WAYNE’S WORLD:
21 YEARS OF NCBC, OR
DÉJÀ VU ALL OVER AGAIN

Wayne Dunn, PE, PEng, LEED AP, CIAQP

21st National Conference on Building Commissioning
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Questions related to specific materials, methods, and services will be addressed at the conclusion of this presentation.
LEARNING OBJECTIVES

- Trace the history and growth of commissioning as a valuable element of the building design, construct and perform process.

- Put into working context the origin and expansion of commissioning practices.

- Explain to owners and project team members the potential impact of existing and new codes, standards and technologies on building requirements.

- Consider updating practical and technical commissioning methods to meet emerging applications.

- Convey a vision of the future of commissioning to other professionals.

- See who’s still here and how many I can put to sleep
DÉJÀ VU ALL OVER AGAIN...
GATHERING AN INDUSTRY APPROACH (..in the beginning)

- Energy Crisis exposed inefficiencies in built environment & transportation
- Built environment responded, with Utility support and technical solutions
  - HVAC deemed an energy hog
  - Building envelopes inadequate
- Solutions were failing to achieve results
  - Building industry lacked validation process
  - Comfort complaints led issues
  - Efficiency measures not working
  - High tech buildings failing
- Commissioning was born
MILESTONES LEADING TO NCBC

- 1977 - London Conference (Testing & Commissioning of Building Service Installations)
- 1984 - Symposium on Commissioning (University Hospital, Edmonton, Alberta)
- 1988 - PECI begins work with 15 “Utility Collaboratives” (utilities and stakeholders) to develop DSM programs in the Northeast, California and Maryland
- 1989 - ASHRAE publishes HVAC Commissioning Guideline
- 1990 - APWSS Publishes first draft of formal procedures
- 1991 - Electric utilities begin to require Cx on energy installations
- 1991 - BPA tests first Commissioning Guideline on Energy Edge program pilot building
- 1992 - BPA & PECI organize Cx Roundtable for California and Northwest utilities
- 1992 - BPA revises Commissioning Guideline based on findings
- 1992 - New Construction Programs for DSM Conference
- 1993 - First NCBC Conference hosted by SMUD, Sacramento CA
- 1993 - Introduction of “Cx” abbreviation for commissioning
NCBC: WHO AND HOW

- **Nancy Benner** was dedicated to development and expansion of NCBC as a hub for learning and energetic dialog on commissioning.
- Nancy developed a committed PECI team including Debbie Dodds, Diana Bjomskov and **Liz Fischer**, now Executive Director of BCA.
- Created liaisons with industry stakeholders across the country from utilities to individual providers, and organizations like NEEA and EEI.
- Negotiated funding sponsorships.
- Identified and vetted conference topics.
- Attracted potential participants and well-respected presenters.
- Charmed exhibitors.
- Managed NCBC organization and implementation.
1ST NCBC - SACRAMENTO, 1993

- Host Sponsor: Sacramento Municipal Utility District (SMUD)
- Sponsors:
  - Baltimore Gas & Electric
  - California Institute for Energy Efficiency
  - Electric Power Research Institute
  - LA Department of Water & Power
  - Northeast Utilities
  - Pacific Gas & Electric
  - US Department of Energy
  - Wisconsin Center for Demand-Side Research
- Supporters
  - Bonneville Power Administration
  - New England Electric Service
THE BIG ISSUES
(1993 summary report)

- Standards and Guidelines
- Whole Building Commissioning
- Owner’s Responsibility
- Role of Lenders, Appraisers & Insurers
- Who Does Commissioning?
- Interface Between Commissioning and Design Professionals
- When Does Commissioning Happen?
- Who Does the Commissioning Agent Report To?
- Who Should Pay for Commissioning?
- What About Paying for Deficiencies?
- Disconnect Between Energy Efficiency and Indoor Air Quality
THE SESSIONS

- What is Commissioning and How Much Does It Cost?
- Costs and Savings / Benefits of Commissioning
- Making Commissioning Business as Usual
- Commissioning in Utility Programs
- State-of-the-Art (1993 style)
- Research Efforts Underway
- Tools of the Trade
- Retrofit, Recommissioning and O&M
- Integration of O&M With Commissioning
- Energy Management Control Systems
- Unique Applications

WAR STORIES
SOME THINGS WERE DIFFERENT THEN …

- NCBC focused only on energy efficiency
- Sponsors were utilities and government agencies
- Attendees were mostly government, research, utilities & engineers
- Monitoring “performance” was a hands-on process
- Groceries, hospitals & labs were “unique applications”
- Speakers submitted “paper” papers
- Presentations were mostly overheads (mine was slides)
- Conference communication all by mail
- Conference lasted 3 days
- Hotel group rate was $66.00
- Air and land transportation by “Giselle’s Travel Bureau”
TODAY - SOME OF THE SAME ISSUES BUT...

