Commissioning & Retro-Commissioning

*Helping You Get the Most of Your Facilities*

John Rimer, CFM

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Introduction

John Rimer, CFM

- 16+ Years Facility Management
- Numerous Industries & Various Roles
- Owner, FM360 Consulting
- Certified Facility Manager (CFM) - IFMA
- Director, Northern Rockies Chapter of IFMA
- IFMA Qualified Instructor
- Commissioning (Cx)
  - Developed & Managed Cx/TAB Team
  - BCxA and NEBB Member

Agenda
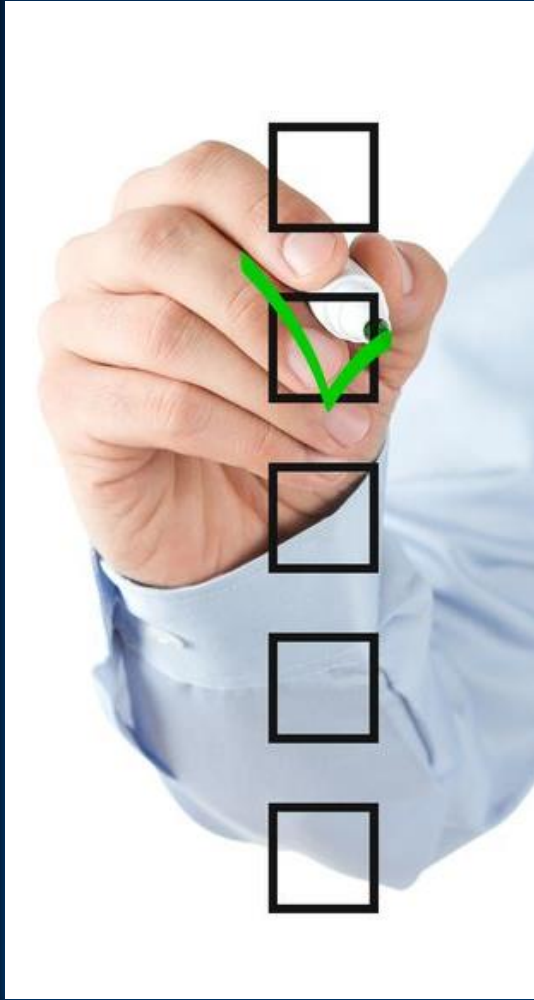
- What is Commissioning (Cx)?

- Why Commission?

- Fundamental vs. Enhanced Cx?

- What is Retro-Commissioning (RCx)?

- What's the value of Cx?

- How much does it cost?

- How do you select a Cx Agent?

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What is Commissioning?

Commissioning is **NOT**:

- Just a pre-requisite for LEED

- Contractor Start-Up

- Testing & Balancing (TAB)

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What is Commissioning?

COMMISSIONING (Cx)

Commissioning Agent (CxA) acts on the owner's behalf to ensure that the end product (facility, system, etc.) meets the owner's specified requirements and acceptance criteria

RETRO-COMMISSIONING (RCx)

Commissioning of existing facility/system to ensure it operates as originally intended or as is now required.
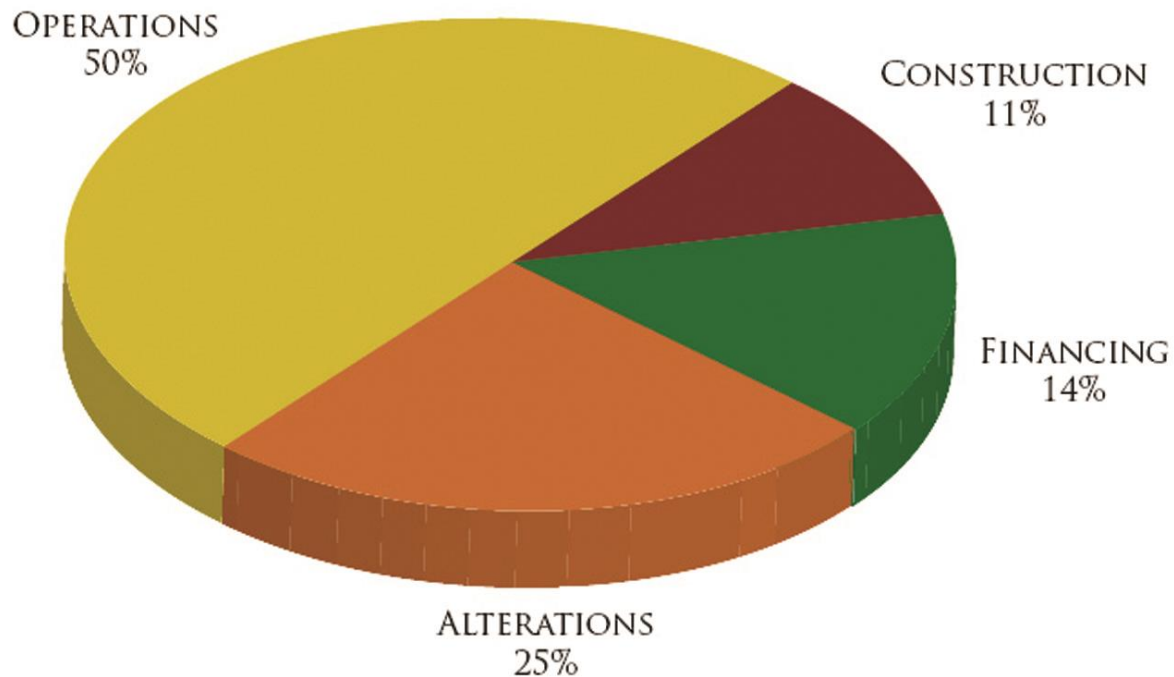
Retro vs. Re-Cx

