Commissioning: Global & Local Development, GBI CxS Submission Compliance & BAS Impact

13th to 15th Apr 2016
Ir TL Chen DL&F.ASHRAE, PEng, CEng
Paper 4: Evolution of Local CxS Industry

13th to 15th Apr 2016
Ir TL Chen DL&F.ASHRAE, PEng, CEng
ONE DAY COURSE
BUILDING COMMISSIONING & AUDIT
28th July 2010, Petaling Jaya

ONE DAY SEMINAR ON COMMISSIONING
4th October 2010, Petaling Jaya

CxS: Demarcation of Scope &
Is it VALUE FOR MONEY?
13th to 14th March 2013, Petaling Jaya

Commissioning Process
for Green Buildings
13th to 15th Feb 2014, Petaling Jaya
Seminar & Workshop on Commissioning for Building Systems: Energy Efficiency & Performance
5th to 7th Mar 2015, Petaling Jaya

Commissioning: Global & Local Development, GBI CxS Submission Compliance & BAS Impact
13th to 15th Mar 2016, Petaling Jaya
What is the definition of Cx?

- In a new building, commissioning services is a systematic quality assurance process to verify that building systems are fully operational and perform interactively according to the design intent and owners requirements.
- Building commissioning is the process of verifying, in new construction, all of the subsystems for mechanical, plumbing, electrical, fire/life safety, building envelopes, interior systems, cogeneration, utility plants, sustainable systems, lighting, wastewater, controls, and building security to achieve the owner's project requirement.
The History of Cx

• The US Navy was the first to implement the need for Cx to ensure that ships were seaworthy prior to leaving ports
• 1977: Public Works Canada was the first to use Building Cx in their project delivery system
• 1981: Disney World includes Cx in design, construction and start-up of the Epcot Centre
• 1988: ASHRAE publishes HVAC Cx Guidelines
• 1991: US Utilities require Cx on EE installations
• 1998: LEED criteria includes Cx
• 2009: GBI criteria includes Cx
• 2010: Cx helps Diamond Building achieve GBI Platinum
The Present & Future Scenario

Today the role of the building CxS/CxA/ICA has become a central component to the whole building design process as the built environment continues to include more complicated and interdependent systems and owners focus on energy efficiency to keep operational costs down.
What really is Commissioning?

• Commissioning is a standardized process lead by a professional, commonly referred to as a Commissioning Authority (CxA in LEED) or Commissioning Agent (CxA in BREEAM & ICA in Green Star) or Commissioning Specialist (CxS in GBI) who is knowledgeable in the design, construction, and operation of systems

• The CxA, ICA or CxS typically leads a team of system experts trained and certified in the facility commissioning field

• There are numerous certification organizations in the industry
Acceptance or otherwise of Cx services

Some of the emerging issues in Cx services include:

- **Slow Market Acceptance Within and Outside of GBI**
- The GBI rating system has had both positive and negative effects on the commissioning industry
  
  Positive from the recognition and business development standpoint, but negative because it has caused Cx to be viewed as a commodity rather than a custom solution to fit an owner's needs

- Owners not striving for GBI and unfamiliar with Cx also need to be educated as to its benefits instead of dismissing it when faced with a tight budget.

In the end, owners will realize that they can pay for Cx now, or they can pay (very much more) for energy and other inefficiencies later
Acceptance or otherwise of Cx services

- Lack of Training Beyond the Cx Process
- Upon entering this discipline one discovers that there are a number of resources to learn about the process of Cx. Beyond this basic knowledge lies a gap in practical training. Experience and in-house expertise become the standard teachers at this stage which then begs the question, "Can you teach experience?"

- CxS that fail to gain this practical experience are in danger of becoming paper pushers and will bring little value to a project. A large opportunity exists for the organization that can bring this type of hands-on knowledge to this discipline.

- Litigation - not an issue yet in Malaysia
Relevant Codes and Standards on Cx

- ASTM Standard E2813-2012, Standard Practice for Building Enclosure Commissioning
- The Building Commissioning Guide by U.S. General Service Administration, 2005
- CALGreen
- 2015 International Green Construction Code® (IgCC®)
Rating Tools with Cx credits

- BREEAM (1990)
- LEED (1998)
- Green Globe (2004?)
- GBI (2009)
Rating Tools **without** Cx credits

- Green Mark
- CASBEE
- All regional rating tools
- All local rating tools except for GBI
# CxA vs ICA vs CxS

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<th>CxA</th>
<th>ICA</th>
<th>CxS</th>
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<td>LEED's Commissioning Authority</td>
<td>Green Star's Independent Commissioning Agent</td>
<td>GBI's Commissioning Specialist</td>
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Verify project’s energy related systems are installed, calibrated and perform according to Owner's Project Requirements (OPR), Basis of Design (BoD) and construction documents.

