Market Transformation to Sustainability
Guideline Standard
September 2006

Whole System Integration Process (WSIP)

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Introduction

In November, 2005 a committee of building industry practitioners gathered in Chicago to begin a dialogue on how to offer the marketplace a document that codifies the meaning, importance, and practice structure of an Integrated Design Process. The organization, Market Transformation to Sustainability requested the formation of this group to create a standard guideline of practice to provide clients and practitioners with a framework to structure this way of practicing a highly interactive and co-learning practice. The process of Integrated Design is essential to achieve both cost efficiencies and highly effective green performance. Many talk about the need for this process, very few teams do it well. This guide is intended to inform designers, engineers, builders, and clients about this process and provide a framework to take the mystery out of this way of practicing.

The City of Chicago and Perkins and Will sponsored this effort with meeting space and support. Many others expressed interest and the people who took time from an abnormally intense business climate to work on this are listed above.

This document is intended as a first draft to elicit comment from many others in the industry. This will be a consensus process. Experience has demonstrated that participation in a process like this is limited at first. Comments and participation are plentiful once something definite is published. This is the first draft. It is intended to start a dialogue process with representatives of the major interest groups in the building industry – architects, designers, engineers, contractors, ecologists, owners, institutions, government, manufacturers, facility managers, procurement officials, and so on.

Our assumptions about the nature of this document are:

- It needs to be simple enough to be referenced by busy building professionals and clients seeking to understand why they can benefit from an IDP process.
- It needs to be specific enough to function as a guideline for practitioners and clients in determining the scope and deliverables of the design, construction, and operation practices.
- This framework needs to be generic enough to be applicable to a wide variety of project types and process entry points in the timeline of a project
- It needs to speak to all participants in project delivery so they are comfortable participating in the design process
- Because the breadth of environmental design moves building practice significantly beyond the physical boundaries of the project and backward and forward in time to involve many more people than the "designers" we have changed the name from the usual "Integrated Design Process" to one that looks toward a broader and evolutionary integration process – a "Whole System Integration Process"

In the spirit of not letting 'perfection become the enemy of the good' this first draft is meant to stimulate comment and dialogue so that the community of building professions can align themselves around the importance of integrating all the aspects of life that need to be considered in the support of a healthy planet. This is the beginning of a consensus process and this document is intended as a catalyst to spur deeper dialogue with a broader band of building industry professionals and associations. As interested parties step forward we will schedule a structure to address comments and rewrites if necessary.

Intent – This document is intended as a standard guideline to support the building industry in the practice integrative design. The purpose of Integrative Design is to effectively manage the optimization of complex systems in the effort to realize sustainable practices in design and construction. To achieve cost effective and increasingly more effective environmental performance, it is necessary to shift from conventional linear design and delivery processes to the practice of interrelated systems integration.

Purpose - To provide a common reference for all practitioners (architects, builders, designers, engineers, landscape architects, ecologists, clients, manufacturers, and so on) in support of <u>process changes</u> needed to effectively realize cost savings, deeper understanding of human and environmental interrelationships, and an improved environment for all living systems – human, other biological, and earth systems.

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1. Reviewers: Issues to consider when critiquing this draft document:

Before Reviewing the document - Please review the questions below so that they will be present in your thoughts as you review the document.

After Reviewing the document – Please provide your input by answering the questions below and returning your responses to

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1) Is the information sufficient to support design and building teams as they begin the effort to shift the structure of their practice?
   a) Is it too much information or too little?
   b) What areas of the document would benefit from more or less information?

2) Does this document inspire deeper thinking about the subject or is it inadequate / overwhelming?

3) What acronym best catches the scale of moving IDP practice to more whole systems –
   a) WS-IDP (Whole System – Integrative Design Process)
   b) WSID (Whole System Integrative Design)
   c) IWSD (Integrative Whole System Design)
   d) IDP (Integrative Design Process)?

4) Evaluate the proposed indicators of success (point scoring potential)
   Do we want such indicators? Offer alternative suggestions and / or edits.

2. Background

a. Definitions

Integrative Design Process (IDP):
A discovery process optimizing the elements that comprise all building projects and their interrelationships across increasingly larger fields in the service of efficient and effective use of resources

Whole System Integrative Design Process (WS-IDP):
A discovery process optimizing the elements of all living systems and their interrelationships (the Whole) in the service of sustaining the health of living systems (human, biotic, and earth systems)

b. Everyone is practicing Integrative Design . . . at least that's what they say…

What is this mysterious label and what does it mean? How do you know if you really are practicing integrative design or not? How does a building or master planning client know who to believe when selecting a team?

With the steadily increasing demand for green building, and the proliferation of the U.S. Green Building Council's LEED® Green Building Rating System, there is a heightened awareness that the design process itself determines the success and cost effectiveness of implementing green building and using rating systems. Practitioners now recognize that a more collaborative design process, one that focuses on integrated design, can make or break a project. Indeed, it largely determines the final value of the built project. This process also can be seen as the most difficult aspect of (green) design, and its success depends upon every member of the team participating and committing to it.

When asked about green building, design professionals often respond in one of two ways. First, there are the nay-sayers, those who feel that green design is either a passing trend, or that it is an expensive add-on layer superimposed onto 'traditional' design. Second, there are those professing that they've been doing green design since the 70's solar craze, and that everything they do is green.

So how do you know? We suggest that to answer this question, one needs to have a set of indicators - both qualitative and quantitative criteria - that evaluate whether or not one really is building green. The U.S. Green Building Council (USGBC) created the LEED rating system to answer the questions, "what is a definition of a green building" and "how green is your building?" Similarly, we now need to have a set of indicators that can answer the question – "how green is your process?". . . or, "how integrated is your process?"

To answer this question, it first is necessary to raise awareness about our current practice and to uncover what might work better. Accordingly, it is important to recognize the indicators of a "dis-integrated", or dysfunctional, process. These include:

- lack of clear and shared understanding of **project goals and basic aspirations** during conceptual and schematic design
- poor **communication** resulting in errors, omissions, and assumptions that result in over-sizing, redundancy, and gaps - or disconnects - in knowledge and performance analysis
- a heightened degree of **mystery** between disciplines, particularly around specific analysis (for example, the architect doesn't understand how the mechanical engineer arrived at the current design, or what assumptions defined the system's performance analysis)
- lack of **value** in meetings, tasks or activities: This could range from "value engineering" (which jokingly is referred to as neither), to a set of ongoing, repetitive meetings where specific outcomes are not clearly defined. People walk away from such meetings feeling like their time has been wasted.
- overlaps in roles and and gaps between team members' **responsibilities** (especially in LEED projects) with discoveries throughout the process that holes in scope exist or that tasks overlap
- **silos** – decision making happens without collaboration (a typical example is the architect saying, "it's too early to include the mechanical engineer, interior designer, or landscape architect - we're only in early design")
- lack of a specific or defined **map**. The integrated design process differs in significant ways from the conventional design process to which we've become accustomed or conditioned. There is no way to embark on an integrated design process without charting its course (together as a group or team); the project team must intentionally map its process with clearly targeted goals and with identified decision-making paths, milestones and methodologies for analysis – Without these, the team has no idea where it will end up, but it can be assured that the results will include lots of added headaches and increased cost. In other words, without a map, it's too easy to fall back into conventional practice patterns.
- **meeting structure** and flows – lack or omission of group brainstorming sessions, particularly early in the process - project teams need to utilize a charrette process, combined with targeted meetings that are interspersed between larger group meetings, focused on specific analysis and co-solving problems – without such a process, teams tend toward silo behavior.

