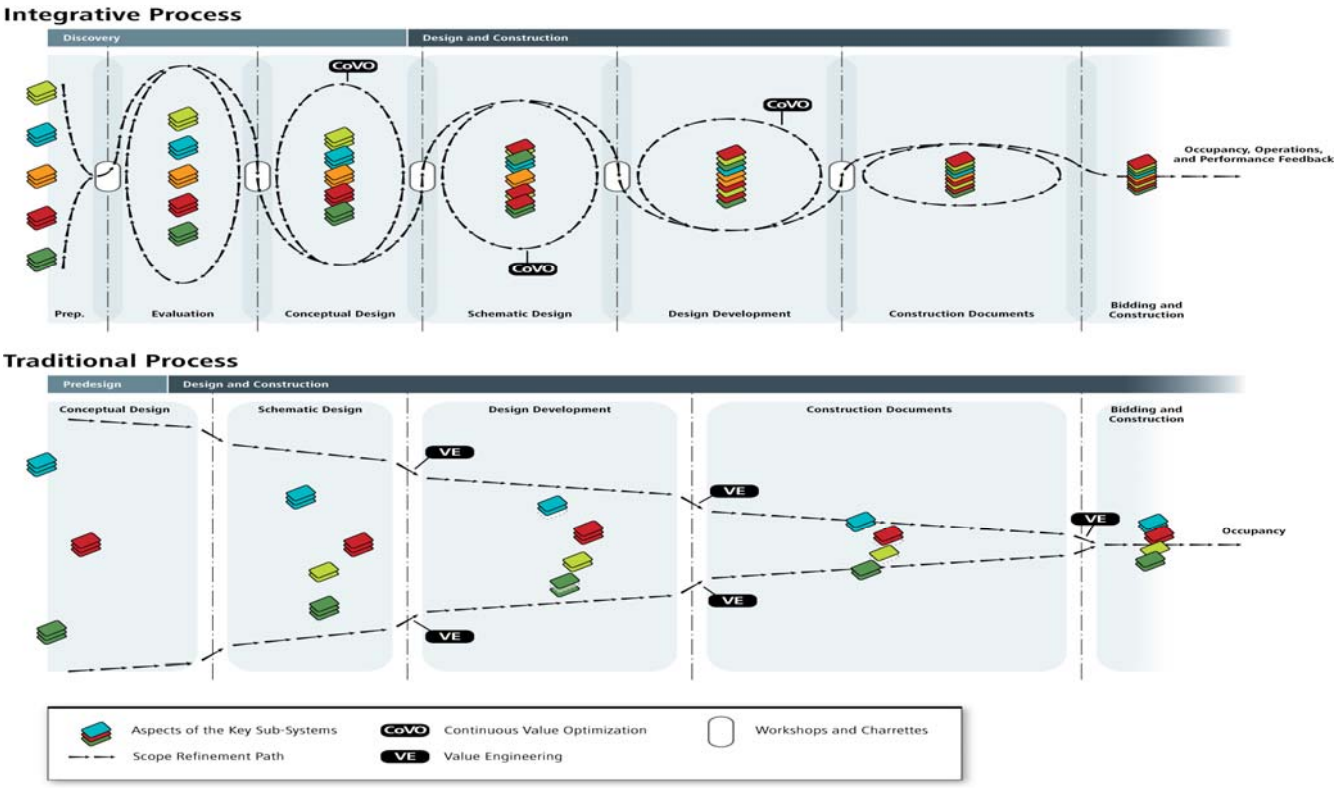
