

COMMISSIONING FROM THE START

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INTRODUCTIONS

60+ years of industry experience



**John Williamson, CBCP®
President & CEO**

As an AEE Certified Building Commissioning Professional (CBCP), John provides on-site representation for all Willen building commissioning contracts. Since founding Willen in 1994, John has developed detailed commissioning processes which provide value to the owner and construction team from the design stage through project close-out and warranty. He manages the mechanical and electrical commissioning activities for all phases of each project. John has been in the construction industry for over 35 years with direct involvement in commissioning building systems for more than 25 years.



**Steve Nelson, PE, CEM®, EBCP™, LEED® Green Associate™
Vice President & Director of Engineering**

As Director of Engineering for Willen, Steve is responsible for reviewing construction documents and building systems, writing commissioning plans, and developing energy/resource utilization studies & reports. Steve is a graduate of the University of Minnesota with a B.S. degree in Mechanical Engineering and has been a licensed Professional Engineer in the State of MN since 1991. With over 30 years in the commercial construction industry, his experience includes design/build mechanical systems, participation in LEED certified projects, and building systems energy/resource optimization.

WHO WE ARE – WILLEN INC.

A trusted partner in building commissioning services

ABOUT US

- “ Founded in **1994**
- “ **Independent** provider of building **commissioning** services for both **new construction** projects and **existing facilities**
- “ Services focus on the **delivery** process, system **compliance**, **efficiency**, **reliability** and **sustainability** of each unique project
- “ **AEE** certified (Association of Energy Engineers)

OUR SERVICES

- “ *AEE Certified Building Commissioning Cx, Validation, and Project Delivery*
- “ *Comprehensive Recommissioning RCx Plans*
- “ *Utility Recommissioning Programs (Xcel Energy, CenterPoint Energy)*
- “ *Existing Building Commissioning EBCx and Continuous Commissioning Plans & Programs*
- “ *Energy Studies and Reports*
- “ *Water Resource Studies and Reports*
- “ *Benchmarking-B3, EnergyStar*
- “ *EnergyStar Portfolio Manager*
- “ *Equipment and Systems Operational Training Programs*
- “ *Equipment Maintenance Schedules and Program Assistance*
- “ *Owner/Occupant Energy & Resource Education Programs*
- “ *Occupant Informational Materials and Interactive Displays for Energy Reduction Awareness*



WHAT KNOWLEDGE YOU SHOULD WALK AWAY WITH

After this session, we want you to have an understanding of the following:



What **Is** Building Commissioning? (Cx)



What **Benefits** does Cx Deliver?



What are the **Challenges** Associated with Cx?



What **Processes** are Enhancements to Cx?



What is the **Future Outlook** for Cx Services?

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COMMISSIONING IS MORE IMPORTANT NOW THAN EVER

Cx Defined

Commissioning (Cx) is a collaborative and systematic **quality assurance process** to verify and document that building systems **perform correctly and efficiently** according to the design intent, and that they **meet the operational needs** of the building owner and building users.

Independent Cx Authority

It is highly recommended by industry experts that the Commissioning Authority (CxA) be an **independent third-party consultant** contracted by the building owner.

History & Evolution

- “ Cx process began in the shipbuilding industry to assure quality materials and systems in addition to well trained and qualified staff came together for the finished product- a commissioned ship.
- “ Modern day building commissioning process began in the late 1970s in response to energy efficiency initiatives as well as to address **project completion issues** and **building performance deficiencies**.
- “ The increasing **complexity** of interactive building systems and **rising operating costs** continue to drive the need and expand the scope for quality building commissioning services.