On the other hand, you know you are participating in an integrative design process when…

- … you are asked for your input on a wide range of issues – including those outside of your immediate area of expertise or purview.
- …a number of project team members are pushed out of their "comfort zone" (they either find this exciting and invigorating, or initially terrifying and disturbing!)
- …there is a shared understanding of project goals that result from collaborative working session(s).
- …the expectations of your work are clearly defined and sufficiently detailed – the results have targeted, quantified performance goals.
- …other people's work depends on yours, since no one's efforts are completely independent; rather, tasks are *interdependent* - you can't just go off and hide in a corner, then push through your deliverables. Stakeholders need to co-solve problems.
- …you feel that group interactions inspire creativity - working sessions are more "fun".

- …you feel more respected and valued than in a traditional project, and you feel obligated to respond in kind – you sense a higher level of morale and alignment with the core values expressed by the group, resulting in an expanded degree of pride in the outcome.
- …there is a focus and emphasis on process itself, including an early collaborative goal-setting session attended by all team members (no later than schematic design) to establish a shared understanding of project targets and priorities.
- …the process is mapped clearly – stakeholders actually spend time planning how problems will be solved together, with decisions made in a transparent way – this defined "map" is incorporated into main project schedule.
- …innovative solutions that challenge "rules-of-thumb"are encouraged (innovation doesn't mean high tech or risky strategies).
- …decision makers (client) and an expanded array of stakeholders are involved in a significant way.
- …the project embraces issues not usually considered in the typical design process – such as the health of the watershed, the regional ecology, and the community – by engaging an ongoing process of discovery that identifies what contributes to the health of the project's context or place.
- …you feel a greater sense of ownership in the entirety (or whole), rather than in individual aspects or components.
- …there is dialogue and debate surrounding design decisions, leading to a higher level of "buy-in" and consensus among the team.

However, it is important to remember that very little in life is black and white, including the design process. It is not usually the case that a process is completely collaborative or completely dysfunctional. More likely, there are variations. One typical scenario is that a team gets off to a great start, then the process degrades over time. At the outset, a team focused on green design will plan an initial charrette – excitement is high, enthusiasm abounds. People leave the charrette revved up and ready to charge ahead…however, engrained habits are hard to change! Either the charrette was a one-hit-wonder and didn't include a rigorous mapping process, or there wasn't enough built into the ensuing process to insure that collaborative interaction would continue.

Taking it on faith after the first charrette isn't enough. Team members need to understand that their process will not be integrated unless they continue to pay vigilant attention to it, and continue to question even their own participation and habits. A truly integrative design process will include a variety of interactions amongst the team – a series of larger charrette meetings with smaller focused meetings in between, all orchestrated to build on each other. Each meeting, interaction and activity should serve to add clarity and value to the exploration, analysis, and resulting design. If not, the merits of these activities should be questioned,and alternatives explored that might better serve the purpose.

The indicators of an integrative design process are mirrored in both the built product and the human interaction that leads to it. First, opportunities are found that optimize the interdependence and syntheses between building systems and - this is key - optimize costs as well, specifically first costs – hard construction costs. Decreased costs resulting from the elimination of redundancies and streamlining systems are a solid indicator that the design team is not just piling on technology without a rigorous and carefully considered method of analysis. As a result, highly integrated building systems can't fall prey to typical value engineering methods, because components are inextricably inter-related, and they cannot be reduced by merely removing them without significant impacts on other systems components. Clarity about both the design and the steps to be taken in the design process are another strong indicator of integrated design – the mystery surrounding who knows what and how they do what they do is reduced, thereby augmenting clarity that is visible in the final design.

Accountability is another indicator. Accountability in the form of quantifiable building performance metrics (where LEED and other rating systems plays a role) gives design teams a measurable means for determining what actually has been accomplished. Such accountability in the design process requires that stakeholders are held to task for specific milestones; their input is interdependent with others and therefore critical in order to produce deliverables and meet deadlines.

The first step in assuring proficiency as an integrative designer is to pay particular attention to your own indicators – if you are reflective about your participation and the participation of others in the group, you have a much higher chance of success. In other words, look for quantifiable feedback that evaluates the collaborative nature of the process,

c. The Need for WS-IDP

There is high demand for green and sustainable design. The use of LEED (and other green building rating systems) by the architecture, design, construction, and engineering fields grows monthly. At the same time, demand for green buildings from both public and private sector clients is expanding dramatically.

Substantive claims and data from a number of studies support the notion that green buildings, as defined by LEED, are achievable with cost increases ranging from less than zero to three percent, relative to conventional construction budgets. Rising energy costs may transform added costs into substantial net cost savings. Advanced practitioners claim that even LEED platinum buildings can be achieved within conventional construction budgets. This is true when the client-design-construction team realizes these designs by employing a deeply integrative design process.

Sustainable design requires a mindset or mental model that differs from standard practice methodologies. Such a mental model looks at systems in a more complex and integrated way. Instead of looking at just the physical elements of the building, the invisible connections and relationships between the elements need to be understood. These invisible connections and patterns may be manifest, for example, in the downstream impacts resulting from toxins in building materials, or the multiple efficiency and cost relationships between an HVAC system and the building envelope, or the effects that raw material extraction - such as logging practices - has on social systems or habitat.

The concept of integration can be taken farther – sustainability is not merely about making more efficient objects and ecosystems. Sustainability is not something we can simply make. The concepts of “tools” and “toolkits” often are used in ways that perceive sustainability as if it can be achieved by applying technology alone. Success, in such cases, is defined with metrics and benchmarks that mimic industrial production.

Consequently, such projects end up mimicking nature as if its only purpose is to be adapted to human intention. These approaches, although sometimes useful, are incomplete. Instead, we need a literal grounding in the ultimate purpose of sustainability – which, simply stated, is about sustaining life.

It is necessary to understand life in order to sustain it. The interrelationships between water, soil, sun, and shelter – the basic systems that support all species – need to be addressed as a whole system of life-giving processes. Life is a process that is continually making itself and evolving. We must understand that we are an integral part of that process. This understanding is fundamental. If we fail to comprehend this, we will fail in our efforts to achieve a sustainable condition. Unfortunately, understanding the complex interactions of life and the unique nature of how each place relates to the "whole system" requires a different design process - a process that identifies the key species, patterns, and interrelationships that are unique to the place we are building.

This mandates an iterative process of looking through different lenses from the very inception of any design pursuit – even before site selection, if possible. Some of these lenses include: energy, CO^2 burden, life cycle assessment, life cycle cost, LEED goals, habitat health, soil health, hydrology, human and ecosystem symbioses, and so on. We need to advance this notion one step further, conceptually, in order to understand all of these issues as if they are one entity. In short, the pieces need to be understood as *aspects* of a whole, as components that are in integral relationship with each other . . . because that's precisely what they are.

