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Designers Lighting Forum

The How, Why & When of Systems Integration

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

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Learning Objectives

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

1. Understand what a systems integrator does
2. Know when you should consider a systems integrator
3. Understand how to engage a systems integrator
4. Know how to budget for a systems integrator

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What is a Systems Integrator?

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According to Google

A systems integrator (SI) is an individual or organization that helps businesses with technology projects by combining hardware, software, networking, and other products from **multiple vendors** to build computing systems. This process is known as system integration.

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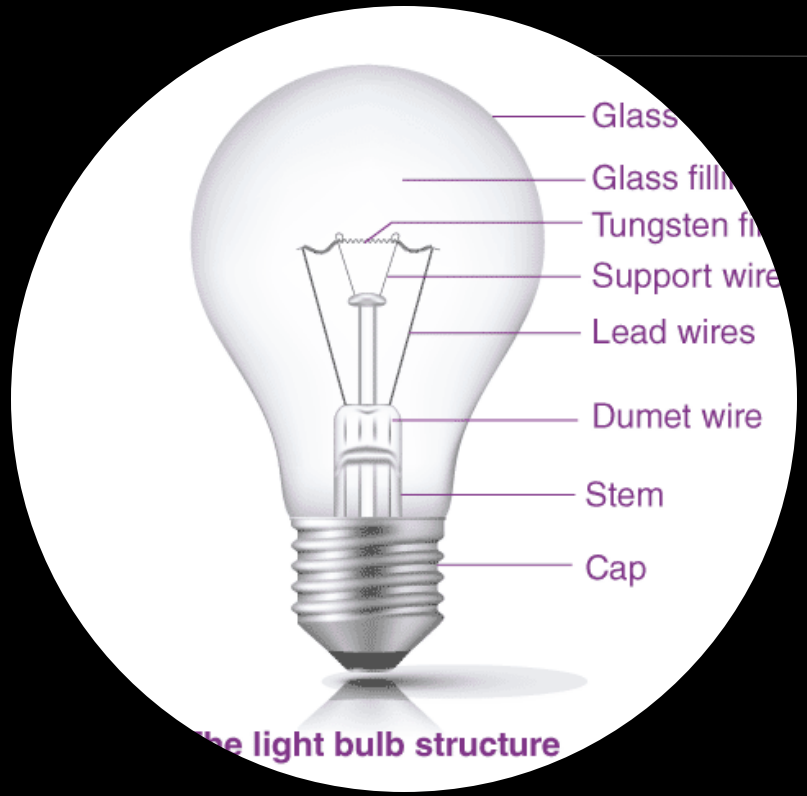
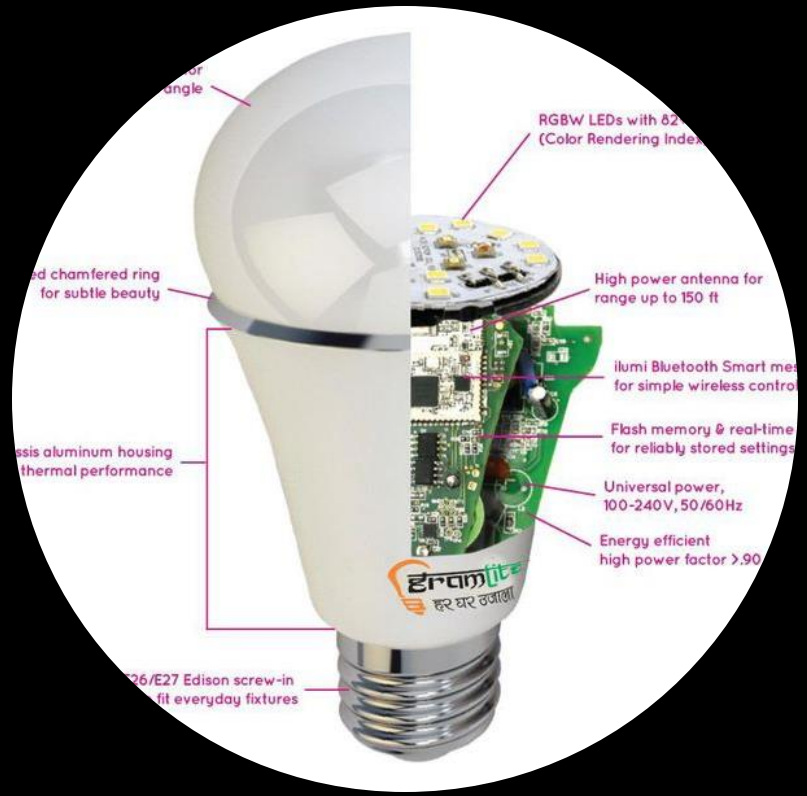
When did lighting fixtures become computers?