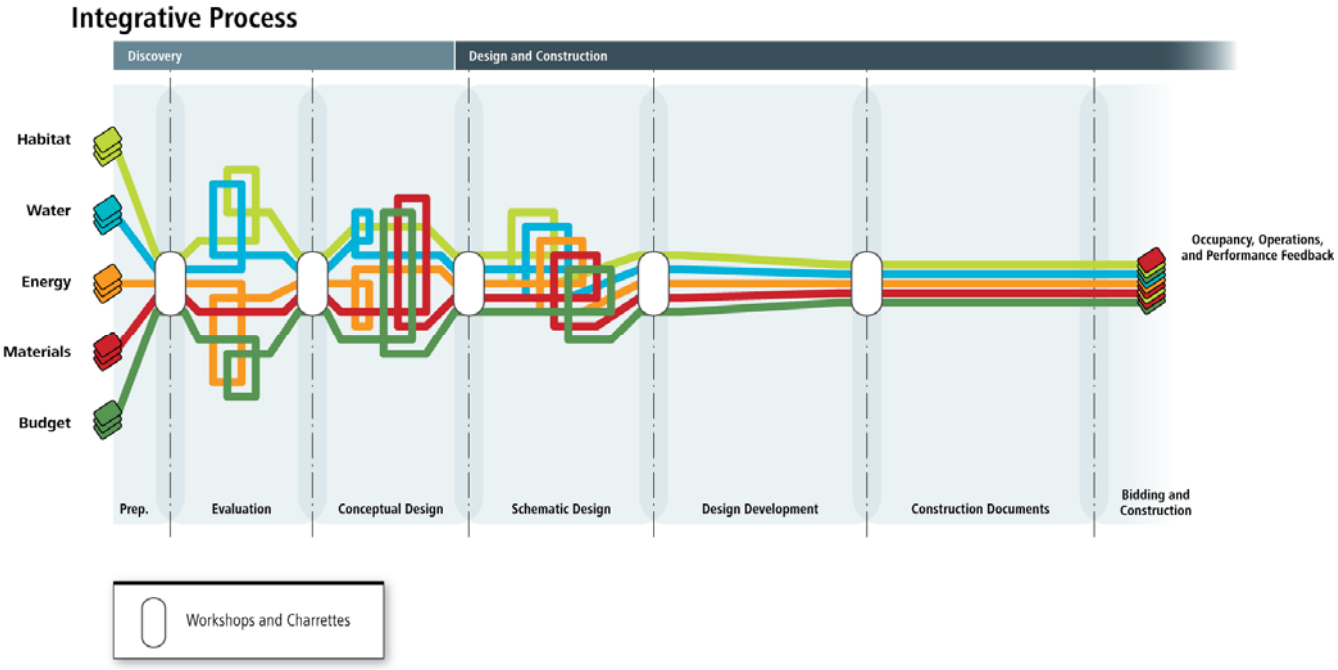
Integrative Design Process Outline





