

ENGAGING THE COMMISSIONING TEAM



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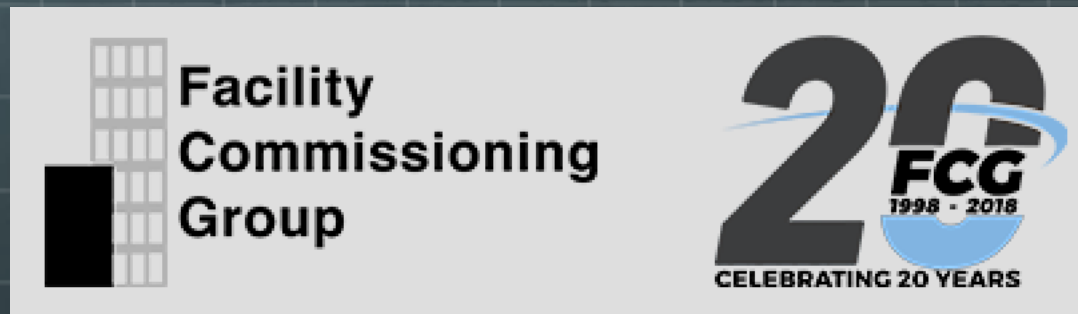
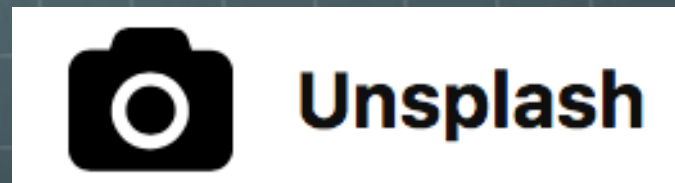
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Course Description



- Complexities associated with building construction plans require interdependence of trades and professions to achieve success through collaboration.
- Project commissioning teamwork coupled with consistent process application achieves results.
- Collaborative techniques enhance teamwork.
- Interaction and sharing of ideas and methods with audience enhances learning objectives.

Learning Objectives

At the end of the this course, participants will be able to:

1. Understand how modern building construction paradigms create the need for collaboration and cooperation among trades and suppliers in order to accomplish the many objectives that fall under the auspices of commissioning. These range from ensuring design intent to ensuring compliance with indoor air quality standards to validating the optimization of mechanical, electrical, plumbing, and fire protection systems.
2. Understand the role of the commissioning authority in helping to foster and encourage this collaboration and cooperation.
3. Learn to lead in the commissioning capacity in spite of, in most cases, not having the direct line of authority to compel it. This includes communicating that compliance with laws, codes, regulations, standards, etc. is a joint obligation of all parties associated with the projects that must be met on behalf of the owner.
4. Learn to take the lead on site conditions that will in the future expedite trouble shooting and repair of structural, mechanical, electrical, plumbing, fire protection and occupant safety issues that arise.



ENGAGING THE COMMISSIONING TEAM:



- Long Term Commitment
- Typically does not result in matrimony

ENGAGING THE COMMISSIONING TEAM:



