National Institute of Building Sciences

Provider Number: G168

Steps for Successful Building Systems Integration

Course Number

Matthew Ezold, CTS-D
Cerami & Associates, Inc.

January 8, 2019

Credit(s) earned on completion of this course will be reported to AIA CES for AIA members. Certificates of Completion for both AIA members and non-AIA members are available upon request.

This course is registered with AIA CES for continuing professional education. As such, it does not include content that may be deemed or construed to be an approval or endorsement by the AIA of any material of construction or any method or manner of handling, using, distributing, or dealing in any material or product.

_____

Questions related to specific materials, methods, and services will be addressed at the conclusion of this presentation.

Course Description

Our building systems are smarter than ever however the typical building design and integration process has not kept up with the times. Integrating modern building systems, from environmental systems to user aware sensing systems, into a cohesive platform that enhances the user experience requires proper planning and careful delineation of scope between various systems designers and providers. Using a theoretical multi-tenant building, this session will outline the steps and schedule for identifying potential building systems integrations, determining the tenant/landlord benefits for integration, designing and coordinating systems scope and then bringing the systems contractors to the table to ensure interoperability across all systems. This session will also define some new project team roles, including that of the building systems architect and highlight building network design options for both single and multi-tenant buildings.

Learning Objectives

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

1. Identify key <u>steps</u> for properly integrating disparate building systems.

2. Identify the <u>planning stages</u> for building systems interoperability.

3. Identify design and integration <u>team roles</u> and responsibilities for integrating building systems.

4. Identify <u>network</u> security coordination areas when making building systems interoperable

Who am I?

Matthew Ezold, CTS-D

Principal

Regional Director

What is Building Systems Integration?

Sharing of data between building systems for the purpose of:

- Expanding the capabilities or inputs of a system

- Unifying under a common interface

- Automation

- Improving building systems' efficiency

Smart Buildings

Smart Buildings

≠

Building
Systems Integration

Interoperability

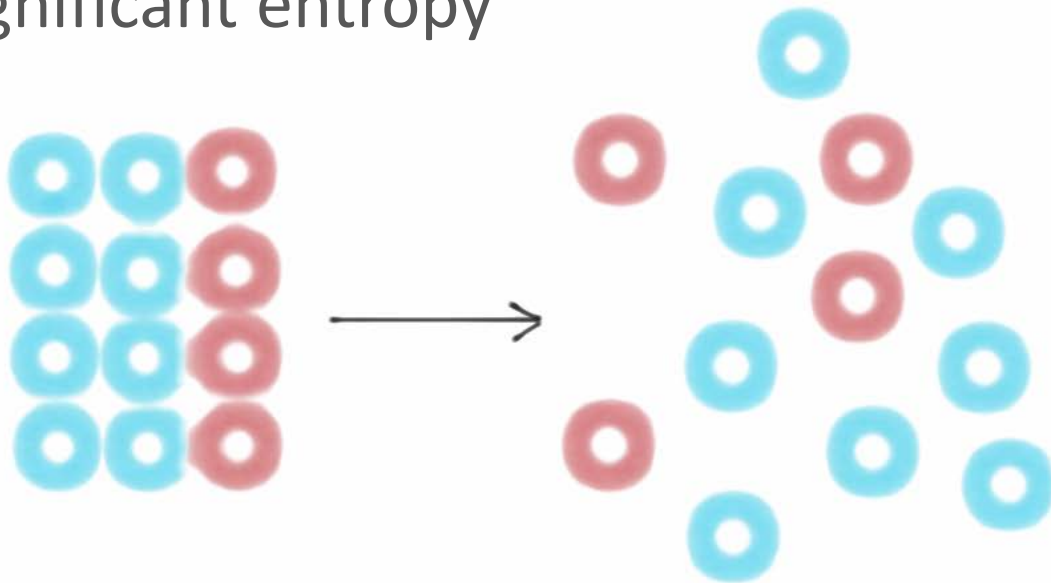The ability of computer systems or software to exchange and make use of information (data)
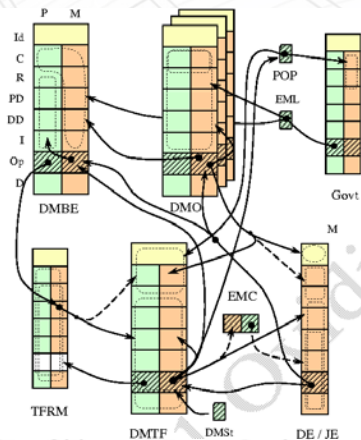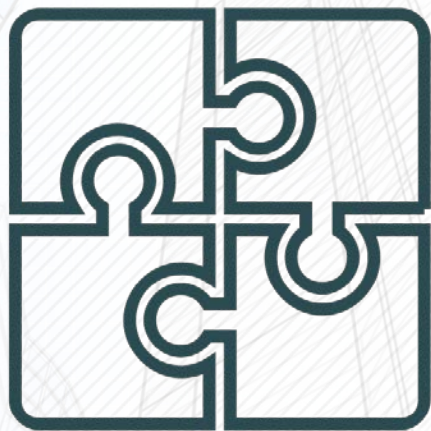
Interoperability in Building Systems is subject to significant entropy

