Designers Lighting Forum

Bridging Lighting Content and Design

Concept, Composition, and Commissioning

I'm sorry, did you want to talk about the "Content" or the "Concept?"

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Cy Eaton, MIES

12 March 2019

leducation.org

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

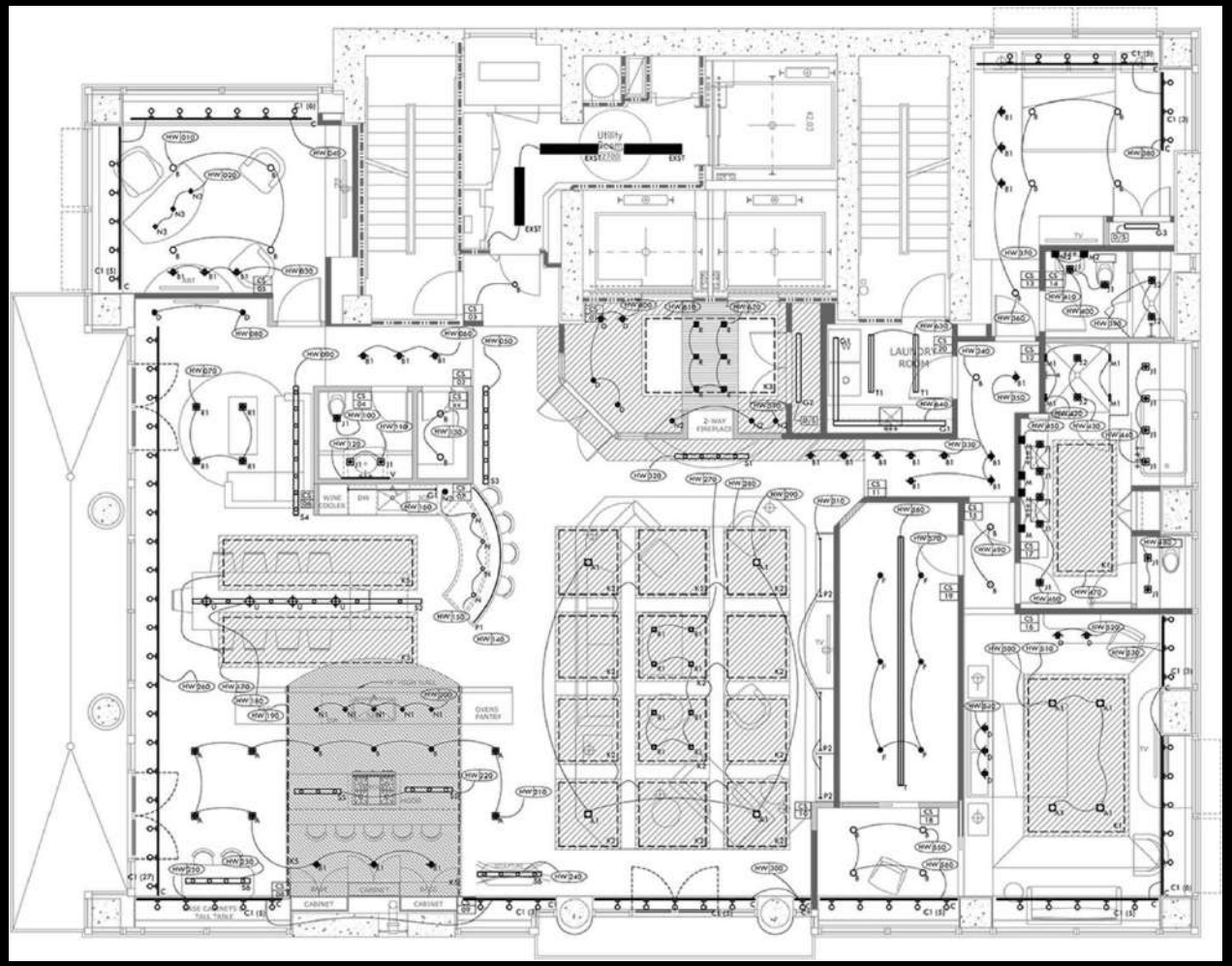
Learning Objectives

1. Develop a rich vocabulary to discuss the practice, process, and technology of Lighting Design Composition.
2. Provide a vantage point for lighting specifiers to develop their designs in a holistic and effective manner with the entirety of the design team.
3. Bullet point examples of design strategies to support the design concepts and integrated technology, concurrently.
4. Understanding the practical connections between the lighting design, building technology, and the occupants of a building.

Lighting DESIGN

The Hi-Fi System

Type	Manufacturer	Catalog Number	Mounting	Area of Use	Lamp Volt	Lamp Watts	Lamp Type	Description	Notes
A		107-BX-01-X-X-WA-12-4S-AA-X-LH-35-TF-BB-X-AL-X	Wall	Lobby	120	24W/FT	3500K LED 80+CRI	LED wall-mounted grazer with 4.5" square canopies; non-dimming driver	To be sized per application and drawings
B		CE180-AR-L1.1-35M-D	Bollard	Exterior	208	39W	T6-G12 CMH	4'-0"high aluminum bollard; 360 degree optics; Finish to be verified by architect	All steel components to be certified for a minimum of 75% U.S. content
C		MULTIPLE LARGE 8238-01-40-UNV-FINISH	Recessed	Lobby	120	78	3500K LED 80+CRI	LED 3 lamp adjustable downlight with a 7.25"W x20.3"L aperture; 40 degree beam angle LED module	Provide integral 0-10V dimming driver
D		LEDS315-13-MG-3-W-1	Recessed	Bathroom	120	12	3500K LED 85+CRI	3.5" square pinhole; 284 lumens; satin nickel finish	
E		W827/LENGTH TV IP67 (with all appropriate accessories)	Surface	Walkway	120	3W/FT	2900K LED 80+CRI	Continuous linear LED strip light; 357 lumens per meter; run length to be verified in field	Integrated within curb to provide egress lighting on pathway