Then



Now



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How did the transition to LED's go?

- **Drop out**
- **Pop on**
- **Dead travel**
- **Ghosting**
- **Flickering**
- **Strobing**
- **Flashing**

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DMX enters the architectural world

DMX was originally implemented as a means of controlling light dimmers for theatrical lighting. Since then, however, it's use has widened and advanced, and DMX is now used for many other special effects like fog machines and light-rig motion control, as well as complex architectural and interior lighting Systems.

What scope does a Systems Integrator handle?

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Typical integrator scopes of work

- **Controls design**
- **Shop drawings/ riser diagrams**
- **Equipment supply (controls and dynamic fixtures)**
- **Pre-wire meetings with electrical contractor (EC)**
- **Termination of low voltage at the rack and at the fixture**
- **Commissioning of control gear and dynamic fixtures**
- **Programming of fixtures and shows**
- **Staff training on system**

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So what is the advantage using an integrator?

- **Free peer review**
- **Compatibility confirmation prior to ordering and installation**
- **Identification of scope gaps**
- **Product agnostic protection of the specification without substitution**
- **Assistance with the VE process**
- **Single entity ownership off the working system**
- **Post installation support**

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When do I need a Systems Integrator?

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These questions may help

- Are the controls complicated?
- Is it a dynamic lighting installation?
- Is it immersive? (sensor driven)
- Are there multiple entities involved?
- Will the CA be complicated?


