

# ENVIRONMENTAL RISK MITIGATION THROUGH EXISTING BUILDING COMMISSIONING

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# Training Objective

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To develop a working understanding of Existing Building Commissioning, EBCx, and identify how it can help mitigate exposure to environmental risks in public buildings, specifically schools.

# EBCx— Existing Building Commissioning

“The term EBCx is intended to be a comprehensive term defining a process that encompasses the more narrowly focused process variations such as retro-commissioning, re-commissioning and ongoing commission that are commonly used in the industry.”

BCxA

EBCx Best  
Practices  
Criteria were  
Developed  
Drawing from  
the Following  
Sources

- California Commissioning Collaborative Guide for Existing Buildings
- LEED-EB for Existing Buildings, Version 2.0 by USGBC
- Building Commissioning Handbook by BCA
- NEBB Retro-commissioning Process
- ACG (AABC) Commissioning Guidelines
- ASHRAE Guideline 0-2013
- ASHRAE GPC 1.2
- SMACNA

# Purpose of Commissioning

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- Improved indoor air quality / occupancy comfort
- Increases efficiency of system performance
- Optimize energy usage
- Direct operating/maintenance staff engagement

# Improve Indoor Air Quality / Occupancy Comfort

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SAFE AND HEALTHY WORK  
ENVIRONMENT