Lighting CONTENT

The Music


THE HISTORY
OF LIGHT
IN 60 SECONDS


125,000 BC

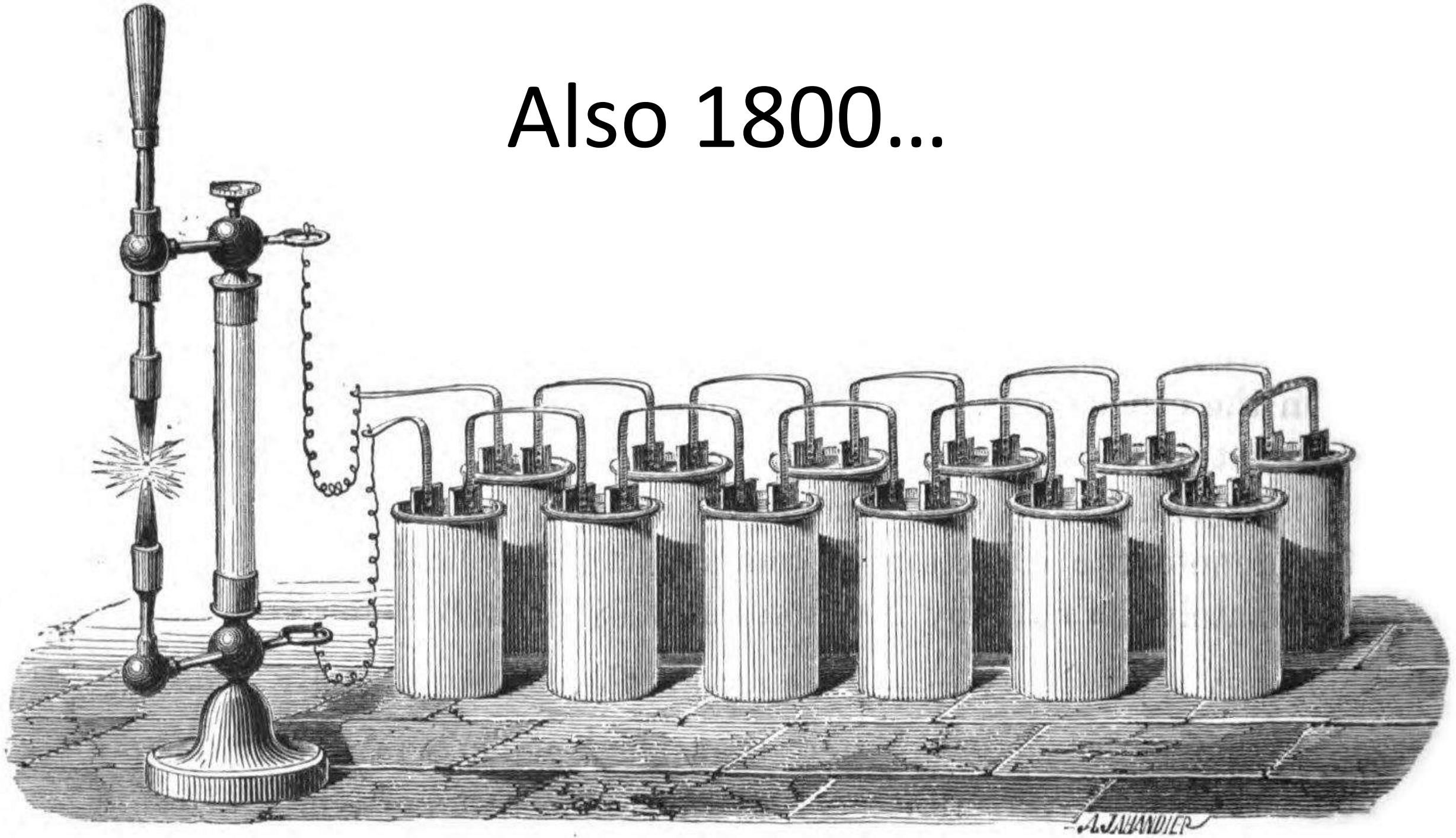

70,000 BC

5,000 BC

500 BC

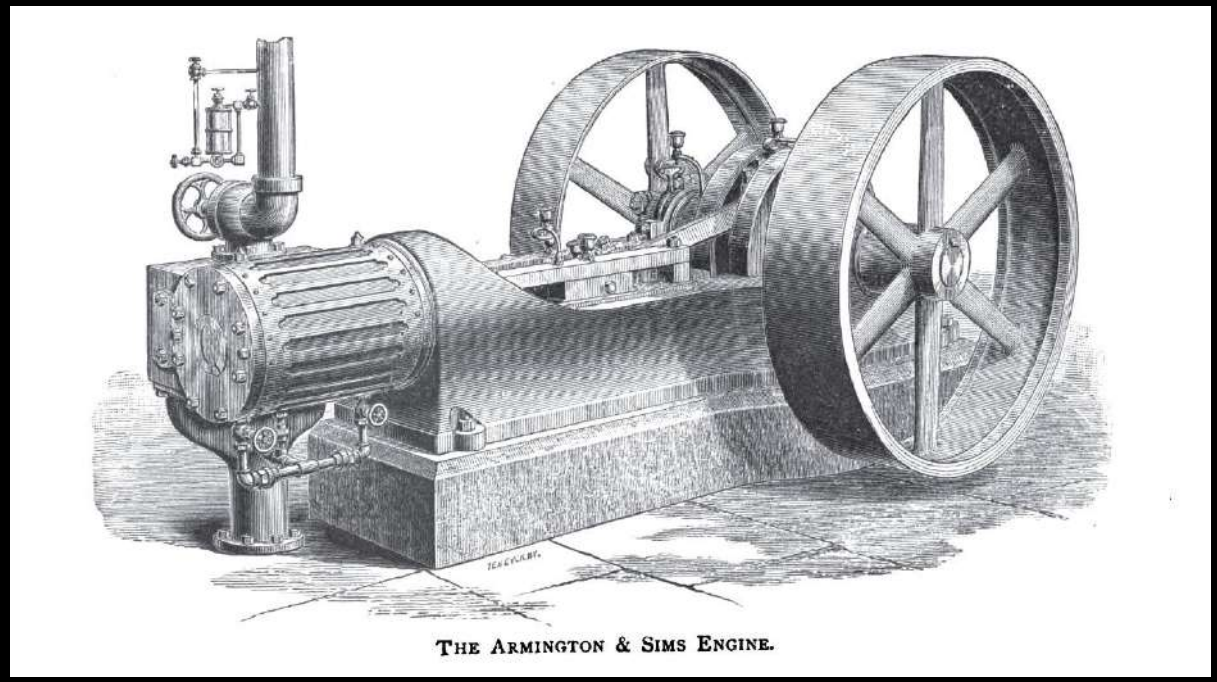
1800

Also 1800…



1880

…also 1880



THE ARMINGTON & SIMS ENGINE.

1882

227 Fulton Street, New York, December 13, 1905.

Dear Sir:- It has been proposed to form a Society of Illuminating Engineers, composed of those people who are especially interested in the question of light and its distribution. For this purpose, the undersigned have asked a number of those most prominently interested in such questions to meet at the Hotel Astor, 44th Street and Broadway, this city, on Thursday evening, December 21, at 6:30 o clock, to talk over the formation of such a society and to discuss whatever is necessary to accomplish this purpose. We trust you will be able to attend this meeting and would ask that you kindly let Mr. L. B. Marks, 202 Broadway, New York City, know beforehand so that arrangements for an informal dinner may be made. The price of this dinner will be 1.00 each.

Trusting that we may have the pleasure of meeting you at that time, we are,

Very truly yours, L. B. Marks, E. Leavenworth Elliott, Van

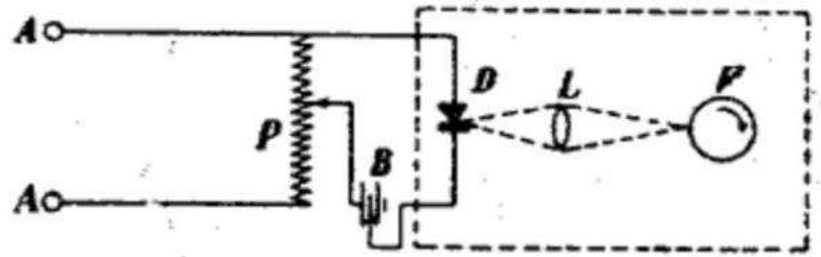
P.S.-The dinner will be purely informal and business suits will be in order.

