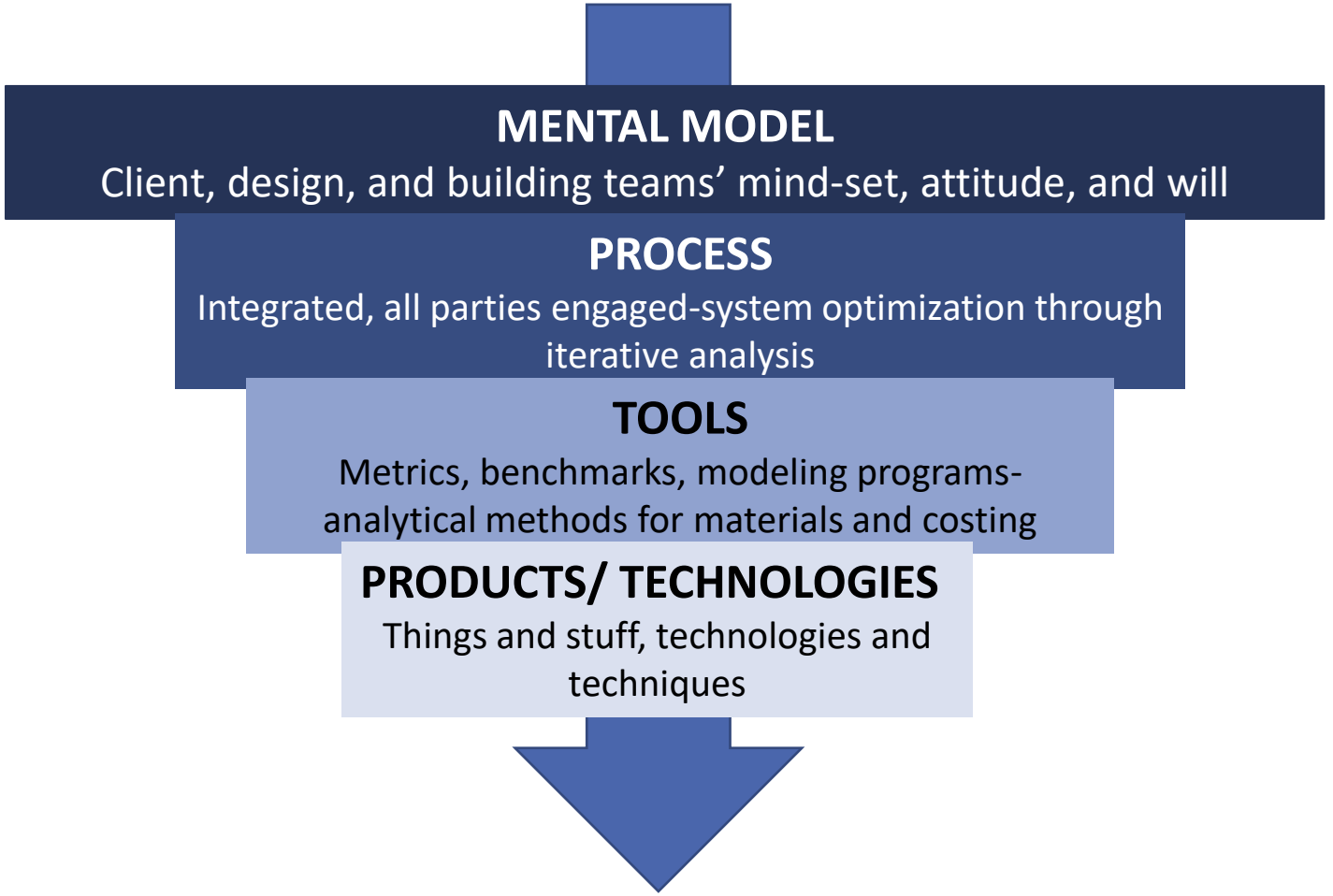
Evaluation Phase

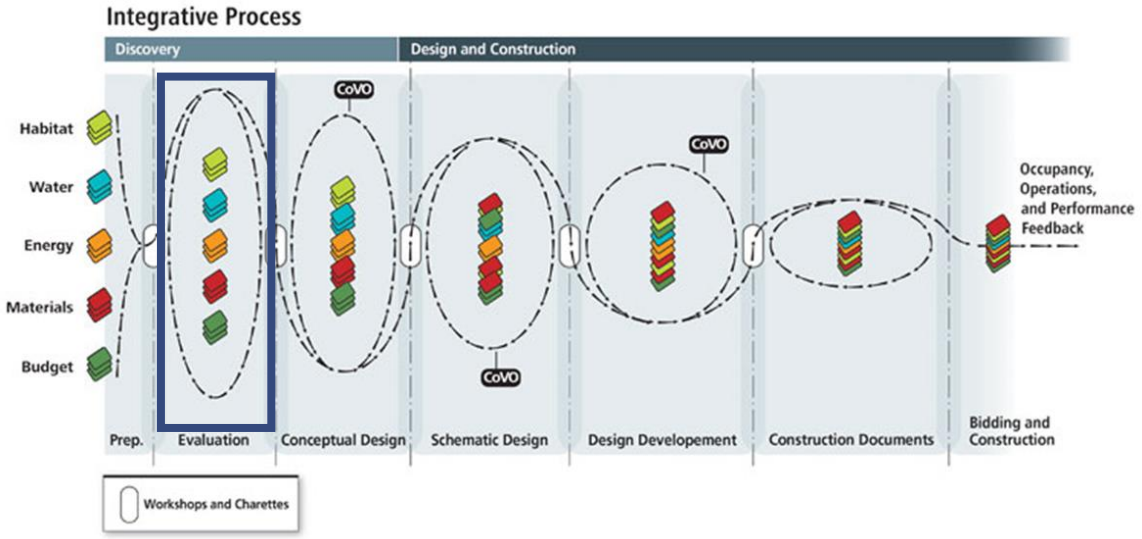
جلسه هفتم- مبانی طراحی محیطی، نظریه و روش‌ها

اردیبهشت ماه 1399

Introduction

- Second Research & Analysis Phase: Evaluating possible strategies
- Conceptual Design Charrette