Fixtures default to address 1

Fixtures addressed properly

One neck to choke
or one back to pat

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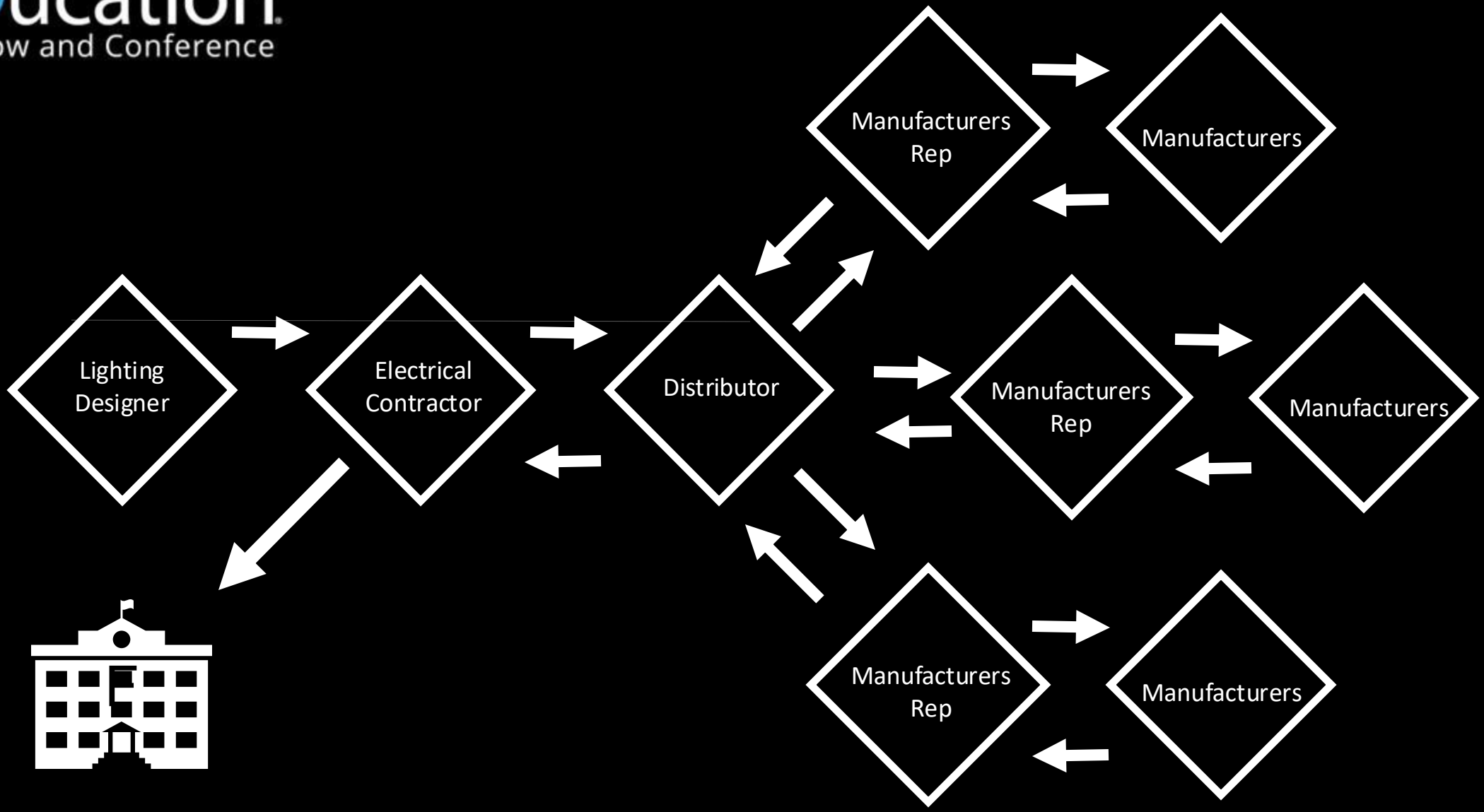