A Common Integration Expectation
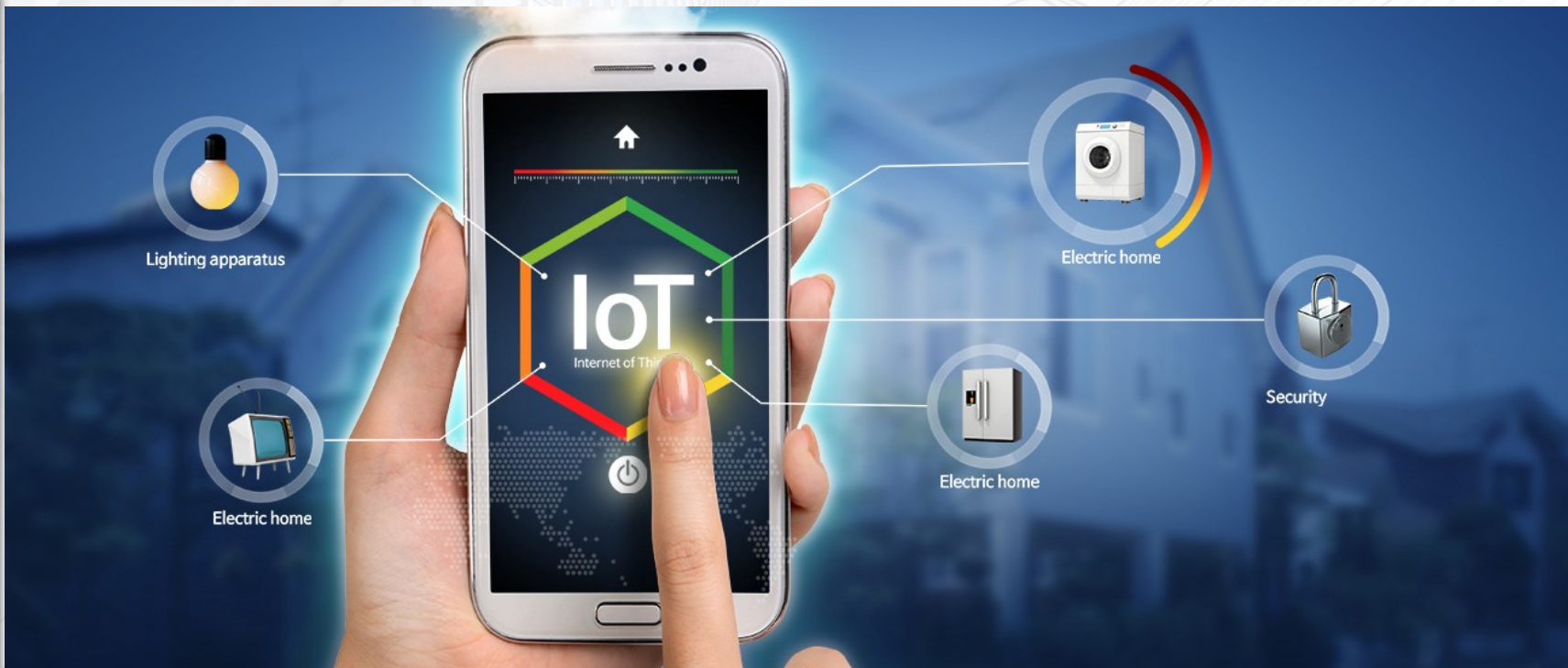
Common Integration Opportunities