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PART A—DISCOVERY

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

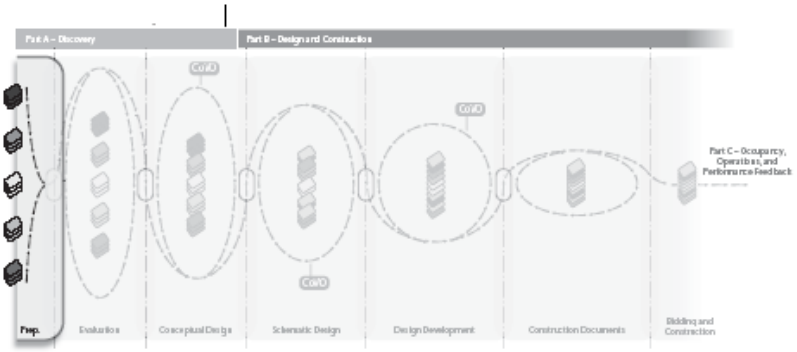
- Select rating system and performance measurement criteria

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



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Stage A.2

Workshop No. 1: Alignment of Purpose and Goal-Setting

A.2.1 Workshop No. 1: Tasks and Activities

- Introduce participants to the fundamentals of the integrative design process and to systems thinking
- Elicit client's deeper intentions and purpose for the project
- Engage Touchstones exercise to elicit stakeholders' values and aspirations
- Clarify functional and programmatic goals
- Establish initial Principles, Metrics, Benchmarks, and Performance Targets for the four key subsystems:
  - Habitat
  - Water
  - Energy
  - Materials
- Generate potential strategies for achieving identified Performance Targets
- Determine order-of-magnitude cost impacts of proposed strategies
- Provide time for reflection and feedback loops from client and team members
- Develop an Integrative Process Road Map that identifies responsibilities, deliverables, and dates
- Commissioning: Initiate documentation of the Owner's Project Requirements (OPR)

A.2.2 Principles and Measurement

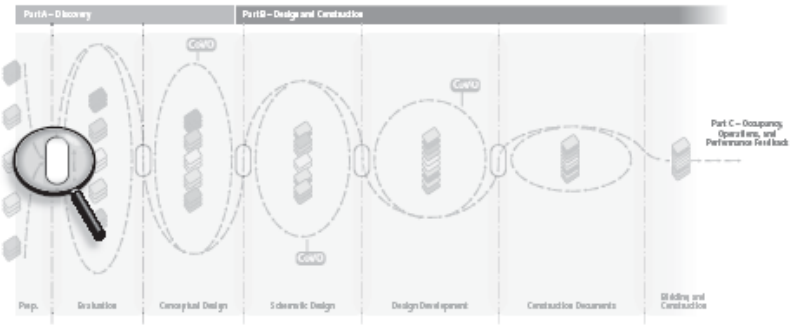
- Document Touchstones, Principles, Metrics, Benchmarks, and Performance Targets from Workshop No. 1

A.2.3 Cost Analysis

- Document order-of-magnitude cost impacts of proposed strategies to reflect input from Workshop No. 1

A.2.4 Schedule and Next Steps

- Adjust Integrative Process Road Map to reflect input from Workshop No. 1
- Distribute Workshop No. 1 report



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Stage A.3

Research and Analysis: Evaluating Possible Strategies

A.3.0 Prepare *Proposal B*

- Develop *Proposal B*: confirm scope and fees based on Workshop No. 1 scope refinement

A.3.1 Research and Analysis Activities: First Iteration

- Explore and identify a wide range of opportunities and possible strategies before collapsing into solutions
- Expand the analysis of the four key subsystems:
  - Habitat
  - Water
  - Energy
  - Materials

A.3.2 Principles and Measurement

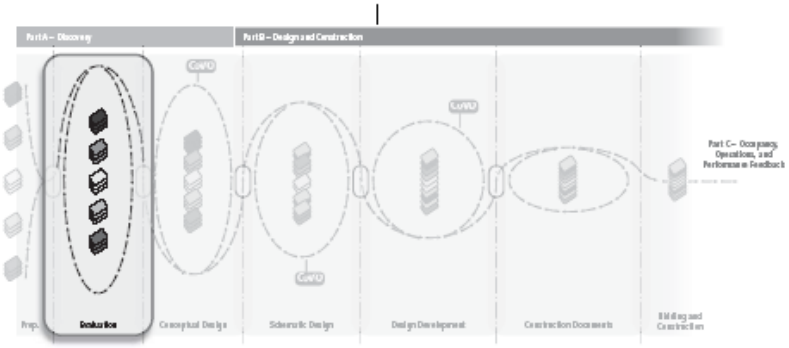
- Evaluate design concepts against Performance Targets from Workshop No. 1
- Commissioning: Prepare conceptual phase OPR

A.3.3 Cost Analysis

- Apply unit cost estimates to the integrative cost-bundling template

A.3.4 Schedule and Next Steps

- Update Integrative Process Road Map in preparation for Workshop No. 2
- Prepare Agenda for Workshop No. 2