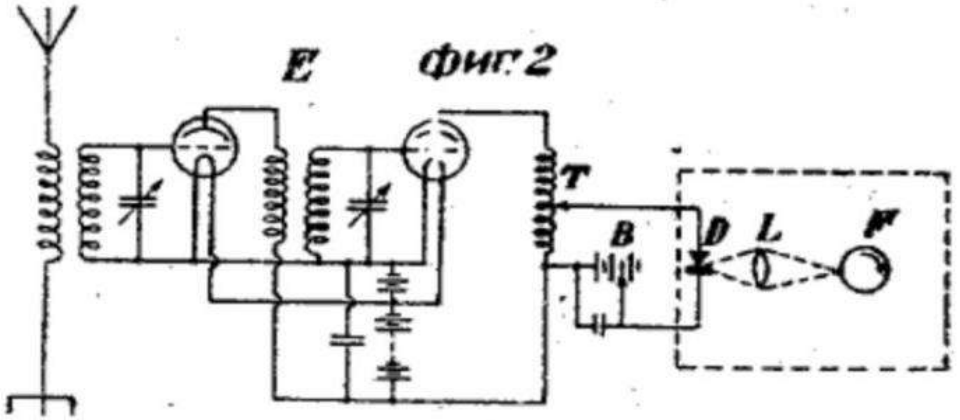
1905

1927

К патенту О. В. Лосева № 12191

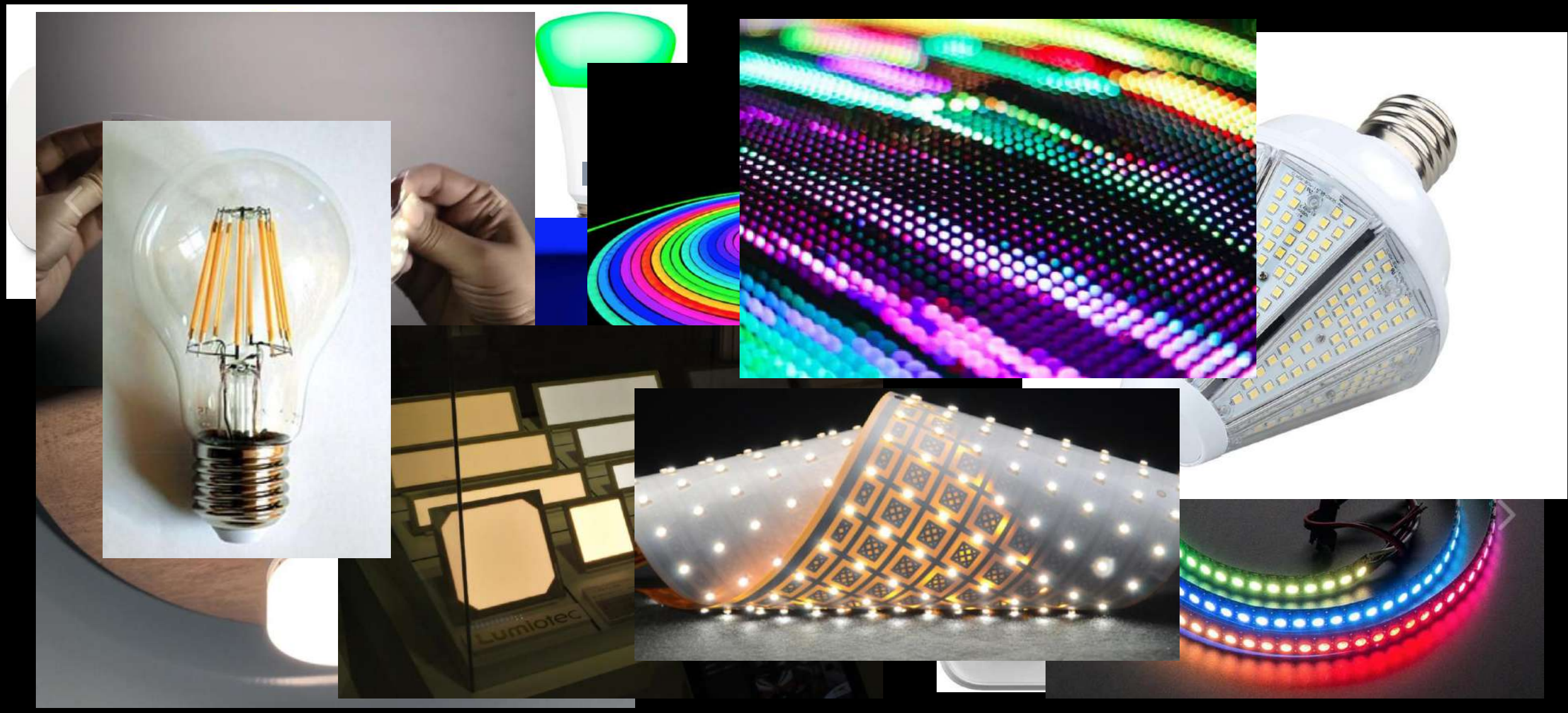
Фиг. 1





Фиг. 2

The Last Seven Years



Architect → Electrical Engineer → Lighting Designer

Stone Mason → Contractor → Integrator

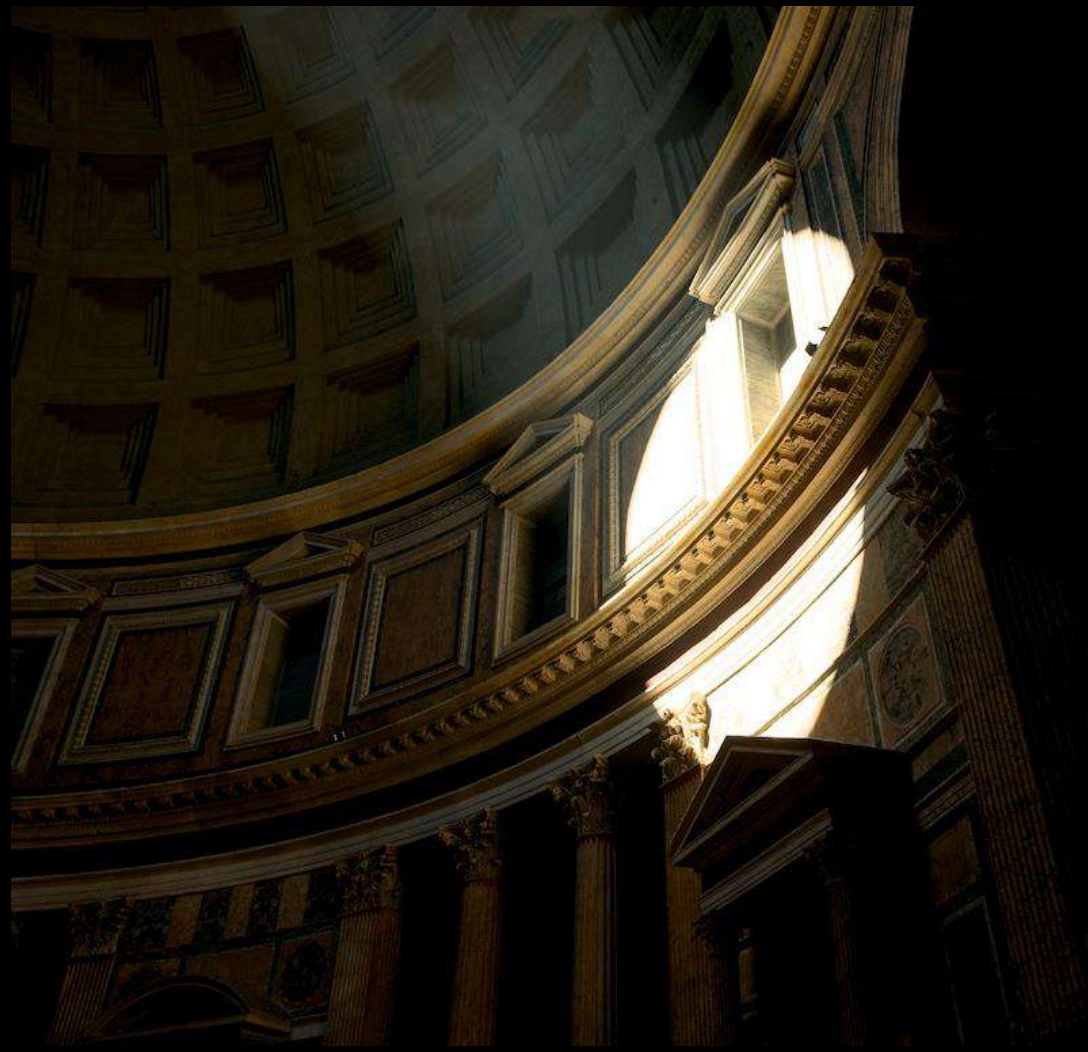
Architect →

Light, God's eldest daughter, is a principal beauty in a building.

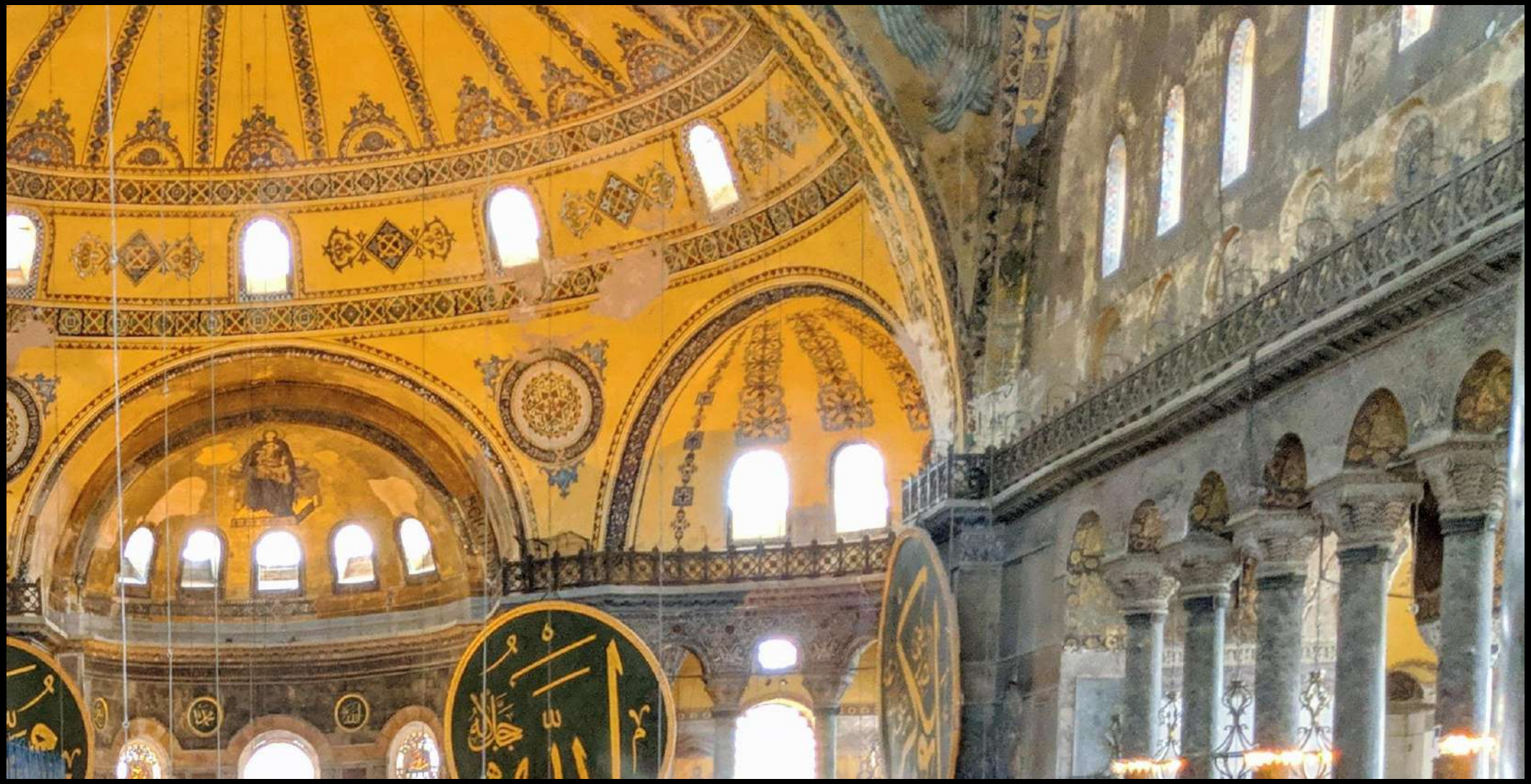
- Thomas Fuller

113AD: The First Dynamic Lighting Project

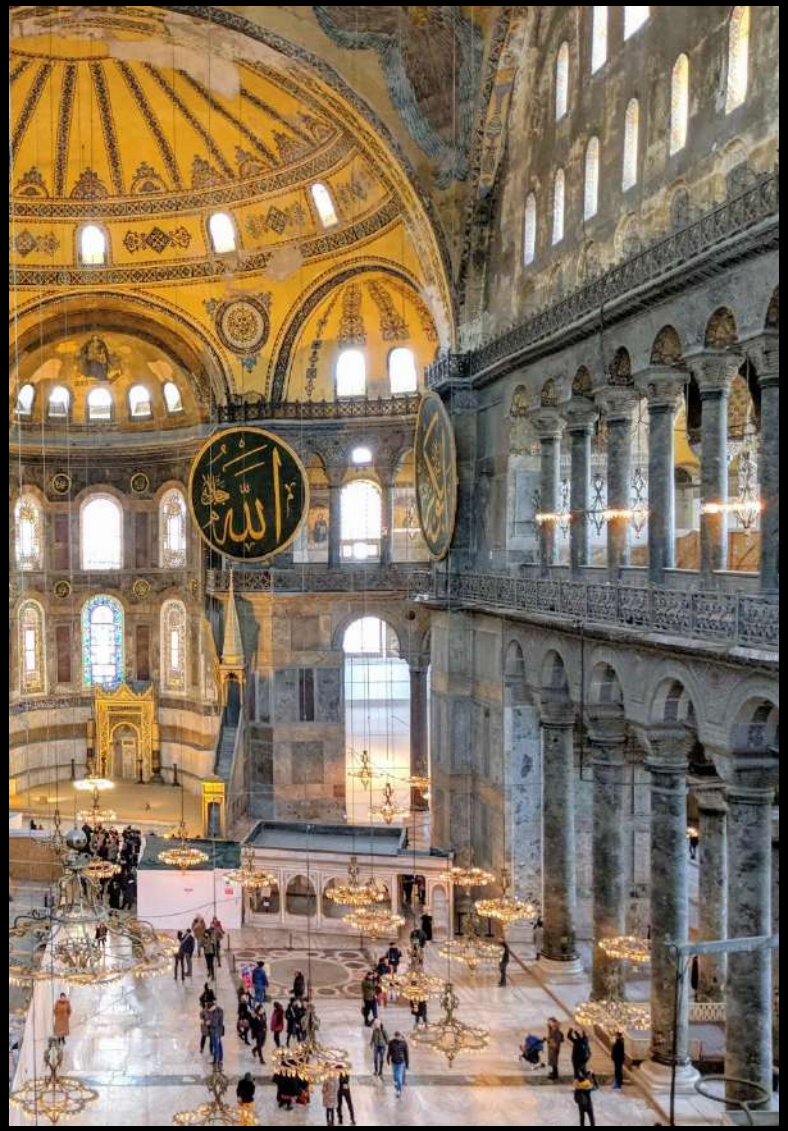
113AD: The First Dynamic Lighting Project



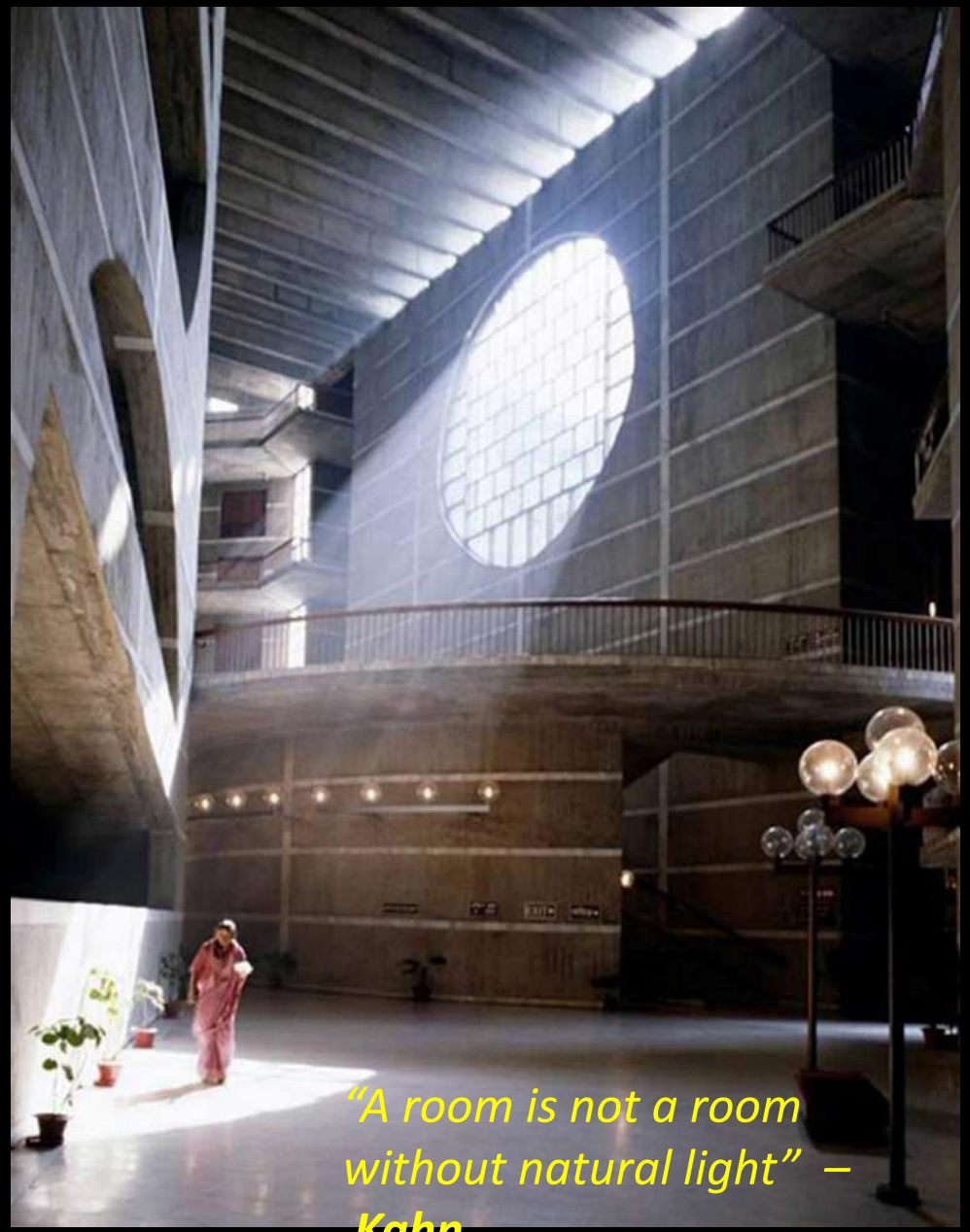
113AD: The First Dynamic Lighting Project