This set of ideas may seem like a lot to grasp initially, but once engaged at a whole systems level, one wonders how we ever could have designed without such an understanding of the relationships between these vital sub-systems. Reaching this understanding takes some extra time for discovery at the beginning of the project, particularly for people new to this way of working and thinking. Understanding and engaging this process might be likened to a blind man attempting to understand an elephant - It will take a few circles around the animal, touching its various parts, in order to understand it's entirety with any thoroughness.

Viewing sustainability through the multiple lenses of technological efficiency and living system health requires us to weave together the unique patterns of life in each place we build. This requires a rigorous level of analysis coupled with enthusiastic dialogue. It also requires: early engagement from the participants, an understanding of how to use a variety of tools, and the ability to recognize ecological patterns in order to make meaningful evaluations. Since no one possesses all of this knowledge, the role of the team takes on great importance. Integrating multiple participants with the increased number of issues that need to be considered within standard fee structures and time frames means that the nature of the design process has to change.

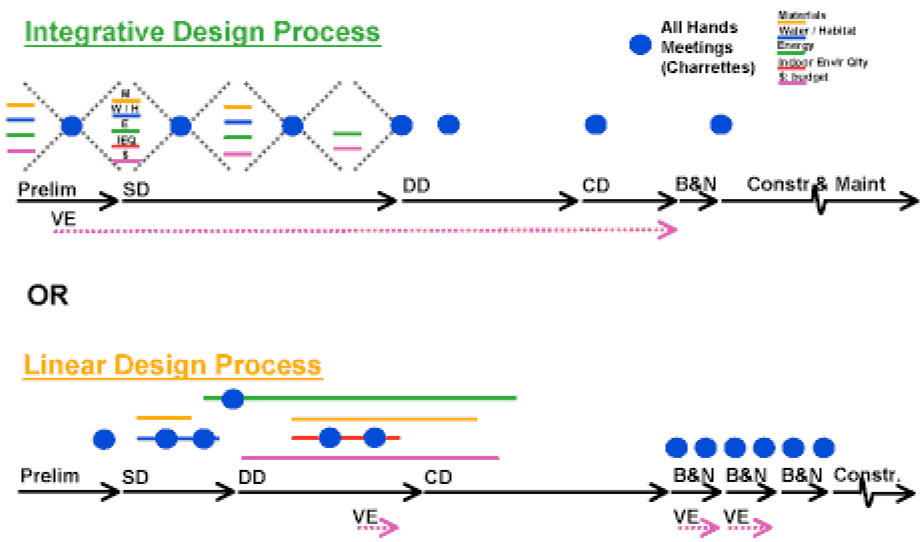
Accordingly, the Integrative (Integrated) Design Process has been explored and effectively practiced by green building practitioners over the last decade. A number of integrated design practice guidelines have been discussed, and in some cases, specific steps have been outlined; however, many clients and design firms who attempt LEED and other rating systems the first time become frustrated because they find themselves slipping back into conventional practice patterns. Consequently, they react negatively to the predictable resultant cost increases. These cost increases, though, need not have occurred had they understood the essential changes required of them and their team.

Other projects teams begin with great enthusiasm for achieving these important objectives, then excitement wanes, and again, frustration sets in. This is because the nature of the change required of participants, their viewpoints, and their practice patterns are not addressed with intentional deliberation. In short, the process of "change" is difficult for all of us. Therefore, it is critical that the integrated design process create a defined structure and map to guide the changes required in the design process itself and to hold them as integral throughout that process.

This document is a first draft guideline aimed at such change by creating a template for practitioners wanting to achieve deeper levels of design and construction integration, with the explicit intent of being applicable to any level of environmentally effective design. Additionally, the WSIP Standards Steering Committee (the group that drafted this document), intended it to serve as a guideline that can be used as a means for expanding current integrated design models in order to consider how we might embrace the "whole" of living systems – and to do so in a manner that becomes integral to how we build and to how we engage in mutually supporting all living systems. Because of this "expanded approach" idea, the design process is addressed from a more integral standpoint. Accordingly, the Steering Committee feels that it would be beneficial to rename it "Whole Systems Integration Process".

d. Linear vs. Integrative Design Structure

The Integrative Design Process is different from the conventional, or linear, design process. Achieving the greatest effectiveness in cost and environmental performance requires that every issue and everybody be brought into the project at the earliest point.



The WS-IDP can be described simply as:

RESEARCH / ANALYSIS - Individual expert team members initially develop a rough understanding of the issues associated with the project before meeting - ecological systems, energy systems, water systems, material resources, skill resources. This is occurs so the design process can begin with a common understanding of the base issues.

- WORKSHOP - These team members come together with all stakeholders in the first workshop (charrette) to compare ideas, to set performance goals, and to begin forming a cohesive team that function as a consortium of co-designers. By being in relationship to each other, each team member allows the issues associated with the system for which he or she is responsible to come into relationship with all others, so that a more integrated and optimized project results.

- RESEARCH / ANALYSIS - Team members go back to work on their respective issues – refining the analysis, testing alternatives, comparing notes, and generating ideas in smaller meetings.

- WORKSHOP - The team reassembles for a deep discussion of overlapping benefits and opportunities – how best to utilize the “waste” products from one system to benefit other systems. New opportunities are discovered, explored and tested across disciplines, and new questions are raised.

- RESEARCH / ANALYSIS - Team members go apart again to design and analyze with more focus and potentially with greater benefits accruing. New ideas are uncovered.

- WORKSHOP(S) - The team reassembles once again to further refine the design and to optimize systems being used (building and mechanical systems) and to integrate systems connected with the project (sun, water, habitat, materials, etc.)

. . . and this pattern continues until iterative solutions move as far as the team and client wish. Simply stated, good integration is a continuously dynamic iterative process. All issues need to be kept in play so that the connections and relationships can be optimized. A linear process approaches each problem directly and separately, while an integrated process approaches each problem from the varied viewpoints of multiple participants and the issues they represent. It is a continuous circling process, one that encourages exploration in order to ensure discovery of the best opportunities, while permitting continuous adjustments as more understanding emerges.

Three to five charrettes are the typical number of large meetings required to move integration forward, in conjunction with many additional sub-meetings. When and how team members interact is the responsibility of the project manager or integration facilitator. Nevertheless, unless the project team meets with some level of intentional integration (and updated analysis) at least every two weeks, the momentum of exploration will diminish.

The foundation of an Integrative Design Process is the Discovery Phase. An understanding of the invisible relationships between the basic systems of a project needs to be gained before the design of any tangible, physical relationships can begin. These basic systems are the aspects and relationships that are engaged within and around a specific project. Every key issue needs to be brought into play – the more the better. This requires that the client, the design and construction team members, the community, and other stakeholders representing key issues and interest, be brought into a relationship with each other so that co-discovery can take place.