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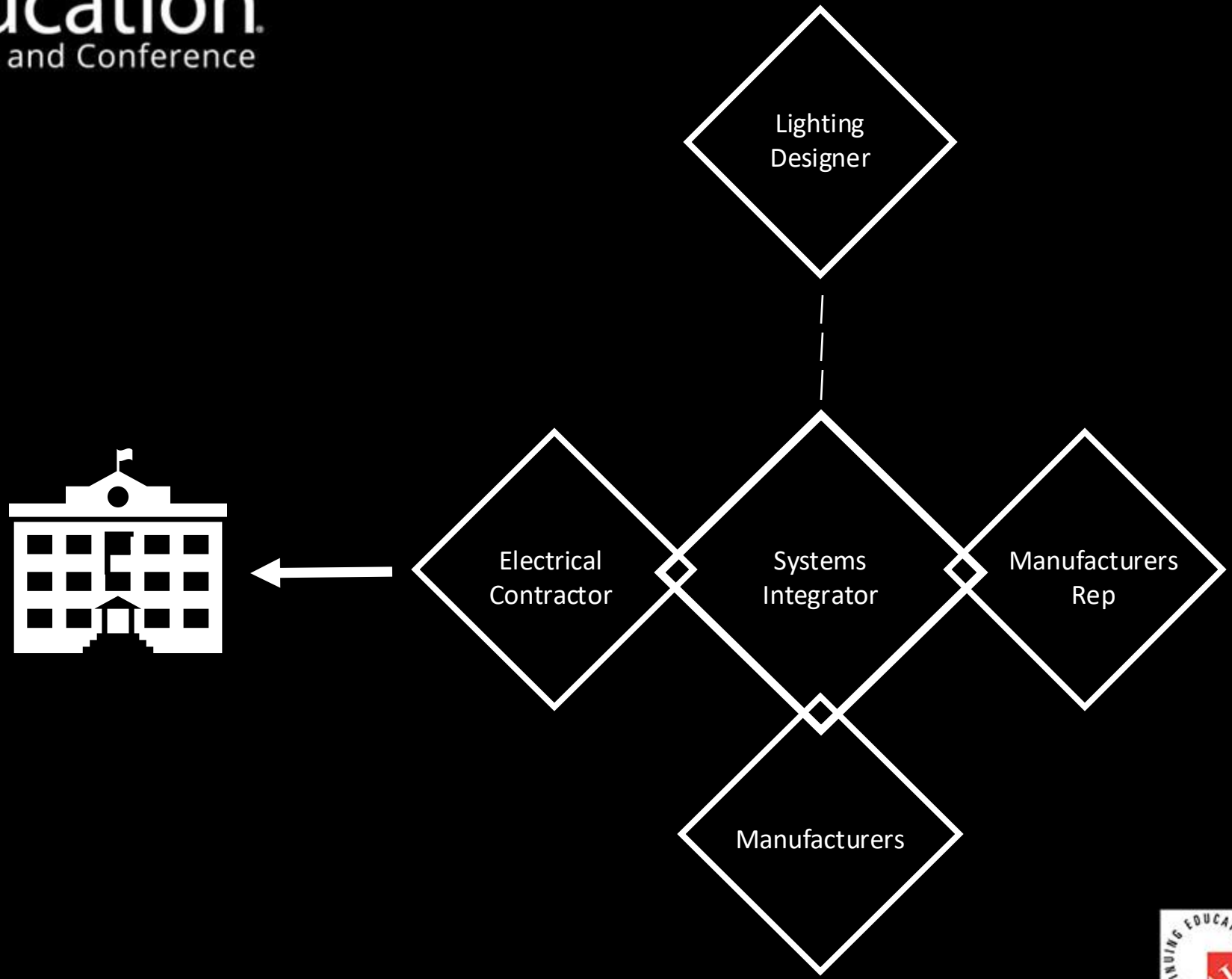

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The real questions

- Do you anticipate pain points
- Are there potential scope gaps
- Who will take ownership of the system holistically and be responsible for insuring everything works as designed?

At what stage should I involve the Systems Integrator?

EARLY!!!!!!

- During Schematic Design
  - A trusted integrator will give free advice
  - Help avoid costly compatibility issues on site
- And throughout the process
  - Free peer review
  - A good SI will support the lighting designer

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Design Assist

Sometimes a systems integrator can be contracted as a design assist to write the controls narrative and specify the controls gear. Sometimes they are written into the specification to take ownership of (and complete) the controls design.

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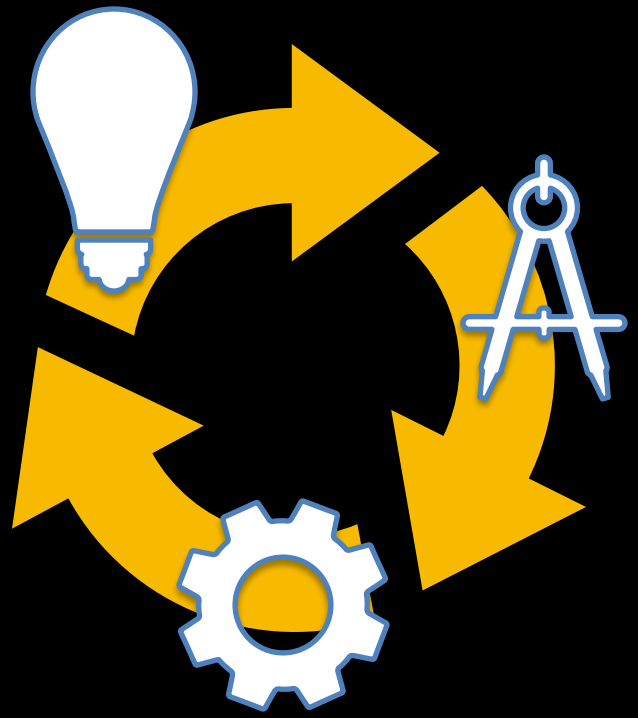
The collaborative turnkey approach

