



Integrated Design / Construction Process



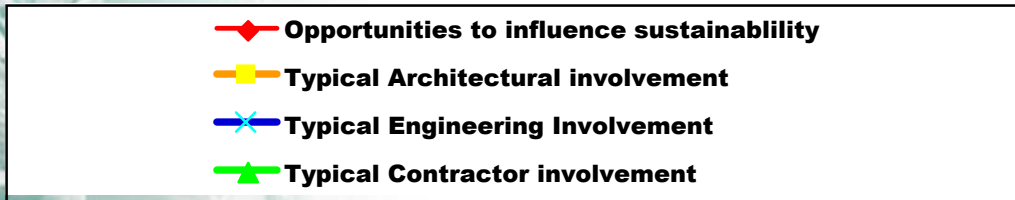
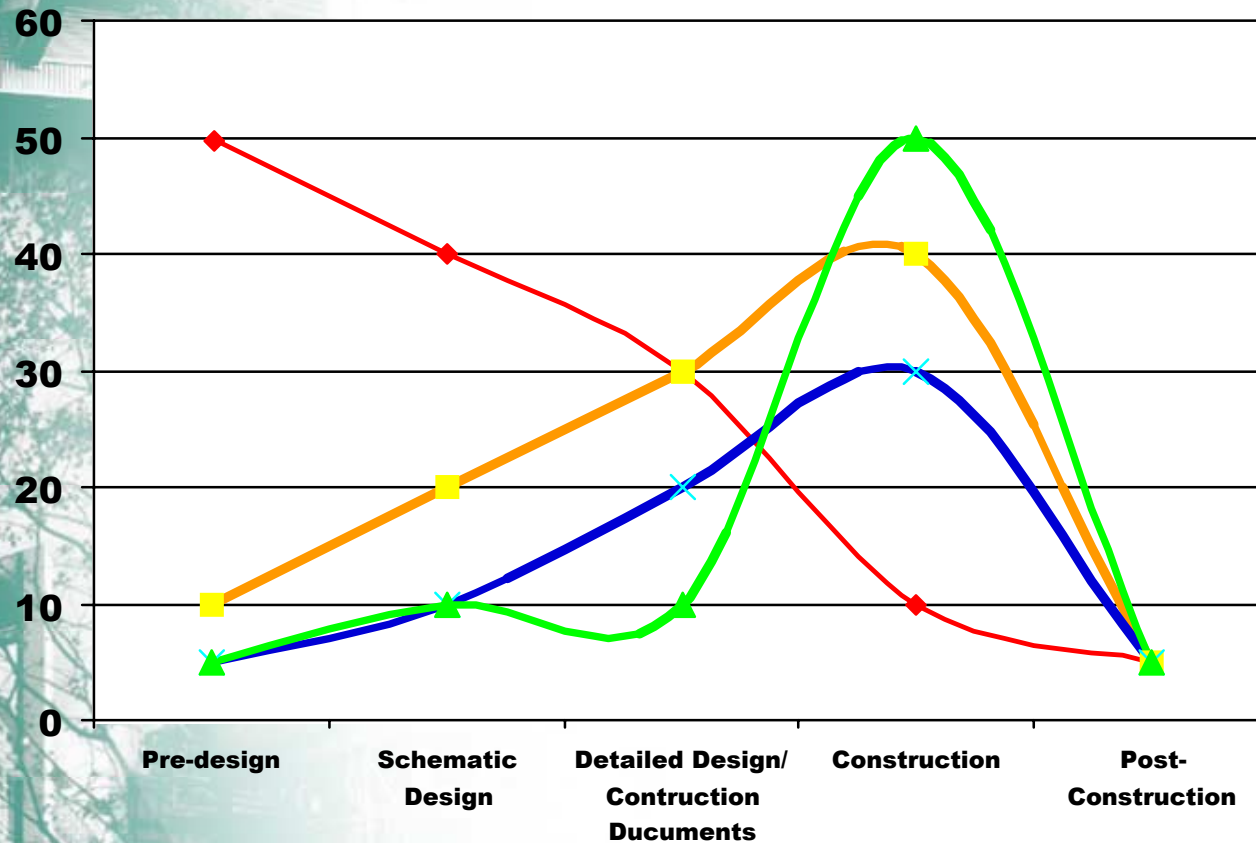
- Achieving cost-effective sustainable design
 - ◆ Collaborative Design Process
 - Clients/Community
 - Architects
 - Engineers
 - Landscape Architects
 - Clients
 - Builders
 - ◆ A team approach to achieving sustainable buildings

What is IDCP ?