*Is not about hiring
commissioning
teams*

*It IS about firing up
Cx Teams*

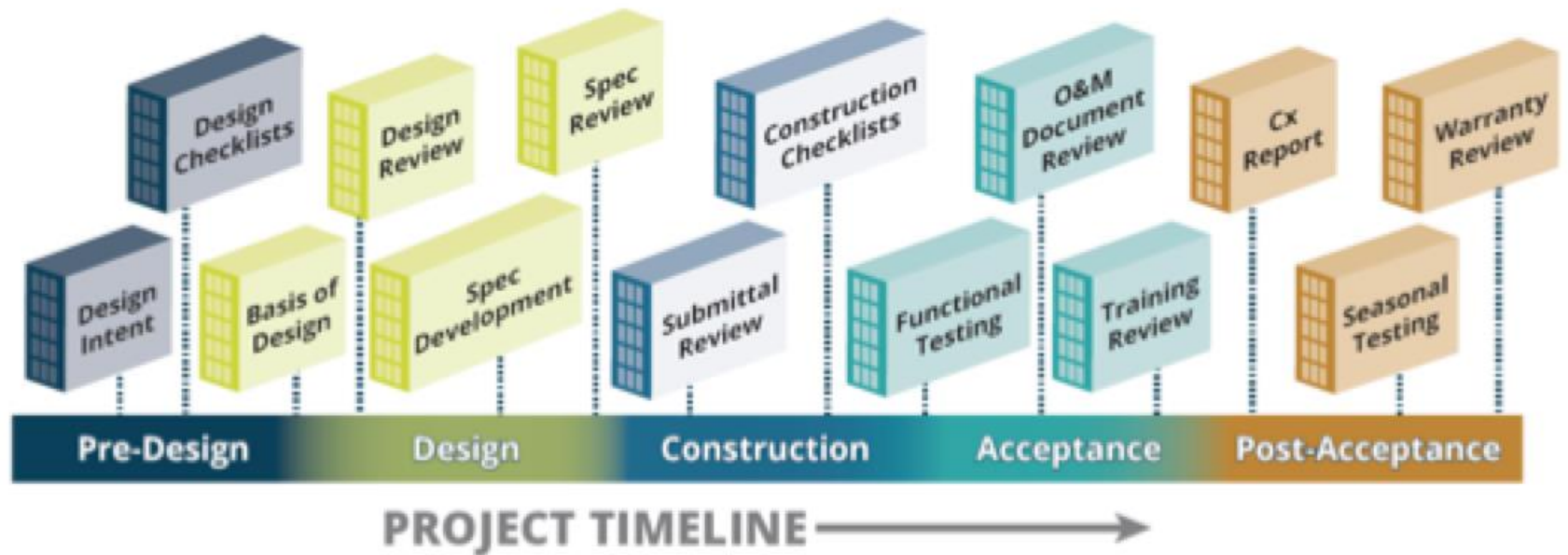
COMMISSIONING PROCESS

- ◆ **ACG Commissioning Guideline – 2005:** For Building Owners, Design Professionals and Commissioning Service Providers
- ◆ **ASHRAE Standard 202 - 2013:** Commissioning Process
- ◆ **ASHRAE Guideline 1 - 1996:** The HVAC Commissioning Process
- ◆ **ASHRAE Guideline 1.1 - 2007:** HVAC&R Technical Requirements for the Commissioning Process
- ◆ **ASHRAE Guideline 0 - 2005:** The Commissioning Process

ACG Commissioning Guideline – 2018

Cx PROCESS

COMMISSIONING ACTIVITIES



Cx PROCESS DELIVERABLES

- ◆ Design Intent Documents (DID, OPR)
- ◆ Commissioning Plan
- ◆ Commissioning Specifications
- ◆ Design Reviews
- ◆ Submittal Reviews
- ◆ Site Observations, Meetings
- ◆ Resolution Tracking Forms (RTF's)
- ◆ System Verification Checklists (SVC's)
- ◆ Organized Systems Start-Ups

Cx PROCESS DELIVERABLES

- ◆ Functional Performance Tests (FPT's)
- ◆ Operation and Maintenance (O&M) training
- ◆ O&M Documentation
- ◆ Commissioning Report
- ◆ Systems Manuals
- ◆ Warranty Review of Building Operation
- ◆ Preventative Maintenance Programs
- ◆ Energy Usage Evaluations



Cx PROCESS DELIVERABLES

Commissioning Specification:

- ◆ Develop commissioning plan
- ◆ Commissioning team
- ◆ Systems to be commissioned
- ◆ Define approximate extent of testing
- ◆ Contractor roles and responsibilities

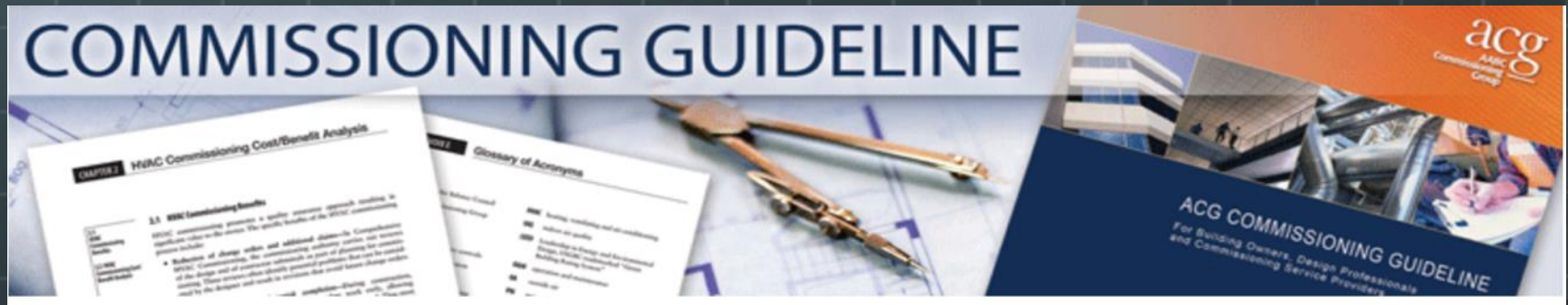


THE COMMISSIONING TEAM

- ◆ Owner / Operator
- ◆ Architect
- ◆ Design Consultants
- ◆ Commissioning Authority
- ◆ Construction Manager (or GC)
- ◆ Mechanical Contractor
- ◆ Electrical Contractor
- ◆ Temperature Controls Contractor
- ◆ Test and Balance Contractor

THE Cx TEAM DELIVERABLES

- ◆ Start-Up Specialists
- ◆ Equipment Vendors
- ◆ Specialty Trades
- ◆ Specialty Consultants
- ◆ Program Manager
- ◆ Service Contract Providers
- ◆ BAS Specialists
- ◆ IT Support Groups



Cx TEAM DELIVERABLES

- ◆ OPR – Owner/Designers
- ◆ Cx Plan – Contractors
- ◆ Cx Specifications – Contractors/Designers
- ◆ Design Reviews – Owner/Designer
- ◆ Submittal Reviews – Owner/Designer/Contractors
- ◆ Site Meetings – Owner/Designer/Contractors
- ◆ RTF – Owner/Designer/Contractors
- ◆ SVC's – Contractors
- ◆ Systems Start-Ups – Contractors