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

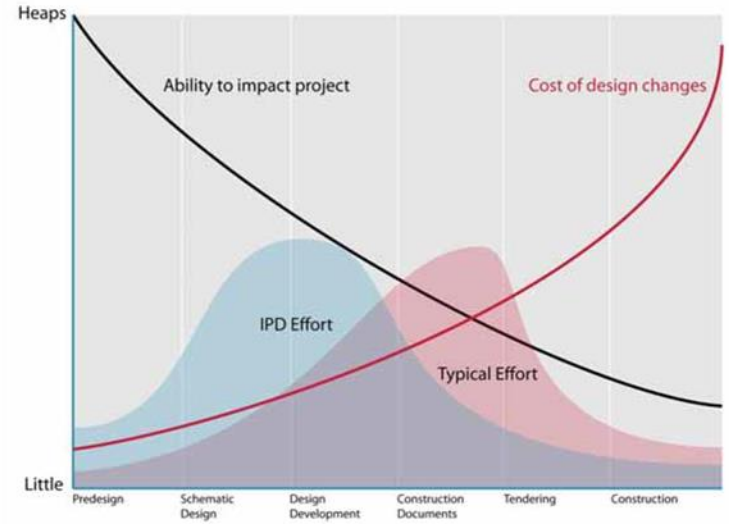
A.3.4 Schedule and Next Steps

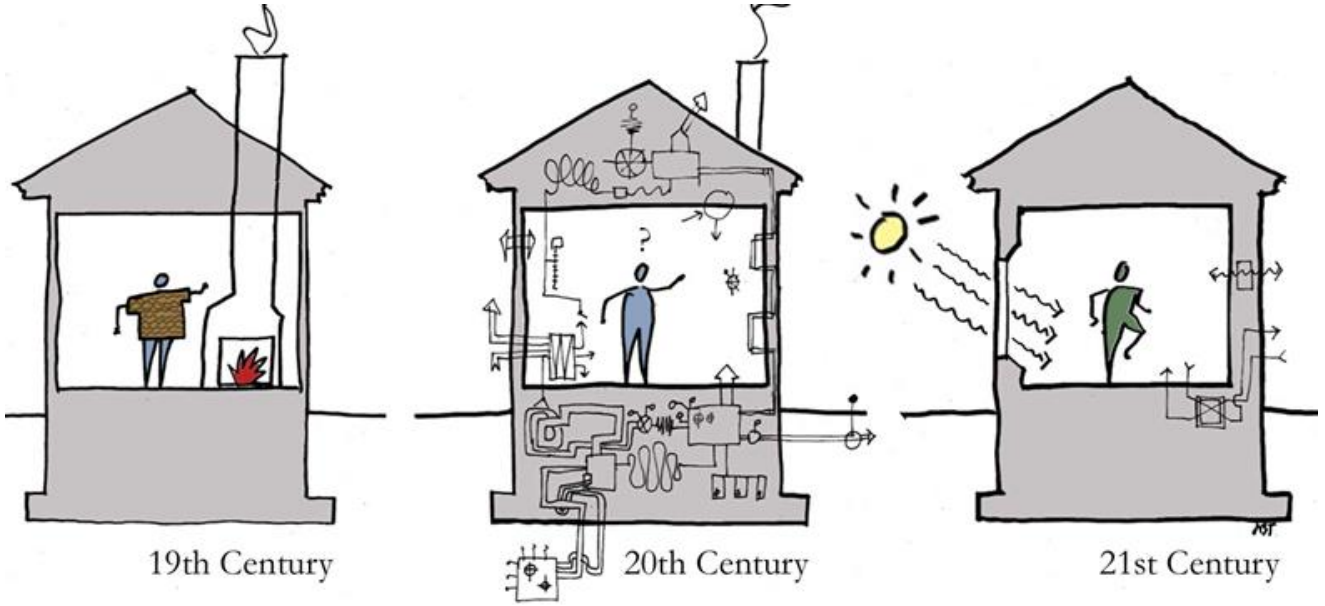
- Update Integrative Process Road Map in preparation for Workshop No. 2
- Prepare Agenda for Workshop No. 2

Research & Analysis: Evaluating Possible Strategies

Preparation of Proposal B

- To define the scope of services for all team members.
- The allocation of effort is front-end loaded
- The integrated decisions to be made before the CD phase to avoid significantly oversized systems, redundancies, and inefficiencies.