- A way of making smart cost-effective decisions early in the design process
- A way of getting buy-in to sustainable design strategies
- A way of defining and then delivering a design strategy that meets specific goals
- A fun, less stressful way of making “it” happen

Timing is really different



Who takes on Project Leadership ?



- **Architect has opportunity to take leadership role while engaging the team**
 - ◆ Systems decisions & trade-offs are made early.
- **Architect can act as a facilitator**
 - ◆ Architect has to learn role and how to play that role...
 - ◆ An external facilitator can be hired to assist
 - Be mindful of the background of the facilitator !
 - ◆ How can we afford to do this ?
 - Integrated design only costs more the first time that you do it.
 - Integration takes time but it saves more time - no re-work!

What are the underlying values ?



- **Trust**
 - ◆ The team trusts that together they can achieve the common goals - goals need clear definition (rock climbing image)
- **Respect**
 - ◆ Each team member knows that everyone brings knowledge, experience and understanding of the project, design and construction
- **Underlying Curiosity**
 - ◆ A new solution will emerge when the team members explore the project's ideas together - all design teams arrive curious, without pre-conceived ideas, but with knowledge and experience; there is a willingness to challenge ideas..
- **Shared Expectations**
 - ◆ Expectations are clearly articulated, and results shared.
- **Teaching & Learning**
 - ◆ The design process is one of teaching and learning from each other.

Great Clients

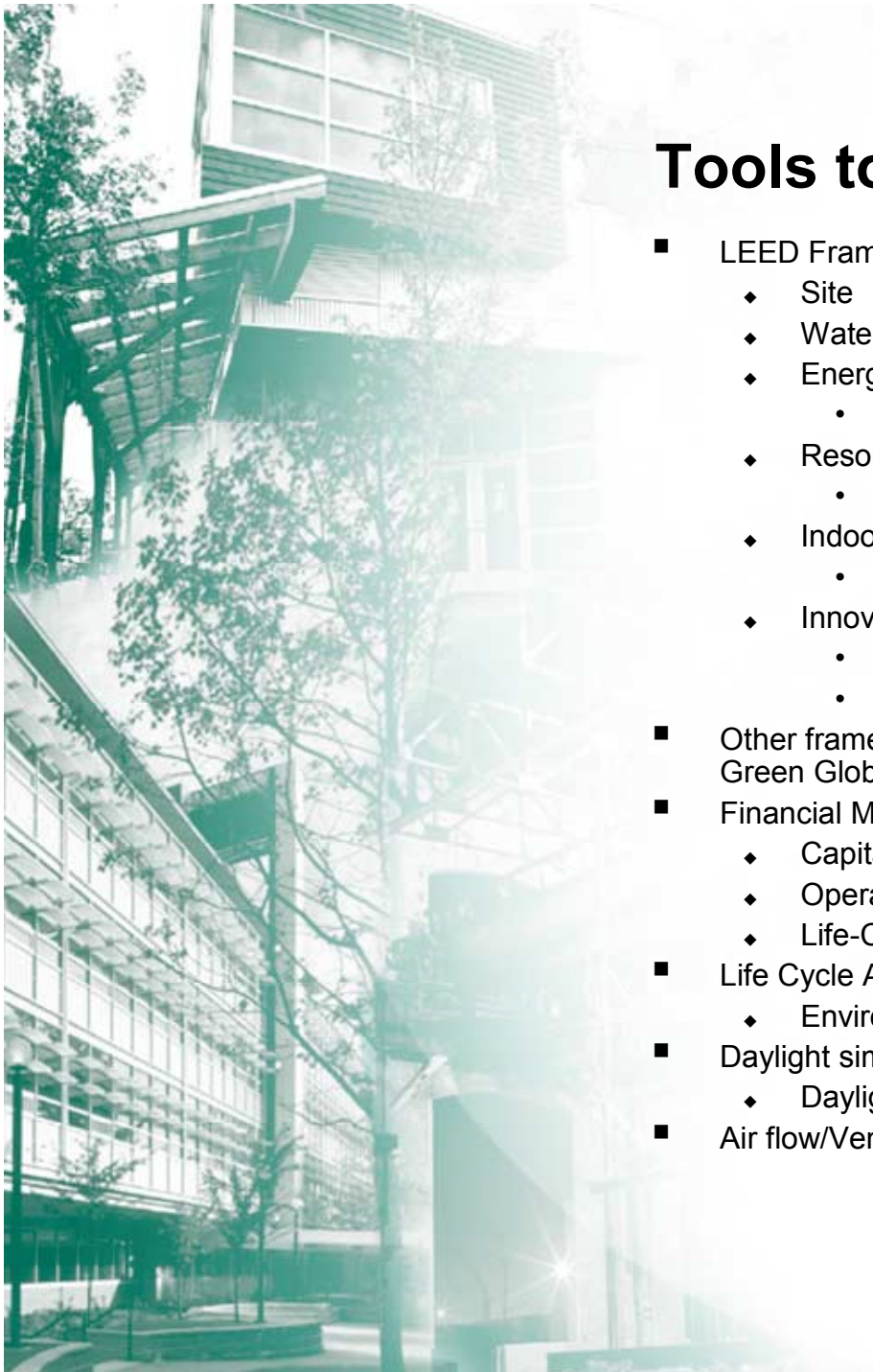
- Clients enthused about being involved
- Leadership team
- User groups
- Community engagement