Cx TOUCHES A BROAD RANGE OF BUILDING SYSTEMS

Mechanical

Electrical Power &
Lighting

Building
Automation &
Controls

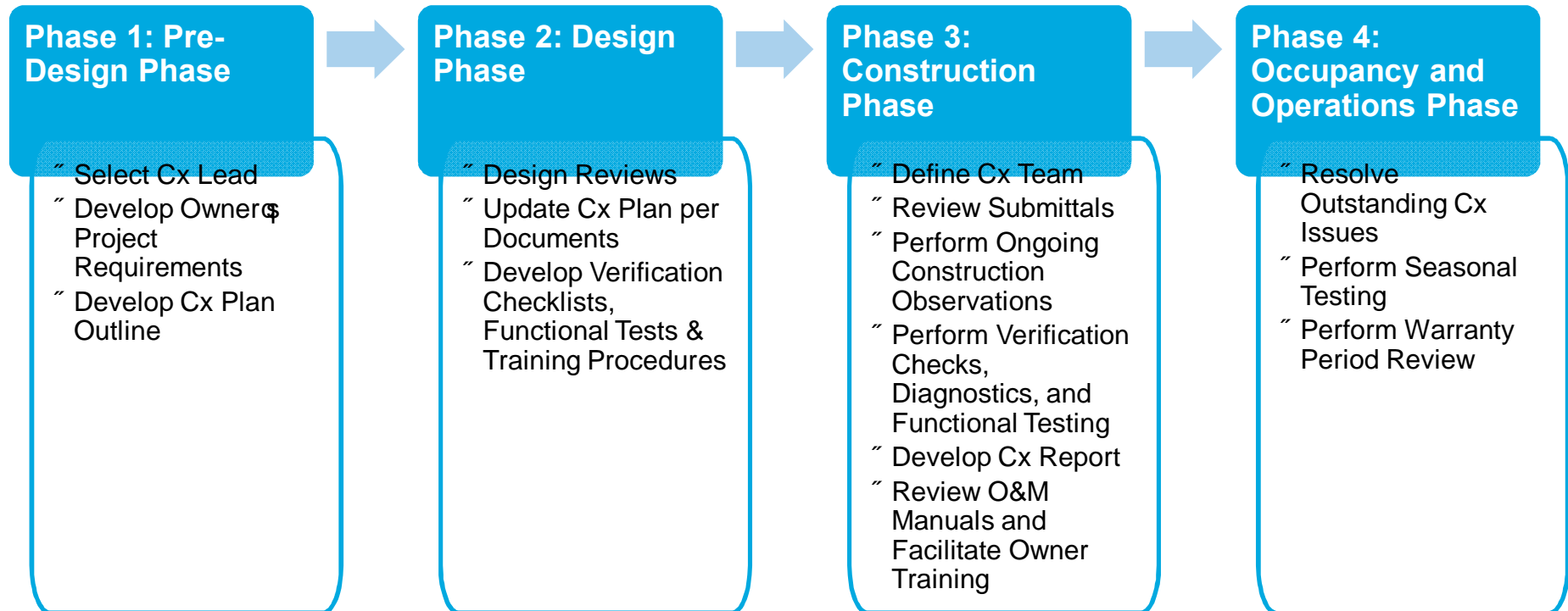
Fire Alarm/
Life Safety

Building Envelope

Security

Communications

THE Cx PROCESS CONSISTS OF FOUR MAIN PHASES



COMPREHENSIVE AND EFFECTIVE Cx KEY POINTS

Cx begins at conceptual design stage → **Commissioning From The Start**

Cx goes beyond traditional testing and balancing (TAB)

Cx is a **quality assurance** process

The Cx Authority (CxA) should be **independent** entity acting as the owner's advocate

Cx is an **interactive** and **collaborative** process

Cx is much more than a punchlist or checklist at the end of a project

Cx is a **comprehensive** process that bridges the AIA, AGC, CSI, etc. processes

ONGOING Cx EDUCATION IS A CRITICAL COMPONENT

Building Owner/Representatives Education

Building Operator Training

Building Occupant Training

Contractors and Construction Trades Education

Code Officials Education



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EFFECTIVE Cx SIGNIFICANTLY REDUCES COSTS

Benefit

Details



Lower **energy operating costs** through improved systems energy efficiency

- “ *Verification of original design intent*
- “ *Comparative measures*



Reduced **maintenance** and **service costs**

- “ *Attention to installation detail*
- “ *Training and preventive maintenance procedures*



Reduced **construction costs** from thorough plan reviews resulting in fewer change orders and potential delays

- “ *Document reviews prior to construction*
- “ *Resolve errors, omissions, inconsistencies in advance*

ADDITIONAL BENEFITS DELIVERED

Benefit

Details



Streamlined construction process

- “ Improved communication & coordination
- “ Smoother project close-out & owner operations



Longer equipment life cycles

- “ Proper operations & maintenance
- “ Well trained building staff



Satisfied and more productive building occupants

- “ Improved environmental conditions
- “ Studies show 2-20% improved occupant productivity

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MANY STAKEHOLDERS MISUNDERSTAND THE FULL SCOPE & VALUE THAT COMPREHENSIVE Cx OFFERS

Challenges to the Cx Process:

- “ Industry understanding of the Cx Process and Cx value proposition
- “ Various abbreviated forms of Cx are being performed and accepted in the current marketplace
- “ Owner support and team approach is critical
- “ Building operators need to be involved and engaged in the process
- “ Execution of procedures is required