537AD: Hagia Sofia



537AD: Hagia Sofia



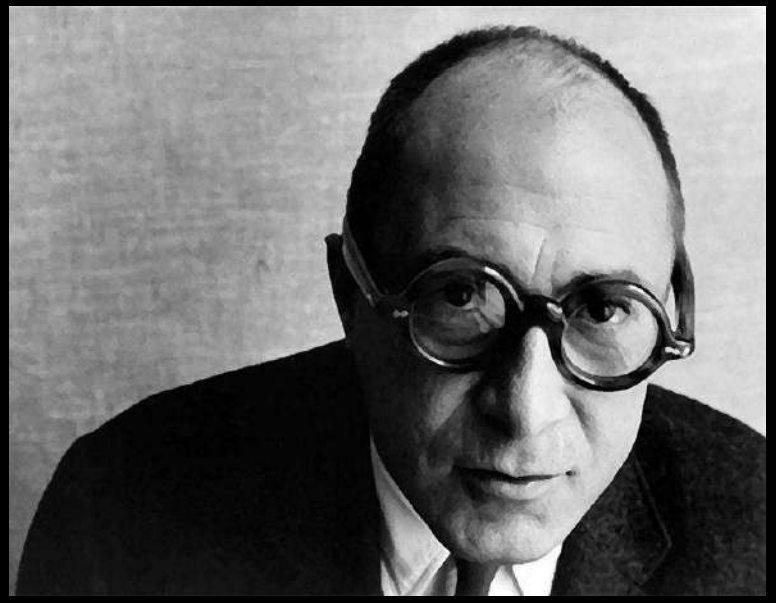
*"A room is not a room without natural light" – **Kahn***

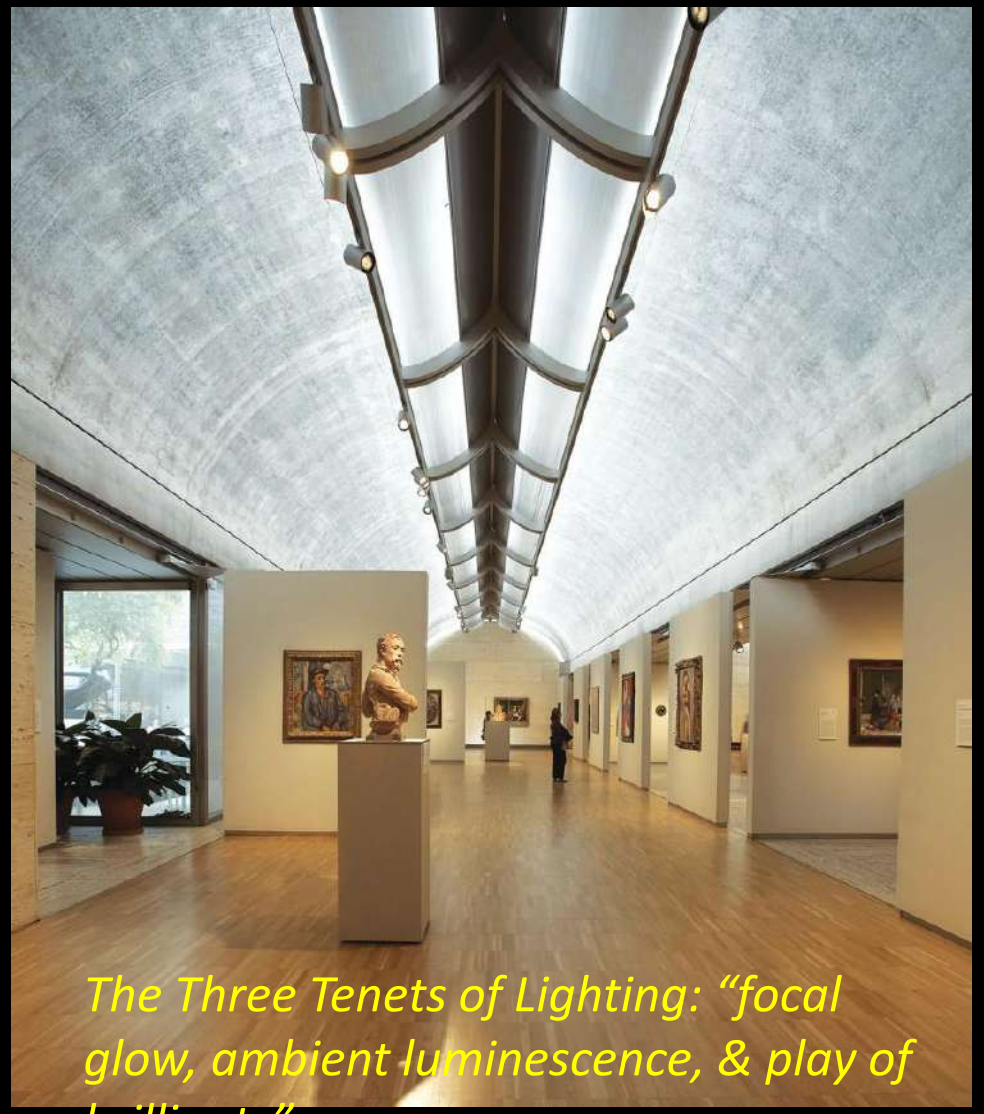
1961: Jatiya Sangsad Bhaban, Bangladesh

Architect → Electrical Engineer

1955: Inland Steel Building

Architect → Electrical Engineer → Lighting Designer

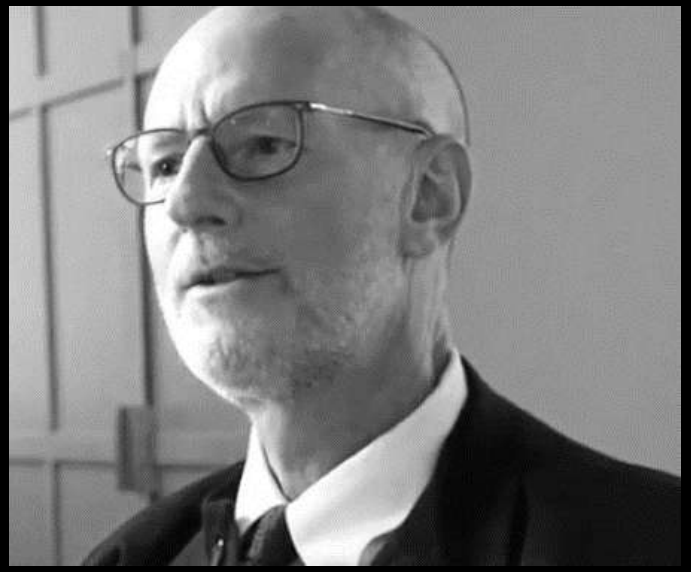




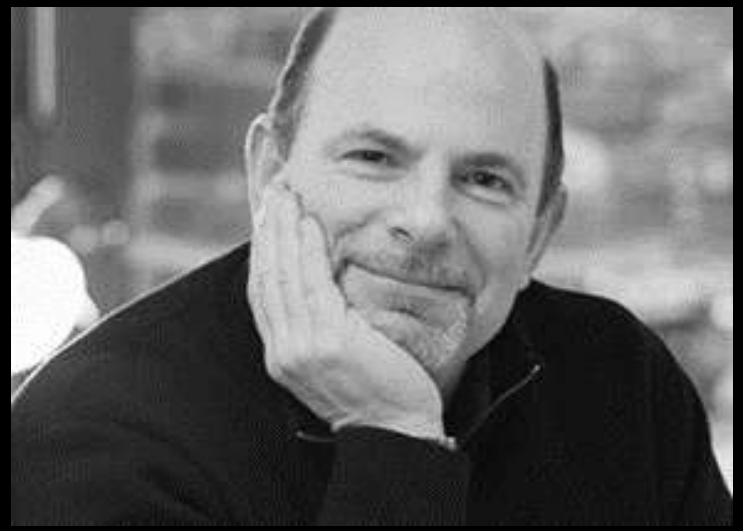
The Three Tenets of Lighting: "focal glow, ambient luminescence, & play of brilliants"

Richard Kelly: Yale Art Gallery

Architect → Electrical Engineer → Lighting Designer → ?????



