The Integrated Design Process and Integrated Project Delivery
Rocky Mountain ASHRAE Technical Conference 2011

Presented for

April 15, 2011
Presentation Outline

- Evolution of the Design Process
- Definitions
- Design Effort Curve
- Practicing Integrated Design
- Disintegrated / Dysfunctional IDP
- Tips for Integrated Design
- IDP and LEED Certification
- Conclusion
- Q & A
- Contact / Resources
Questions

- When you hear the term “Integrated Design”, what comes to mind?
- Do you associate Integrated Design with sustainability?
- Is Integrated Design critical to the success of every project?
Evolution of the Design Process

- Building Design is **increasing in complexity** at an exponential rate.

- **Emphasis on total building performance** is forcing the design/construction industry to perform at a higher level.

- Integrated Design represents an **evolution in the construction industry**.

- **Design and construction firms** are struggling with **information overload**, growing business complexity and associated risk and compliance challenges, as well as increasing complexity managing internal and external collaboration.

- Firms are faced with the challenge of **continually assimilating and updating the firm’s computer and communications technology**, and ensuring that everyone involved in a project is on the same page, with the same information and versions of key documents.
Definitions

**Integrated Design Process (IDP):**
A discovery process optimizing the elements that comprise all building projects and their inter-relationships across increasingly larger fields in the service of efficient and effective use of resources.

*Source: ANSI/MTS WSIP Guide, 2007*

**Integrated Project Delivery (IPD):**
A project delivery approach that integrates people, systems, business structures and practices into a process that collaboratively utilizes the talents and insights of all participants to optimize project results, increasing value to the Owner, reduce waste, and maximize efficiency through all phases of design, fabrication, and construction.

*Source: Integrated Project Delivery – A Working Definition, Version 1 May 15, 2007, from AIA California Council*
Valuable Insight

“Our biggest challenge is implementing integrated design in daily practice. The traditional approach, where the Architect designs the building shape, orientation and envelope and then transmits the drawings to the mechanical and electrical engineers for their design, is a sequential approach that misses the rich opportunities for optimizing building performance through a collaborative approach throughout the design process. It is going to require a cultural shift in our industry to transform the design process, and it is a shift that has to occur if we are going to reach our goal of net-zero energy buildings.”

Lynn G. Bellenger, P.E., Fellow ASHRAE
2010-2011 ASHRAE President
The Integrated Design Process is not a concrete concept. The progress toward integrated design is not a technical or programmatic change – it is an *adaptive* change, as this industry adapts to improved project delivery methods and the effort toward a more efficient design and construction process, resulting in high-performance buildings.
Challenges

Adaptive Changes to the Project Dynamics:

- Communication
- Business Relationships
- Level of Trust
- Level of Involvement
- Risk Allocation

AIA Document C191 – 2009 Standard Form Multi-Party Agreement for Integrated Project Delivery
Integrated Design Process

- Today’s marketplace challenges are driving AE firms toward a better way of delivering a project.

- Some architects and engineers give integrated design a degree of lip-service – claiming to practice IDP, but the process is not always strictly followed.

- IDP can lead to a final product that is a high-performing building - viewed as a success on multiple levels.

- A high-performance building cannot be achieved unless an integrated design process is employed.
Whole Project Integration

WHOLE PROJECT
- Modeling
- Delivery System
- Integrated Operation

NEW
- BIM
- IPD
- GREEN LCM

OLD
- DRAWINGS & SPECS
- DELIVERY “SILOS”
- OPERATIONAL “SILOS”
Practicing Integrated Design

Traditional design process

WHAT

HOW

REALIZE

WHO

Integrated design process

WHAT

HOW

REALIZE

WHO

Agency

Owner

Designer

Design Consultants

Constructors

Trade Constructors
Practicing Integrated Design

Design Effort Curve – Primary Points:

- Greater ability to impact cost and functional capabilities early in project.
- Cost of design changes increase significantly when they occur further into the project.
- Design effort is increased early in the design process under IDP.
Design Effort Curve Illustration

Macleamy Curve

1. ability to impact cost and functional capabilities
2. cost of design changes
3. traditional design process
4. IPD design process

Design Effort/Effect

traditional integrated
Pre-design Conceptualization Schematic Design Criteria Design Design Development Detailed Design Construction Documents Implementation Documents Agency Permit/ Bidding Agency Coord/ Final Buyout Construction
Design Effort Curve Illustration
Design Effort Curve Illustration

Note: The area under each curve represents the total effort, and fee should be the same for both scenarios.
Practicing IDP

When do you know you are taking part in a truly integrated design process?