REAL Cx VALUE UNLOCKED WHEN DONE COMPLETELY AND CORRECTLY

- “ **Project completion time- Done vs DONE!**
- “ **Avoid chasing punchlist items and unresolved issues through warranty period**
- “ **Owner gets full use of building and all system capabilities sooner**
- “ **Higher level of building operator knowledge and confidence**
- “ **Improved occupant comfort and productivity**

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COMMISSIONING ALSO APPLIES TO EXISTING BUILDINGS

This process is called Recommissioning (RCx)*

Reasons for RCx:

- “ The building energy use is higher than comparable buildings
- “ Systems were never properly configured from the original design
- “ The building has not been properly maintained / general performance degradation
- “ The use of the building has changed over time
- “ Building operators not properly trained

Benefits of RCx:

- “ Many low and no cost Energy Conservation Opportunities (ECOs) for immediate energy savings
- “ Reduced operating and maintenance costs
- “ Increased equipment life cycles
- “ Increased comfort and improved air quality result in more productive occupants
- “ Increased asset value
- “ Detailed documentation and training lead to more effective staff

*Recommissioning or Retro-Commissioning technically applies to a building that was once commissioned vs. Existing Building Commissioning EBCx (which applies to an existing building that has never been commissioned)



BENCHMARKING TRACKS PERFORMANCE OVER TIME

Tools are available to help in the benchmarking process

Definition:

Benchmarking sets a **baseline** for energy and resource utilization and allows tracking of future performance

- “ City of Minneapolis requirements

Tools:

B3, EPA Energy Star / Portfolio Manager

Benefits of Benchmarking:

- “ Reduced operating costs lead to increased profitability
- “ Optimization of energy and water resource utilization
- “ Increased building asset value
- “ Ability to establish building baselines and set goals for continuous performance improvement plan
- “ Meaningful same building future performance comparisons to verify the success of energy reduction initiatives
- “ Meaningful industry performance comparisons for similar buildings
- “ Facilitates prioritization and well informed decisions on energy efficiency & energy reduction projects



CONTINUOUS Cx DRIVES SUSTAINABLE RESULTS

Never Stop Improving

Commissioning is often addressed as a one time process which may (or not) be revisited periodically in the future.

No operational vision or plan can lead to band-aid fixes which may eliminate the complaint but do not address the root causes or align with efficiency objectives.

Example: Just adding more heat, airflow, water flow without looking at the whole picture may temporarily satisfy a comfort issue but energy use is increased. These adjustments are usually not well documented (if at all) and several per year over time will result in significant added operating costs and deviation from design intent.

Continuous Commissioning is an ongoing data based process to sustainably optimize building comfort, performance and operations/procedures.