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Stage A.4

Workshop No. 2: Conceptual Design Exploration

A.4.1 Workshop No. 2: Activities

- Assess the findings from Stage A.3 (Research and Analysis) of the four key subsystems:
  - Habitat
  - Water
  - Energy
  - Materials
- Generate conceptual site and building design concepts from:
  - Touchstones and Principles
  - Site forces
  - Community and watershed living-system patterns
  - Functional program
  - Breakout group working sessions
- Confirm alignment with Touchstones, Principles, Metrics, Benchmarks, and Performance Targets
- Review integrative cost-bundling studies in progress
- Review and adjust the Process Road Map
- Provide time for reflection and feedback loops from client and team members
- Commissioning: Review Owner's Project Requirements (OPR)

A.4.2 Principles and Measurement

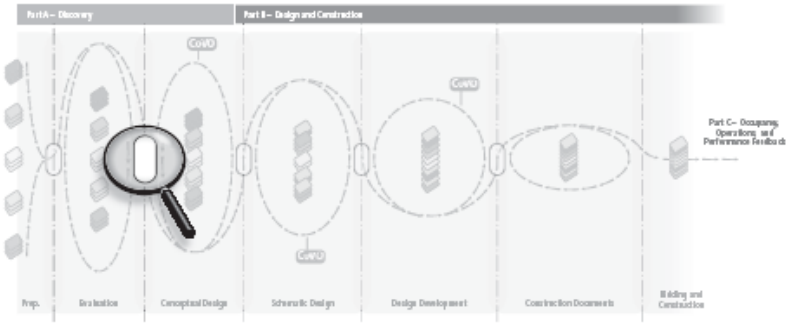
- Document adjustments to Performance Targets to reflect input from Workshop No. 2
- Commissioning: Adjust OPR to reflect input from Workshop No. 2

A.4.3 Cost Analysis

- Update any required integrative cost-bundling templates to reflect input from Workshop No. 2

A.4.4 Schedule and Next Steps

- Update Integrative Process Road Map to reflect input from Workshop No. 2
- Distribute Workshop No. 2 Report



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Stage A.5

Research and Analysis: Testing Conceptual Design Ideas

A.5.1 Research and Analysis Activities: Explorations within individual disciplines and smaller related groups

- Test Conceptual Design schemes from Workshop No. 2 within the realities of the program and guiding principles relative to the four key subsystems:
  - Habitat
  - Water
  - Energy
  - Materials
- Coalesce findings and bring analysis to a reasonable conclusion before beginning the Schematic Design phase

A.5.2 Principles and Measurement

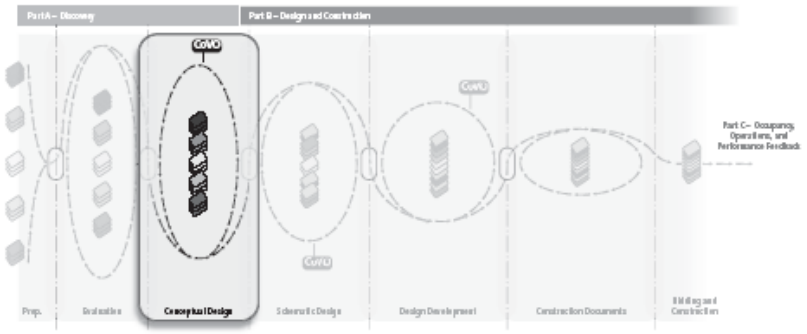
- Confirm and solidify Metrics, Benchmarks, and Performance Targets
- Commissioning: Develop Basis of Design (BOD)

A.5.3 Cost Analysis

- Put a price tag on every strategy and subsystem, then aggregate them into integrated cost bundles

A.5.4 Schedule and Next Steps

- Update Integrative Process Road Map in preparation for Workshop No. 3
- Prepare Agenda for Workshop No. 3



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PART B—DESIGN AND CONSTRUCTION

Stage B.1

Workshop No. 3: Schematic Design Kickoff—Bringing It All Together (without committing to building form)