Fisher, Marantz, Stone: Burj Al Arab Jumerirah



Available Light: Franklin Institute

Available Light: Franklin Institute

Maja Petric: We Are All Made of Light

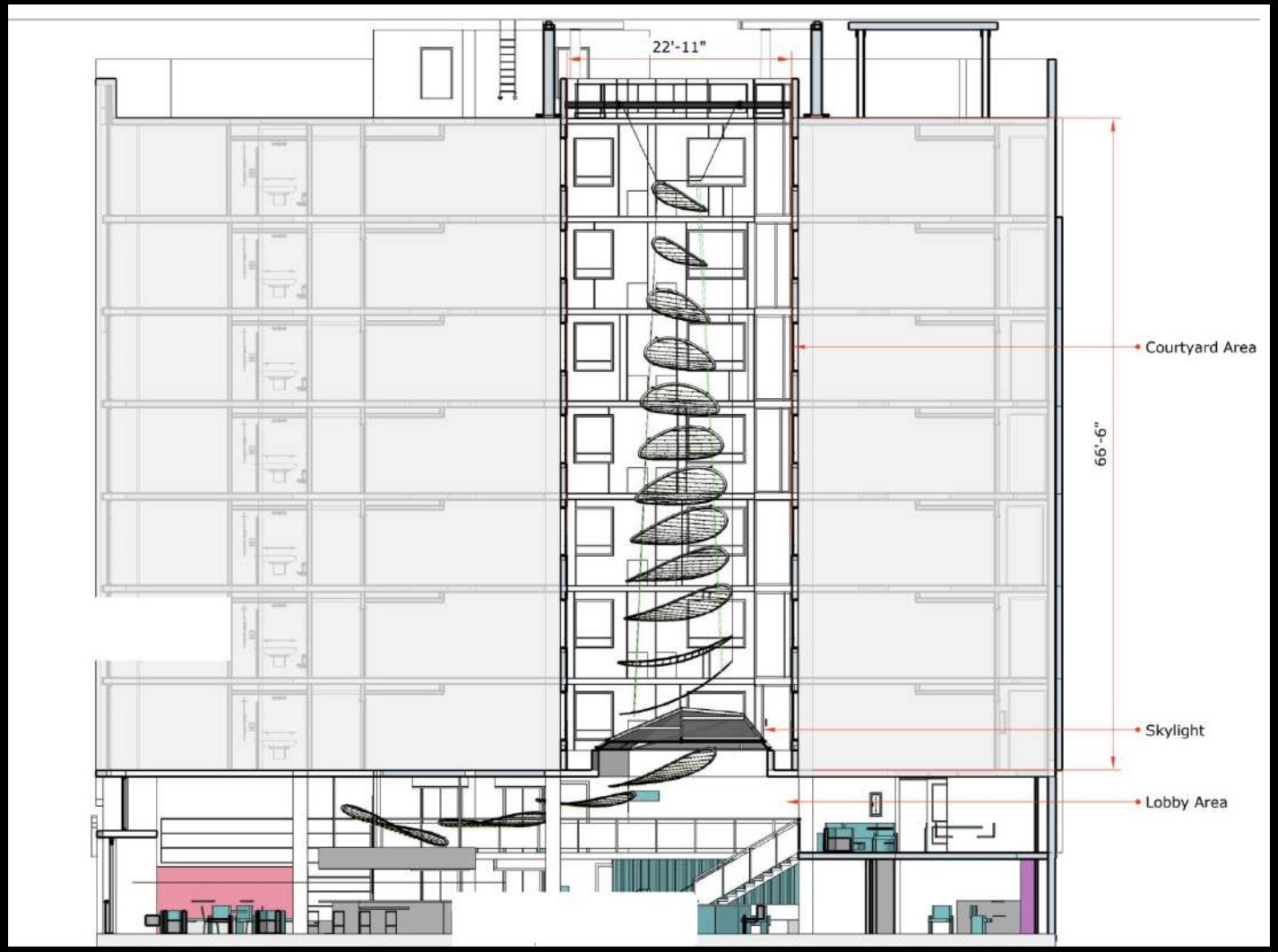
DIGITAL AMBIANCE

Digital Ambiance: Moxy Hotel

“This piece can be described as a volumetric lighting installation, using pixels suspended within a volume of space to create a “holographic” area in which to run animated lighting patterns. Programming a system like this requires advanced software and lighting control techniques. We worked with Moment Factory’s custom lighting control environment and provided them with the control systems needed to express their animations on the sculpture.”

DIGITAL AMBIANCE

Digital Ambiance: Moxy Hotel

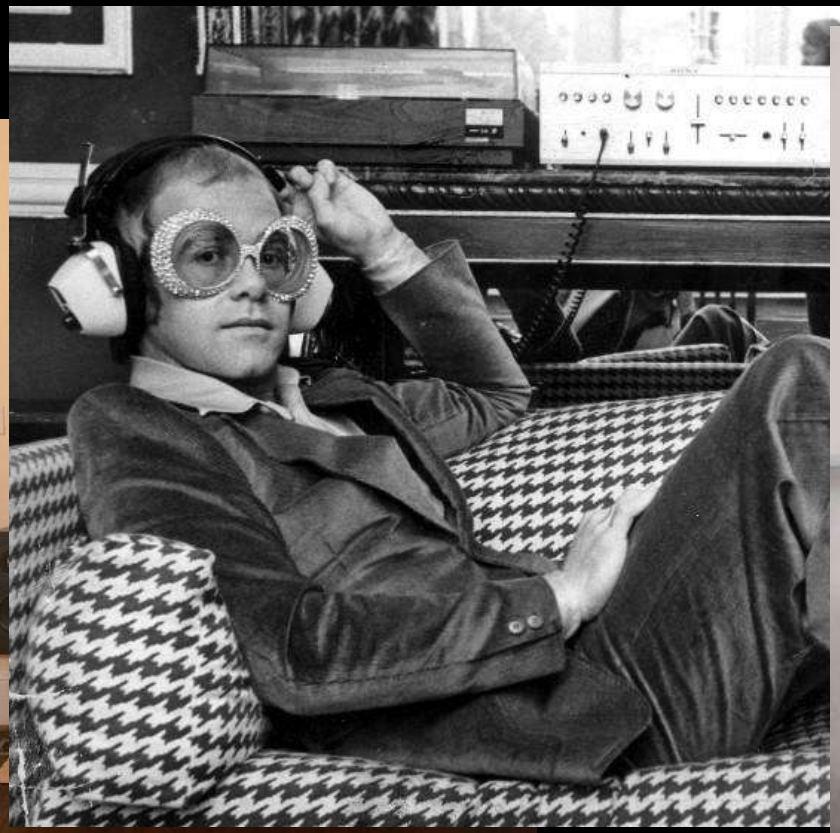


Digital Ambiance: Moxy Hotel

DIGITAL AMBIANCE

Prepare Ourselves

The Hardware, Services, and Media of Content



Hardware Development

- Remixed Technology
- Dynamic Sources
- Shared Standards
- Retrofit/replacement parts
- New Inputs; Better Output

Where do we go from here, and when does it stop?

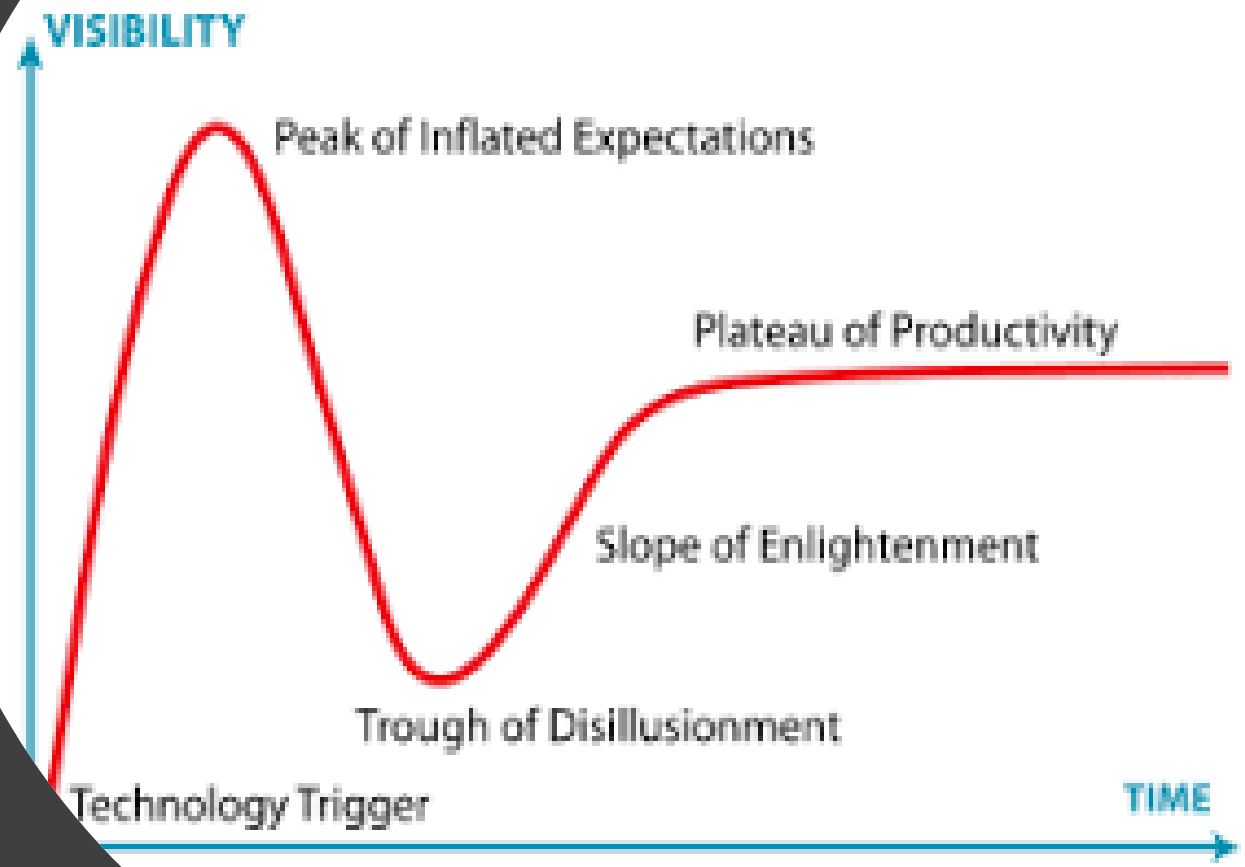
Hardware Development

Remix
Technologies & Techniques

Hardware Development

Expect the Unexpected

…slowly



Hardware Development

- Remixed Technology
- Shared Standards
- Delivery Infrastructure
- New Inputs; Better Output