Elevator Destination Dispatch

Wayfinding

Conference Room Dashboards

Room Scheduling

Lighting Control

Cashless Payment

Mobile User and Guest Apps

Occupancy

Location Awareness

Mass Notification

Typical Building Systems Integration Process

Contract Docs Say

- "Contractor Shall"
- "Provide a user PC"
- "Field Coordinate"

Shop Drawings Show

To Owner Provided Network

Ensuring Interoperability

■ Define Interoperability in each specification

i. Interoperability shall include both <u>information read and information write</u> operations to allow external systems to poll for BAS equipment, sensor or database status and request status changes.

ii. The BAS system shall be responsible for <u>acknowledging information or status change requests</u> and responding to the external system that has made the request.

iii. All BAS system information exchange protocols shall <u>meet existing published industry standards</u> and shall not contain manufacturer proprietary command sets.
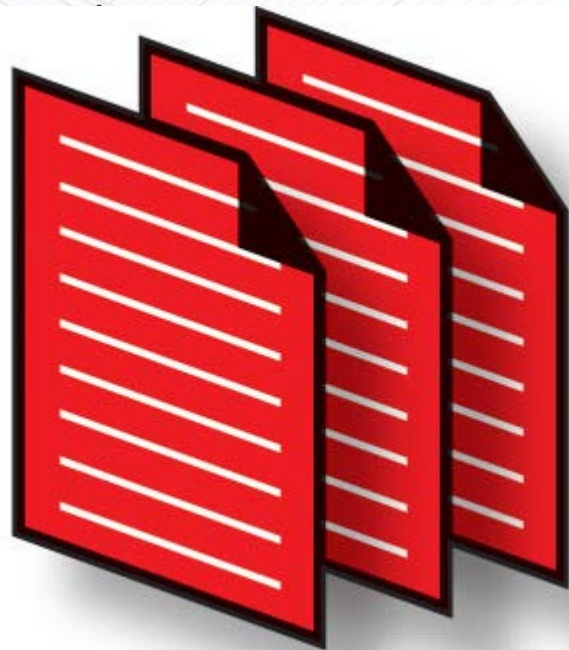
Ensuring Interoperability

- Define expectations for coordination

  i. This subcontractor shall make available as many equipment, software and programming engineers as required to coordinate system interoperability with the external systems vendors.....
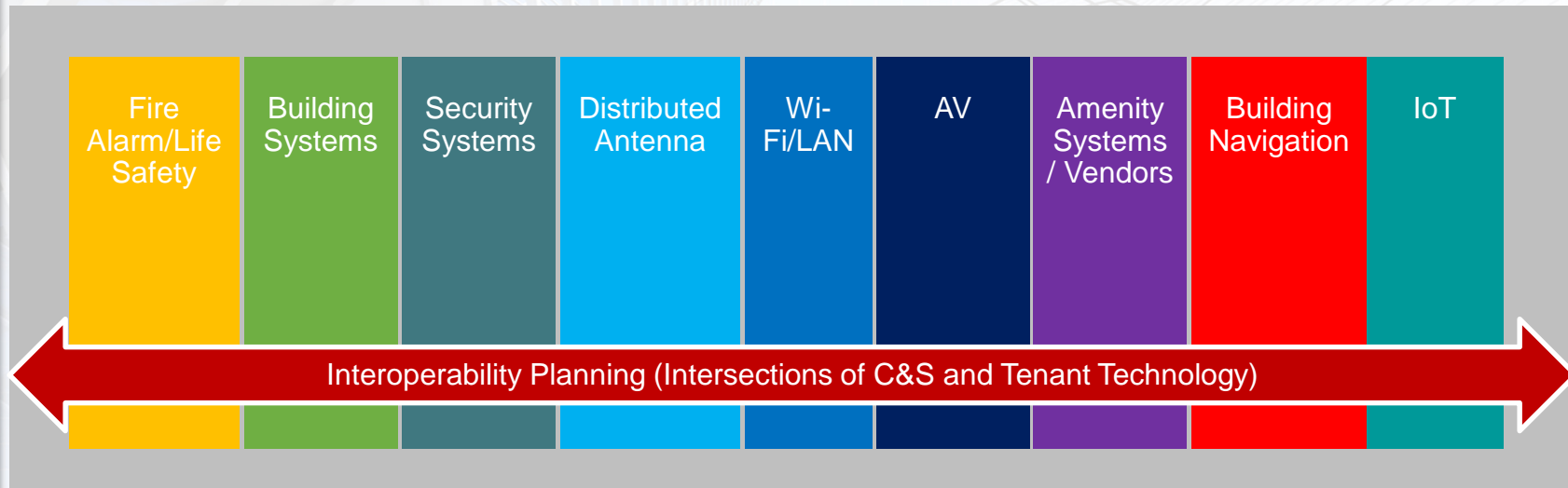
Building Systems Architecture (Architect)