Explore and Identify a wide range of opportunities

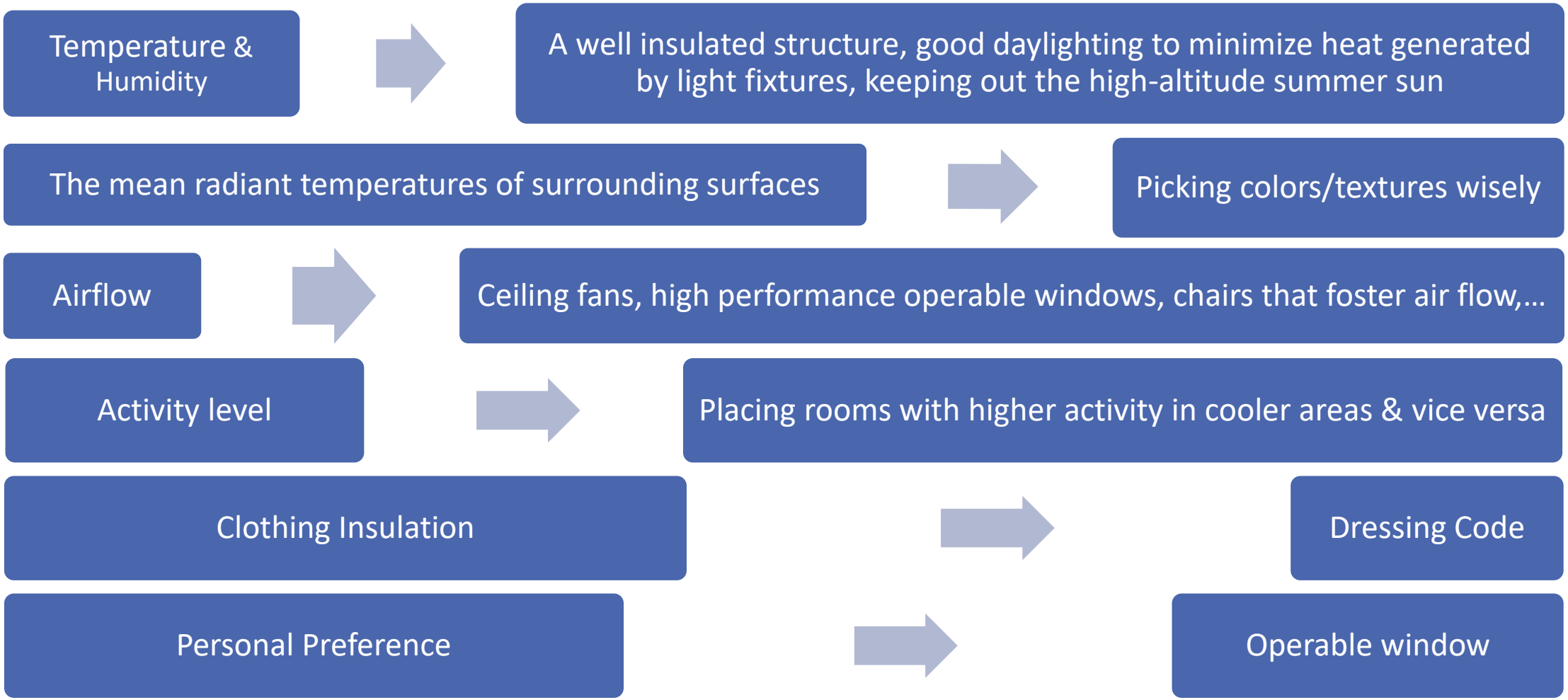
- Exploring a wide range of design ideas and opportunities in terms of interrelationships, techniques, technologies, materials, and systems to investigate.
- We are not optimizing yet!
- Don’t be encumbered by practicalities at this stage! This is the chance for blue-sky ideas!

Expand the Analysis of the Four Key Subsystems-Habitat

- Initial analysis of local habitat impacts and potential strategies to minimize negative impacts.
- Examine potential Indoor Air Quality strategies:
  - Daylighting criteria
  - Initial thermal comfort parameters
  - Potential adaptive thermal comfort strategies,
  - Natural/other ventilation systems….