Hardware Development

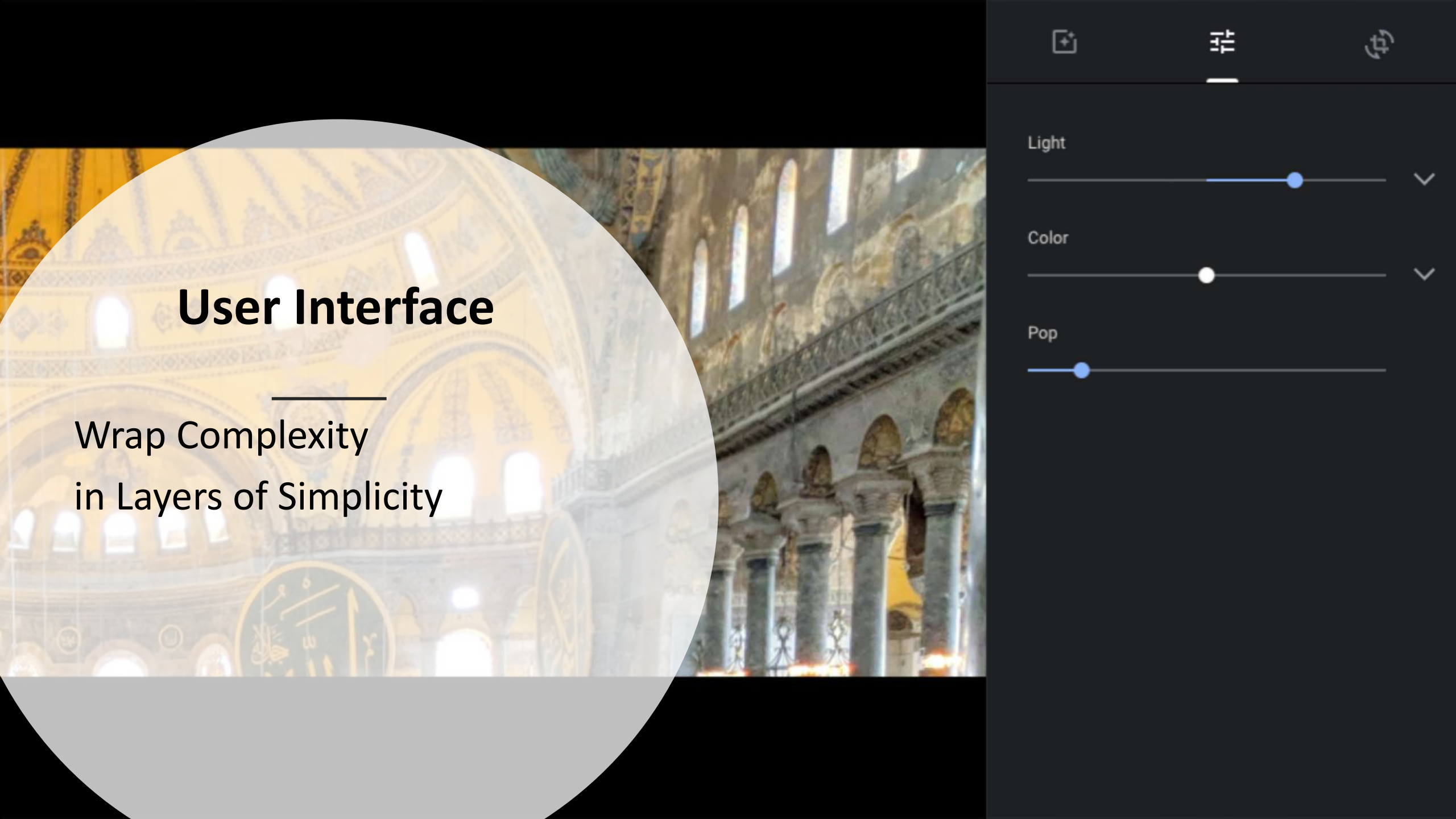
Dynamic Sources

Hardware Development

Beyond Presets

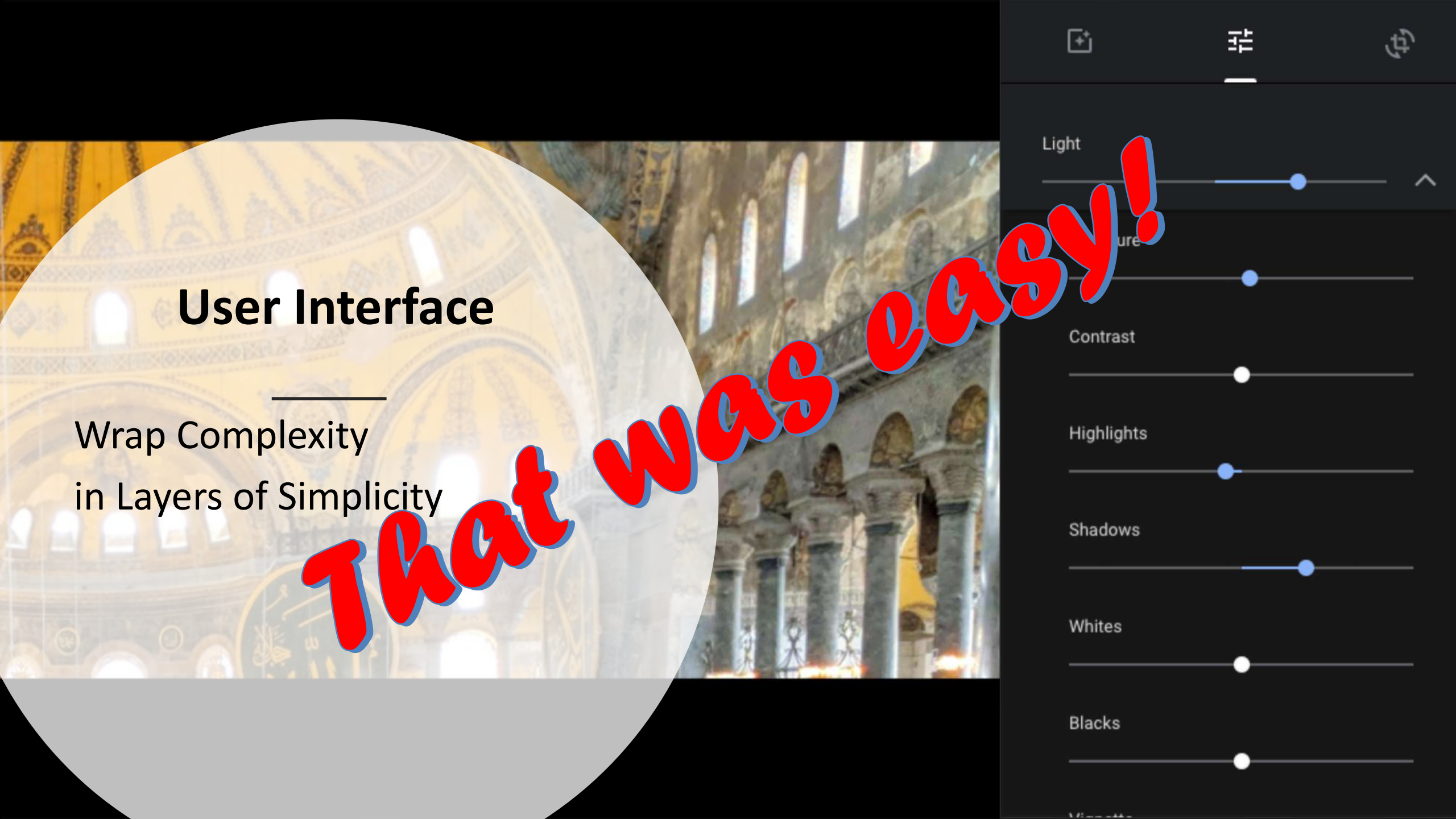
User Interface

Wrap Complexity
in Layers of Simplicity

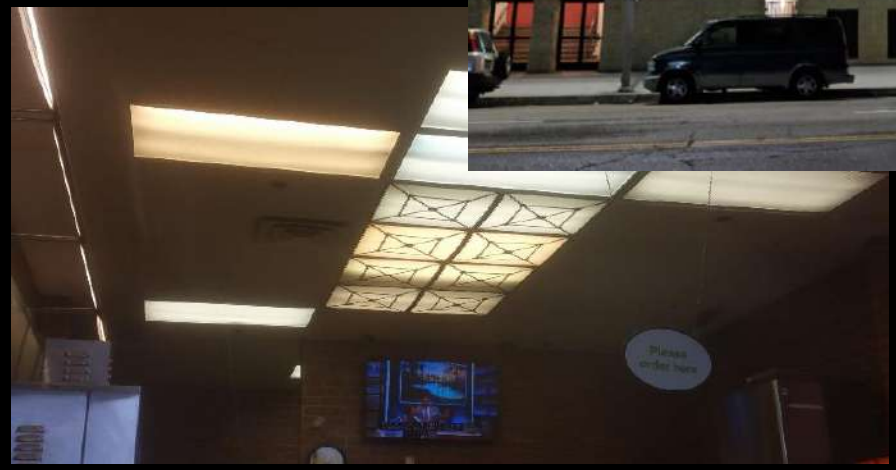


User Interface

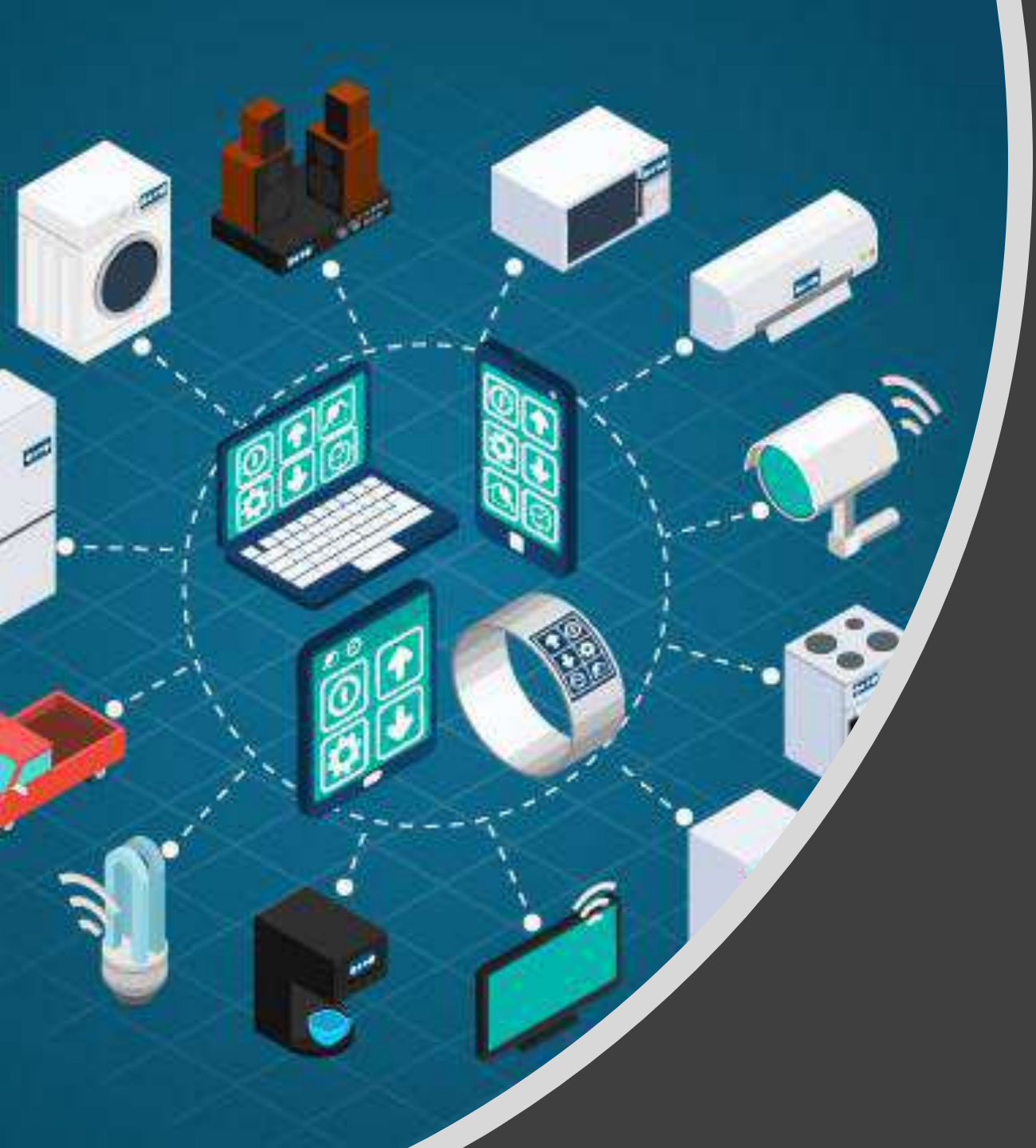
Wrap Complexity
in Layers of Simplicity


User Interface
Wrap Complexity
in Layers of Simplicity
That was easy!