- More:
  - technical and holistic approaches
  - specialized focus on measures and systems
  - specialized building and energy management systems

- Utilities seeking deeper persistence and metrics

- Continuous improvement

- Whole building Cx - no longer “if”

- Defined Owner Responsibilities

- Commissioning Tools & Toys

- Codes & Standards being updated

- More professions involved

... farther down the road
HOW I GOT INVOLVED IN START-UP

- Started out as an instrument tech in petro-chem
- Graduated, naturally went into construction quality assurance
- In petro-chem Cx (commissioning) was called “start-up”
- Oil Companies fussy about stuff working and not blowing up
- The phone rang ...

Heavy industry
HOW I GOT INVOLVED IN COMMISSIONING
(my introduction to bldgs & govt)

- Canadian Federal Government Wanted New Lab
- Combined Human and Animal Pathogens (first time)
- Include Level 4 Biocontainment suites
- Sited Project in Manitoba
- Could I write QA (Cx) specs
  - Sure, sounds kool
- Gave speech at lab conf
  - In Florida
- A series of firsts (for me too)
  - Especially selling, considering......
HOW I GOT INVOLVED IN NCBC (1993)

- The phone rang ...
- It was Nancy Benner
- Could I come to Sacramento and speak about Cx Specs?
  - Nancy didn’t hear words like no, or I’m not certain....

NCBC 1993
WHAT CX WAS IN 1993?

- ASHRAE Guideline 1-1989 defined structure.
- Transition from post construction to parallel process.
- Utility programs and Government Buildings led the way.
- High tech buildings were looking at commissioning as well.
- Many viewed as enhanced TAB.
- Era of Deming and TQM.
### Cost Of Commissioning

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#### Recommended Practice

- **Construction**
- **Test Components**
- **Test Systems**
- **Third Party Testing**
- **Warranty**
- **Fine Tune**

#### Design, Construction, Start-Up:

- **Small Projects**
- **Large Projects**
- **Complex Projects**

**RECOMMENDED PRACTICE**
WHAT CX HAS BECOME

- As close as it ever has been to: “Business as Usual”
- ASHRAE Guidelines still Industry Standard Reference
- Several certifications designating Cx Qualifications
  - Most include some form of experience profile.
  - Most include an examination process.
  - Similar to other industry certifications, including TAB, no professional status
- USG BC & LEED have become primary drivers
  - LEED Enhanced Cx profiles current process as defined by ASHRAE
  - Limited number of systems required for LEED credit.
- Applied Risk Management (multiple forms Cx, ReCx, Cont. Cx)
  - Some still view as enhanced TAB
Wayne A. Dunn PE

**COMPONENT VERIFICATION**
- Component Verification Sheets
  - Cx produces/Eng. Reviews
    - "White" copy
- Shop Drawing Data
  - Contractor Completes
    - "White" copy
- Cx Incorporates Shop drawing Data
  - "Blue" copy
- Contractor Completes Field Data
  - "Blue" copy
- Cx audits Blue sheets
  - Yes
  - No
- Approved sheets printed as final sign off.
  - "Green" copy
  - Yes
  - No
- "Green" sheets incorporated into Cx manual.

**SYSTEM VERIFICATION**
- System Verification Tests
  - Cx produces/Eng. Reviews
    - "White" copy
- Cx produces "Blue" test.
  - "Blue" copy
- Contractor conducts preliminary tests.
  - "Blue" copy
- Preliminary test data forwarded to Cx
- Test results accepted by Cx
  - Yes
  - No
- Test results accepted by Owner
  - Yes
  - No
- Green sign off test is produced by Cx
  - Yes
  - No
- "Green" tests incorporated into Cx manual.