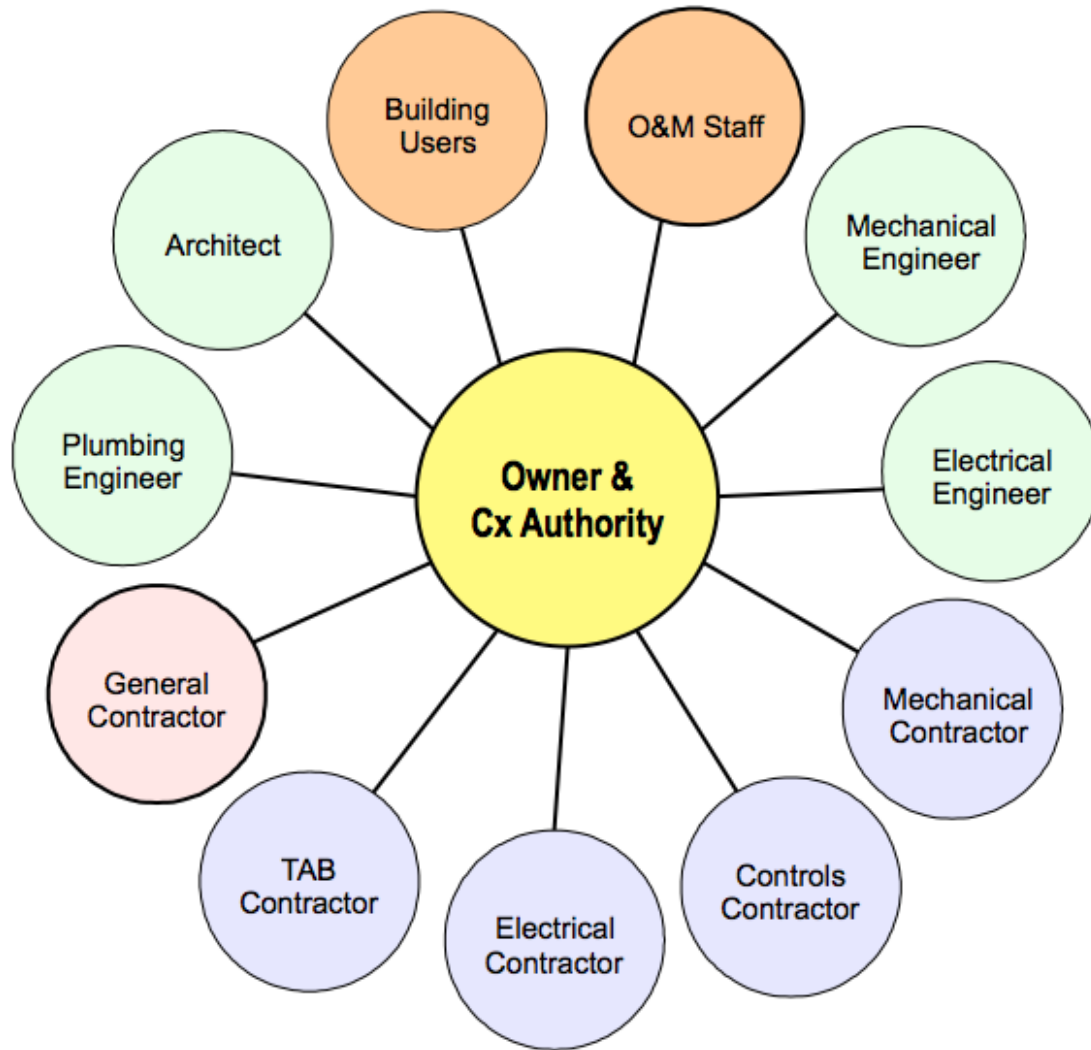


Cx PROCESS DELIVERABLES

- ◆ FPT's – Contractors/Designers
- ◆ O&M Training – Contractors
- ◆ O&M Manuals – Contractor/Designer/Owner
- ◆ Cx Report – Designer/Owner
- ◆ Systems Manuals – Owner
- ◆ Warranty Review – Owner
- ◆ PM Programs – Owner
- ◆ Energy Usage Evaluations– Owner

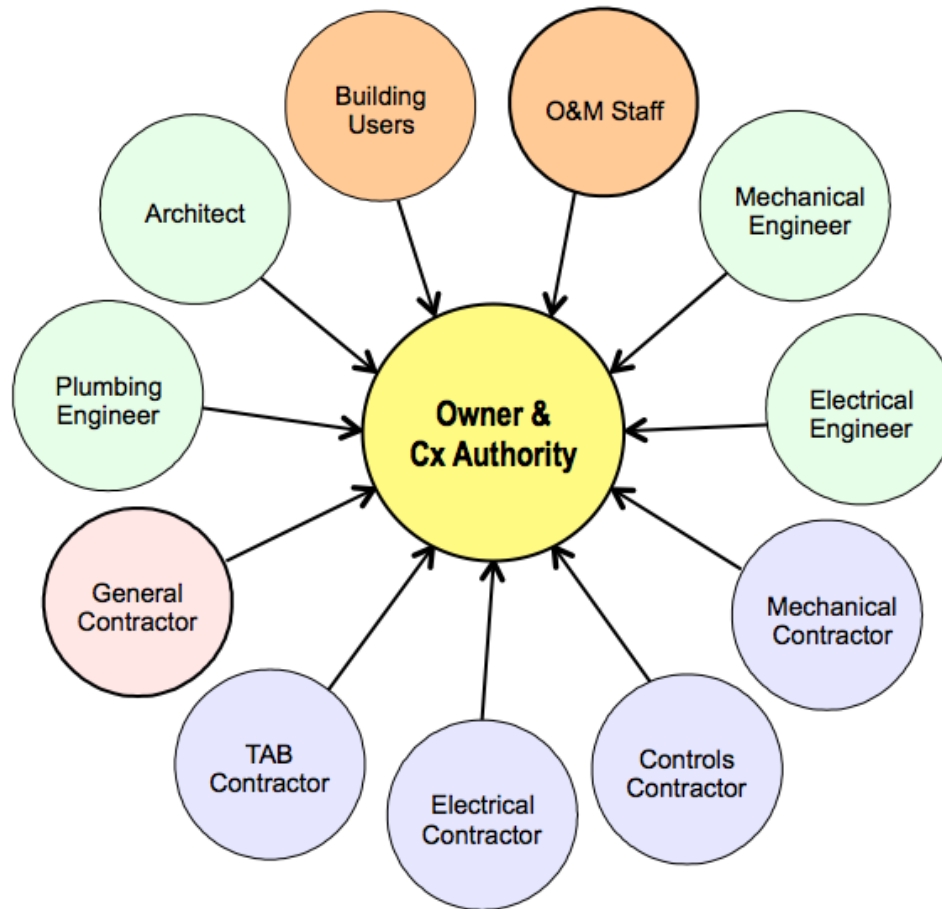
Cx closeout documentation delivery offers opportunities for continuing services