| Fire Alarm/Life Safety | Building Systems | Security Systems | Distributed Antenna | Wi-Fi/LAN | AV | Amenity Systems / Vendors | Building Navigation | IoT |

Interoperability Planning (Intersections of C&S and Tenant Technology)

- Create and preserve interoperability for critical building integrations
- Oversight on all building systems to work as a single entity for users and building operations
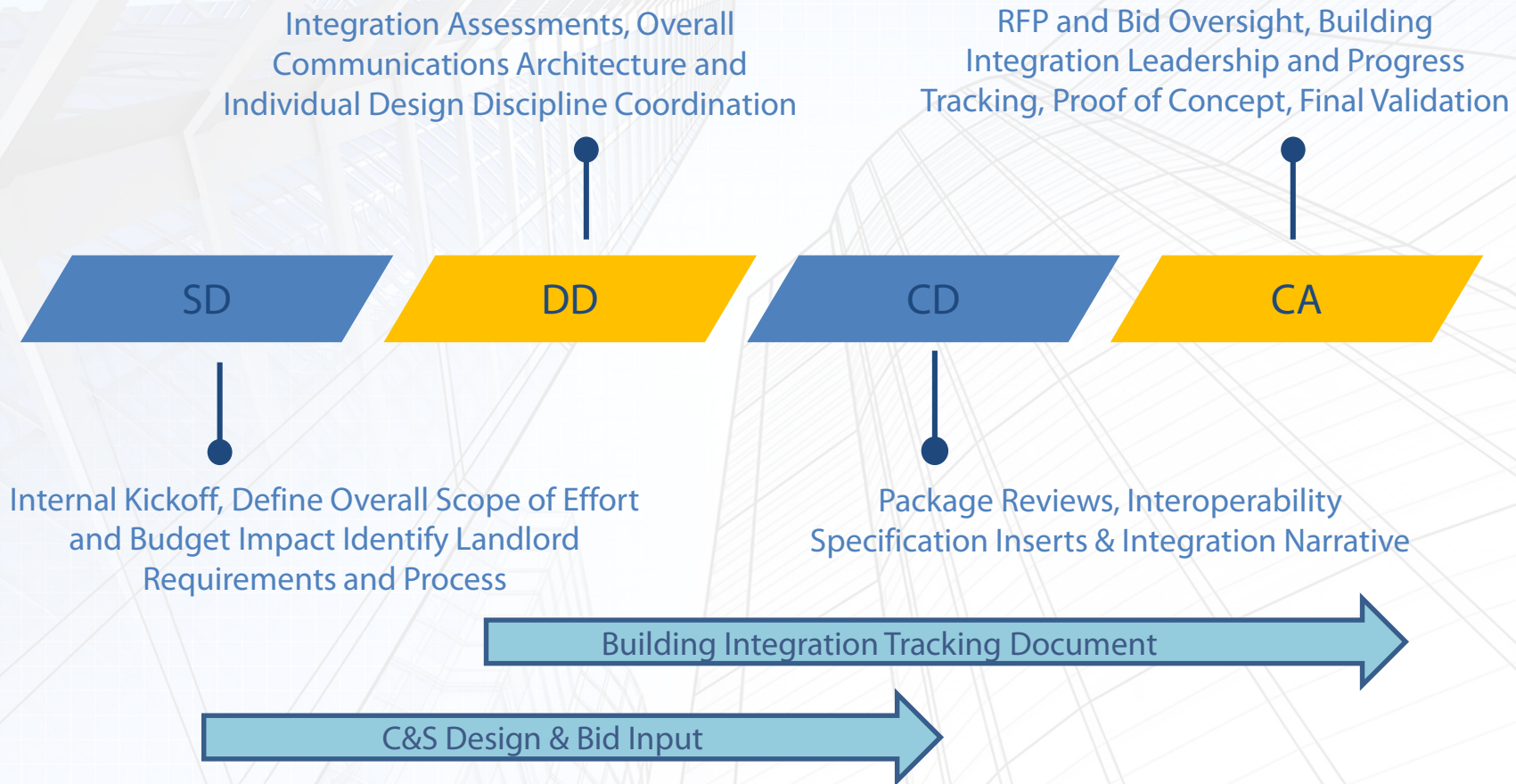
Building Systems Architecture Purpose