**INTEGRATED SYSTEM VERIFICATION**
- Integrated System Tests
  - Cx produces/Eng. Reviews
    - "White" copy
- Cx produces "Blue" test.
  - "Blue" copy
- Contractor conducts preliminary tests.
  - "Blue" copy
- Preliminary test data forwarded to Cx
- Test results accepted by Cx
  - Yes
  - No
- Test results accepted by Owner
  - Yes
  - No
- Green sign off test is produced by Cx
  - Yes
  - No
- "Green" tests incorporated into Cx manual.
  - Cx manuals are turned over to the Owner.

**CONTRACTOR QUALITY CONTROL**
- Source Inspection
  - i.e. Factory Visits/Tests
- Pre-Work Meeting
  - Confirm Procedures
- Initial Inspection
- Follow-Up Inspection
  - After Install Complete
- Resolve Issues
- Initial Testing & Start-up

**APPLIED PROCESS & PAPERWORK DISCIPLINE**
(in a cloud?)

**FIGURE #3 - COMMISSIONING DATA MANAGEMENT FLOW CHART**
NCBC: CX METHODS, TOPICS & ISSUES

Issues:
- Cost & Value (perception of risk/ reward)
- Qualifications (professional, sticker or both)
- Contract vehicle and selection process

Topics:
- Engaging Stakeholders
- Codes & Standards
- Scope (process & systems)
- Cx Definitions & Methods (Risk Managed Approach)
  - New Construction
  - Re or Retro Commissioning Existing Facilities (EBCx)
  - Continuous or Monitor Based Commissioning (MBCx)
WHAT ARE WE GOING FOR (% RISK)?
NCBC: DEFINITIONS & METHODS

- **Cx New Construction**
  - Risk Management (design)
  - Quality Assurance (construction)
  - Performance Validation (testing)
  - Tech. Transfer (turnover)

- **Retro or Re Cx or EBcx**
  - Assessment of never or previously Cx’d facility
  - Establish then execute optimization
  - Tech. Transfer throughout project

- **Continuous or Monitor Based Cx or MBCx**
  - Calendar or event driven form of Retro Cx
CX WORK METHODS – THEN & NOW
NCBC: TOPICS

- Engaging Stakeholders
- Codes & Standards
- Scope
  - Process
  - Systems
- Reiterating the Value Statement
  - Thinking & Testing are Cheaper than Surprise, Surprise
NCBC: ISSUES

- Cost & Value (perception)
  - View as a Risk Management tool growing
  - Value still predominantly defined in terms of energy savings
  - Difficulty remains trying to prove a negative

- Qualifications
  - Experience
  - Sticker
  - Professional Status
  - Pick D?

- Contract Vehicle and Selection Process
  - Qualifications based or Price Based
  - Contract through project team or direct
WE ARE NOT ALONE
(it is difficult to prove a negative)

- Remember Redwater Fertilizer Plant
  - One of largest, if not, largest in North America
  - West Texas Fertilizer Facility might have fit in our parking lot.
REMEMBER HIGH TECH VIRUS LAB

Vial of deadly virus missing at Texas

Alison Young, USA TODAY | 7:23 p.m. EDT March 25, 2013

A Texas lab can't find a frozen vial of virus that is a potential bioterror agent. Lab officials say it's most likely the vial was accidentally destroyed inside the facility.

Officials at a maximum-security research lab in Texas report that a vial of a potential bioterror agent is missing, but they say it's likely that the virus has been destroyed and poses no danger.

The incident, voluntarily disclosed by the Galveston National Laboratory, comes amid growing concerns about security and safety risks at labs researching germs and toxins that could be used as bioterror weapons.

Scott Weaver, the Galveston lab’s scientific director, said Monday that a routine check last week led to the discovery that one of five small plastic vials of an obscure virus called Guanarito was missing from a locked freezer. Checks of the lab's security systems show no malfunctions and no unusual entries to the lab or the freezer since a previous inventory.