Conceptual Design



Technical Design

Integration

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Avoid Rescue Missions

Bringing a systems integrator in after installation is often more costly than getting them involved earlier. Change orders and finger pointing often being the end result. The most expensive place to solve a problem is on site.

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How to budget for (and with) a Systems Integrator

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Have the Systems Integrator help

- Determine a responsibility matrix
- Avoid scope gaps and overlaps
- Deliver as budgeted

Why not budget through traditional channels?

- Sometimes the dynamic scope gets overpriced because the entity creating the budget is unsure of the technology requirements. The can result in the dynamic scope being value engineered out of the project.
- Sometimes there are scope gaps that get missed, such as fixture commissioning, which can be handled by many different trades (i.e Manufacturer, Distributor, Agent, lighting designer, Integrator, etc). If nobody quotes it or owns it that scope can become a change order.

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Specifying a Systems Integrator

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Systems Integration is often found in the following sections:

- 26 09 43.13 - Digital Network Lighting Controls
- 26 09 43.16 - Addressable Luminaire Lighting Controls
- 26 09 43.19 - Wireless Network Lighting Controls
- 26 09 43.23 - Relay Based Lighting Controls
- 26 09 61 - Theatrical Lighting Controls

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#1 - Requirement

Systems Integrator (S.I.) that possesses a minimum 5 years experience working as a lighting systems integrator, as well as 5 years in network systems integration for lighting systems and controls. An S.I. and all related services shall be included by each bidding contractor. At a minimum, the S.I. must demonstrative expertise and proficiency in the following:

A. Lighting Controls Systems
B. Data network management including fiber and copper system design
C. Application programming interface (API) control of lighting systems through http, TCP, UDP and Serial
D. ASHRAE Standards and energy management
E. Commissioning networked lighting systems
F. Engineering and implementing Bluetooth L2CAP, Casambi, Zigbee, Dali, DMX and TCP/IP (802.11.5 and 802.11.3) based data distribution systems.
G. Lighting lighting industry control protocols, including but not limited to: DMX, sACN, Ethernet, ArtNET, RDM, 0-10V control, SMPTE, MIDI, and ETCNet, BACnet/IP, Ketra, binary closed contact.

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#1 - Requirement (Continued)

H. Interfaces between lighting control systems (specifically, the system specified on this project) and control systems ***(such as Crestron, Medialon, AMX, etc.), including but not limited to: network interfaces, serial interfaces, and contact closures (see items #4, #5, #6)
I. Architectural, theatrical, and specialty lighting fixtures
J. Mounting and installation of lighting fixtures and accessories.
K. Coordination of fixture installation with other vendors.
L. Power Supply and accessory compatibility
M. Experienced lighting technicians to commission, aim and focus light fixtures (see item(s) #6, #7 and #8)
N. Expert-level lighting programmers (see item #7 and #9)

Systems Integrator shall engineer and provide a complete working system based on the design requirements of *firm name here*, including but not limited to: power and data distribution to data controlled fixtures; interfaces between lighting control and show control systems; and control rack requirements.

#2 - Working System

The Systems Integrator (S.I.) shall provide all necessary cables, adapters, splitters, power supplies, mounting hardware, etc. necessary to constitute a complete flexible working system. The S.I. shall assume that all clamp mounted hardware has the potential to move several feet in any direction during the aim and focus session that shall occur at the tail end of the project installation phase.

#3 - Prior to Onsite Focus

Prior to *light design firm name here* arriving onsite for aim and focus, and control system commissioning, the Systems Integrator shall verify, in writing, that the lighting system is 100% functional. All programmable lighting fixture and addressable hardware must be energized and readied for intended function.