B.1.1 Workshop No. 3 Activities

- Present sketch concepts, supporting data, and discoveries from *Stage A.5* Research and Analysis
- Develop site and building configuration sketch solutions by evaluating flows and exploring interrelationships between the four key subsystems:
  - Habitat
  - Water
  - Energy
  - Materials
- Assess the realistic potential for achieving Performance Targets and review commitment to Touchstones and Principles
- Identify the systems that require more extensive cost bundling analysis, including life cycle cost impacts
- Provide time for reflection and feedback from client and team members
- Commissioning: Identify where the OPR and BOD will need refinement based upon new discoveries

B.1.2 Principles and Measurement

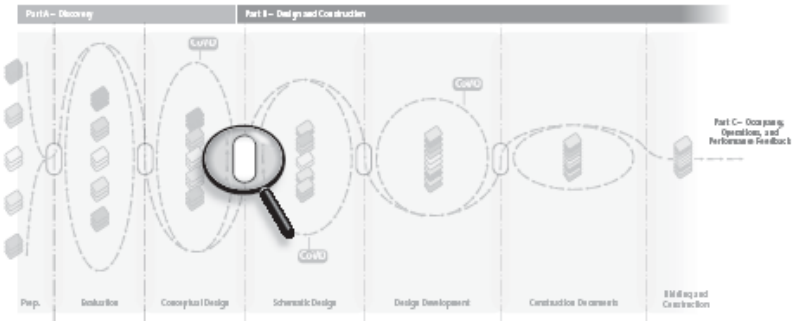
- Document adjustments to Performance Targets to reflect input from Workshop No. 3
- Commissioning: Adjust OPR and BOD to reflect input from Workshop No. 3

B.1.3 Cost Analysis

- Update any required integrative cost bundling templates to reflect input from Workshop No. 3

B.1.4 Schedule and Next Steps

- Refine and extend forward the Integrative Process Road Map tasks and schedule into future phases to reflect input from Workshop No. 3
- Distribute Workshop No. 3 report



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Stage B.2

Research and Analysis: Schematic Design—Bringing It All Together (and now committing to building form)

B.2.1 Research and Analysis Activities: Schematic Design

- Engage a more informed schematic design process and develop building form solutions from conceptual sketches produced in Workshop No. 3.
- Iterate, iterate, iterate, with meetings, conference calls, etc., to integrate the four key subsystems with building form
  - Habitat
  - Water
  - Energy
  - Materials

B.2.2 Principles and Measurement

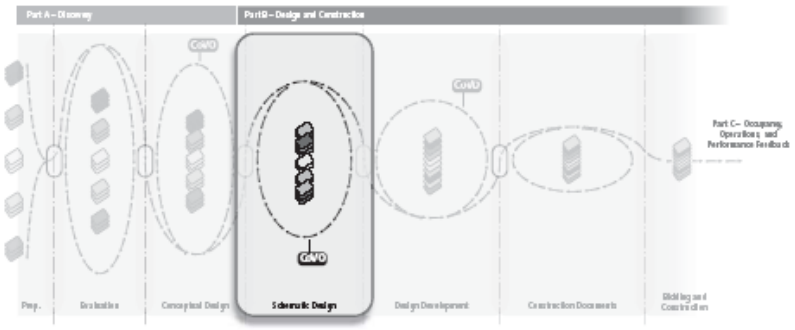
- Test building performance in detail and evaluate results against Performance Targets
- Commissioning: Adjust the OPR and BOD to reflect proposed schematic design

B.2.3 Cost Analysis

- Refine integrated cost bundling numbers to ensure that proposed schemes, systems combinations, and cost scenarios can be evaluated with increasing accuracy

B.2.4 Schedule and Next Steps

- Adjust and prepare Integrative Process Road Map for team review to include tasks and schedule impacts that have emerged from schematic design discoveries
- Prepare Agenda for Workshop No. 4



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Stage B.3

Workshop No. 4: Design Development Kickoff—It Is Brought Together; Does It Work?