Extending the thermal comfort range → reducing HVAC system size → Saving Energy

Adaptive Thermal comfort



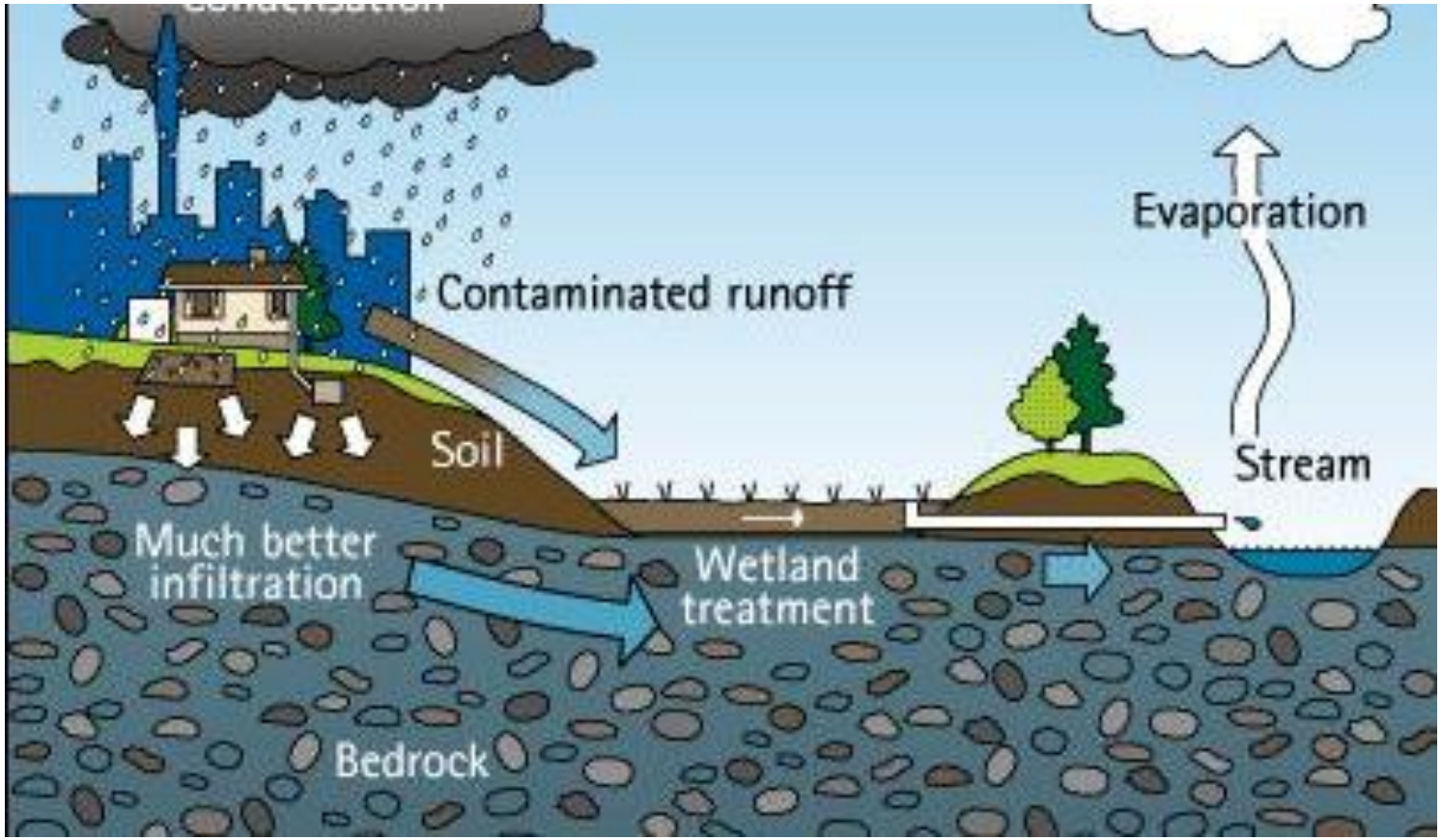
Optimum and Acceptable Ranges of Operative Temperature for People During Light, Primarily Sedentary Activity (≤1.2 met) at 50% Relative Humidity and Mean Air Speed ≤0.15 m/s (30 fpm)[a]

Season	Description of Typical Clothing	I_{cl}(clo)	Optimum Operative Temperature	Operative Temperative Range (10% Dissatisfaction Criterion)
Winter	heavy slacks, long-sleeve shirt and sweater	0.9	22°C 71°F	20-23.5°C 68-75°F
Summer	light slacks and short-sleeve shirt	0.5	24.5°C 76°F	23-26°C 73-79°F

Office dress code: minimal dressing in summer

27°C
81°F

- By expanding the range of assumed thermal comfort parameters in early design, and therefore interior temperature settings during operations, project teams can potentially allow owners to downsize equipment and thereby save money and energy.



Water

- Investigate strategies associated with water quality and water conservation
  - Stormwater
  - Soil permeability
  - Initial quantification of annual water consumption and wastewater generation
- To test the ability for achieving initial performance targets.