- There is an IDP “Champion” assigned to the project – someone who understands the process and engages all parties.
- You are asked for input on a wide range of issues – including those outside your area of expertise.
- Design team members are pushed outside of their comfort zone.
- There is shared understanding of the project goals from the outset.
- The expectations of your work are clearly defined and sufficiently detailed, with targeted goals.
- Other people’s work depends on yours – tasks are inter-dependent.
True IDP

- Group interactions inspire creativity – work sessions are exciting.
- Your input is valued and respected.
- There is focus and adherence to the process itself, including early goal-setting sessions that are collaborative.
- Innovative solutions that challenge rules-of-thumb are encouraged, and the team assumes risk – not just one individual or firm.
- Decision-makers are involved in a significant way.
- You feel a greater sense of ownership in the whole project.
- There is dialogue and debate surrounding design decisions, leading to a higher level of buy-in among the team.
LEED recognizes the IDP in Pilot Credit 42 – Integrated Process:

Intent is to provide LEED credit under the Innovation in Design section of the project LEED scorecard.

- Team must demonstrate that key building system interactions have been explored and analyzed.

- Team must demonstrate that building system interaction analysis has been used in the decision-making process.

- For each project type, there are several options to document compliance.
Is the Integrated Design Process applicable to every project?

The simple answer is . . . . . . No.

- Projects that do not have high-performance goals and have a limited and pre-determined scope may be best done in a conventional, sequential way.

- However, collaboration and teamwork concepts that are part of IDP can improve any project.
Disintegrated / Dysfunctional IDP

When do you know you are *not* taking part in an integrated design process?

- **Lack of a clear understanding** of project goals and direction early in the process.
- **Poor communication** resulting in errors, omissions, and assumptions that result in over-sizing, redundancy, and gaps or disconnects.
- A heightened degree of mystery between disciplines.
- **Lack of value in meetings, tasks or team activities.**
- Overlaps and gaps in the roles between member’s responsibilities with discoveries throughout the process that holes in scope exist.
- “**Silos**” – decision-making happens without collaboration.
Disintegrated / Dysfunctional IDP

- Meeting structure and flow – lack or omission of group brainstorming sessions, particularly early in the process. *Absence of important parties.*

- Deadline crunches.

- Wasted time.
Disintegrated / Dysfunctional IDP

Macleamy Curve

1. ability to impact cost and functional capabilities
2. cost of design changes
3. traditional design process
4. IPD design process

Design Effort/Effect

1 2

traditional integrated

Pre design Conceptualization Schematic Design Criteria Design Design Development Detailed Design Construction Documents Implementation Documents Agency Permit/ Bidding Agency Coord/ Final Buyout Construction

Dysfunctional IDP
Tips for Integrated Design

For the Project Team:

- The team should have an **IDP “Champion”** that is committed to the IDP process.

- The team must intentionally **map its process with clearly targeted goals and decision-making paths**, with milestones or methodologies defined. Urge the prime design firm to assemble a plan of action that includes integrated design characteristics.

- **Solicit input from team** members regarding critical decision-making time frames to understand the inter-relationships of the team members.

- Tailor the **project contractual agreements** toward Integrated Design.
Tips for Integrated Design

For you:

- **Solicit input from the team** – Commissioning agent, architect, sound/vibration consultant, civil engineer, etc.

- **Review scope of all disciplines** - Ask questions/offer input on scope of other trades.

- **Have a plan** – Understand the advantages of IDP.

- **Add value to the process** – Be responsive and accountable.

- **Encourage decisions early** in the process from the Architect and Owner.
What has been your experience with Integrated Design?

Has it been successful?
“Our biggest challenge is implementing integrated design in daily practice. The traditional approach, where the Architect designs the building shape, orientation and envelope and then transmits the drawings to the mechanical and electrical engineers for their design, is a sequential approach that misses the rich opportunities for optimizing building performance through a collaborative approach throughout the design process. It is going to require a cultural shift in our industry to transform the design process, and it is a shift that has to occur if we are going to reach our goal of net-zero energy buildings.”

Lynn G. Bellenger, P.E., Fellow ASHRAE
2010-2011 ASHRAE President
Resources


THANK YOU!
Contact

Barry Stamp, P.E., LEED AP, Principal
Shaffer • Baucom Engineering & Consulting
Phone: 303.986.8200
Email: bstamp@sbengr.com
Barry Stamp, P.E., LEED AP, Principal

- Architectural Engineering Graduate of The University of Colorado at Boulder with emphasis in Building Energy Engineering.
- More than 25 years of experience.
- Direct project experience with Integrated Design Process (IDP).
- Experience applying sustainable design techniques and standards for LEED® certification.
- Active participant on the advisory committee to the Governor’s Energy Office (GEO) effort to assemble the CO-CHPS program.
- In recent years, served on a special regional bio-containment laboratory review committee for the National Institutes of Health (NIH).