Commissioning of Fire Protection Systems -
More Than Just Your Local Fire Marshal

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This presentation will focus on Commissioning of fire protection systems. We will discuss the major national standards associated with Commissioning of fire protection systems and the importance of the process.

Of significance is the Building Owner’s perspective on Commissioning of building systems.

Attendees will have an overview of the concepts of Commissioning relevant to fire protection systems.
We will cover:

• What is Commissioning?
• The sub-parts of Commissioning
• An overview of NFPA 3 and NFPA 4
• The Building Owner’s perspective on Commissioning

We will *not* cover:

• Details of Inspection, Testing, and Maintenance (ITM) found in resources such as:
  • NFPA 1
  • The IFC
  • NFPA 25 and its sister standards (NFPA 13, 20, 22, 24, etc.)
  • NFPA 72
  • NFPA 101
Snapshot – Dave Cozier

- B.S. – Civil Engineering
- M.S.C.E. – Construction Management
- Post-Graduate Studies – Executive Business

- Licensed Professional Engineer (IN)
- Owner Experience
  - U.S. Navy Civil Engineer Corps - 24 years Active Duty
  - Cleveland Clinic
  - Mount Carmel Health System
  - COAA, ASHE
  - Calibrated Foot
Snapshot – Karl Houser

- B.S. – Fire Protection Engineering
- B.A. – Law Enforcement
- A.A.S. – Engineering Technology
- Post-Graduate Studies – Architecture Technology
- Licensed Professional Engineer (WI and MD)
- Diversified Experience
  - Anne Arundel County (MD) Fire Department
  - Maryland State Fire Marshal’s Office
  - Gypsum Association
  - Baltimore-Based Design / Consulting Firm
  - Intertek-ATI
Building Commissioning (Cx) is the process of verifying performance, in new construction, all (or some, depending on scope) of the subsystems to achieve the Owner's Project Requirements (OPR) as intended by the building owner and as designed by the building's architects and engineers.
What “Subsystems” are involved?

**Subsystems** can include basically anything in the built-environment and include:

Mechanical (HVAC/R), infrastructure plumbing and electrical, interior plumbing, interior electrical, **fire & life safety**, building enclosures/envelopes, interior systems (example: laboratory units, data centers, etc.), co-generation/utility plants, sustainable systems, lighting, wastewater, controls, and building security/force protection.
What is “Commissioning”?

When a building is initially commissioned it undergoes an intensive quality assurance process that begins during design and continues through construction, occupancy, and operation of the building.
What is a CxA?

The Commissioning Authority or Commissioning Agent (CxA) is generally (and preferably) contracted directly to the building owner as a *third-party independent representative* to ensure unbiased observation of performance.

The CxA's primary goal is to provide a completed and properly operating product to the Building Owner and the occupant or user of the space.
What is a CxA?

The **Commissioning Team (CxT)**, led by the CxA, has a primary objective of verifying proper installation, operation, and performance based on the project’s **Basis of Design (BOD)** and the **OPR**.
What is a CxA?

The CxA typically is responsible for leading and managing the project commission process (design and/or construction) and works closely with the design, construction, and operation teams in a co-operative work environment that focuses on teamwork throughout the building's design, construction, & post-construction.
With whom does the CxA work?

The CxA works closely with the Owner's Representative, building/facility operating engineer, architect, design engineer, general contractor, and all trade subcontractors.
Who is a FCxA?

The FCxA is the Commissioning Authority responsible as the *Fire Commissioning Agent*.

Section 4.2.1.1.1, NFPA 3 - The FCxA should be knowledgeable and experienced in the proper application of commissioning recommendations of this recommended practice and general industry practices.
What is one of the keys to success?

A Commissioning Plan…

A required, customized document specifically prepared for each project that identifies the processes and procedures necessary for a successful commissioning process.
Why Commission a building?

The Commissioning of the facility, systems, and/or equipment provides verification, identifies issues and discrepancies, and if designed and constructed properly, ultimately enhances the facility’s total quality, control, performance, and efficiency which in turn provides increased sustainability.
Are there other forms of Commissioning?

**Recommissioning** (Re-Cx) is the methodical process of testing that occurs when a building that has already been commissioned undergoes another commissioning process.

The decision to recommission may be triggered by a change in building use or ownership, the onset of operational problems, or some other need.
Retrocommissioning (RCx) is the application of the commissioning process to existing buildings.

Retrocommissioning is a process that seeks to **improve** how building equipment and systems function together.
The GOOD NEWS!!
Since we are dealing with systems critical to life safety and building survival, often the Acceptance Tests that code officials/fire marshals witness on a regular basis are close to what one would expect from “Commissioning”.

The Good News!!
Some of the Differences…

- “Commissioning” is a formal process

- *Begins* at the design stage; not during construction

- Most often, an *independent third-party*

- *Duty* is to the *Building Owner*; not the public, per se

- *Usually, a far more intensive* investigation
Why should a code official care?

- Another set of fire-related eyes on the job
- Probably on-site more often and longer
- Outstanding chance for teaming with professionals
- May relieve overburdened staff to some degree
- Should help with efficiency and fewer re-inspections
Why will code officials still be involved?