THE COMMISSIONING TEAM



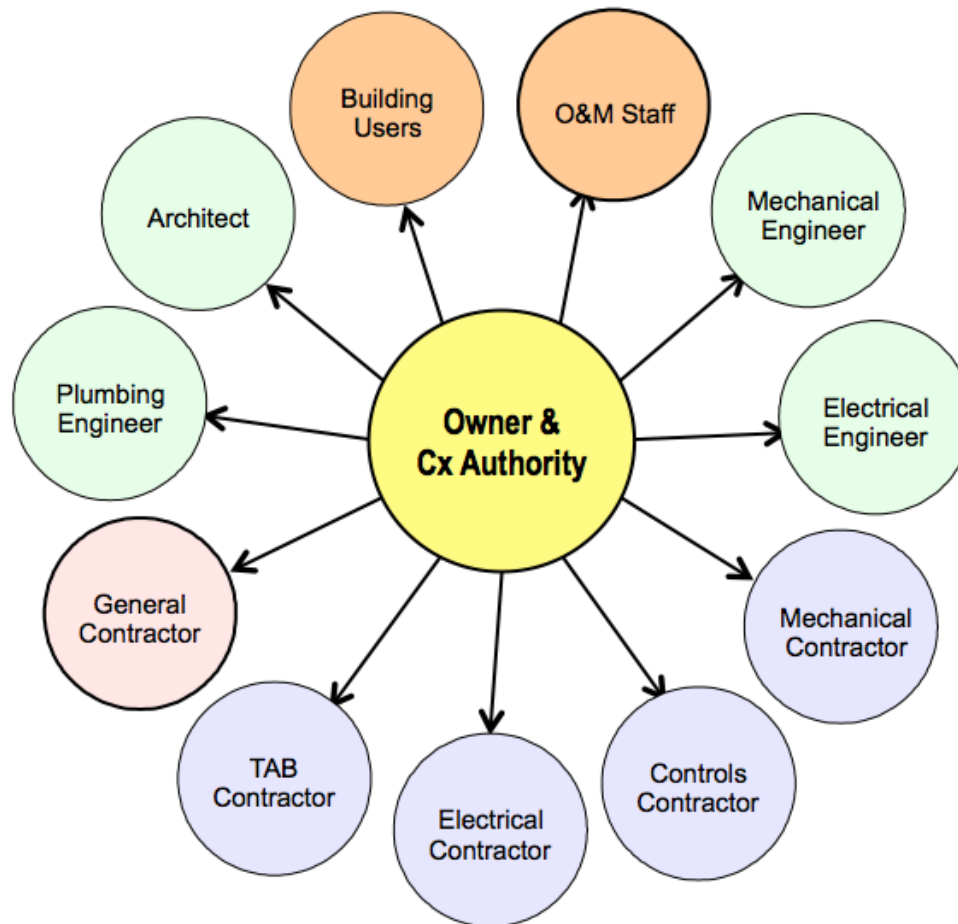
THE COMMISSIONING TEAM

Commissioning Failure



THE COMMISSIONING TEAM

Commissioning Success



THE COMMISSIONING TEAM



STAKEHOLDERS MUST COLLABORATE

THE COMMISSIONING TEAM



Cx TEAM ROLES

Owner / Operator

- ◆ Develop Owner's Project Requirements
- ◆ Assign Cx Team Member and attend meetings
- ◆ Retain a commissioning agent
- ◆ Communicate requirements to the design team
- ◆ Coordinate facilities and staff participation
- ◆ Conduct regular site observation



Cx TEAM ROLES

Architect

- ◆ Assign Cx Team Member and attend meetings
- ◆ Coordinate work of design consultants
- ◆ Consider spatial requirements
- ◆ Consider room naming convention
- ◆ Conduct regular site observation
- ◆ Coordinate design & changes w/ owner & users



Cx TEAM ROLES

Design Consultants

- ◆ Assign Cx Team Members and attend meetings
- ◆ Provide Basis of Design and Design Intent
- ◆ Respond to RFI's and CO's
- ◆ Conduct regular site observation
- ◆ Coordinate design & changes w/ owner & users
- ◆ Review O&M manuals, as-built drawings, etc.
- ◆ Provide training on the design intent



Cx TEAM ROLES

Commissioning Authority

- ◆ Assign Cx Team Leader and attend meetings
- ◆ Review Design
- ◆ Provide Commissioning Plan and Specification
- ◆ Conduct regular site observation visits
- ◆ Provide System Verification Checklists
- ◆ Monitor system start-ups
- ◆ Conduct Functional Performance Tests
- ◆ Review O&M documentation and training