B.3.1 Workshop No. 4 Activities

- Present schematic design solutions from *Stage B.2* Research and Analysis and verify that the ranges of Performance Targets are being met for the four key subsystems:
  - Habitat
  - Water
  - Energy
  - Materials
- Verify that schematic design solution meets building program requirements and environmental performance objectives
- Commit to building form, configuration, and systems interrelationships that will be analyzed in further detail for optimization during *Stage B.4* Research and Analysis
- Identify the systems components variants that will require more detailed cost bundling analysis
- Identify Measurement and Verification (M&V) methods and opportunities for providing continuous performance feedback
- Commissioning: Identify where the OPR and BOD require updating

B.3.2 Principles and Measurement

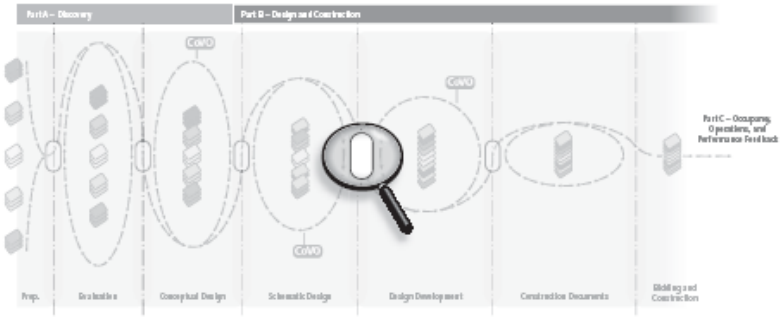
- Document adjustments to Performance Targets that reflect schematic design solution
- Commissioning: Adjust OPR and BOD to reflect schematic design solution

B.3.3 Cost Analysis

- Expand any integrative cost bundling templates to reflect input from Workshop No. 4

B.3.4 Schedule and Next Steps

- Refine and extend forward the Integrative Process Road Map tasks and schedule through Design Development
- Distribute Workshop No. 4 Report



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Stage B.4

Research and Analysis: Design Development—Optimization

B.4.1 Research and Analysis Activities: Design Development

- Engage detailed analysis of systems interrelationships with continuous iterations between disciplines
- Validate achievement of Performance Targets for specific components of the four key subsystems
  - Habitat
  - Water
  - Energy
  - Materials
- Obtain input and feedback from builder on all systems

B.4.2 Principles and Measurement

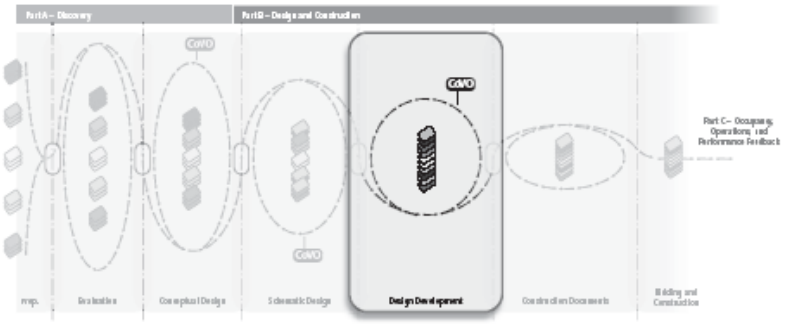
- Document in detail and validate building performance results against Performance Targets
- Prepare draft Measurement and Verification (M&V) Plan
- Commissioning
  - Invite the Commissioning Authority to review design progress and identify opportunities for further optimization and potential conflicts
  - Identify the preliminary list of systems to be commissioned
  - Prepare preliminary Commissioning Plan

B.4.3 Cost Analysis

- Utilize integrated cost bundling templates to optimize value and performance (true value engineering) to conclude cost analysis for all major systems