"Tune" the facility/system

TESTING & BALANCING (TAB)

Establishing air/fluid flow and distribution per design and Owner requirements

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Why Commission?

40-YEAR LIFECYCLE COSTS

OPERATIONS 50%
CONSTRUCTION 11%
FINANCING 14%
ALTERATIONS 25%

Why Commission?

"Commissioning is a systematic, forensic approach to quality assurance"

"Commissioning is arguably the single-most cost-effective strategy for reducing energy, costs, and greenhouse gas emissions in buildings today"

"The aim of commissioning of new buildings is to ensure that they deliver, if not exceed, the performance and energy savings promised by their design."

"When applied to existing buildings, commissioning identifies the almost inevitable 'drift' from where things should be and puts the building back on course."

*Building Commissioning: *A Golden Opportunity for Reducing Energy Costs and Greenhouse Gas Emissions, Dr. Evan Mills July 2009*
http://cx.lbl.gov/2009-assessment.html

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Fundamental vs. Enhanced Cx

Fundamental Cx

- Owner's Acceptance Criteria
- Manage OPR Document
- Supply Cx Specifications
- Conduct Design Review
- Review Design Submittals
- Provide Cx Plan
- Construction Doc Review
- Review Submittals
- Start-Up Testing
- Review TAB Report
- Fxn Performance Testing
- Review O&M Manual
- Develop Systems Manual
- Administer Training
- Provide Cx Report
- 10-month Ops Review
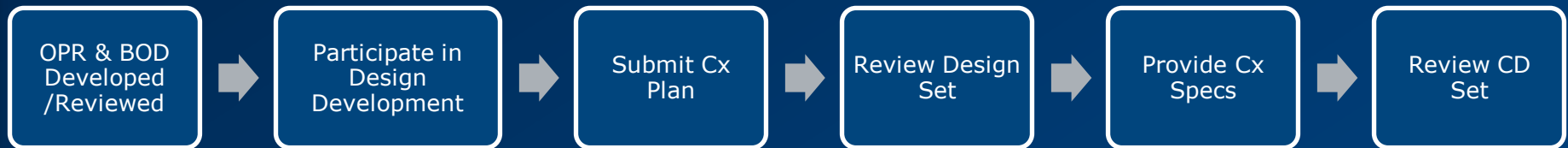- Warranty Support
- Transitional & Operations

Enhanced Cx

- Owner's Acceptance Criteria
- Manage OPR Document
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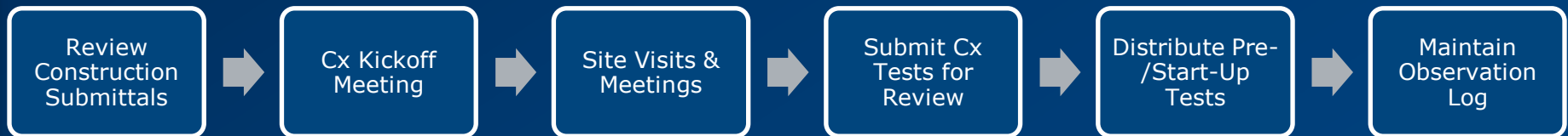- Transitional & Operations