Good Data



- Climate/Weather
- Indoor air quality
- Site information and site selection
- Materials selection data
- Systems information
- Alternative approaches
- “in God we trust - all others bring data”



Tools to work with



- LEED Framework as a checklist
 - ◆ Site
 - ◆ Water Conservation
 - ◆ Energy & Environment
 - EE4/DOE2 as energy modeling tools
 - ◆ Resource Conservation
 - Database of existing materials availability
 - ◆ Indoor Air Quality
 - Assessment tools
 - ◆ Innovation
 - LEED certified professional
 - Innovation opportunities
- Other frameworks include BREAM Green Leaf and Green Globes
- Financial Modeling
 - ◆ Capital Cost projections
 - ◆ Operational Cost projections
 - ◆ Life-Cycle Costs
- Life Cycle Analysis
 - ◆ Environmental Impact of decisions
- Daylight simulation
 - ◆ Daylight modeling software
- Air flow/Ventilation analysis tools

Tunneling through the cost barrier



marginal cost of
efficiency
improvement

detour



What are the process theories ?



- Group Creativity
 - ◆ Ideation and the generation of creative ideas in a group setting
- Permission to Play
 - ◆ Nominal Group and other methods of engaging individual and group creativity

Just new construction ?



- New Construction Approaches
 - ◆ Site Selection and orientation become primary considerations.
 - ◆ Up to 15% impact in energy performance, as well as significant impact of environmental impact on land and water are determined by site selection and site orientation.
 - ◆ If the design team can be involved at this stage, it makes a big difference!
- Approaches to Renovation
 - ◆ Focus salvage of significant components of the existing building
 - reuse of existing materials
 - ◆ Focus on protection of the site..
 - Benefits of the existing site
 - What is the “tipping point “ decision between new construction and renovation?? - sustainable design changes it !



Integrated Design / Construction Process Phases



- **Pre-Design/Programming**
 - ◆ Vision
 - ◆ Site Masterplan
 - ◆ Project parameters and programmatic needs
- **Conceptual Design**
 - ◆ Space Planning Workshop
 - ◆ Vision Workshop
 - ◆ Building Systems Integration
- **Design Development**
 - ◆ Building Systems Workshop
 - Sustainable Design Issues
 - LEED or other framework
 - ◆ Detailed space planning sessions
 - ◆ Detailed research and design development
 - ◆ Initiate Energy Modeling
- **Construction Documents**
 - ◆ Document Consistency
 - ◆ Integration Carries on
 - ◆ Construction selection
- **Pre-Construction**
 - ◆ Partnering Workshop- CM Phase
 - ◆ Partnering workshop - Site Phase
- **Construction Phase**
 - ◆ Project leadership
 - ◆ Quality assurance
 - ◆ Close working relationship
 - ◆ Monitoring of construction progress
- **Post- Construction**
 - ◆ “De-construction” workshop



Who is involved ?



- Client Team
 - ◆ Steering Committee
 - ◆ User Groups
 - ◆ Community Members
- Architects
 - ◆ Designers and Facilitators
- Electrical Engineers
- Structural Engineers
- Mechanical Engineers
- Landscape Architects
- Civil Engineers
- Other Specialists
- Builders
 - ◆ Project Managers
 - ◆ Estimators
 - ◆ Major sub-trades
 - ◆ Field team



Pre-Design/ Programming



Issues

Organizational Values
 Organizational Chart
 Growth Pattern - past & future
 Community Values & Priorities

Time & Money

What resources are available
 What sources of funding are needed or in place?
 What is the time frame within which the project must proceed

Team Members

Architects, Client Steering Group, User Groups...

Activities & Tools

Gather background materials
 Interview individuals or small groups to understand issues
 Conduct community consultations

Outcomes

A clear understanding of the organization's values and needs
 A conceptual or feasibility report that identifies strategic options as to alternative accommodation approaches.





