Walter Grondzik
WHAT IS INTEGRATED BUILDING DESIGN?

1. WHAT IT IS:
   A PROCESS
   A MEANS OF STRUCTURING DECISION MAKING
   COMPARED TO CONVENTIONAL LINEAR DESIGN PROCESS
   CONNECTION TO BUILDING COMMISSIONING
   DEFINING CHARACTERISTICS
   ASHRAE
   AIA
   OTHER?

2. WHAT IT IS NOT:
   A SPECIFIC OUTCOME
   SUSTAINABILITY
   GREEN
   ENERGY EFFICIENT
   BIM
   A RIGIDLY PRESCRIBED METHODOLOGY
   ONE SIZE FITS ALL

3. WHY USE INTEGRATED BUILDING DESIGN?
   INCREASINGLY DEMANDING PROJECT OUTCOMES
   SUSTAINABLE, GREEN, ENERGY EFFICIENT, HIGH PERFORMANCE, CARBON NEUTRAL
   INCREASINGLY DEMANDING DESIGN TOOLS
   PERFORMANCE SIMULATIONS
   BIM

4. WHAT IS NEEDED FOR SUCCESS?
   DESIRE TO SUCCEED
   TEAM LEADERSHIP AND TEAM PLAYERS
   GOOD COMMUNICATIONS
Chuck Gulledge

The Integrated Design Process

Vision and Goals:

- Vision
  - Big Picture Perspective
  - Subjective Definition
- Goals
  - Definition of Quantifiable Boundaries
  - Basis of Unique Team Structure
  - Basis of Applied Strategy Development
  - Objective Evaluation Metric

Owner Activities:

- Timelines
  - Schedule – Goal Relationship
- Total Ownership Costs
  - Capital Costs
  - Professional Service Fees
  - Utility Costs
  - O&M Costs
  - Replacement Costs
  - Occupancy Costs
- Financial Criteria
  - Life-Cycle Analysis
  - ASHRAE Service Life and Maintenance Cost Database

Team:

- Structure
  - Conventional
  - Integrated
- Working as a Team
  - Joint Decision Making
  - Problem Solving Relationships
  - Effective Communication
- Attributes
  - Experience
  - Optimization Skills
  - Stewardship
- Preliminary Tasks
  - Decision-Making Body
Objective Refinement
Information Organization
Charrettes

Strategy Development:

- Progression
  - Linear Versus Iterative
  - Iterative Loops
  - TOP-DOWN/BOTTOM-UP
- Tracking
  - Multiple Objectives
  - Linked Strategies
  - Variable Criteria
- Evaluation
  - Multi-Criteria Assessment
  - Common Ranking Systems

Commissioning:

- Timing
- Goal Definition
- Developing Basis of Design

Summary:
Vision and Goals:

- **Vision**
  - Create net zero energy buildings
  - Need integrated design team to achieve
- **Goals**
  - May be a specified percent energy savings
  - May be to reduce utility costs or set a maximum annual utility bill
  - May be how green or sustainable the building design is
  - May be the construction cost budget

Owner Activities:

- Must stay involved throughout project
- Owner-driven processes yield the best results

Team:

- Help owners understand what they really want
- Needs a champion to question everything and keep the project on track

Strategies:

- Use simulation throughout, especially at the beginning
  - Simulated buildings are easy to model
  - Give people confidence that goals are achievable
- The building envelope should provide most of the heating, cooling, and ventilation requirements
- Determine whether orientation and windows contribute to goals
- Evaluate HVAC, plug, and miscellaneous loads
- Review all programmatic requirements
- Measure progress at key steps
- Evaluate performance

Summary:

Keep in mind the vision of creating a zero energy building. Key to achieving that vision is to have a team of experts work together and use the best available simulation technology to reach the individual goals and evaluate the final product.
Paul Torcellini

Bringing the Pieces Together – Actual Applications

Vision and Goals:

- **Vision**
  - Owner or project leader defines
  - Can be vague
- **Goals**
  - Represent the translation of the vision into something measurable
  - Must be substantiated

Owner Activities:

- Define tasks that support goals
- Implement strategies that are mapped directly to individuals on the design team
- Designate a champion (architect, green building consultant, engineer, or owner)
  - Champion must ensure that all players are kept within the vision
  - People who are left outside the vision will not complete their tasks

Team:

- Each member must be aware of and buy into the vision and goals
- Each person is responsible for coming up with strategies to meet the goals

Projects:

- **Van Geet house**
  - Owner was his own team
  - Owner had a vision to create a grid-independent house
  - Owner established a goal to have a house that uses 90% less energy

- **Zion National Park Visitor Center**
  - Vision was to protect park and enable visitors to enjoy it
  - Project arose out of a need to manage traffic
  - Goal was to use 80% less energy than a typical visitor center; 70% saving was achieved
  - Solar panels, Trombe wall, daylighting, uninterruptible power supply, and operable windows were used to achieve energy goals

- **BigHorn Home Improvement Center**
  - Owner very committed to energy efficiency goals
  - Goal was 60% energy savings over code-compliant building
  - Daylighting, radiant floors, and photovoltaic panels used
• **NREL Science and Technology Facility**
  o Vision: Match the National Renewable Energy Laboratory’s image of energy efficiency and renewable energy
  o Goal: Have a LEED Gold rated laboratory building (LEED Platinum was achieved)
  o Energy savings of 40% over code
  o Building has variable-speed fume hoods, variable-speed HVAC systems, extensive daylighting, and very good insulation

**Summary:**

The keys to successful integrated project design are to set quantifiable goals, create a team structure that encourages communication, develop strategies to meet the goals, and evaluate progress toward those goals.