B.4.4 Schedule and Next Steps

- Extend forward the Integrative Process Road Map tasks and schedule through the Documentation phase and begin integrating with the builder if this has not yet occurred
- Prepare Agenda for Workshop No. 5



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Stage B.5

Workshop No. 5: Construction Documents Kickoff—Performance Verification and Quality Control

B.5.1 Workshop No. 5 Activities

- Verify achievement of all Performance Targets
- Present and verify the integrated performance of the project as an interrelated whole
- Identify where Specifications will need to be altered to effectively document project performance and integrate the four key subsystems (habitat, water, energy, and materials)
- Verify final cost bundling analysis and cost impacts related to all major systems and components
- Commissioning: Review Commissioning Plan for alignment with BOD and schedule Commissioning review at mid-construction-documents phase

B.5.2 Principles and Measurement

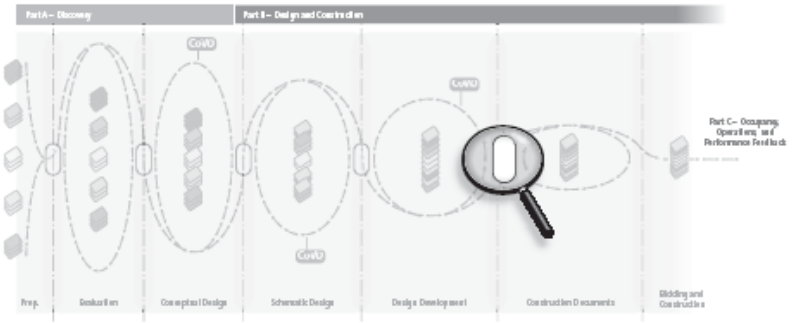
- Document final Performance Targets
- Review draft Measurement and Verification (M&V) Plan
- Commissioning: Update OPR, BOD, and Commissioning Plan to reflect input from Workshop No. 5

B.5.3 Cost Analysis

- Document integrated cost implications of final design decisions

B.5.4 Schedule and Next Steps

- Plan quality control review process of Construction Documents
- Distribute Workshop No. 5 Report



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Stage B.6

Construction Documents—No More Designing

B.6.1 Documentation Activities

- Complete Bidding Documents with thorough Specifications that communicate both performance requirements and project intentions for integrating the four key subsystems
- Commissioning: Update Commissioning Plan and insert Commissioning requirements into Specifications

B.6.2 Principles and Measurement

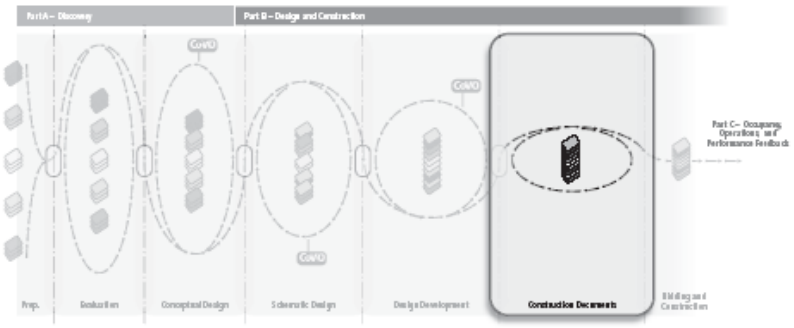
- Finalize performance calculations to validate final design and document results
- Produce final Measurement and Verification (M&V) Plan to build performance measurement and feedback mechanisms into project
- Commissioning: Perform detailed review of Drawings and *specifications* to ensure consistency with OPR and BOD