[Photo: Galveston National Laboratory]
Results: Analysis of the demonstrated orbital launch reliability and yearly successes and failures for the four LV classes has been completed. Launch vehicle classes are seemingly, readily identifiable but not easily defined. A unique, unambiguous classification method, which considers the lift capability growth over time, was introduced by the authors. The method is based on a non-linear regression analysis of the historical growth data of published lifting capabilities to LEO for the U.S. vehicles and the results show that, for example, in 1960’s the HLV could be defined as having a lift capability of at least 8,000-kg (17,640-lbm) to LEO, whereas today’s HLV has a lift capability of more than 17,310-kg (38,162-lbm). The elite SHLV class consists of only U.S. Saturn V and CIS/USSR N-1 and is considered a special class in the study. There were 4,517 successes and 419 failures during the last 51 years and 88 days of world orbital space launches. Out of these launches, 12 successes and 5 failures were in SHLV class, 583 successes and 5 failures in MLV class, and 806 successes and 134 failures in SLV class. The demonstrated reliability is 91.5%.
EMPATHIZE WITH OUR SECURITY FORCES

The 9/11 Blame Game

By MICHAEL DUFFY/WASHINGTON  |  Wednesday, Sept. 27, 2006

Wouldn’t you have thought, five years later, we’d be done arguing about who was to blame for 9/11?

I just assumed that after one congressional probe, a two-years-long bipartisan commission and more solid journalism than even our business has awards for — and that would be a lot — we could all agree that fingers could be safely pointed at least three entities: the terrorists, for launching the attacks; and both the Clinton and Bush administrations, for acting too timidly to stop them, despite all the warning signs.

End of story. Can we move on now?

No, instead, we’re witnessing a full dynastic rumble about who is to blame.

Chris Wallace asked Clinton last week if he had done enough to get bin Laden. Clinton evidently said no, but before he left he ordered over the Bush White House — one legit, one not. First, he said the Bush team demoted his counterterrorism czar Richard Clarke. That’s technically right, but even the Kean-Hamilton commission noted Clarke continued to function at the same level of authority inside the White House as before. (Many Democrats just refuse to believe this.)

But what really teed off the Bushes is that Clinton then said that his successor "did not try" to kill or stop bin Laden for the first eight months in office — that is, the

Boston Marathon bombing: the blame game begins

Just days after the Boston Marathon bombing, the political maneuvering and blaming have begun. Some lawmakers fault the FBI for not following up on intelligence about one of the alleged bombers. Others want to prosecute the surviving suspect as an enemy combatant.

It may be plainly obvious who was responsible for the horrific Boston Marathon bombing on Patriots’ Day: ethically Chechen brothers Tamerlan and Dzhokhar Tsarnaev, one dead in a shoot-out with police, the other seriously wounded and sedated in a Boston hospital where investigators are eager to interrogate him.

Unexploded bombs were found in their apartment, surveillance videos show them carrying heavy backpacks in the vicinity of and just before the explosions that killed three people and injured more than 180, and they are said to have acknowledged their responsibility to the driver of a car they hijacked.

But less than a week after a train of events that kept Boston-area towns on lock-down for days, the political maneuvering and
CX VISION: WAYNE’S WORLD

- What does the future look like for Cx - both as an industry and for CxAs?
  - Process defined, somewhat accepted but what systems/ scope?
  - Professional Engineer, Industry Sticker or Both?
  - Specified Contractual Service (QBS selected) or Bid?
  - Fox and Chickens or Lion with Mouse or Chickens and Chickens?
SCOPE: PROCESS VERSUS SYSTEMS
(Cx must manage expectations)

PROCESS
- LEED/LEED enhanced
- Expanded TAB
- FMECA
- FDA validation
- HCA regulations
- Responsibility for results
- Underwrite risk?

SYSTEMS
- Envelope
- Renewable
- HVAC
- Automation (SCADA)
- Power Distribution
- Lightning Protection
- Milking machine
- Waste Treatment
WHO DO YOU HIRE & HOW TO PICK?

- Licensed Professional
- Industry Certified
  - ASHRAE: CPMP
  - BCA: CCP or ACP
  - AABC: AC G
  - AEE: CBCP
  - NEBB: BSC C
  - U of Wisc: 5 Cx Stickers
    - QCxPSM, CXA PSM, CXM SM, CxT SM, or GCxPSM
- Both?
- Qualifications Based Selection
- Price
- Both?
- How much experience?
WHAT IS BEST CONTRACT STRUCTURE?
Q & A

- What will stay the same?
- What will change?
- What else should change?
THANK YOU

Wayne A. Dunn PE, PEng, LEED AP
waynedunn@ewdunn.com
904-635-5108