Energy

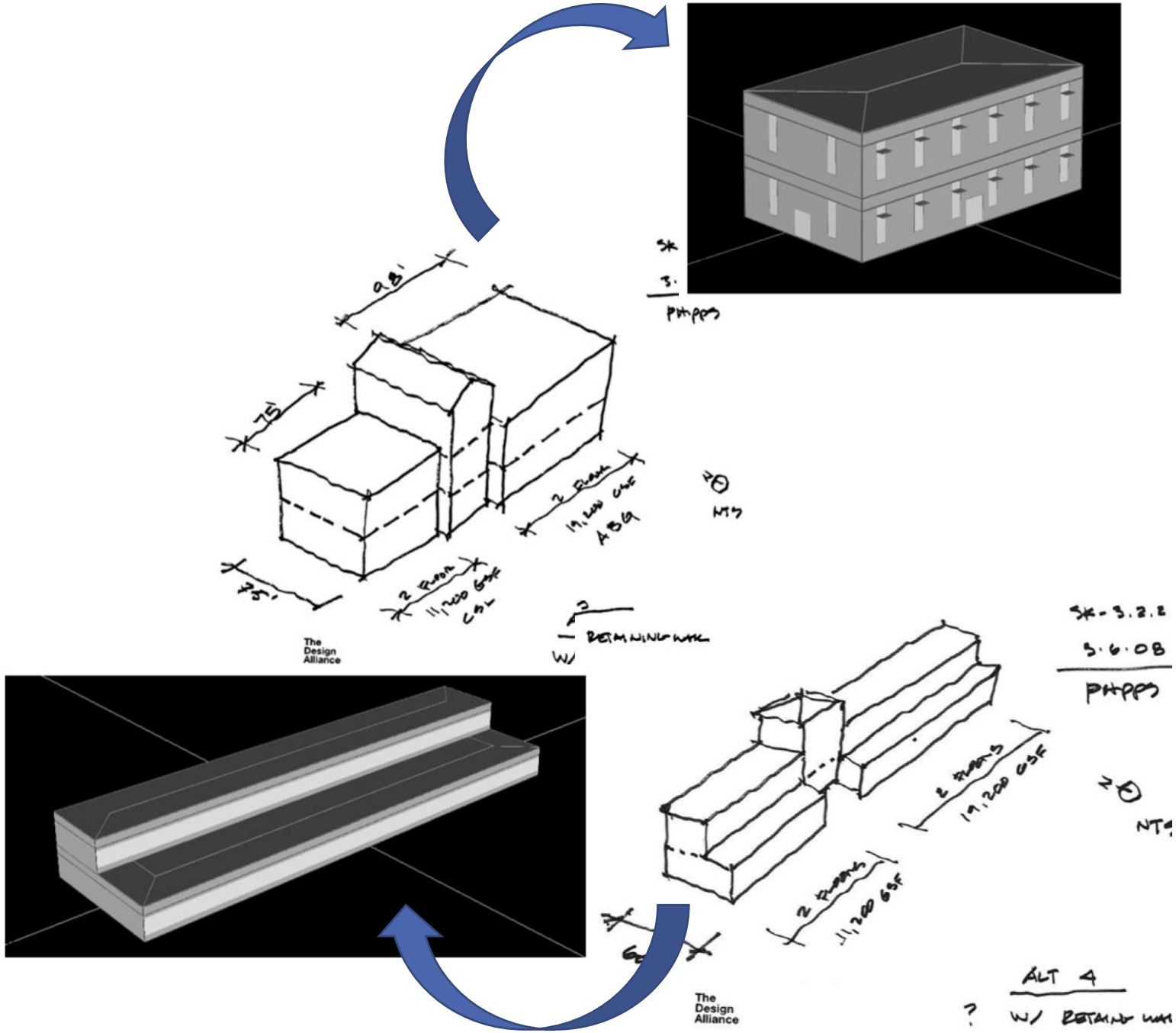
Establishing overall energy performance targets