The design process should begin by determining, as best as possible, how to increase the beneficial interrelationships between human, biotic, technical, and earth systems. This understanding becomes the foundation for any design aimed at saving resources, restoring the health and benefits of natural system processes, and engaging humans in an understanding of these functions, so that they can serve as effective stewards. Participants in the design, construction, and operations phases of the project must actively seek to optimize the interrelationships between these systems over time – in other words, making sustainable (and best) use of resources, both technical and natural.

The IDP process - or the Whole System Integration Process - for projects that embrace the larger systems of which they are a part, can be summarized with the "Three E's" – **E**verybody engaged, **E**very issue considered, **E**arly in the project.

The trick here is managing this process in such a way that every person is not around the table at every meeting. Each project is unique, so every project requires a roadmap to make sure that assignments are accomplished and addressed by having the right people present at the right time. Management of this design process is critical if money is to be used efficiently and if the energy of team members is to be maintained.

Everybody, Every Issue, Early in the Project

The conventional linear design process makes assumptions about what kind of services and solutions will be provided by consultants. Engineers, for example, will assume the most reasonable, code compliant target for the project's energy consumption. The design process will utilize "rules-of-thumb" to size and select systems. Designers are not asked to think more creatively, because it is assumed that they are practicing at the highest practicable level. However, engineers and architects typically are not working together in an integrated manner to address energy issues from the most basic standpoints of building form, orientation, daylighting, habitat impacts, microclimate, client operations, and flexibility, to name just a few.

An integrative process mandates more coordination. It encourages rigorous questioning. It challenges typical assumptions and rules-of- thumb from the very beginning of the project. Coordinating building and site systems must be addressed early and questioned before schematic design starts, or at the least, while it proceeds. Integrating the many systems involved in a building project requires that the expertise of each team member responsible for each system, be brought together for the purpose of augmenting the efficiency and effectiveness of each system and team member in relation to one another.

3. Practice Suggestions and Template

- To achieve an Environmentally and Cost Effective Integrated Project

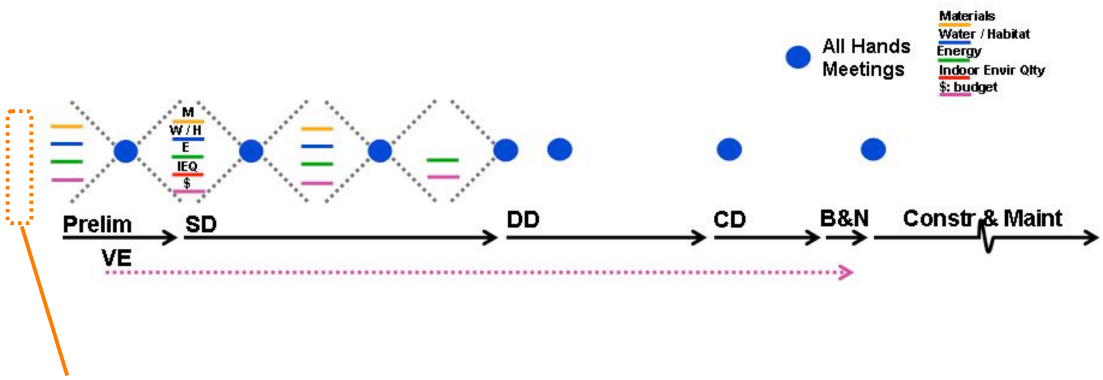
The Basic Elements of Integrated Design

- Fully engage Client in the design decision process
  - Beneficial Characteristics
    - 100% commitment to the process and goals
    - Teachable / Coach-able
- Assemble the right team
  - To design ecosystems, we need to deal with ego-systems. (Carol Franklin)
    - Attitude is critical – i.e., teachable / Coach-able
- Align team around basic Aspirations, a Core Purpose, and Core Values
- Identify key systems to be addressed that will most benefit the environment and project
- Commit to specific measurable goals for key systems
  - with all participants – including the main financial decision maker (not a substitute)
  - Identify Champions for these issues
- Optimization of the design of systems
  - Understand and make best use of key systems in relationship to each other, to the goals, and to the core purpose
  - Iterate ideas and systems relationships among team
    - with all participants – including the main financial decision maker (not a substitute)
- Follow through during the Construction Process
- Commission the project
- Maintain the system
- Measure performance and respond to feedback - adjust key aspects of the system accordingly

A Suggested Process Structure

PROPOSAL PHASE – DEFINING BASIC INTENTIONS

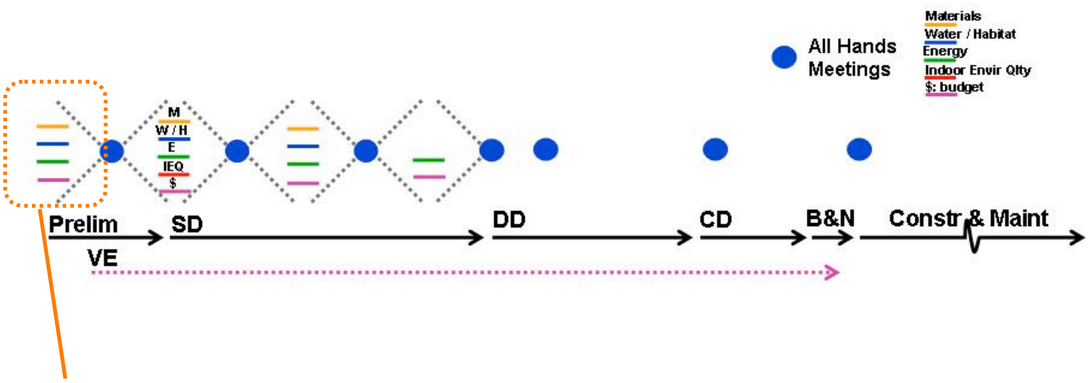
Purpose of the Project – the start of a dialogue creating a foundation for the project



– **PROPOSAL** (to the client)

- Meet with potential Client to get alignment about possibilities for the design and sustainable design potential
  - **A possible Part A and Part B proposal**
    An option is to have the client accept a fee for an initial workshop from selected consultants in order to assemble the proposed team – a Part A proposal.
    - This initial workshop can be used to set performance goals as well as to define the Integrative Design roadmap. With these goals and roadmap established, the consultants will have a much more realistic idea of their scope and what the process may mean for their fee – Part B Proposal.
    - The result is a realistic fee proposal from all team members. This can create a fair process moving forward – less guesswork and frustration for people new to the green design process.
  - **Outline an initial understanding of scope, building program, and sustainability objectives**
- Select the right team members who can respond to building and sustainability objectives and opportunities. Assess expertise needed (whether individuals or combined knowledge held by one person)
  - **Additional consultants may be needed to achieve some level of effective sustainability:**
    - For a Building Project some additional consultants or experience may be needed such as:
      - An experienced Energy Modeler; Daylighting Modeler; Lighting designer; Commissioning Authority; a Landscape Architect or Civil Engineer with an ecological systems background; Building science expertise; Green Material and specifications expertise; a facilitator for group meetings; etc.
    - For a Whole Systems approach some additional expertise may be:
      - A systems ecologist or systems permaculturist; geohydrologist; restoration biologist; community facilitator; social historian; etc.