Light
Contrast
Highlights
Shadows
Whites
Blacks

Maintenance Strategies



Maintenance Strategies



IoT?

Yes. That, too.

Next Slide.

Composing Content

Audio Team

AV Engineer

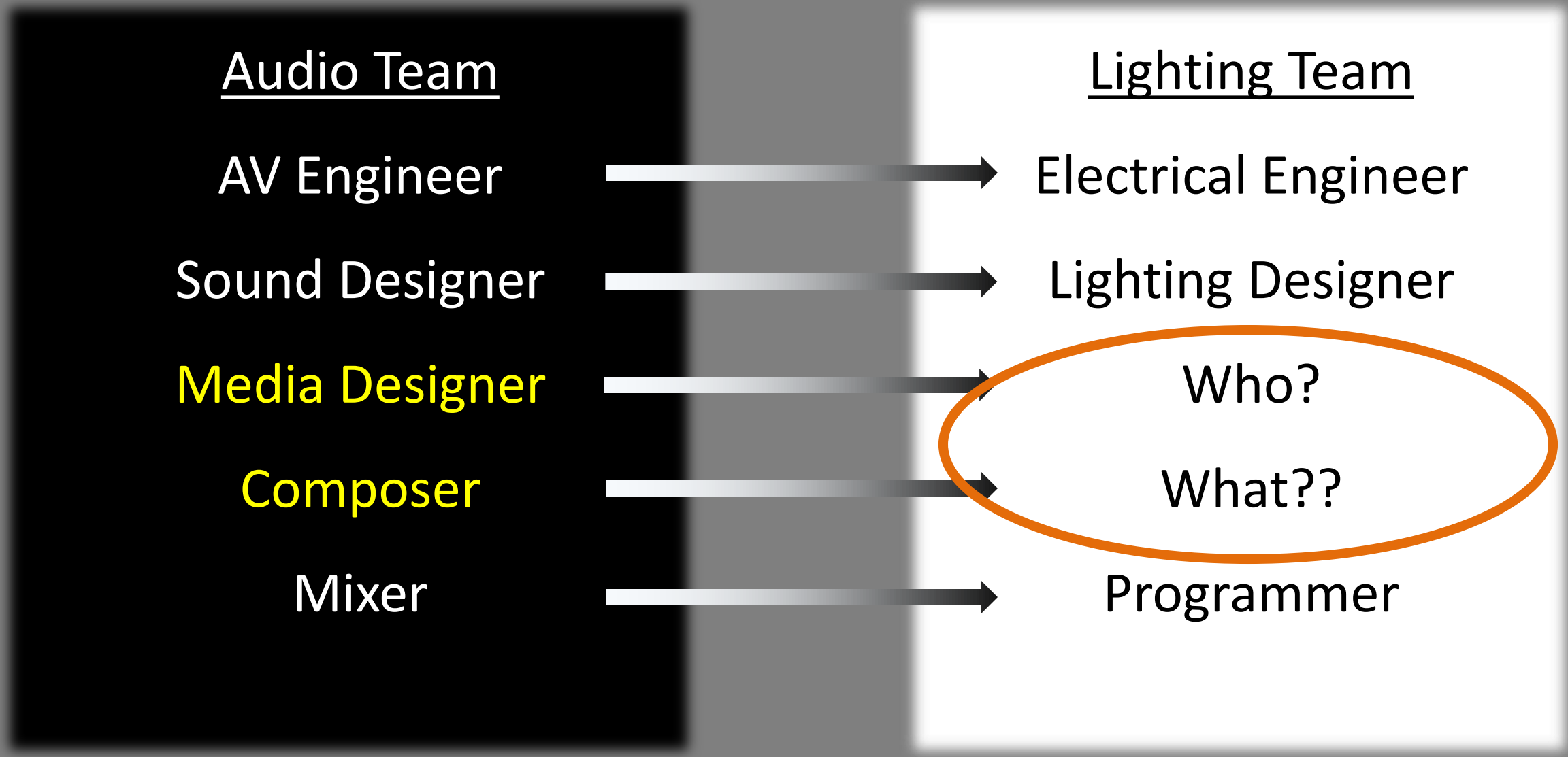
Sound Designer

Media Designer

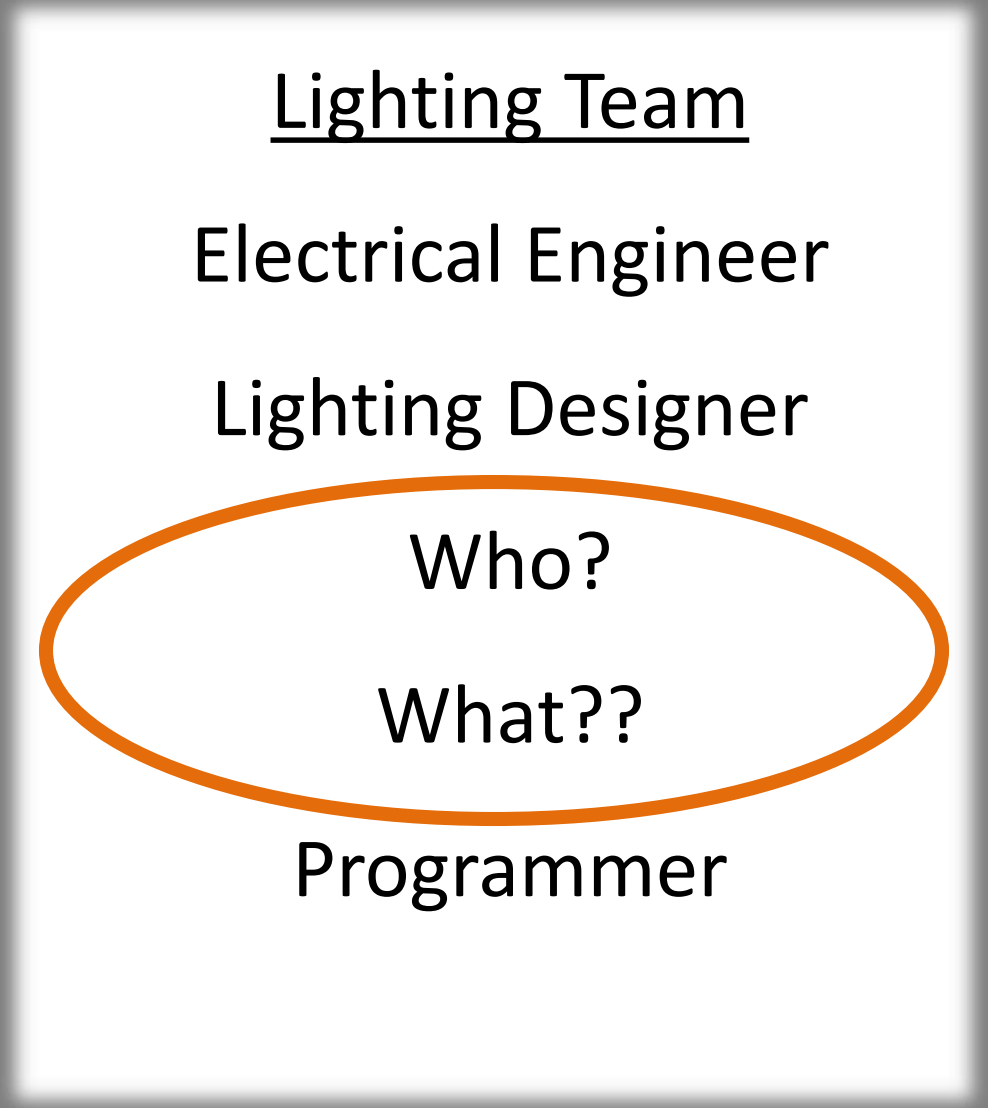
Composer

Mixer

Composing Content



Bridging the Gap



Architect → Electrical Engineer → Lighting Designer → ?????