Conceptual/ Schematic Design



Issues

Site Masterplan

Spatial Relationships

Image & Vision

Sustainable Design opportunities & strategies

Time & Money

Budget Constraints

Time Constraints

Team Members

Architects, Landscape Architects, Engineering Team, Client Steering Group, User Groups...

Activities & Tools

Spatial Relationships Workshop

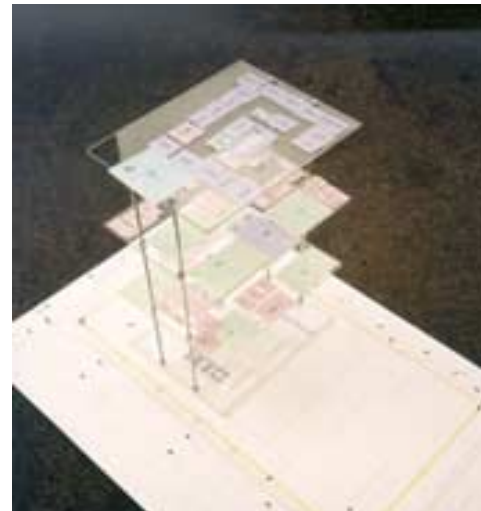
Vision Workshop(s)

LEED Framework

Outcomes

LEED Checklist-Select Appropriate strategies for this project
Schematic Plans

Schematic Identification of building systems
Schematic Design Report that Identifies proposed site and building planning strategies





Design Development



Issues

Alternative Building systems
 Building Systems Integration-
 Reducing scale of mechanical
 systems
 Building Performance
 Human Performance

Time & Money

Capital Cost Trade-offs
 Life Cycle Analysis
 Operational Cost Estimates and
 Life-Cycle Costing

Team Members

Architects, Landscape
 Architects, Civil,
 Structural, Mechanical
 & Electrical Engineers,
 Client Steering Group,
 Facilities Operations
 team

Activities & Tools

Structural Systems Analysis
 Building Envelope Alternatives
 Mechanical Systems Alternatives
 Lighting & Daylighting Strategies

Capital Cost Plans
 Life Cycle Analysis
 Life-Cycle Costing

Outcomes

Integrated Site masterplan
 Selection of optimal combination
 of Building Systems
 DOE-2 (or EE4) Energy Model/
 Daylight and ventilation models
 Design Development Report
 Identifying proposed strategies
 and cost plan, design
 development drawings for all
 disciplines



Construction Documents



Issues

Details and Component
Integration

Trade-offs of performance of
glazing and other elements

Architectural and Engineering
Details

Time & Money

Class A Estimates

Team Members

Architects, Engineers,
Client Steering Group,
Construction
Management Team if
available

Activities & Tools

Detailed design

Mock-ups of elements or details

Review specifications of all
disciplines and identify
opportunities for refinement

Capital Cost refinement

Life-Cycle cost refinement

Outcomes

Specifications that are clearly
integrated
Clear understanding of site and
building components and
assemblies
Construction drawings & Specs

Clear Details

Final Energy Model

Pre-tender report



Pre-Construction Partnering



Issues

Shared understanding of building systems

All trades speak to design and client team.

Team Members

Architects, Engineers, Construction Management or Contractor team, all significant sub-trades, Client Steering Group, Facilities Team

Activities & Tools

Overview of the design decisions taken during the process

Overview of the LEED checklist & Sustainable Building Strategies selected for the project.

Outcomes

Shared Understanding of Design Concept and Building Integration Strategies.

Understanding of Mechanical, Electrical, Lighting and Building Envelope trade-offs.

Clear Lines of communication and conflict resolution strategies.

Preparation for construction mobilization

Time & Money

Review of Capital Budget

Clear understanding of integrated building systems costs and tradeoffs



Post-Construction



Issues

Lessons Learned
(One Year later)
Commissioning Challenges

Time & Money

Change Order Review
Capital and Operational Costs
analysis

Team Members

Architect, Engineers,
Field Services team,
Contractors, Owners,
Facilities Team

Activities & Tools

Operational Costs data review
Employee/Staff satisfaction ?

Building Performance Indicators ?
Comparison to energy and
performance model
LEED Completion

Outcomes

Comparisons of design intent and
actual outcomes
Post-occupancy evaluation
Case Study Report



What do we achieve ?



- Same capital costs as standard building
- Reduced operational costs
- Great environments for people
- Good indoor air quality
- Energy efficient buildings
- Quiet places
- Active environments



Why this approach ?

- Design team integration
- We listen and create alignment
- Great Architecture
- Sustainable Buildings
- LEED rating
- An enjoyable design process - happy clients & consultants

