

The Commissioning Process and LEED®

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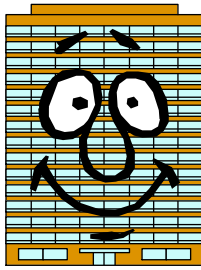
Program Director



After this Session, You Will Be Able To...

- Explain to Clients/Colleagues:
What is Commissioning (Cx) and why is it used?
- List Goals & Benefits of the Commissioning Process
- Describe How LEED® Approaches Cx
- Find Additional Resources

What is Commissioning (Cx)?



- Commissioning: a formal process to verify quality
 - Provides techniques that facilitate integrated design efforts
 - First step is Owner's Project Requirements, or goal setting
 - Traditional start-up commissioning/ pre-occupancy testing is just one of the steps

Why Verify Quality?

A study of 60 newly constructed buildings revealed that:

- ✓ 50% suffered from controls problems
- ✓ 40% had HVAC equipment problems
- ✓ 15% had missing equipment
- ✓ 25% had energy management systems, economizers, and/or variable speed drives that did not function correctly.

--Lawrence Berkeley National Laboratory

Why Is Commissioning Needed?

“Owners are spending more and more on building systems than ever before, yet are not getting the performance they expect...”

- EPRI Survey

- New technologies -- Modern buildings and materials are more complex
- Even the best designers and contractors may not guarantee success



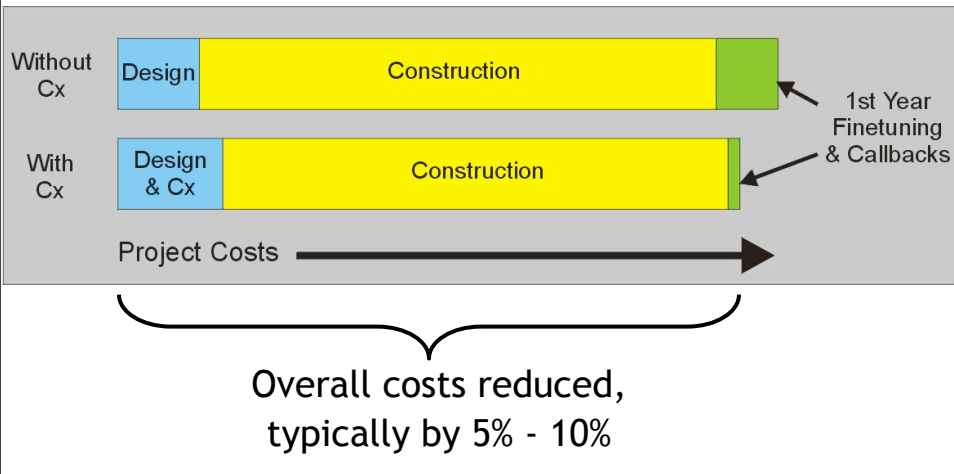
Goals of Cx Process

- *Better Documentation & Performance*
 - Document owner's goals, requirements & decisions
 - Verify project team provides documentation for life of the building
 - Help project team stay focused on owner's goals
- *Cost Reduction*
 - Prevent or eliminate problems inexpensively
 - Lower overall costs for the owner
 - Increase profits for project team by decreasing costs/overhead caused by redesign, rework, callbacks

Cx Offers Many Benefits...

- *Verification* that building systems operate as intended
- Substantial improvement in first-year operation
- Reduced complaints
- Building is maintainable
- Reduced rework and callbacks, saving the contractors \$ (profit)
- Reduced overall project costs, saving the owner \$...

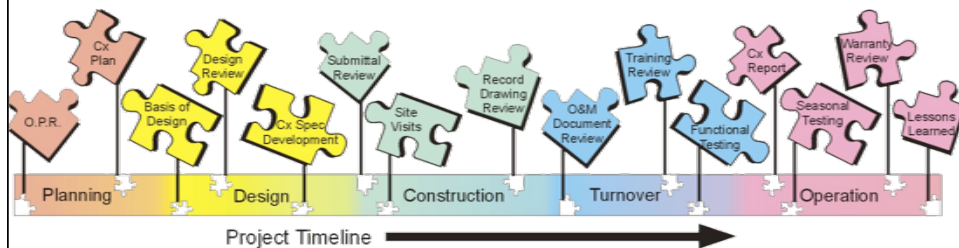
Cx Offers Many Benefits...



Why Isn't Everyone Using Cx?

- Doing something new can be difficult
- “I’ve been doing it this way for 30 years.” - don’t see the need to change
- Misconceptions and confusion
- Unrealistic expectations (not a magic bullet)
- Not sure what to do, how to begin...

The Commissioning Process



- Every step was created for a reason: to solve a common problem
- Not every project uses every step
- Some Cx professionals specialize in one step or phase of the process

Who Leads the Cx Process?



- The Commissioning Authority (CxA):
 - Independent owner's advocate
 - Primary focus is on the guiding the process, preventing rework, and documentation
 - Background in design, construction, operation, quality verification
- Mission: verify that the owner gets the building they want, and it works from day one

Who Can be the Cx Authority?

- Owner's Representative: **Yes (ideal!)**
- Independent Consultant: **Yes (2nd best)**
- Design or Construction Professional: **Maybe**
 - Cannot be providing design or construction services on the project
 - Must have proper experience in Cx
- Cx is a tough job - there must be no conflicts of interest!