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Enhanced Cx Process

Design Phase

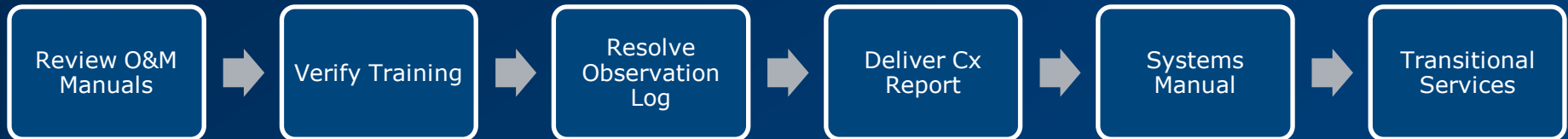OPR & BOD Developed /Reviewed → Participate in Design Development → Submit Cx Plan → Review Design Set → Provide Cx Specs → Review CD Set

Construction Phase

Review Construction Submittals → Cx Kickoff Meeting → Site Visits & Meetings → Submit Cx Tests for Review → Distribute Pre-/Start-Up Tests → Maintain Observation Log

Acceptance Phase

Review Sequence of Operations → Review Pre-Start Tests → Coordinate Start-Up Tests → Review & Verify TAB → PTP Verification → Conduct FPTs

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Enhanced Cx Process

Close-Out/Transition Phase

Review O&M Manuals → Verify Training → Resolve Observation Log → Deliver Cx Report → Systems Manual → Transitional Services

Operate & Maintain Phase

Continuous Cx → Seasonal Review → Warranty Review → O&M Review / Consulting → Performance Assurance (M&V) → Operate & Sustain Services

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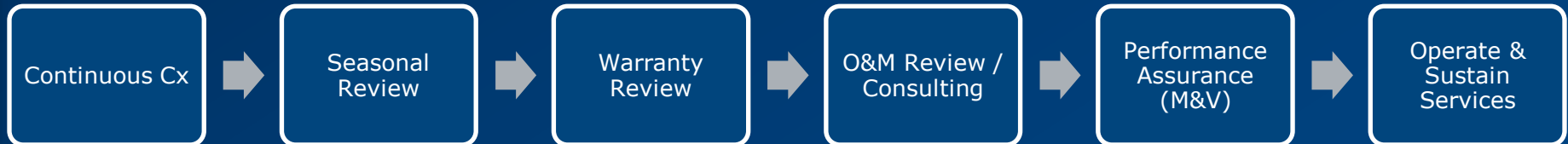
What's are the Benefits of Cx?

- 13% Median whole-building energy savings

- Enhanced Cx returned 2x the energy savings

- Enhanced Cx 5x more savings than Fundamental Cx

- 4.2 Year Median payback based on energy savings alone

- Median non-energy benefits offset an additional 49% of Cx costs

- Most cited non-energy benefits were improved thermal comfort and extended equipment life

*Building Commissioning: *A Golden Opportunity for Reducing Energy Costs and Greenhouse Gas Emissions, Dr. Evan Mills July 2009*
http://cx.lbl.gov/2009-assessment.html

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Shouldn't My Contractors Do That?

Lawrence Berkley National Laboratory (LBNL) study of more than 600 buildings:

- Over half had building control problems

- 40% had HVAC problems

- 1/3 had sensors not working properly

- 15% were missing equipment

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Retro-Commissioning (RCx)

RetroCommissioning vs. Re-Commissioning

- RetroCommissioning is commissioning an existing building that has never been commissioned

- Re-Commissioning is commissioning an existing facility again

In short, RCx is a methodical inspection of the facility systems, their condition, how they operate, and how they interact with other systems; these are measured against the original design intent or current performance criteria