Energy Budget	
All spaces	New construction—reduce energy cost budget by 30% compared to an ASHRAE Standard 90.1-2004 baseline building. Renovation—reduce energy cost budget by 20% compared to a pre-renovation 2003 baseline building.
Lab Spaces	< 300 kBTU/gsf/year
Office Spaces	< 40 kBTU/gsf/year
Computer Center	< 50 k BTU/gsf/year
Child Care Center	< 25 kBTU/gsf/year
Lighting Budget	
All spaces	Do not exceed the recommended light levels in the *IESNA Lighting Handbook 9th Edition*
Lab Spaces	1.00 W/gsf
Office Spaces	0.65 W/gsf
Computer Center	0.50 W/gsf
Child Care Center	0.80 W/gsf
HVAC Cooling Load	
Lab Spaces	> 250 sf/ton
Office Spaces	> 550 sf/ton
Computer Center	> 400 sf/ton
Child Care Center	> 600 sf/ton
Ventilation	
All spaces	Comply with ASHRAE Standard 62.1-2004
Lab Spaces	CO_2 levels not to exceed 500 ppm
Office Spaces	CO_2 levels not to exceed 700 ppm
Computer Center	CO_2 levels not to exceed 700 ppm
Child Care Center	CO_2 levels not to exceed 700 ppm

Glazing	
All spaces	Interior surface temperature of >62°F at outdoor temperature of 20°F
Measurement & Verification	
All building projects	Comply with the requirements of the *IPMVP Concepts and Options for Determining Energy Savings in New Construction, Volume III*, Option B or D.
Daylighting	
All Regularly Occupied Spaces	2.0% daylight factor as calculated by the International/IESNA Method
All Regularly Occupied Spaces	25–30 fc of daylight
Thermal Comfort	
All spaces	Comply with ASHRAE Standard 55-2004
Water Budget	
Office/Child Care	Do not exceed 3 gallons per person per day of potable water
Renewable Energy	
All building projects	On-site renewables
All building projects	Green power purchase which meets the Green-e requirements for 100% of electric consumption

Energy

- Perform simple building-massing energy modeling to explore “large-grain” issues such as:
  - Solar orientation
  - Footprint and massing relationships
  - Apertures
  - Load profiles
  - Day-lighting opportunities
  - Wind profiling
  - Potential for natural ventilation



Materials

Develop a materials comparison using LEED criteria and/or begin initial life cycle assessment (LCA) with tools such as ATHENA.

- LCA is a scientific methodology for holistic thinking.
- All materials have an impact and determining which materials are “best” is often a subjective choice based on a trade-off of some sort.
- LCA major concepts:

  -Service life

  -Durability

  -Delamination (not using what you don’t need)