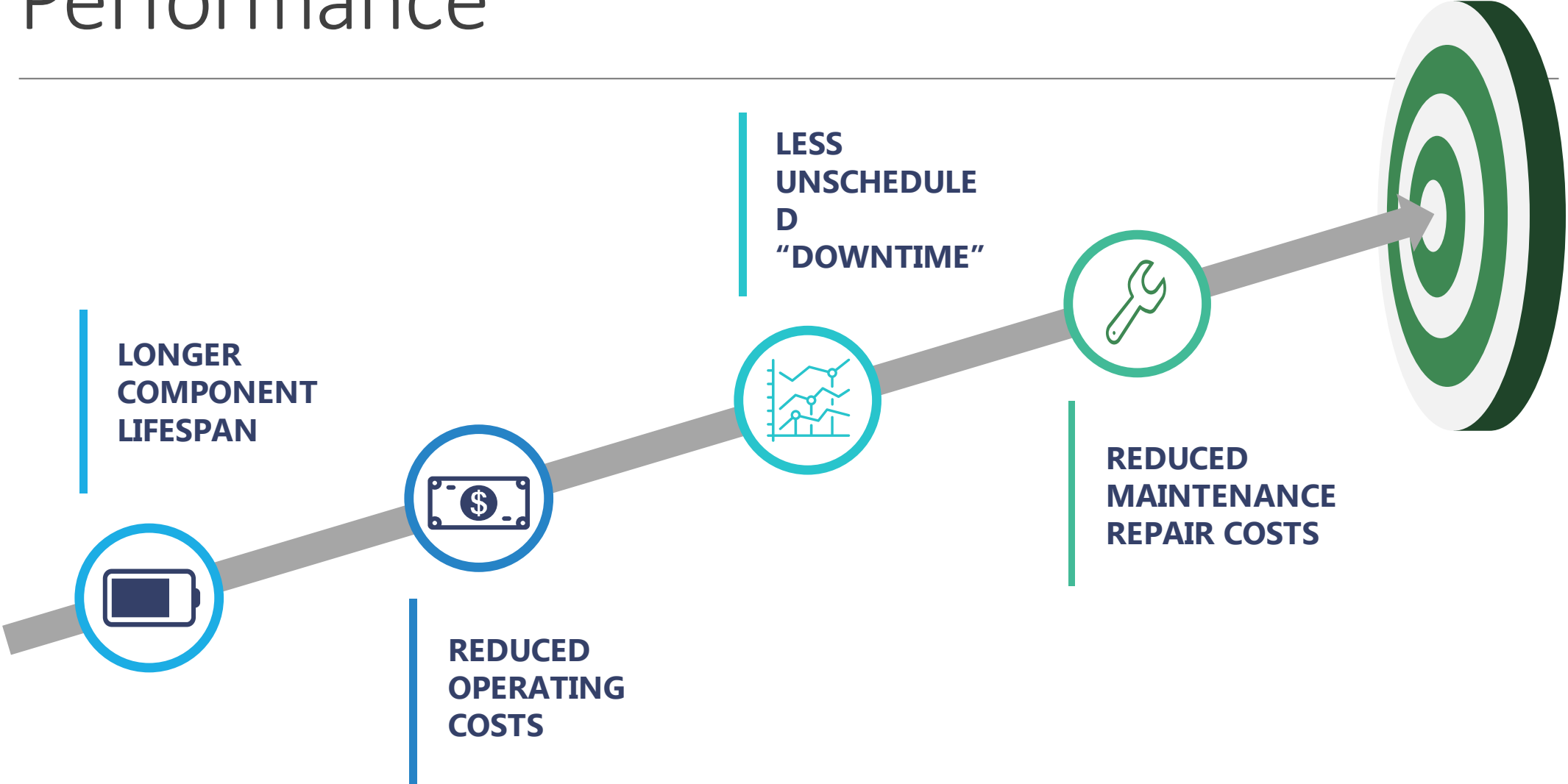


IMPROVE WORKPLACE  
PERFORMANCE / EFFICIENCY



MITIGATE BUSINESS LOSSES

# Increase Efficiency of System Performance



# Optimize Energy Usage

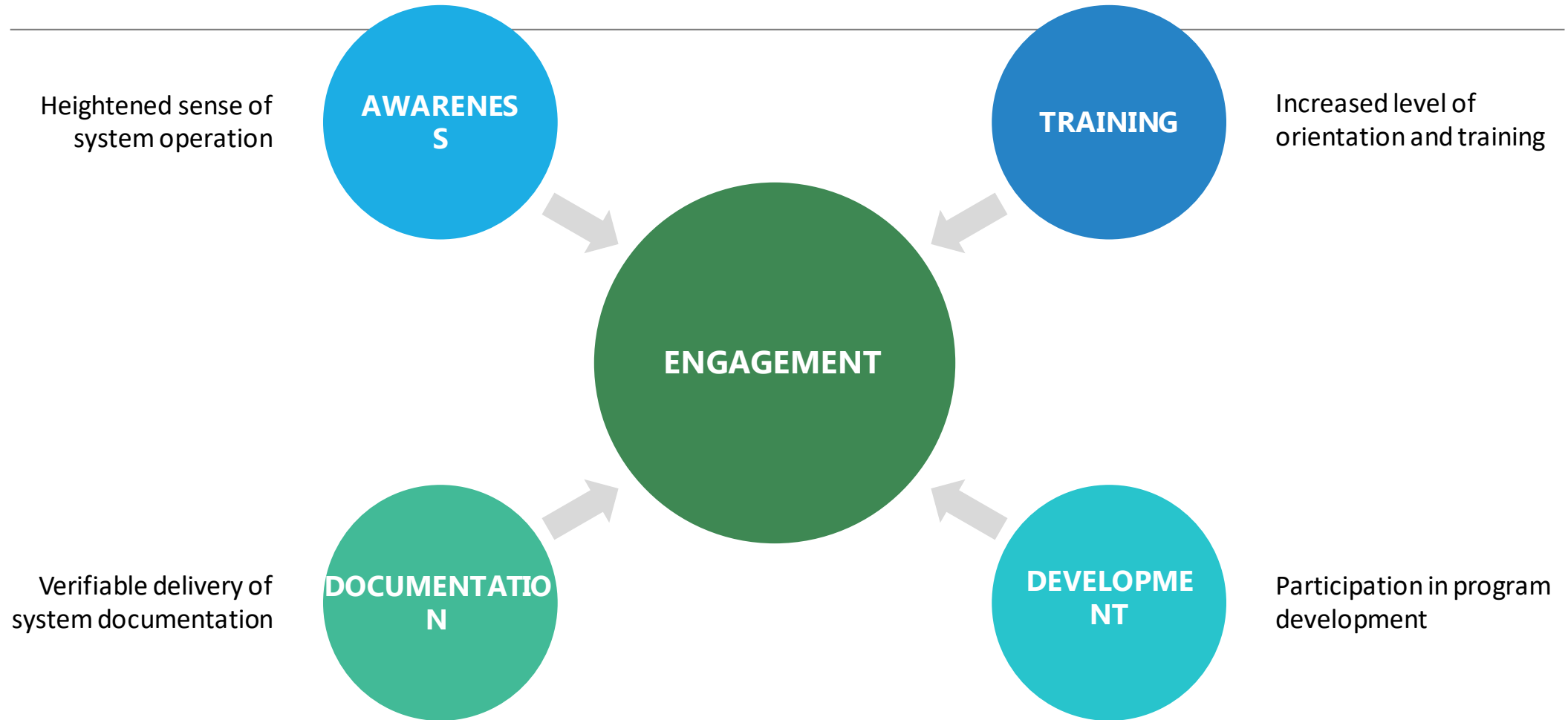


- Direct utility savings



# Direct Operations/Maintenance Staff Engagement

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# What is EBCx

EBCx is the systematic process for investigating / analyzing and optimizing the performance of building systems through the identification and implementation of low/no cost and capital intensive Facility Improvement Measures (FIM) and ensuring their continued performance. The goal of EBCx process is to assist in making building systems perform interactively to meet the Current Facility Requirements (CFR).

# EBCx Includes

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- **Retro-Commissioning** – commissioning building system functionality for the first time after installation has occurred
- **Re-Commissioning** – performing commissioning on building systems after they have been previously commissioned
- **Ongoing Commissioning** – periodic re-commissioning performed on a regular schedule

# EBCx Applies the “Whole Building” Approach

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HVAC&R Systems

Building Assembly  
(envelope, interior, paths  
of egress, etc.)

Conveying Systems  
(elevators and escalators)

Protective Systems  
(fire suppression,  
lightning protection, etc.)

Plumbing Systems  
(water distribution,  
sanitary/storm water,  
etc.)

Electrical Systems  
(power distribution,  
lighting, etc.)

Communication  
Systems (telecom,  
sound, video, etc.)

Alarm Systems (fault  
detection, security, leak  
detection, etc.)

# The Purpose of EBCx

- Verify that a facility and its systems meet the CFR