- **CxA** can be from the design or construction team if project GFA $<4,645m^2$. For GFA $>4,645m^2$, CxA must be independent of project, design and construction teams, but can be employee of the firms providing those services.
- **ICA** to be suitably qualified and independent of the design team – must not be an employee of organisations involved in the design or construction of the commissionable systems.
- **CxS** to be suitably qualified and independent of the design team – must not be an employee of the organisations involved in the design or construction of the commissionable systems. CxS and GBIF can be from same organisation but must be different individuals.
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<td>LEED awards additional points if the CxA is appointed prior to the construction documentation phase and if the CxA is independent of the design and construction team</td>
<td>GreenStar does not impose having an ICA on the project; it merely awards projects 1 point for appointing an ICA</td>
<td>GBI does not impose having a CxS on the project; it merely awards projects related credits under CxS' scope where carried out</td>
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<td>LEED requires CxA to be appointed otherwise you won’t get a rating!</td>
<td>Green Star requires ICA to be appointed at the beginning of schematic design phase</td>
<td>GBI requires CxS be appointed at the beginning of schematic design phase</td>
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<td>CxA needs to be involved at the beginning of each stage of the design process, and they need to provide greater information for the Commissioning Plans (provided to the consultants for inclusion in Tender Specifications)</td>
<td>In Green Star projects the client undertakes the review of the design process themselves</td>
<td>CxS needs to be involved in reviewing all stages of the design process</td>
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During construction a CxA/ICA/CxS undertakes installation inspections, creates test procedure for system performance testing and attends system performance tests as needed.

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<td>CxA needs to provide a system manual for handing over to owner (in addition to O&amp;M manuals by the contractors)</td>
<td>ICA need not provide system manual</td>
<td>GBI needs to develop a systems manual that provides future operating staff the information needed to understand and optimally operate the commissioned systems</td>
</tr>
<tr>
<td>CxA must review the building operation within 10 months of substantial completion, and provide a detailed report at the end of the project</td>
<td>ICA need not do this</td>
<td>CxS must review and verify the building operation within 12 months of CCC or earlier if the building is at least 50% occupied</td>
</tr>
<tr>
<td>CxA not required to verify training of operating personnel</td>
<td>ICA not required to verify training of operating personnel</td>
<td>CxS must verify that the requirements for training operating personnel and building occupants are completed</td>
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Progress through GBI

At its onset in 2009, GBI rating system became the 1st rating tool in the region (and is still the only tool) to incorporate the following criteria:

- **EE6 - ENHANCED COMMISSIONING OF BUILDING ENERGY SYSTEMS**
- **EE7 - POST OCCUPANCY COMMISSIONING**
- **EE8 - VERIFICATION**
- **EE9 - SUSTAINABLE MAINTENANCE**
The best designed and best installed building services last only until the end of the Defects Liability Period.
Towards our Green future ......

1st Class Design

Got Class Installation

Best in Class Commissioning

Sustainable Maintenance

The best designed and best installed building services will last beyond the end of the Defects Liability Period
Cx: Who's Responsibility?

Typical Owner's response .....  
• Shouldn't it be the M&E Consultant's scope?  
• Shouldn't it be the respective trade contractor's scope?  
• Should already be covered under both M&E Consultant and Trade Contractors  

BOTTOM LINE: Why should the Owner pay extra for this scope!
Cx: Who's Responsibility?

Why and how did this situation evolve over the years?

- Deterioration of MC's M&E coordination scope
- Deterioration of trade contractor's supervision, T&C staff and maintenance outfit
- Deterioration Consultant's site staff
- The evolution of TAB consultants
How much is CxS cost to a project?

1970
- Main Contractor’s M&E Attendance team comprises:
  - M&E Manager + M&E Staff
  - to coordinate Builder Works with M&E Trade Contractors
- Prelim cost in Main Contract = 3% total cost

1980
- GBI introduces RA, RE & COWs appointed = 6% total constr cost

1990
- Main Contractor’s M&E Attendance team comprises:
  - M&E coordinators only
- Prelim cost in MC = 1% total cost
- RSS team appointed

2000
- Main Contractor’s M&E coordination by HVAC trade contractor
- Prelim cost in MC = 0% total cost
- COWs left

2009 today
- COWs now replaced with IOWs
- RE almost extinct COWs dying breed

today
- COWs now replaced with IOWs
What is our progress since 2009?

As of 15/3/16
GBI registered CxS = 23
Active CxS = 12

Total GBI registered projects = 673
Total GBI certified projects = 350
(RNC = 144, Townships = 7, Others = 199)
(Note that CxS is not applicable to RNC and Township projects)
(Other comprise NRNC, NREB, INC, IEB projects)

Total GBI projects with CxS = 121 (60% of 199)
THANK YOU