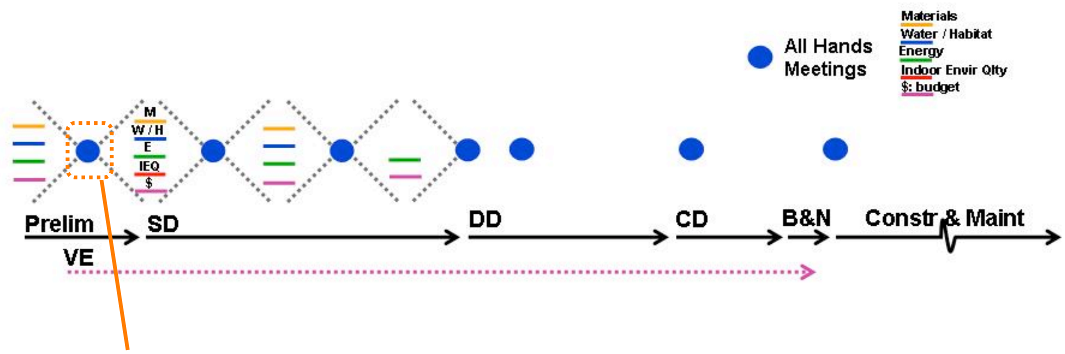
PREDESIGN – THE DISCOVERY PHASE
The foundation of the project



– **RESEARCH / ANALYSIS: Stage 1**
Understand the key issues that can inform the design

- Perform Preliminary Research to prepare for WORKSHOP #1.
- Without initial research, potential green design opportunities will not be able to be discussed with a high level of rationale (avoiding a "fact-free" meeting).
- This is the beginning of an iterative process - a living research document that evolves with a deeper understanding of what is needed to sustain the health of the systems that support life in "this Place".
  - **Identify Base Conditions – the context of the project**
    The Latin root "contexere" = to weave together
    There are two potential tracks to address – reduce consumption AND restore the health of the key living systems of which the project is part and has influence. It is necessary to understand:
    - Microclimate or, at the least, general local climate
    - Hydrology
    - Habitat (soil, animal, plant & human)
    - Cultural / Economic history
    - The interrelationships of all of the above
      - History of the Place (context) - natural & social, past, present & future projections – patterns of life understanding
  - **Core Project Programming**
    - In addition to the basic areas, functions, and adjacencies of the typical building program:
    - Question assumptions (what is the real CORE purpose of this project?)
    - Assess the fundamental, heartfelt Aspirations as well as Needs (functions)
  - **Preliminary Analysis of Flows, Relationships, and Economics between Project Program and the Base Conditions**
    - Energy efficiency and Sources / Microclimates / Building Use
      - Begin the Production of a simple base case or shoe-box energy model to inform and understand: orientation massing, aperture, load profiles, daylighting opportunities, and wind profiling for natural ventilation
    - Water quality and conservation and local habitat, geohydrology and soils
      - Research rainfall and appropriate habitat; perform a water balance study (potential sources and waste – input / output.
    - Material Resources – informed by Life Cycle Assessment
      - Identify local material sources and C&D waste opportunities

- Consider transportation impact of occupants and users – evaluate alternate resources and location of project

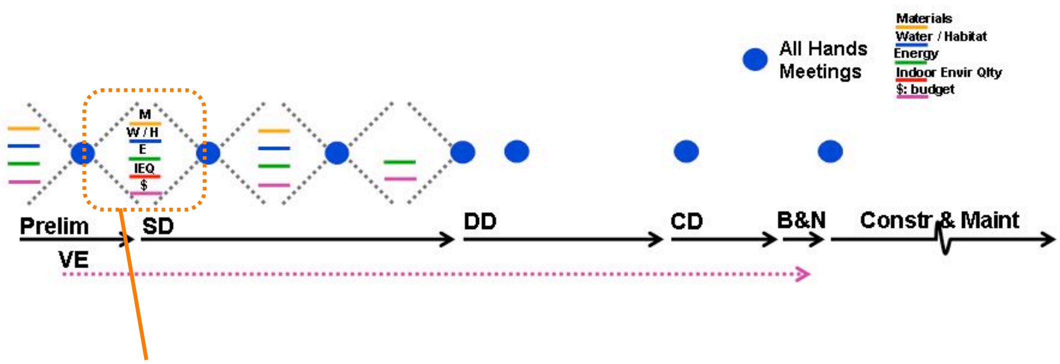


– **WORKSHOP #1:**
Goal Setting and Alignment of purpose / objectives with the Client and Design Team

- **Elicit the clients deep reason for this project …(leverage the clients mission and aspirations if possible)**
  - "Profit" by itself is rarely the only reason for building a building. Leaving a great legacy or helping people achieve higher quality of life is often cited. It is important to make explicit these drivers, because they can shape a project's sustainability objectives more effectively than technical efficiency or economic examples alone.
- **Elicit the design and construction team's deep reason for their work and why they are interested in sustainability**
  - Getting alignment around their real aspirations is essential – if not, the design process may fall back to "default" mode. Avoiding lawsuits is often cited as the driving objective for many practitioners – this aspiration needs to be replaced with something more noble; otherwise, advanced design is rarely achieved.
- **Determine the important design drivers and touchstones essential for this project to be considered a success (project-specific design objectives)**
  - Agree on Initial Performance Metrics & Targets (reach consensus)
    - Living system health
    - Identify and Quantify (to the extent possible) Initial Sustainability Targets
      - LEED, GGHC, Labs21
      - CO2 balancing, ecological footprint, input/output, LCA, Natural Step, GB tool
- **Develop a Process Flow Map (Diagram) to create a disciplined integrative design process.**
  - This addresses responsibility for action items and champions for environmental issues, detailed and staged deliverables (so that rational system optimization decisions can be made), meeting schedules with purpose and expected attendees.
    - This is a roadmap to stipulate points of joint decision-making and problem-solving (not just individual assignments that are later integrated into a project)
- **Project Program re-evaluation in light of sustainability objectives**
  - Operation schedules, building energy zones, size of structure, etc
- **Core team meetings are scheduled & implemented**
  - The Core Team is composed of key team members who are responsible for holding the higher aspirations of the project. The Core Team is not to function in day-to-day management issues – although some members may be in a management position. The Core Team is to evolve with the project

through its life and operation. Its purpose is to build on and improve on the aspirations for sustainable performance over time.

