systems and the environment?
- How can spaces be integrated into the site in ways that utilize exterior spaces to stimulate learning?
- Can building components instruct students about our relationship to natural phenomenon, for example, by including passive solar strategies or an integral sundial?
- Can conservation strategies such as rainwater catchment systems and photovoltaics be integrated into the design such that they provide instructional opportunities?
- How can the project contribute to the health of the place in which we are building?

These discussion points and questions represented

Programming Efforts



Synergies between Green building approaches and the school values

- PV panels that produce about half of the electricity the school needs, becoming a leading source of investigating the pursuit of grid-neutrality for schools.
- Natural Ventilation and great Indoor Air quality
- Copious daylighting provided in all educational spaces reducing lighting demand by 50 percent.
- A rainwater harvesting system, including a sluice that not only is used by teachers to educate students about water flows but also reduces building water use by approximately 70 percent.

Synergies between Green building approaches and the school values

- Science gardens where students are growing organic foods, composting and learning about the food cycle, including food that is served at the school and waste that is composted back into the garden soil.
- A web-based energy-monitoring system that is incorporated into curriculum and can be used by students to track their energy use, learn about the relationships between building performance factors and energy consumption, and compete with other classrooms for lowest energy use.
- Salvaged materials used to build portions of the school derived from the building previously existed on the site; and a design that is panelized with bolted connections and special fasteners that allow for deconstruct ability of systems at the end of their useful life.

Results

- **The school costs less to build and significantly less to operate.**
- **Initial post-occupancy evaluations indicate a pattern of reduced absenteeism, reduced reports of health-related issues due to IAQ issues, and anecdotal evidence of improvements in learning and student outcomes, along with a significant increase in the enthusiasm on the part of students for engaging education.**