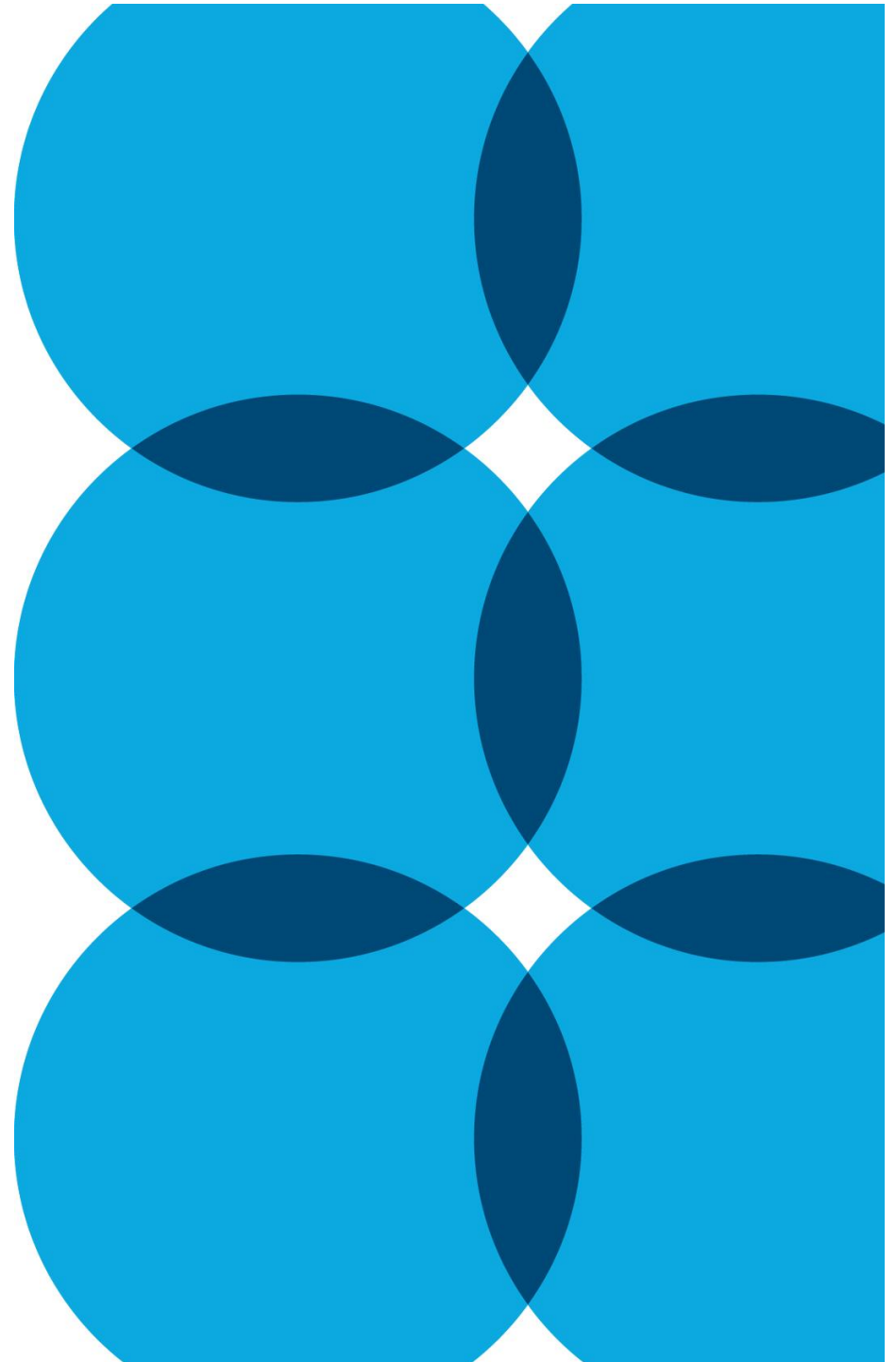
Continuous Commissioning Process:

1. Establish Baselines:
 - “ Environmental comfort- thermal, air quality
 - “ Building systems performance, efficiency, energy usage
 - “ Operations and maintenance programs & training protocols
2. Identify deficiencies and opportunities with financial impact details.
3. Prioritize, implement, measure & verify results, educate and train.
4. Continuous feedback loop approach.



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ONGOING Cx AWARENESS & EDUCATION

- “ **Building Owners and Operators**
- “ **Building Occupants**
- “ **Design Team- Architects and Engineers**
- “ **Construction Team- General Contractors and M&E Subcontractors**
- “ **Code Officials**

WHAT Cx MEANS TO CODE OFFICIALS

- “ **Code Compliance Aspect**
 - “ Cx currently only mandated for Schools and State Buildings
- “ **IBC- 2030**
- “ **IFC**
- “ **IEE**
- “ **NFPA 9**
- “ **ASHRAE, ANSI, ASTM, NIOSH**
- “ **MN Statutes and Codes**
- “ **Other Regulations- Federal, State, Local, MNSCU**

Cx will become increasingly integral to building codes in the future

Cx HAS A PROMISING FUTURE

Awareness and Understanding are Key to Continued Cx Value

- “ **Scope, consistency & enforcement**
- “ **Standards and Certifications for Cx**
- “ **Adoption in the private sector**

“ **Additional Cx Opportunities:**

- Site work
- Elevators
- Roofing systems
- Structures
- Other- discussion



DID WE ACHIEVE WHAT WE SET OUT TO DO?



What Is Building Commissioning? (Cx)

“ Quality Assurance Process



What Benefits does Cx Deliver?

“ Cost Savings, Efficiencies, Improved Interior Environment & Sustainable Results



What are the Challenges Associated with Cx?

“ Early Involvement & Consistent Standards



What Processes are Enhancements to Cx?

“ Benchmarking, Recommissioning & Continuous Cx



What is the Future Outlook for Cx Services?

“ Understanding & Awareness Increases Cx Scope & Value
“ Regulations

THANK YOU

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Resources:

- " Association of Energy Engineers (AEE)
- " ASHRAE
- " AABC, NEBB
- " NFPA Minnesota Statute 123B.72
- " International Building Code Council
- " PECI
- " FEMP/USDOE
- " EPA Energy Star