- **Begin determination of Project Delivery methodology - Design, Bid, Build; Design, Negotiate, Build (contractor on Board as early as possible)**
- **The Commissioning process can begin at this point**

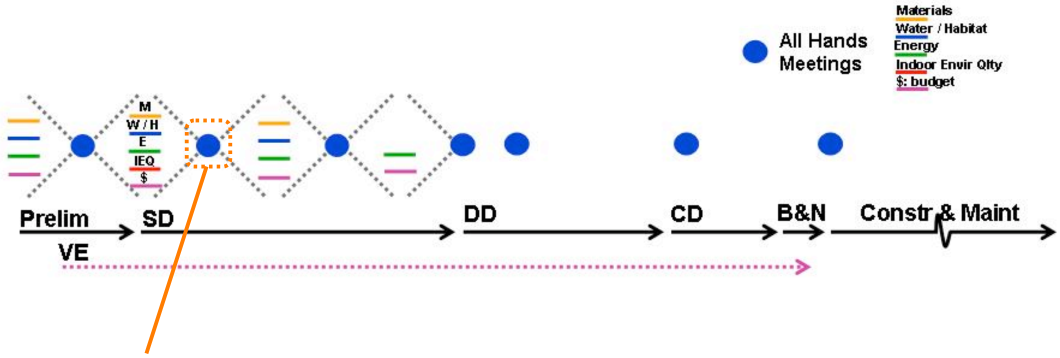


– RESEARCH / ANALYSIS: Stage 2

Continue to refine initial studies based on understanding developed at Workshop #1
Testing concepts for feasibility

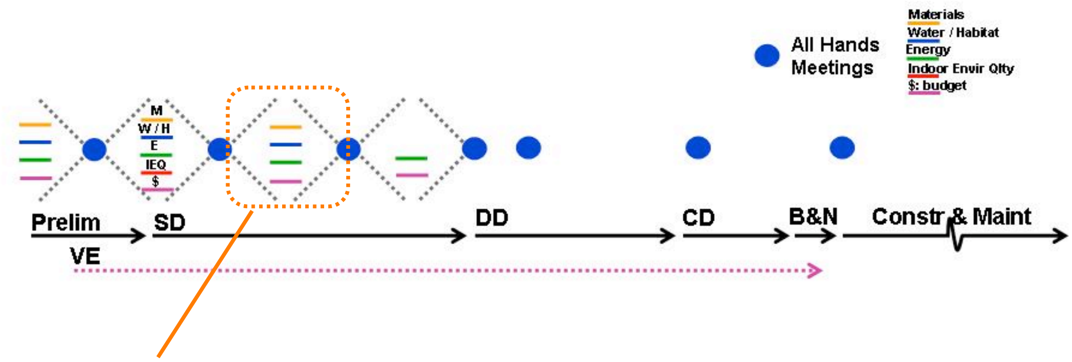
- **Seek Integrated Design Opportunities – reality testing**
- **Refine the Preliminary Analysis of Flows, Relationships, and Economics between Project Program and the Base Conditions. Work with team members both individually and in larger groups as necessary**
  - Energy modeling
  - Water quality, water conservation, local habitat, geohydrology, soils understanding and design
    - Input / output model
  - Material Resources – informed by Life Cycle Assessment, such as ATHENA initial comparative analyses
  - Energy modeling
  - Water quality, water conservation, local habitat, geohydrology, and soils understanding and design
    - Input / output model
- **Build integrative cost bundling template to accurately portray Initial Cost and Life Cycle Cost considerations**
  - Use systems base line items cost estimate as starting point to understand which first costs need to be grouped together to get a true picture of first cost implications – every system is connected in multiple ways to other systems in a project.
  - Consider a net present value analysis of Life Cycle Costs
    - Operation, Maintenance, and Replacement cost considerations
    - Also address productivity and environmental costs when possible
- **Reconfirm Metrics and Benchmarks (LEED, etc.)**
- **Revisit Project Scope**
  - If using a two part fee proposal - Part B proposal due

SCHEMATIC DESIGN



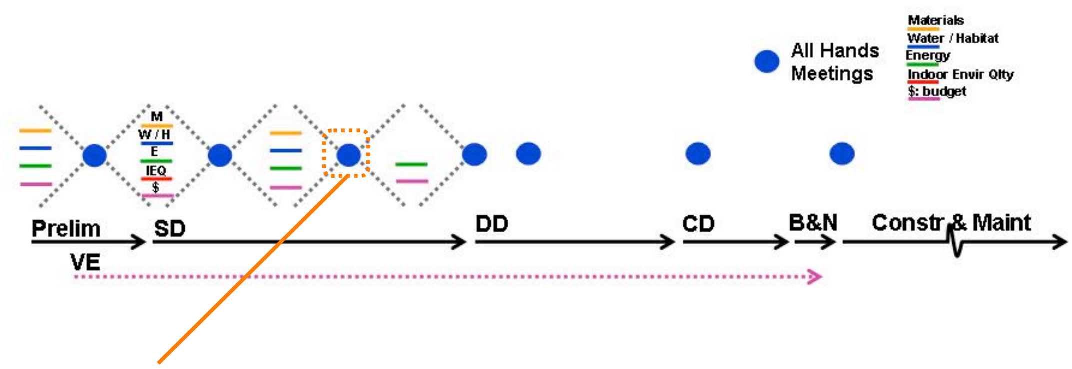
– **WORKSHOP #2:**
Concept Design or Early Schematic Design (Charrette)
The bridge from research and alignment of objectives to the actual design process

- Concept design generation or Concept design review & exploration (depending on where the project is in its development when starting an Integrative Design Process)
  - **Assess the Refined Analysis of Flows, Relationships, and Economics between Project Program and the Base Conditions**
    - Energy efficiency and Sources / Microclimates / Building Use
    - Water quality and conservation and local habitat, geohydrology and soils
    - Material Resources
    - Transportation impact of occupants and users
    - Indoor Environmental Quality Issues
    - Community System relationships – Habitat health restoration; the interrelationship of natural systems with human systems
  - **Review any Integrative Cost Bundling Studies in process – refine as necessary**
  - **Evaluate the Building or Project Program in light of the above findings**
  - **Iterate Design Concepts with the above and set up a schedule to make sure all the issues are in play throughout the design process.**
  - **Confirm alignment around the purpose and aspirations of the project with Client and Design and Construction Team members**



– **RESEARCH / ANALYSIS: Stage 3**
Schematic Design – refinement of research and integration with design

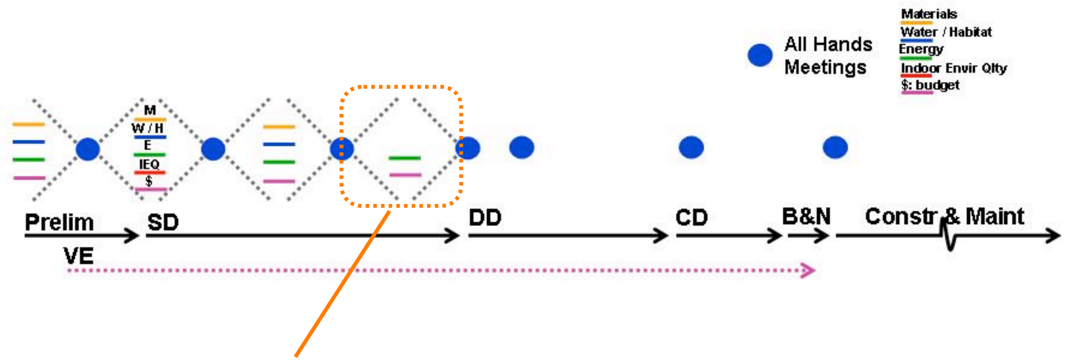
- **Test Early Schematic Design (or Concept Design) ideas against the Core Purpose, Design Drivers, and Objectives**
    - Move to increasing levels of specificity for system integration relationships and resulting benefits
- **Iterative evaluations and optimization of smaller scale systems - work with team members both individually and in larger groups as necessary**
    - Energy issues
    - Water issues
    - Material Resources
    - Indoor Environmental Quality Issues
    - Community System relationships – Habitat health restoration; the interrelationship of natural systems with human systems
- **Review any Integrative Cost Bundling Studies in process – refine as necessary**
- **Reconfirm Metrics and Benchmarks (LEED, etc.)**
- **Build performance measurement and feedback loops into project – immediately and after occupancy**
    - Commissioning process to begin