#4 - Life Safety / Egress Lighting

Systems Integrator to coordinate control of architectural lighting with life safety systems and egress lighting with Electrical Engineer/local safety authority to assure a unified, cohesive interface approved by the building user.

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#5 - Energy Management
Systems Integrator to coordinate control of architectural lighting with Energy Management and environmental emissions code compliance. System integrator shall ensure Lighting Control system is configured to local and national energy management compliance.

#6 - Control System Control System overview
To trigger lighting programs, the Lighting Control System shall receive commands from the Cloud Control System. Protocols may include RS-232, RS485, TCP/IP, UDP, SMPTE, or Cont

#7 - Commission
During the commissioning phase the system integrator shall be responsible for ensuring the correct addressing of all luminaries and accessories to ensure the lighting system functions as designed. Ensure all luminaires, switches, button stations, motion sensors, daylight sensors, door and window sensors, are addressed as per the construction documents and are connected to the system and test to verify correct operation. Create as-built documentation including marked up drawings, spreadsheets of fixture numbers, drawing location, MAC addresses, IP address, serial number, DMX / Dali Address, etc. light design firm name here. to approve formatting of document to ensure all required information is there.

#8 - Onsite Focus Crew

Aim and focus crew shall be experienced with the specified lighting fixtures, including but not limited to: safety mechanisms and related accessories; beam focus; inserting color media, spread lenses, and diffusion or frost; and how to lock fixtures in both pan and tilt directions. As aiming and focus is completed, crews are responsible for tightening all locking set screws, handles, bolts, etc. to ensure fixture focus is secure. For spaces affected by daylight, aim and focus shall be carried out after dark at the direction of *light design firm name here*. *light design firm name here* shall recommend the number of lighting technicians required for focus upon completion of final design documentation. Crew shall be available for *insert number here* sessions of aim / focus / programming. One session of *insert number here* contiguous days, and one session of *insert number here* contiguous days. An aim and focus day shall be 10 hours, not including meal breaks. Crew shall be available for up to TBD days on or over TBD trips for aim and focus with *light design firm name here*.

#9 - Onsite Programmer

Systems Integrator shall provide a professional Lighting Systems Programmer(s) who is an expert in programming the specified lighting control system. The Lighting Systems Programmer must be approved by *light design firm name here.* Demonstrated experience must include: multiple scene settings; multipart and overlapping light cues, discrete luminaire attribute timings, marking of automated fixtures; setting intensity levels; setting additional luminaire attributes, including color, beam shape, beam size, gobo, etc.; color mixing with multiple sources types, including CMY, RGB, RGBW, RGBAW, etc and color spaces (HSI, RGB, discrete emitters); recording cues, cue timing; creating events (ie time based, SMPTE, and astronomical); show file organization, creating and managing digital end-user interfaces in lighting control software as required by the project; coordinating triggers with Show Control (see item #5); and configuring DMX and Ethernet based lighting networks.The Lighting Systems Programmer shall be available for a minimum of insert number here days on or over insert number here trips for programming with light design firm name here. Lighting Systems Programmer shall be on site at the same time the base building automation representatives and IT representatives to coordinate lighting triggers, energy management, media synchronization, start of day, end of day, sensor driven automation, etc. When synchronization with other building systems systems is required, both 3rd party systems Programmer and Lighting Programmer must be on site when the client with approval authority is on site to approve all programming.

#10 - Intelligent Lighting Setup

Systems Integrator shall provide qualified technicians for setup and servicing of the automated luminaries specified on this project. This shall include, but not limited to: DMX addressing; installing gobos; service and repair of internal modules, including iris, prisms, shutters, gobo wheels, etc.; adjusting mechanical limits; and replacing power supplies.

#11 - System Integrator List

Recommended Systems Integrator:
Name of company / Contact person
Email / Phone number / website

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Questions?

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