Cx TEAM ROLES

Construction Manager / General Contractor

- ◆ Implement Cx per the specifications
- ◆ Assign Cx Team Member and attend meetings
- ◆ Project Scheduling
- ◆ Manage overall completion of work
- ◆ Manage project documentation
- ◆ Coordination of contractors
- ◆ Maintaining specified building conditions



Cx TEAM ROLES

Mechanical Contractor

- ◆ Assign Cx Team Member and attend meetings
- ◆ Manage subcontractors and vendors
- ◆ Document Progress (SVC's)
- ◆ Coordinate equipment start-up
- ◆ Operate systems as required for FPT's
- ◆ Plan and deliver O&M staff training
- ◆ Provide O&M manuals, as-built drawings, etc.



Cx TEAM ROLES

Electrical Contractor

- ◆ Assign Cx Team Member and attend meetings
- ◆ Coordinate electrical installation w/ mechanical
- ◆ Attend meetings
- ◆ Document Progress (SVC's)
- ◆ Operate systems as required for FPT's
- ◆ Plan and deliver O&M staff training
- ◆ Provide O&M manuals, as-built drawings, etc.



Cx TEAM ROLES

Temperature Controls Contractor

- ◆ Assign Cx Team member and attend meetings
- ◆ Design and complete controls installation
as required by Construction Documents
- ◆ Document Progress (SVC's, Pt.-to-Pt., SOO Δ)
- ◆ Coordinate with TAB agency
- ◆ Operate systems as required for FPT's
- ◆ Plan and deliver O&M staff training
- ◆ Provide O&M manuals, as-built drawings, etc.



Cx TEAM ROLES

Test and Balance Agency

- ◆ Assign Cx team member and attend meetings
- ◆ Review design for adequate testing provisions
- ◆ Submit TAB data sheets for approval
- ◆ Coordinate work with master schedule
- ◆ Review site conditions prior to field work
- ◆ Submit complete and accurate TAB Report
- ◆ Participate in verification of TAB Report



Cx TEAM ROLES

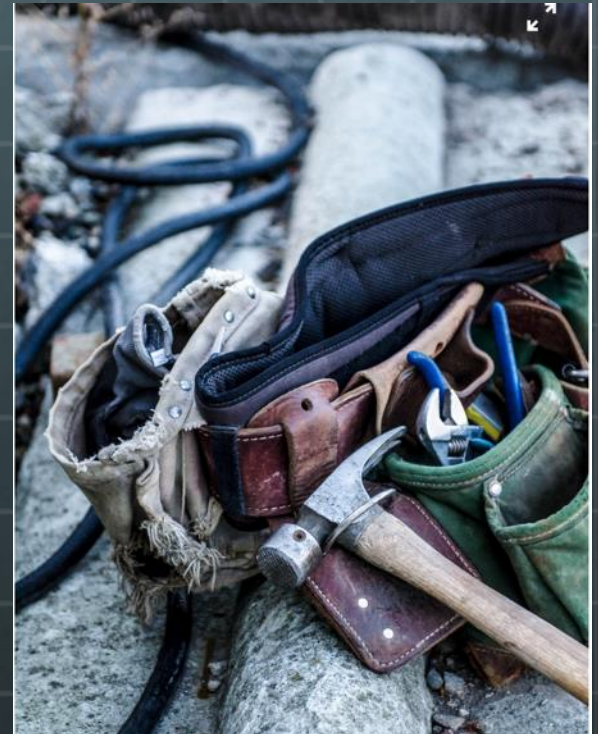
Vendors / Testing Agencies

- ◆ Coordinate dates with contractors
- ◆ Perform equipment startup & documentation
- ◆ Provide calibrated test equipment
- ◆ Support commissioning testing
- ◆ Provide qualified owner's training



Cx PLAN

- ◆ Cx Plan is a set of tools for building the Cx Process
- ◆ Consider Cx Team members as clients
- ◆ Craft process elements for appropriate parties
- ◆ Consistency: Documentation
- ◆ Consistency: Approach
- ◆ User Friendly
- ◆ Minimize redundancies
- ◆ Leverage start-up/checkout
- ◆ Seek collaboration



Cx MEETINGS

- ◆ Interpersonal relationships
- ◆ Learn and use names
- ◆ Collaborate and coordinate
- ◆ Early, efficient & often
- ◆ Coincide with OAC or Contractor Meetings
- ◆ Pre-Bid/Pre-Construction Meetings
- ◆ Pre-Installation Meetings
- ◆ Coordination Meetings



Cx MEETINGS

- ◆ Attendance Sheets
 - ◆ Spell names correctly
 - ◆ Use official company names
 - ◆ Set up check boxes
 - ◆ Update sign-in – grow the list
 - ◆ Include name, company, phone & email
 - ◆ Make corrections

Project: MSU-RESSF	Meeting: Commissioning Meeting	Date/Time: 4/10/18 approx. 11:00 AM
---------------------------	---------------------------------------	--

Name	Representing	Phone	Email	✓
Jim Magee	FCG	(859) 221-5838	jim@facomgrp.com	

Cx MEETINGS



158 Burt Road | Lexington, KY 40503 | Tel. (859) 278-5552 | Fax (859) 278-6501
2611 Waterfront Parkway, Suite 340 | Indianapolis, IN 46214 | Tel. (317) 536-2618