– **WORKSHOP #3:**
Mid Schematic Design (Charrette)
Fine tuned refinement of the design and definitive inclusion of sustainability objectives with supporting data (intuitive performance concepts are not acceptable at this point)

- The broad issues of the scheme should be essentially 'locked' at this point
    - **Confirm the alignment of Client, Design, and Construction (or Cost Estimating) team around the objectives and aspirations**

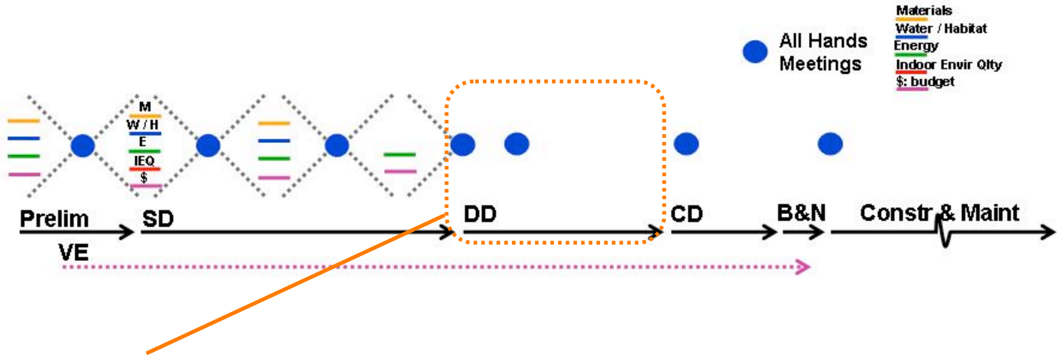
- Continue refining the integration of systems (refine, not redesign)
- Review any Integrative Cost Bundling Studies in process – refine as necessary – Continuous Value Engineering
- Reconfirm Metrics and Benchmarks (LEED, etc.)
- Verify alignment of Schematic Design proposals with purpose and goals of project
- Refine the Design and/or schedule the refining meeting and research process to get there.



– **RESEARCH / ANALYSIS: Stage 4**
Continue to refine modeling and design

- **Address non-building related sustainability issues if not addressed thusfar**
  - These might include more detailed habitat, landscape design, site storm water systems, natural waste systems, recycling programs, education programs, etc.
- **Continue to test design concepts against the Core Purpose, Design Drivers, and Metrics and Benchmarks (LEED, etc.)**
  - Move to increasing levels of specificity for system integration relationships and resulting benefits
- **Review any Integrative Cost Bundling Studies in process – refine as necessary – continuous Value Engineering**
- **Begin documentation process for rating system credits (LEED, etc.)**
- **Build performance measurement and feedback loops into project – immediately and after occupancy**
  - Commissioning process to begin

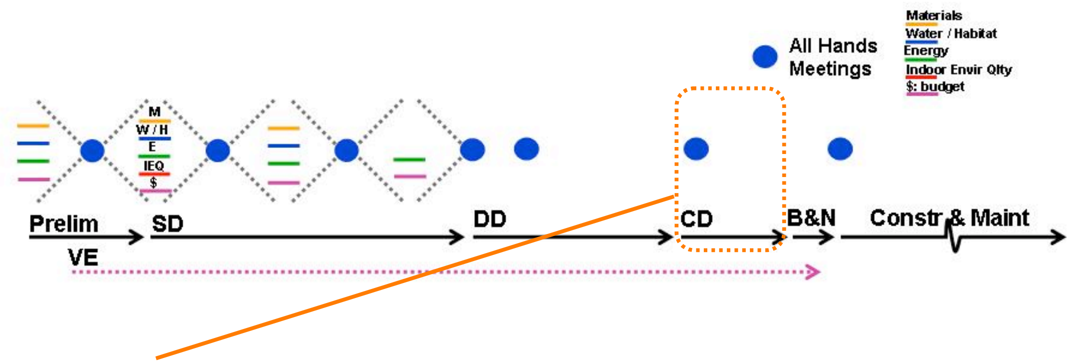
DESIGN DEVELOPMENT



– **WORKSHOP #4:**
  Late Schematic Design Early Design Development (Charrette)

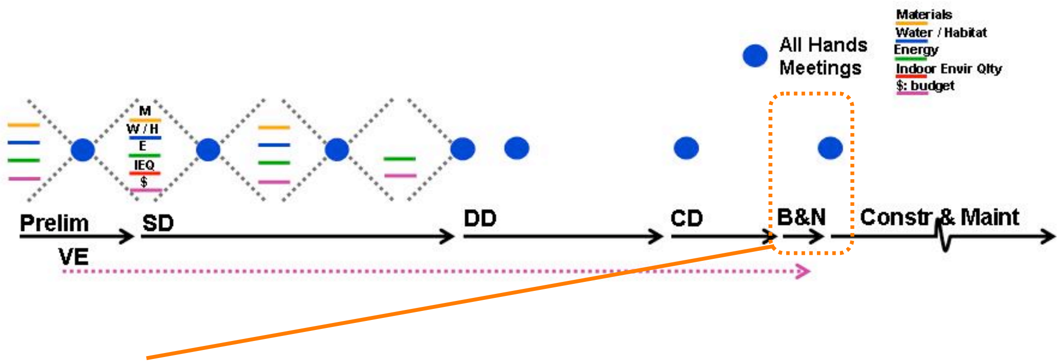
  - This should essentially be a sign-off workshop and used for tying up loose ends before the detailed development process takes place.
    - **Continue refining the integration of systems**
    - **Refine costs as necessary – Continuous Value Engineering**
    - **Reconfirm Metrics and Benchmarks (LEED, etc.)**
    - **Verify alignment of Schematic Design proposals with purpose and goals of project**
    - **Document rating system credits (LEED, etc.)**

CONSTRUCTION DOCUMENTS



– **ANALYSIS:**
Detailed review of Drawings and Specifications

- **Address non-building related sustainability issues if not addressed thus far**
  - These might include more detailed habitat, landscape design, site storm water systems, natural waste systems, recycling programs, education programs, etc.
- **Refine documentation and performance calculations to validate final design**
- **Continue the documentation process for rating system credits (LEED, etc.)**
- **Continuous Value Engineering**
- **Build performance measurement and feedback loops into project – immediately and after occupancy**
  - Design Commissioning process must be in full review mode



BIDDING & NEGOTIATIONS
(The point of engagement in the design process varies, and this process differs for varying construction delivery methodologies)