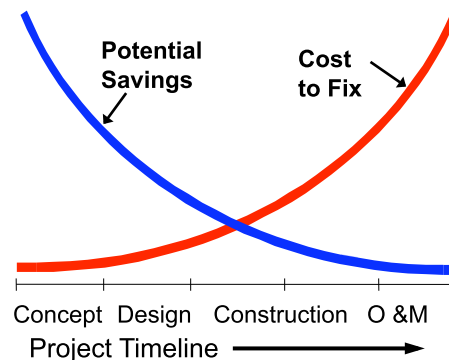
Is Cx the Same as TAB? No.



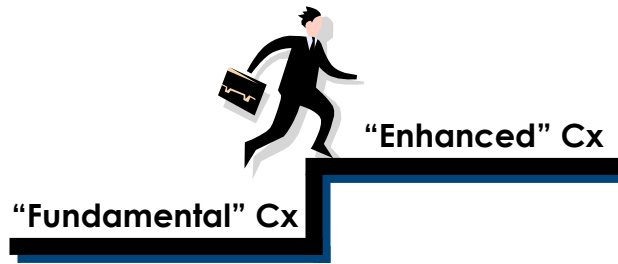
- *Testing Adjusting Balancing (TAB)*
Contractor: balances air & water systems to meet design conditions
- *Commissioning Authority*: verifies quality - including verifying TAB work is done properly

Why Not Just Wait and Test at the End?

- 20 years ago, Cx was limited to simply functional testing step
- Worked fine for finding problems, but did not prevent problems
- Cx limited to testing is much more expensive overall for owners and project team members



Commissioning in LEED® Two Level Format:



- Requires Cx without discouraging small or simple projects by limiting required scope
- Some tasks required, some tasks worth 2 additional points.

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How LEED® 2009 Approaches Cx

- Within the Energy and Atmosphere Category
 - For Building Design & Construction (BD&C):
 - [E&A Prerequisite 1: Fundamental Commissioning of the Building Energy Systems](#) (required: 0 points)
 - [E&A Credit 3: Enhanced Commissioning](#) (2 points)

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2009 BD+C: E&A Prerequisite #1 - Fundamental Commissioning of the Building Energy Systems

Project Timeline →

Commissioned Systems
Commissioning process activities shall be completed for the following energy-related systems, at a minimum:

- Heating, ventilating, air conditioning, and refrigeration (HVAC&R) systems (mechanical and passive) and associated controls
- Lighting and daylighting controls
- Domestic hot water systems
- Renewable energy systems (wind, solar etc.)

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2009 BD+C: E&A Credit #3 - Enhanced Commissioning (worth 2 points)

Project Timeline →

For Credit #3:

- CxA must not be employee of the design firm or contractor on the project, regardless of building size

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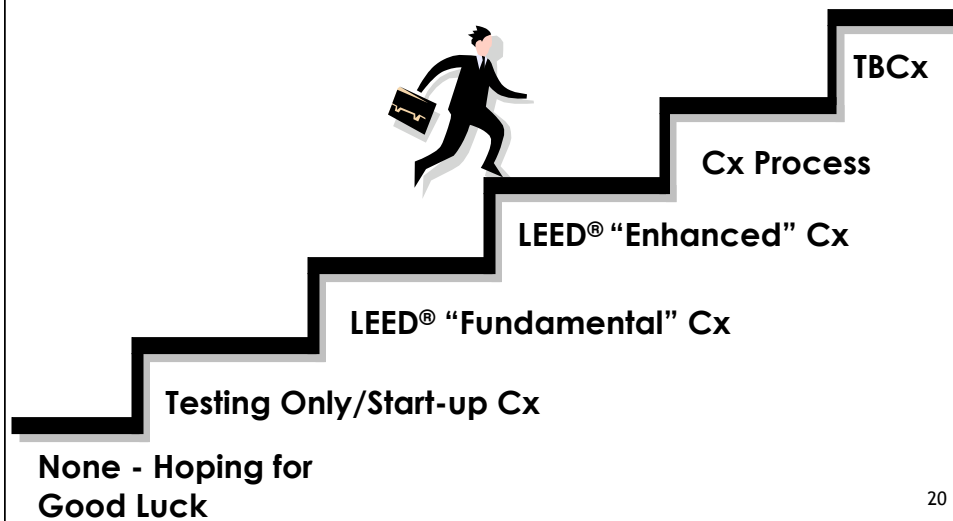
Why the separation?

- Trying to keep LEED® prerequisites cost effective (perceived)
- Some Cx providers may not provide the full process
- Allows owners flexibility in choosing Cx scope

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Commissioning Options

Remember, LEED® Cx is not the full process...



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Commissioning Courses at UW-Madison



- EPD offers a short course series on the Cx Process
- Multi-day courses on the full process & special topics (Cx for LEED, Existing Buildings, etc.)
- Visit the web site for current offerings and schedule:

<http://epd.engr.wisc.edu/bldgcommissioning>

Resources for Additional Info...

- University of Wisconsin Engineering Professional Development Commissioning Courses and Certification, <http://cx.engr.wisc.edu>
- ASHRAE Guideline 0-2005 and Guideline 1-2007, www.ashrae.org
- California Commissioning Collaborative, www.cacx.org (lots of case studies!)
- New York State Energy Research and Development Authority, www.nyserda.org/programs/commissioning.asp
- Building Commissioning Association, www.bcxa.org
- Lawrence Berkeley National Lab, <http://cx.lbl.gov/cost-benefit.html> (detailed cost-benefit study)