B.6.3 Cost Analysis

- Review unique cost implications with builder and finalize cost estimate

B.6.4 Schedule and Next Steps

- Schedule quality control reviews of Construction Documents



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Stage B.7

Bidding and Construction—Aligning with the Builder: Becoming a Team

B.7.1 Bidding and Construction Activities

- Explain unique aspects of project and the integration of all systems at the Pre-Bid and Pre-Construction conferences
- Review with builder's team (all trades and subcontractors) their roles and responsibilities prior to commencing construction regarding:
  - Subcontractors' roles in supporting the integration of their work into the whole
  - Each subcontractor's role in supporting the documentation necessary to demonstrate achievement of Performance Targets
- Review builder submittals through the unique filters of environmental performance
- Commissioning: Coordinate with builder's team installation of all systems regarding achievement of Performance Targets
  - Perform site observations
  - Incorporate Commissioning schedule into construction schedule
  - Review submittals
  - Develop construction checklists and functional tests
  - Witness start-up
  - Perform functional tests
  - Verify training of building operations team
  - Prepare final Commissioning report
  - Produce systems manuals

B.7.2 Principles and Measurement

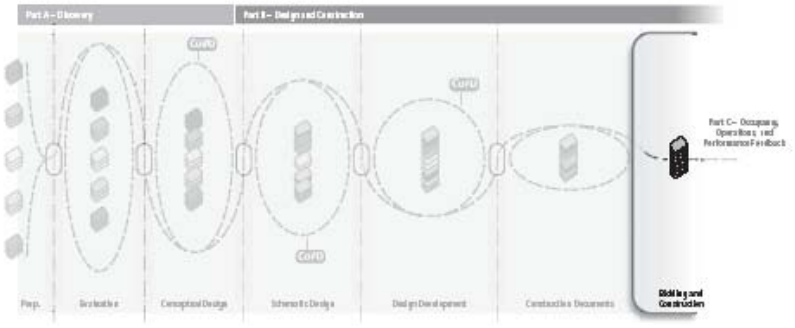
- Manage the collection of documents that verify achievement of Performance Targets
- Commissioning: Document prefunctional and functional testing results and prepare Commissioning (Cx) reports and Recommissioning Plan

B.7.3 Cost Analysis

- Coordinate with builder to ensure that subcontracts are awarded based on performance requirements, not just price

B.7.4 Schedule and Next Steps

- Ensure systematic communication between design and building teams



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PART C—OCCUPANCY, OPERATIONS, AND PERFORMANCE FEEDBACK

Stage C.1

Occupancy: Feedback from All Systems

C.1.1 Operations Activities

- Establish operations team consisting of key stakeholders responsible for continuously monitoring, maintaining, and improving environmental performance
- Establish and implement standard operating procedures (SOPs) that provide continuous feedback regarding performance of the four key subsystems:
  - Habitat
  - Water
  - Energy
  - Materials
- Commissioning: Conduct periodic Recommissioning in accordance with Recommissioning Manual

C.1.2 Principles and Measurement

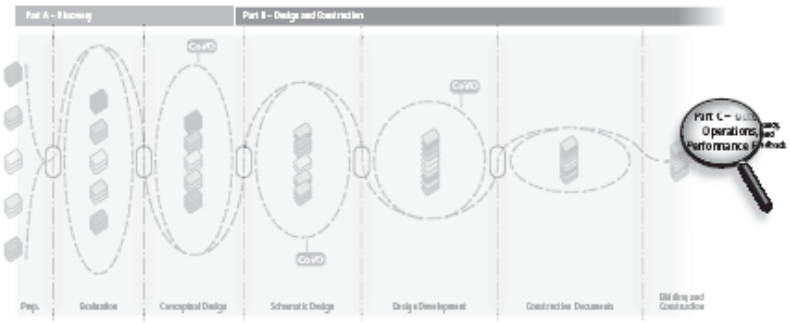
- Document key indicators that serve as proxies for the health of the larger ecosystem
- Document occupant surveys and reconcile results with building systems performance
- Implement Measurement and Verification (M&V) plan continuously over the life of the building
- Insert results of periodic Recommissioning into Recommissioning Manual

C.1.3 Cost Analysis

- Track economic performance of the four key subsystems

C.1.4 Schedule and Next Steps

- Implement all of the above forever



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