- Pre-bid & Post Award Conferences to explain unique aspects of project Detailed review of Drawings and Specifications
  - **Address non-building related sustainability issues if not addressed thus far**
    - These might include more detailed habitat, landscape design, site storm water systems, natural waste systems, recycling programs, education programs, etc.
  - **Refine documentation and performance calculations to validate final design**
  - **Continue the documentation process for rating system credits (LEED, etc.)**
  - **Continuous Value Engineering**
  - **Build performance measurement and feedback loops into project – immediately and after occupancy**
    - Design Commissioning process must be in full review mode

CONSTRUCTION

- Confirm Client-Design Team-Stakeholders-Contractor Alignment
  - **Construction Partnering**
    - Pre-installation (review with trades)
  - **Refine documentation and performance calculations to validate final design**
  - **Verify alignment of construction with purpose and goals with Commissioning Authority and Contractor**
  - **Closeout Process and Training**

OCCUPANCY

- Final Punch List
- Operations and Maintenance
  - **Green Housekeeping training**
  - **Continuous systems training for New Staff and Refresher course for existing**
    - Energy, Landscape, Habitat, Water systems
  - **Feedback Loops - Building Systems & Natural Systems**
    - Monitoring (Functional Testing) & Trending (Cx) - Measurement & Verification – Quantity & Quality evaluation
    - Post occupancy evaluation
    - Assign responsible entity to field & translate feedback

4. Possible Metrics and Benchmarks

Criteria 1. Pre-Design Phase- Early Studies and Analysis to inform the design

Intent
Develop an early understanding of the relationships between technical sub-systems and natural systems in a building or planning project before beginning schematic design.

Requirements
Demonstrate that a systemic understanding of key project systems was utilized to inform basic design decisions. Provide a summary analysis sample of one (1) of the following system issues, and indicate how this analysis shaped and/or informed the building or project design:

- Energy Modeling –
  The analysis should demonstrate a systemic comparison of building elements and aspects. Demonstrate how this iterative analysis helped determine building massing, apertures, envelope performance, location, landscape features, etc.
- Daylight Modeling –
  The analysis should demonstrate a systemic comparison of exterior skin elements and features that indicate optimal levels of daylight efficiency as demonstrated by footcandle contour models, lighting model renderings, or photographs of study models.
- Habitat and Water Quality and Conservation Studies –
  The analysis should demonstrate analysis of water quality and conservation and/or habitat studies (plant and animal) that are reflected in the site design - roads, storm water management, waste treatment, landscape design, plant species selection, etc. - and/or building massing and location.

Documentation
Provide a summary sampling of the data, studies, and/or comparison of data and project design, demonstrating how design decisions were influenced by these studies.

Criteria 2. Project Performance demonstrating successful design and delivery of a well integrated project

Intent
Employ an effective integrative design process to implement restoration processes, demonstrating advanced building performance and natural system viability and evolutionary capability.

Requirements
a. Provide proof of an integrative design process utilizing quantifiable calculations, or a narrative describing the logic of implemented restoration processes,

demonstrating advanced building performance and natural system viability and evolutionary capability.

b. The best proof will be documentation of actual project performance and demonstrated restoration of an ecological system.

Demonstrate that originally proposed key performance objectives have been achieved. Suggested key performance areas may be, but are not limited to the following : Energy efficiency; water quality and water cycle benefits; material resource efficiency; Indoor Environmental Quality; Habitat Restoration; transformational education processes with larger community; transportation integration, and so on.

Documentation
Provide a narrative describing the defined objective, the means by which integration of systems achieves the objective, and the resulting validation of anticipated (one point) or demonstrated (one additional point) success in achieving the objective.

5. Issues to be addressed in a future Reference Guide

a) Stories to illustrate WS-IDP
- **Environmental benefits and cost effectiveness**

b) Demonstrate Integrative Cost Bundling

c) Demonstrate Integrative Project Road Mapping

d) Adapting to Change

DIALOGUE, MINDSET ISSUES

Outline of content to be addressed by "Change" task force group (beginning overview):

1. Two different frameworks need to be addressed to effect change:

   a. **Interpersonal Change** (internal to yourself or core group) –
      i) Those things that are personally controllable, affects yourself and those you are working/interacting with; interest based vs. positional dialogue: moving from assuming expectations to exploring possibilities – moving into realms of not knowing what we don't know
      active listening
      mediation
      facilitation
      negotiation
      collaboration
      ii) Skill building vs. expanding knowledge base. How to develop real comfort and ability with these skills.
      iii) Use exercises that empower transformative behavior and discovery
      iv) Create materials that provide guidance.

   b. **Institutional Change** (external) –
      i) Those things that can be influenced but not controlled. Intervening in large and complex systems creates an ongoing need for IDP in projects - must have existing structure that aligns with implementation of IDP.
      ii) Penetrating the character of an institution and understanding where system-wide opportunities exist. Approaching institutions as complex systems while, paradoxically, they are defined more by internal dysfunction than unification.
      iii) Provide people with abstract models for implementing changes, and provide them with enough anecdotes/examples that allow them to transfer the concepts to their own experience.

   c. **An in-between realm** ("corporate" change at the scale of a firm, practice or company)

i) Interpersonal change focuses on the role of an individual in a project team, but that individual often is acting as a representative of a larger entity or company. The culture, priorities and motivations of that larger entity greatly influence the behavior and attitude of such a team member. It is obviously important to influence the larger entity in order to align their practices with IDP (again structurally as well as behaviorally). This encompasses management, finance, staffing, transfer of knowledge, relationships with clients and consultants and more. (see BB's article in GRT newsletter on "Greening the Firm" and GRT's "BootCamp ©" program for more detail on this – too long to incorporate here)

Other notes on "Change":
An IDP includes both people who are participating and people who are leading. Engaging either effectively, even at a basic level, takes development work. Essentially, this is about creating a dynamic community.

If we acknowledge that the role of participation is key, one barrier to that participation is that people often are intimidated, because IDP pushes them outside their comfort zone. Participation doesn't necessarily mean that you're a leader or expert, and if communicated well, we may be able to reach audience.

What are the barriers to participation?

- Fear of failure in role and responsibility—"they expect something I might not be able to deliver"; "I'm expected to be an expert"; "if I don't know something, my role/power is diminished"
- It's not my job or my responsibility—"I'm not paid to design; I'm paid to size mechanical equipment"
- Lack of trust, respect, equity—trying to get extra work for nothing; you won't listen to my idea or point of view due to discipline or training; my ideas don't count for as much because…
- Education & experience--we're not taught how to work collaboratively and often have no idea how to approach it
- Ego—prima donna nature of architects, "it's my building" attitude of owners, etc.
- Different listening & learning styles
- Owner creating conditions not conducive to collaboration including schedule and budget unreasonably un-aligned with project goals or program scope.

How are these barriers overcome?

- Try to create conditions that make an even playing field.
- Understand differences/group dynamics
- "Speak into the listening"—talk in language understandable to individual(s) so that true communication takes place.

How do you talk to people with different ways of hearing ideas? "Active

Listening" training and other skills training. Highlight importance and need to build capacity in alternate skills.

END