What to Expect?
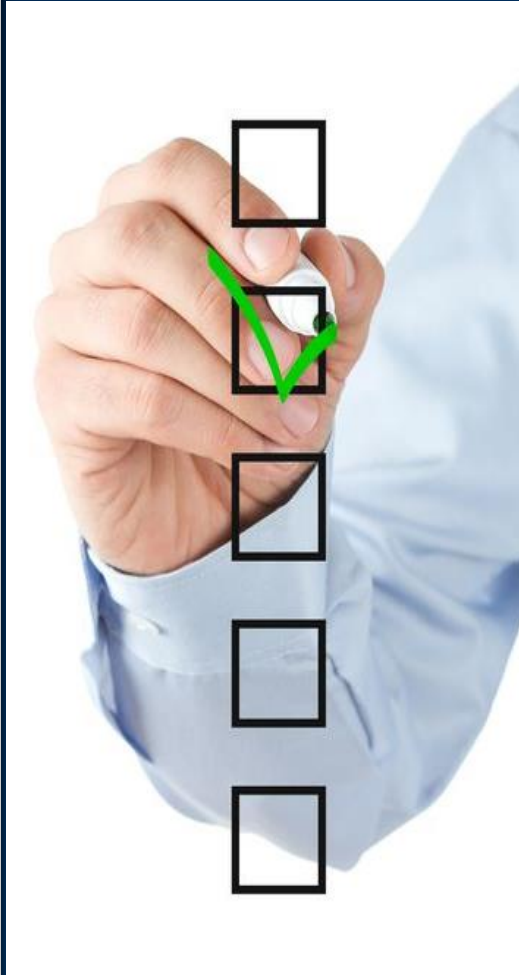
- Report of Improvements Made

- Identification of Needed Maintenance

- Recommended Capital Improvements

- Energy Savings and Cost Estimates

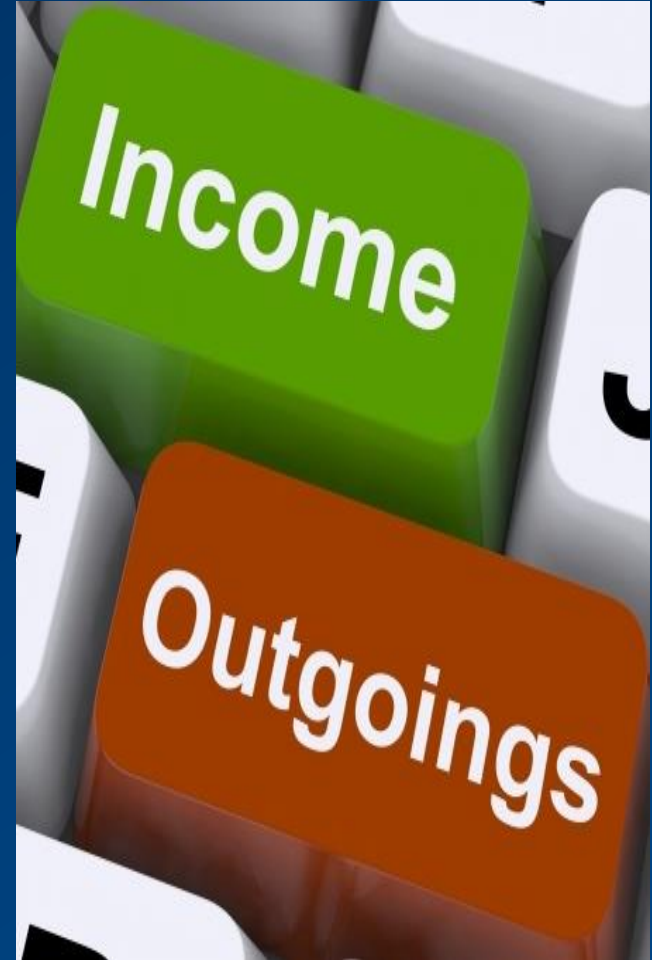- Evaluation of Current FM Program

- Further Recommendations

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Benefits & Costs of RCx

Benefits

- Per LBNL, 16% median energy savings
- Past Experience – 15% to 20+% energy savings
- Improved Operations & Control
- Reduced Risk

Costs

- Per LBNL
  - Median cost is $0.30/SF
  - Median payback of 1.2 years
- My Experience
  - Range of $0.15 to $0.70/SF
  - Equipment Driven
  - Payback of 12 to 24 months

Examples of RCx Findings

- Manual Overrides

- Incorrect Schedules & Setpoints

- Heat Pumps plumbed backwards

- Condensate lines to nowhere

- Unknown equipment

- Outside air dampers screwed shut

- Simultaneous heating & cooling

- Filters sucked into equipment

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How to Select & Procure?

Selecting a CxA

- Full-time, Experienced Cx Staff
- Size of Cx Team
- Depth of Team (Controls, design & energy engineers, PE, etc.)
- Local, if possible
- Certifications and Organization Membership
- Ask for Samples (Cx Plan, Report, etc.)

Procurement

- Pre-Design Stage
- Qualification-based
- Contract direct to Owner

Thank you!

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