- Regulatory authority and charge
- Duty to public welfare and safety
- You probably know the capabilities of your staff
- Review reports and findings of the CxA’s
- Commissioning supplements, not replaces, traditional code inspections
Why will code officials still be involved?

and FINALLY –

- Post-occupancy inspections, testing, and maintenance (ITM) – Some by the Building Owner and some by the local fire department
A Building Owner’s Perspective on Commissioning

Building/Asset Lifecycle

Plan

Inventory/Data

Operate/Maintain

Acquire

Dispose
Over 30 years, the costs of employee salaries and benefits dwarf both the original construction cost and the operation and maintenance cost of the building where they work.
A Building Owner’s Perspective on Commissioning

- Industry Evolution
  - Master Builder, LEED, Recession, Separation of Roles
- Designer’s Role
- Construction Manager/Constructor Role
- Commissioning Agent Role
- Risk Management
- Complexity of Buildings
- Operations/Maintenance/Component Replacement
- Change of Use
An Overview of NFPA 3

- NFPA 3: 
  Recommended Practice for Commissioning of Fire Protection and Life Safety Systems

- 2015 is the current edition; 2012 was first edition

Why? Request from the National Institute of Building Sciences (NIBS) to provide a commissioning document for fire protection systems that would be part of a series of commissioning documents that could be used to create a total building commissioning program.
An Overview of NFPA 3

- NFPA 3 addresses the administrative and procedural concepts of fire protection and life safety system commissioning.

- The document includes information to identify the commissioning team members, their qualifications, and their roles and responsibilities throughout the commissioning process.

- NFPA 3 contains forms to assist in project documentation and the implementation of the commissioning program.
NFPA 3 also provides *some* direction on integrated system tests.

The majority of requirements for integrated system tests was removed at the request of the NFPA Technical Committee and developed into a new document - NFPA 4, *Standard for Integrated Fire Protection and Life Safety System Testing*.

NFPA 3 is a Recommended Practice. NFPA 4 is a *Standard*. 
- NFPA 3 applies to both active and passive fire protection and life safety systems.

- Includes provisions for the commissioning process, testing, delivery of Operations and Maintenance documents (O&M Manuals), training, and modifications required to maintain these systems.

- NFPA 3’s application is a function of the Project Specifications. NFPA 3 is usually not adopted as a law or ordinance.
- The body of NFPA 3 is only about 12 pages. The Annexes are approximately 33 pages. Not necessarily a bad thing...

- **TAKEAWAY** – NFPA 3 outlines a very good, methodical process for the evaluation and documentation of fire protection systems from design through U&O. It, and NFPA 4, have some excellent information to make even everyday Acceptance Tests better and more meaningful.

- 2015 is the current and first edition

Request from the NFPA Technical Committee on Commissioning and Integrated Testing to provide a Standard for the testing the performance of integrated fire protection systems.

“Integrated” means individual systems that are interconnected to perform specific functions.
Section 1.1.4 This standard shall not be interpreted to require integrated fire protection and life safety systems testing unless otherwise required by the design documents or commissioning plan, or by governing laws, codes, regulations, or standards.

Section 1.2.1 The purpose of this standard shall be to provide a testing protocol that will verify that integrated fire protection and life safety systems perform as intended.

Section 1.2.2 The integrated fire protection and life safety system test shall verify the proper operation and function of all interconnected fire protection and life safety systems.
An Overview of NFPA 4

- NFPA 4:

- Section 3.3.12.1.3 Integrated Systems Test. A test performed on fire protection and life safety systems to confirm that operation, interaction, and coordination of multiple individual systems perform their intended function.
The Integrated Testing Agent (ITa) is a person or entity identified by the owner, who plans, schedules, documents, coordinates, and implements the integrated testing of the fire protection and life safety systems and their associated subsystems.

At a minimum, the Integrated Test Team shall consist of the ITa and the installation, testing, or maintenance personnel for each integrated system.
What is one of the keys to success?

The *Test Plan*...

A customized document specifically prepared for each required project that identifies the procedures necessary for a successful integrated test program.
The body of NFPA 4 is only about 9 pages. The Annexes are approximately 29 pages. Again, not necessarily a bad thing…

- **TAKEAWAY** – NFPA 4 has some excellent information to make even everyday Acceptance Tests for more complex buildings and systems better and more meaningful.
More Good News!!

- NFPA 3 and NFPA 4 have a companion Handbook available!! (Perhaps a bit pricey...)
Why do we need Commissioning, Acceptance Tests, and ITM?
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Fire Protection System Performance

- Automatic Fire Sprinkler Systems

- Failure to Activate or Control/Suppress a Fire or Accidental Discharges:
  
  4% to 26%

- Compliance with NFPA 13, NFPA 14, NFPA 20, NFPA 25:

  About 0%
- **Automatic/Manual Fire Alarm Systems**

- Failure to Activate or Operate as Intended:

  9% to 16%

- Compliance with NFPA 70, NFPA 72, and ADA (including occupant notification provisions):

  80% +/-
- Automatic/Manual Fire Alarm Systems

- Ability to Initiate an Appropriate and Timely Evacuation:
  Fairly Low
Building Officials and Fire Marshals are essential, but their duty is to the public.

Owners have spent time and effort (\$\$\$) on a building or build-out and have to live with it. Every day…

Commissioning and Integrated Testing should increase reliability of vital systems.
Thank you…!

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