- Identify and catalog ALL building systems that collect data

- Outline potential integrations, costs, benefits and failure modes

- Design the supporting networks and interfaces to support current and future integrations

- Coordinate with landlord design team for integrations that cross into the core & shell scope and define clear scope of responsibilities

- Ensure all design and integration scopes identify interoperability requirements

- Lead building integration sessions during construction and validate all integration efforts.

BSA SCHEDULE

Integration Assessments, Overall Communications Architecture and Individual Design Discipline Coordination

RFP and Bid Oversight, Building Integration Leadership and Progress Tracking, Proof of Concept, Final Validation

| SD | DD | CD | CA |

Internal Kickoff, Define Overall Scope of Effort and Budget Impact Identify Landlord Requirements and Process

Package Reviews, Interoperability Specification Inserts & Integration Narrative

Building Integration Tracking Document →

C&S Design & Bid Input →

BSA Deliverables

- Integration Opportunities Matrix

    - Identifies possible integrations, benefits, costs, risks, project impact

- Scope of Responsibilities Matrix

    - For each integration, identifies breakdown of design, procure, install responsibilities between the impacted trades and teams

- Interoperability Mission Statement

    - Identifies the overarching goals for building systems integration as a means to evaluate the benefits of integration opportunities and costs

- Integration Network Design

- CA Tracking Document

Capturing Orphaned Systems

- A-typical protocols (fitness streaming equipment, airplay/bonjour, etc.)

- Elevator travelling cables

- Point of sale, mobile ordering and fitness tracking platforms

- Bluetooth Low Energy Beaconing & other assistive technologies

- Cafeteria herb watering systems

- DAS coverage and interfacing

- Etc……

Future Proof vs Future Resilient

|	Future Proof 👎	Future Resilient 👍
Goal	Anticipate and accommodate for all potential future needs	Design for change at all levels
Change	Disruptive	Allowable and encouraged in small intervals
Rate of Change	Static then Accelerated	Gradual
Cost	Lower, increases with time	Higher, decreases with time

BSA Network & Communication Design

- Ownership of Data is Critical!