- Improve building performance by saving energy and reducing operational costs
- Identify and resolve building system operation, control and maintenance problems
- Reduce or eliminate occupant complaints and increase tenant satisfaction
- Improve indoor environmental comfort and quality and reduce associated liability
- Document system operation

# The Purpose of EBCx

- Identify and provide training to Operations and Maintenance (O&M) personnel
- Minimize operational risk and increase asset value
- Extend equipment life-cycle
- Ensure the persistence of improvements over the building's life
- Assist in achieving LEED for Existing Buildings  
<http://www.usgbc.org/LEED>
- Improve the building's ENERGY STAR rating  
<http://www.energystar.gov/>

EBCx

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ENVIRONMENTAL CONTROL

# ENVIRONMENTAL CONTROL

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TEMPERATURE



RELATIVE  
HUMIDITY



DEW POINT



OUTDOOR AIR



# Mold Facts

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- A 2003 study by University of Arizona-100% of homes tested had mold
- Not all mold is dangerous
- Mold needs three things to grow:
  - Moisture
  - Food
  - Warmth

# Factors in Preventing Mold Growth

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- Mold requires moisture to grow
- Control Relative Humidity and condensate in occupied and interstitial space to prevent mold growth
- Install equipment to remove/add moisture to inside air
- Control outside air infiltration
  - Intentional - outside air intake
  - Unintentional - building leakage (25%)
- Be aware of Dew Points
- Design for Dew Point control- Psychrometric

# Air Infiltration Facts

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- Three biggest contributors to air infiltration
  - Ventilation - 60% +/-
  - Air leaks - 25% +/-
  - People - 15% +/-