Project: **MSU – Renovate/Expand Student Services Facility**
DECA Number **440-UNIT-MS16-00**
Regarding: **Construction Phase Commissioning Meeting Minutes**
Site Date: **March 27, 2018**
Time & Duration: **11:00 AM**
Prepared by: **Jim Magee**

Attendees

Gardner May.....	Morehead State University (MSU)
Matthew Watkins	Morehead State University (MSU)
Scott Johnson.....	Morehead State University (MSU)
Marc Williams	CBTS/MSU
Kevin Euga	CMTA
Justin Lane	Monarch Construction Company (MCC)
Jake Raymond.....	Monarch Construction Company (MCC)
Rob Miracle	Siemens
Wes Black	Elliott
Randy Seagraves	Dixon Electrical (Dixon)
Clay Kissick	Facility Commissioning Group (FCG)

Cx MEETINGS

Construction Phase Commissioning Meeting Minutes

Purpose: To track the project progress relative to the commissioning process, address problems that alter the design intent or affect the commissioning process and to provide an open forum for the exchange of information between Cx Team members.

Presenter: Justin Lane

Recorder: Clay Kissick

1. Circulated Attendance Sheet and made introductions.

1.1. Siemens is attending commissioning meetings to achieve proper coordination with Monarch and subcontractors.

2. Review Action Items from last Meeting:

2.1. May 1, 2018 is Lighting Controls equipment initial start-up scheduled date.

2.2. ACTION ITEM: Siemens noted many existing HVAC terminal devices have failed damper actuators, and Siemens will provide a list of these to MCC March 28, 2018.

2.2.1.1. ACTION ITEM: Siemens reported that Potter (low voltage subcontractor) identified 16 bad hot water valve actuators, 20 missing thermostats and 18 missing discharge air sensors; Siemens agreed to provide details of identification and location to MCC March 28, 2018.

2.2.1.2. ACTION ITEM: Siemens will review the Potter list of failed components with MCC tomorrow, March 28, 2018.

SVC's

- ◆ Interface with Contractors
- ◆ Easy to use/KISS
- ◆ Not the Greater Los Angeles phone book
- ◆ Templates and Tables
- ◆ Assist – this is a collaborative Cx Deliverable
- ◆ Monitor
- ◆ Report status regularly

SVC's

System Verification Checklist US Bank Branch Westminster

System: Zone Dampers

158 Burt Road Lexington, KY 40503
Tel. (859) 278-6552 Fax (859) 278-6501

2611 Waterfront Parkway Suite 340
Indianapolis, IN 46214 Tel. (317) 536-2618

Facility
Commissioning
Group

#	Tag	Area Served	Dwg. #	MECHANICAL CONTRACTOR									TEMPERATURE CONTROLS CONTRACTOR			
				Unit Tag	Ceiling Installation	Hanger Rods	Bellmouth Fitting	Flexible Ductwork	Volume Damper	Duct Inlet Size	24V Connection	Initials & Date	Temperature Controls			Initials & Date
													Zone Sensor	24V Actuator	T-Stat ID	
1	ZD 101	Lobby 101	M201													
2	ZD 103	Office 103	M201													
3	ZD 104	Conference 104	M201													
4	ZD 107	ATM/Cash 106, Teller 107, Coupon 108	M201													
5	ZD 112	Vault Vestibule 109, Vault 110, Supplies 110, Passage 112	M201													
6	ZD 116	Break Room 116	M201													
7	ZD 117	Office 117	M201													
8	ZD 118	Office 118	M201													
9	ZD 119A	Open Office 119	M201													
10	ZD 119B	Open Office 119	M201													

#	Date	Remarks
1		
2		
3		
4		
5		

SVC's

System Verification Checklist

US Bank Branch Westminster

System: **Lighting Controls**

Area Served: Location of lighting fixtures and devices

Drawing: Reference to the lighting layout drawing

Electrical Contractor Installation Checks

- Occupancy Sensor(s)
 - **#:** The number of occupancy sensors installed matches what is indicated in the construction documents or as required to provide specified coverage, E101
 - **Type:** Occupancy sensor type installed in location indicated, E101
 - **OS Wiring:** Occupancy wiring installation complete, E101
 - **Position:** Occupancy sensor is mounted as indicated, E101
 - **Wired:** Wiring and terminations are complete for the occupancy sensors
- Light Fixtures
 - **Type:** Light fixture type identified in construction documents, E101
 - **#:** The number of light fixtures indicated in the construction documents, E101
 - **EM:** The number of emergency fixtures identified in the construction documents, E101
 - **Wired:** Wiring and terminations are complete for the light fixtures
- Light Switches
 - **Type:** Light switch type identified in construction documents, E101
 - **#:** The number of light switches installed matches what is indicated in the construction documents, E101
 - **Wired:** Wiring and terminations are complete for the light switches
- Initial and Date indicating completion