- Each Integration increases the overall network vulnerability level

- Passive vulnerabilities can be as disruptive as intentional hacking

- Systems (and controls) should be able to operate independently during a network segment outage
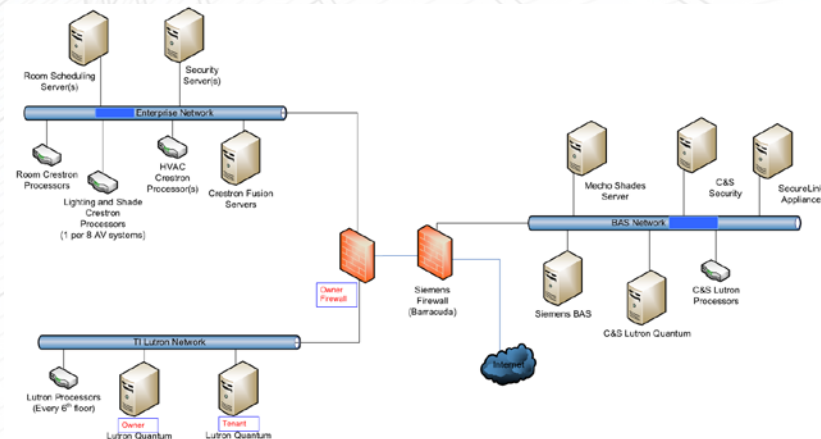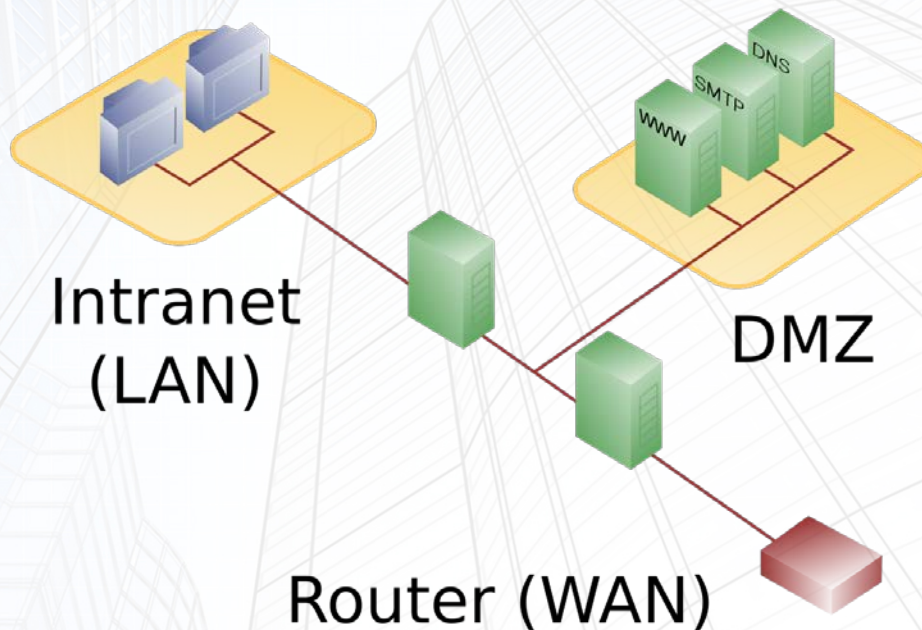
BSA Network & Communication Design

- Consider a neutral DMZ network between building systems or between Landlord – Tenant systems

BSA Network Design

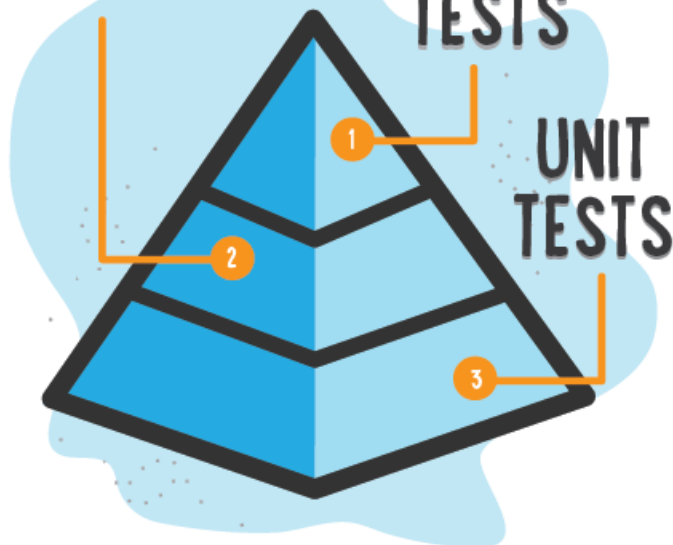- Final Network design happens when all parties are engaged

Testing Interoperability

- Issue a testing plan as part of the bid package

- Some integrations will need to be a Day 2 exercise

- Final integration is often happening as contractors are leaving the site

INTEGRATION TESTS

GUI TESTS

UNIT TESTS

ILLUSTRATED BY SEGUE TECHNOLOGIES

Learning Objectives

We discussed:

1. Identifying key <u>steps</u> for properly integrating disparate building systems.

2. Identifying the <u>planning stages</u> for building systems interoperability.

3. Identifying design and integration <u>team roles</u> and responsibilities for integrating building systems.

4. Identifying <u>network</u> security coordination areas when making building systems interoperable

This concludes The American Institute of Architects
Continuing Education Systems Course

Cerami

Cerami & Associates

Matthew Ezold

mezold@ceramiassociates.com