# Airborne Microbe Facts

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- Microbes can be controlled by managing indoor air quality
  - 85% of diseases are transmitted through our environment via lifestyle
  - Researchers estimate that only 4% of the microorganisms have been identified
  - 10 um droplet can stay airborne for 1.5 hours
  - 0.5 um droplet can stay airborne for 41 hours
  - RH directly affects how long droplets stay airborne
  - These values are inversely proportional (RH low-infection rate high)
  - Based on 1-year study, 800 million data points

# Factors in Controlling Airborne Microbes

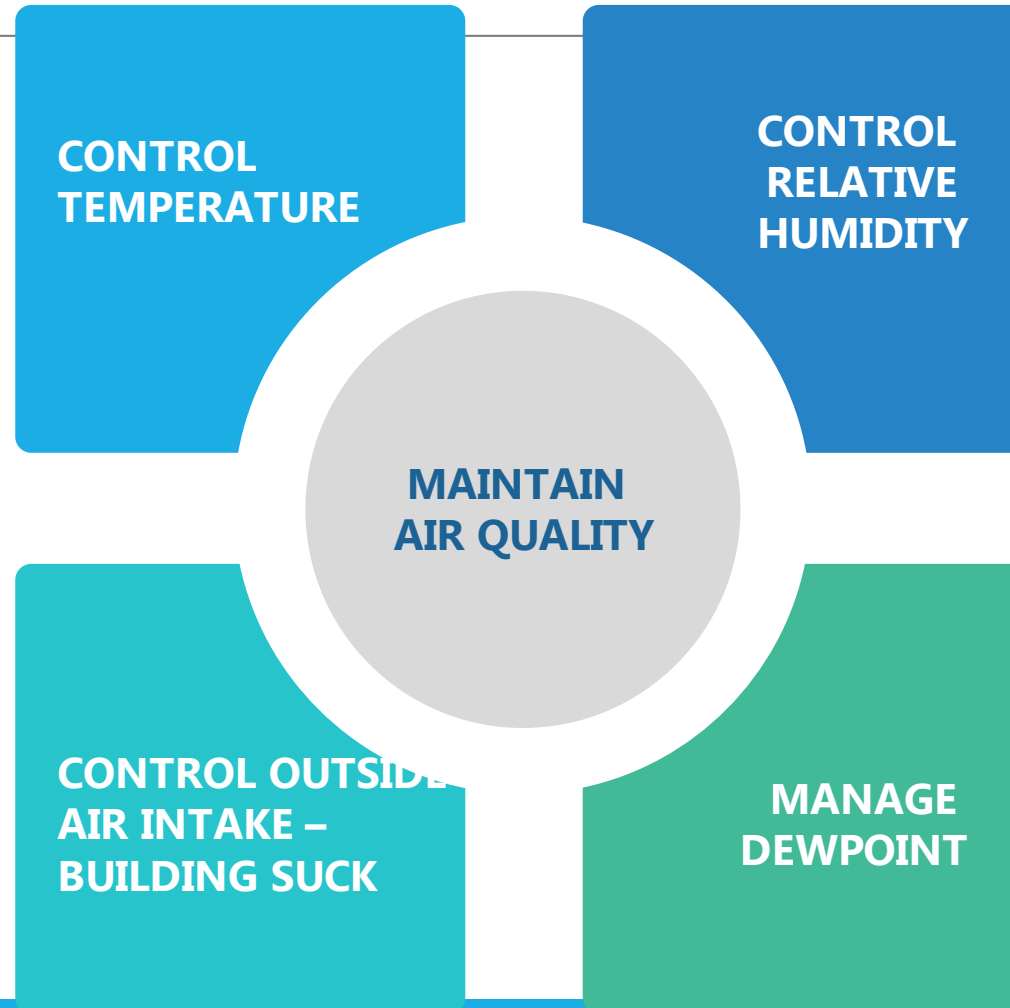
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- Microbes are defined as viruses and bacteria
- **Control Relative Humidity**
- 40% to 60% Relativity Humidity is the most difficult range for microbes to survive in the air
- Pathogens infectivity heighten when  $RH < 40\%$
- Purge with fresh air



# Summary

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Thank You

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- Reference: Best Practices in Commissioning Existing Building by The Building Commissioning Association (BCxA)