SVC's

System Verification Checklist US Bank Branch Westminster

System: Lighting Controls

Facility
Commissioning
Group

158 Burt Road Lexington, KY 40503
Tel. (859) 278-5552 Fax (859) 278-6501

2611 Waterfront Parkway, Suite 340
Indianapolis, IN 46224 Tel. (317) 536-2618

		ELECTRICAL CONTRACTOR														
Dwg. #	Area Served	Occupancy Sensor(s)/Photocell					Lighting Fixtures				Switch			Note(s)	Initials & Date	
		#	ID	Type	Wiring	Position	Type	#	Emerg.	Wired	Type	#	Wired			
Interior Lighting																
E201	Vestibule 100	0	----	----	----	----	A1	2	2		0	----	----			
E201	Lobby 101	0	----	----	----	----	B1	4	0		0	----	----			
							B2	3	1							
							EX	1	1							
E201	ATM/Cash 106	1		OS		Wall	E	2	1		\$os	1				
E201	Conference 104	1		OS		Wall	B	3	0		\$os	1				
E201	Supplies 111	0	----	----	----	----	E1	1	1		0	----	----			
E201	Open Office 102	0	----	----	----	----	B1	1	1		0	----	----			
							B2	1	1							
							EX	1	1							
E201	Teller Area 107	0	----	----	----	----	B2	1	1		\$	8				
							M	6	0							
							C	5	0							
							E1	1	1							
							D	2	0							
E201	Open Office 119	0	----	----	----	----	B1	3	0		0	----	----			
E201	Branch NER 105	1		OS		Wall	J1	1	0		\$os	1				
E201	Mechanical 115	1		OS		Wall	J	1	0		\$os	1				
E201	Break Room 116	1		OS		Wall	E	1	0		\$os	1				
							E1	1	1							
							D	1	0							
E201	Unisex 113	1		OS		Wall	D1	1	1		\$os	1				
E201	Unisex 114	1		OS		Wall	D1	1	1		\$os	1				
E201	Office 117	1		OS		Wall	B	3	0		\$os	1				
E201	Office 118	1		OS		Wall	B	3	0		\$os	1				
E201	Office 103	1		OS		Wall	B	3	0		\$os	1				
E201	Vault 110	1		OS		Wall	E	1	0		\$os	1				
							E1	1	1		\$os	1				

Equipment Lists

Unit Information					
<div> <div>Facility</div> <div>Commissioning</div> <div>Group</div> </div>		KCTCS MCC - Regional Postsecondary Education Center Project #: 470-C76T-MD12			
		158 Burt Road Lexington, KY 40502 Tel: (859) 278-5552 Fax: (859) 278-8585			
		2611 Waterfront Parkway, Suite 34 Indianapolis, IN 46214 Tel: (317) 536-2611			
		www.facomgrp.com			
Air Handling Unit (237323)		Location	Dwg.	Manufacturer	Model Number
1	AHU-1	Mechanical Room 114	H6.1	Ventrol	ITF
Heat Recovery Unit (238129)		Location	Dwg.	Manufacturer	Model Number
1	OU-1	Roof	H7.2	Daikin	RXTQ48TAVJU
Indoor Units (238129)		Location	Dwg.	Manufacturer	Model Number
1	IU-W-05	Elev. Equip 115	H1.1	Daikin	FXAQ07PVJU
2	IU-W-05	Comm 116	H1.1	Daikin	FXAQ07PVJU
3	IU-W-05	Elec. Room 118A	H1.1	Daikin	FXAQ07PVJU
4	IU-W-05	Elec. Room 118B	H1.1	Daikin	FXAQ07PVJU
5	IU-W-05	Comm 209	H1.2	Daikin	FXAQ07PVJU
6	IU-W-05	Comm 216	H1.2	Daikin	FXAQ07PVJU
7	IU-W-05	Comm 306	H1.3	Daikin	FXAQ07PVJU
8	IU-W-05	Comm 324	H1.3	Daikin	FXAQ07PVJU
Fans (233423)		Area Served	Dwg.	Manufacturer	Model Number
1	PA-1	OU-1	H6-1	Nortek	Fan Wall (22-85 - 213T - 44 x 41 x 31 - B4)

Digital Tools

- ◆ iPads/Tablet Computers
- ◆ Construction Management Software
- ◆ Commissioning Software
- ◆ Cell Phones
 - ◆ Camera
 - ◆ Voice memos
 - ◆ Notes
 - ◆ GPS
- ◆ Apps
 - ◆ Sound Levels
 - ◆ Weather
 - ◆ Compass



COLLABORATIVE METHODS

Group Setup

- 🌐 Deliberate Setup of a Team
- 🌐 Before Beginning Work
- 🌐 Increases High Performance Potential
- 🌐 4 Common Group Models



COLLABORATIVE METHODS

Chance

- 🌐 Collaboration by chance
- 🌐 Most basic of 4 models
- 🌐 Cx Team is a random pick of who's available
- 🌐 No regards for skills or needs of members







COLLABORATIVE METHODS

Acuity

- Collaboration by acuity
- Creates Cx Team w/ balanced skill sets
- Conceptualist, Formalist, Operations, Technician
- Each of 4 acuities exist on Cx Team

COLLABORATIVE METHODS

Interest

-  **Collaboration by interest**
-  **Cx Team composed of similar curiosities, careers & hobbies**
-  **Common interests related to problem to be solved**
-  **Common unique knowledge trumps balanced acuity in these Cx Teams**

COLLABORATIVE METHODS








Leader

- 🌐 Collaboration by leader
- 🌐 Members chosen by leader
- 🌐 Cx Team member with
 - 🌐 Compatible values
 - 🌐 Similar schedules
 - 🌐 Common work environments
- 🌐 Addresses acuity and interest










COLLABORATIVE METHODS

Spence's Rules

-  Look for common ground
-  Learn about others
-  Critique results, not people (don't make it personal)
-  Give and get respect
-  Proceed slowly
-  Be explicit and clear
-  Remember the 5 C's of Communication: clarity, completeness, conciseness, concreteness, correctness