  -Deconstructability

Materials

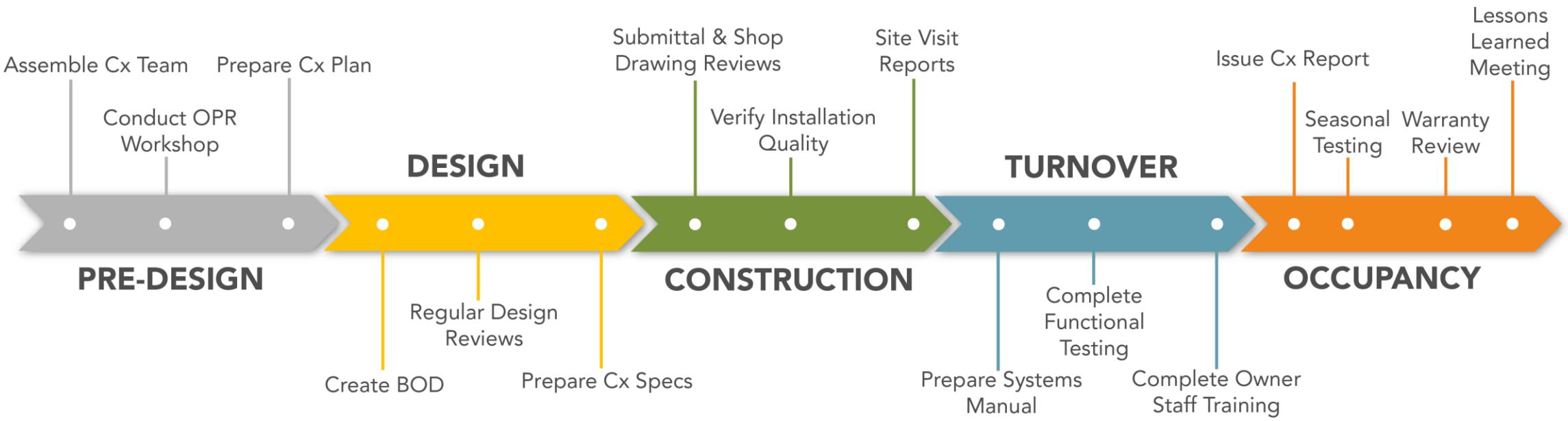
Credit or Category Name	New Construction	Core and Shell	Schools
Materials & Resources	13	14	13
Storage & collection of recyclables	P	P	P
Construction & demolition waste management planning	P	P	P
Building life cycle impact reduction	5	6	5
Building product disclosure & optimization- environmental product declarations	2	2	2
Building product disclosure & optimization- sourcing of raw materials	2	2	2
Building product disclosure & optimization- material ingredients	2	2	2
Construction & demolition waste management	2	2	2

Evaluate design concepts against performance Targets

These evaluations will require the level of analysis described above for the four key subsystems to assess in more detail the Performance Targets established by the team during Workshop No. 1 and to verify that they are capable of being achieved or exceeded by the expanded set of possible strategies being explored during this stage.

Commissioning: prepare Conceptual Phase OPR

- Extracting the owners' conceptual project requirement from the owners' teams' responses to the questionnaire.
- This document will evolve over time as design decisions are made; hence similar updating exercises are recommended.



Commissioning

ASHRAE Definition: "A quality-oriented process for achieving, verifying, and documenting that the performance of facilities, systems, and assemblies meets defined objectives and criteria"

Use the initial template to portray both initial and life cycle cost considerations.

Explore the relative difference between the costs of each alternative “grouping” or “combination” that is being explored.

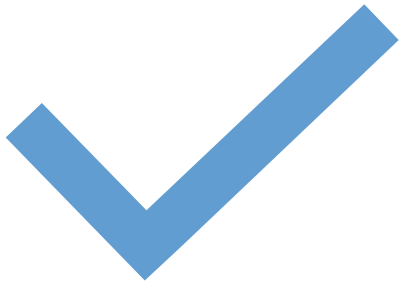
Analyze Life Cycle Costs to include:

- First cost of systems options
- Operations, maintenance, and replacement costs
- Productivity and environmental cost impacts, when possible.

Analyze the effect of adding one system to the cost of other systems.

Applying unit cost estimates to the integrative cost-bundling template

Schedule and Next Steps



Update Integration Process Road Map in preparation for Workshop No. 2.

Prepare Agenda for Workshop No. 2.

Questions to Consider for writing the Reflections:

WHAT IS COMMISSIONING? ITS BENEFITS, DRAWBACKS, AND CONDITIONS?

HOW IS COMMISSIONING CONDUCTED IN OUR COUNTRY? WHAT CHALLENGES DO WE FACE IN CONDUCTING FULL SCALE COMMISSIONING IN OUR COUNTRY?

ESTABLISH INITIAL BENCHMARKS, AND PERFORMANCE TARGETS FOR ANY OF THE FOUR KEY SUBSYSTEMS IN YOUR STUDIO PROJECT.

EXPLAIN ONE OF THE CREDITS IN MATERIALS AND RESOURCES CATEGORY OF LEED CERTIFICATION