COLLABORATIVE METHODS

Katzenbach and Smith's Team Basics

-  Small groups
-  Complimentary skills
-  Common purpose
-  Specific performance goals
-  Shared working approaches
-  Mutual accountability
-  (“Optimal performance through accountability”)

Katzenbach and Smith: “The Wisdom of Teams”

COLLABORATIVE METHODS

Working Styles

- 🌐 Alone/Quiet/Focused
- 🌐 Self paced
- 🌐 Internal thinkers
- 🌐 Driven by goals
- 🌐 Conscious of ownership issues
- 🌐 Best at expressing themselves in writing



COLLABORATIVE METHODS

Working Styles

- Shared/High Energy/Dynamic
 - Fast paced
 - External thinkers
 - Conceptual
 - Consensus builders
 - Best at expressing themselves verbally








COLLABORATIVE METHODS

Working Style Conflicts

- 🌐 Alone/Quiet/Focused vs. Shared/High Energy/Dynamic
- 🌐 “Aloners” become passive-aggressive
- 🌐 “Sharers” become overly aggressive

COLLABORATIVE METHODS

Avoiding Conflicts

-  **Manage expectations**
-  **Build consensus**
-  **Communicate affectively**
-  **Follow consistent process**
-  **Maintain routines and methods**

COLLABORATIVE METHODS

Thinking Styles

🌐 Detailed

🌐 Visionary



COLLABORATIVE METHODS

Learning Styles

🌐 Auditory learning





🌐 Kinesthetic learning

🌐 Visual learning







COLLABORATIVE METHODS

Spence's Interpersonal Communications

-  52% body language
-  37% tone of voice
-  11% based on words
-  Indirect & Direct Communicators

COLLABORATIVE METHODS

Spence's Listening Skills

-  Listening facilitates learning and shows respect for speakers
-  Focus your mind on person speaking
-  Use body language to signal attention and interest
-  Verbally reflect and respond to what the speaker feels and says

COLLABORATIVE METHODS

Barriers to Collaboration

- 🌐 #1 is difficulty achieving agreement from diverse opinions and views
- 🌐 Organizational rankings
- 🌐 Stranger danger
- 🌐 Needle in the haystack
- 🌐 Hoarding
- 🌐 “Not invented here”



COLLABORATIVE METHODS

Magee's List of Characters

🌐 Singers and Composers

🌐 Cult of Personality

🌐 Horse Traders

🌐 Envoys








🌐 Salesman



Leading From Behind



CONCLUSIONS

-  Cx is a collaborative process
-  CxA's must manage teams of people
-  CxA's do not hold contracts
-  Collaboration enhances Cx Teams
-  Cx Teamwork combined with sound Cx process achieves results
-  CxA's are facilitators and respect is your currency
-  Communication is the gateway to collaboration

This concludes The American Institute of Architects Continuing Education Systems Course

Unsplash photographers:

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Jeremy Beadle

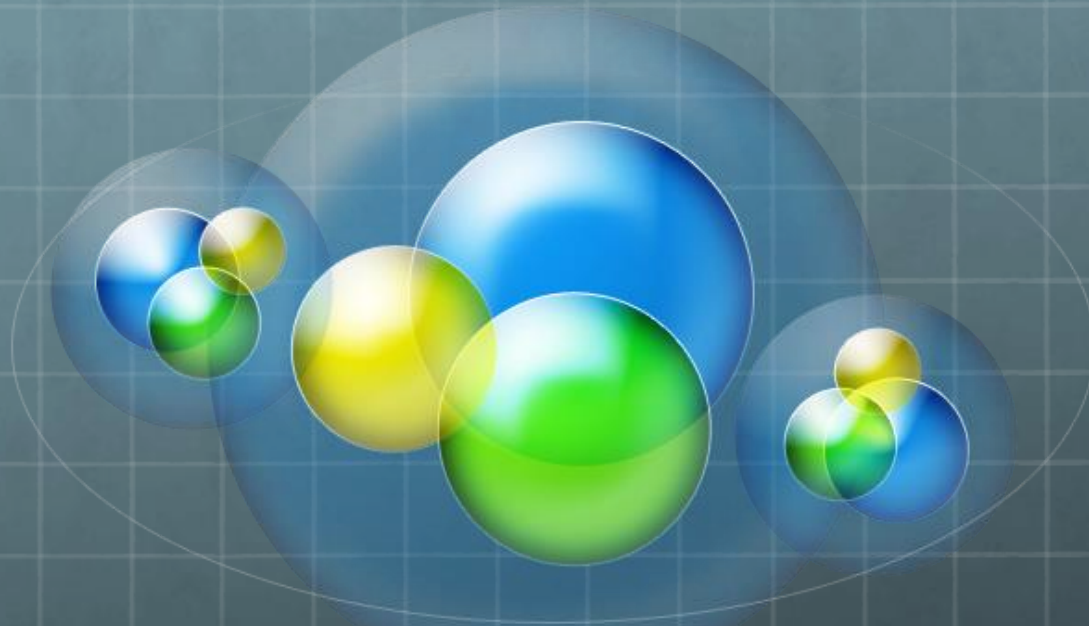
Brooke Cagle

Olga Guryanova

Headway

Anete Luysina

The logo for acg, featuring the lowercase letters 'acg' in a dark blue serif font. The 'a' and 'c' are connected, and the 'g' has a long, curved tail. A horizontal line is positioned below the 'a' and 'c'.



ENGAGING THE COMMISSIONING TEAM INPUT & QUESTIONS?