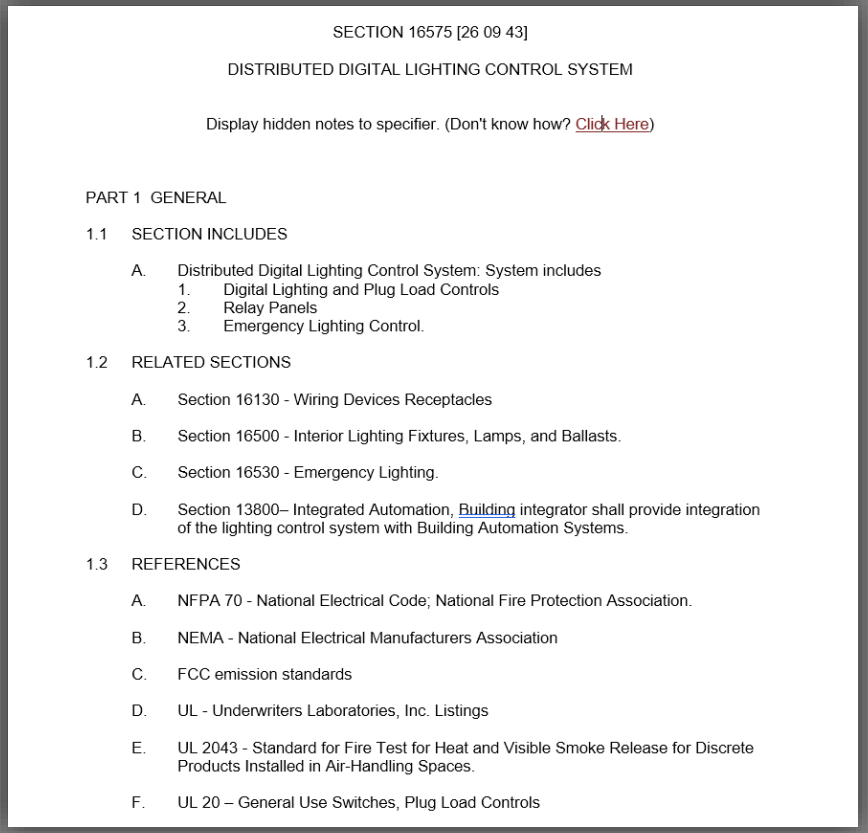
The Content Design Project Cycle

OPR (Owner Project Requirements)

Minimum performative project expectations

BoD (Basis of Design)

Framework, derived from OPR, to inform project design



SECTION 16575 [26 09 43]

DISTRIBUTED DIGITAL LIGHTING CONTROL SYSTEM

Display hidden notes to specifier. (Don't know how? Click Here)

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Distributed Digital Lighting Control System: System includes
   1. Digital Lighting and Plug Load Controls
   2. Relay Panels
   3. Emergency Lighting Control.

1.2 RELATED SECTIONS

A. Section 16130 - Wiring Devices Receptacles

B. Section 16500 - Interior Lighting Fixtures, Lamps, and Ballasts.

C. Section 16530 - Emergency Lighting.

D. Section 13800– Integrated Automation, Building integrator shall provide integration of the lighting control system with Building Automation Systems.

1.3 REFERENCES

A. NFPA 70 - National Electrical Code; National Fire Protection Association.

B. NEMA - National Electrical Manufacturers Association

C. FCC emission standards

D. UL - Underwriters Laboratories, Inc. Listings

E. UL 2043 - Standard for Fire Test for Heat and Visible Smoke Release for Discrete Products Installed in Air-Handling Spaces.

F. UL 20 – General Use Switches, Plug Load Controls

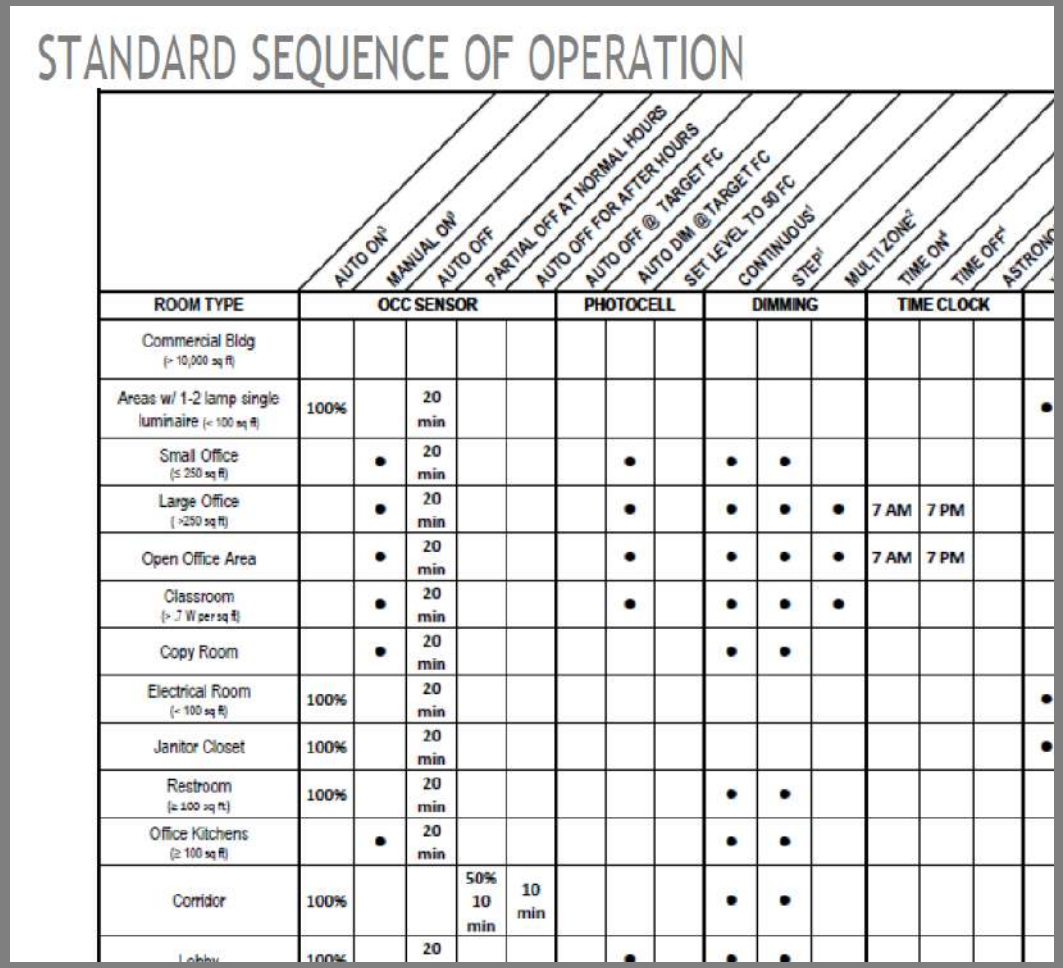
The Content Design Project Cycle

Controls Intent

Functional requirements of the control system to achieve BoD

SOO (Sequence of Operations)

Description of all functions to be programmed into the control system.



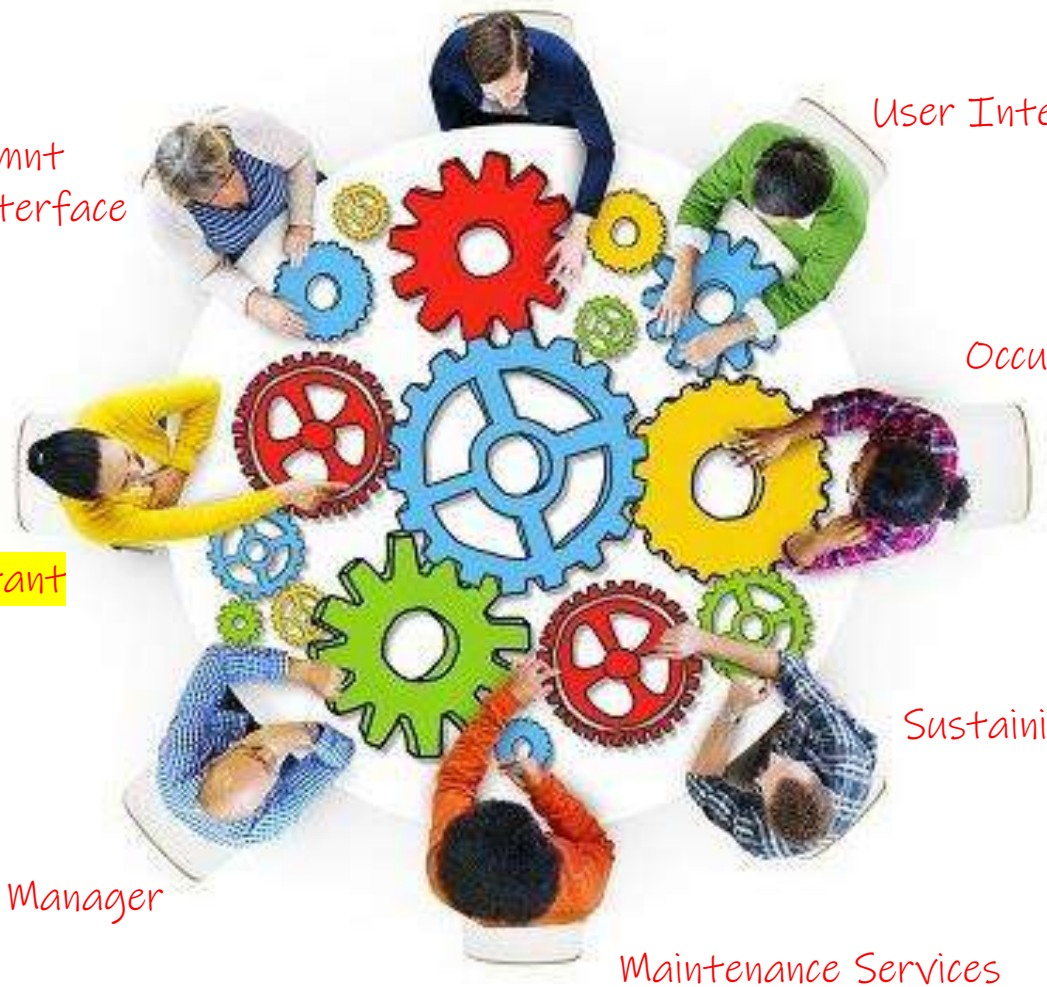
STANDARD SEQUENCE OF OPERATION

ROOM TYPE	OCC SENSOR					PHOTOCELL			DIMMING			TIME CLOCK			
	AUTO ON[1]	MANUAL ON[2]	AUTO OFF	PARTIAL OFF AT NORMAL HOURS	AUTO OFF FOR AFTER HOURS	AUTO OFF @ TARGET FC	AUTO DIM @ TARGET FC	SET LEVEL TO 50 FC	CONTINUOUS[1]	STEP[1]	MULTI ZONE[2]	TIME ON[4]	TIME OFF[4]	ASTRONO	
Commercial Bldg (> 10,000 sq ft)															
Areas w/ 1-2 lamp single luminaire (< 100 sq ft)	100%		20 min												•
Small Office (≤ 250 sq ft)		•	20 min				•		•	•					
Large Office (>250 sq ft)		•	20 min				•		•	•	•	7 AM	7 PM		
Open Office Area		•	20 min				•		•	•	•	7 AM	7 PM		
Classroom (> .7 W per sq ft)		•	20 min				•		•	•	•				
Copy Room		•	20 min						•	•					
Electrical Room (< 100 sq ft)	100%		20 min												•
Janitor Closet	100%		20 min												•
Restroom (≤ 100 sq ft)	100%		20 min						•	•					
Office Kitchens (≥ 100 sq ft)		•	20 min						•	•					
Corridor	100%			50% 10 min	10 min				•	•					
Lobby	100%		20				•		•	•					

Assemble Your Content Team

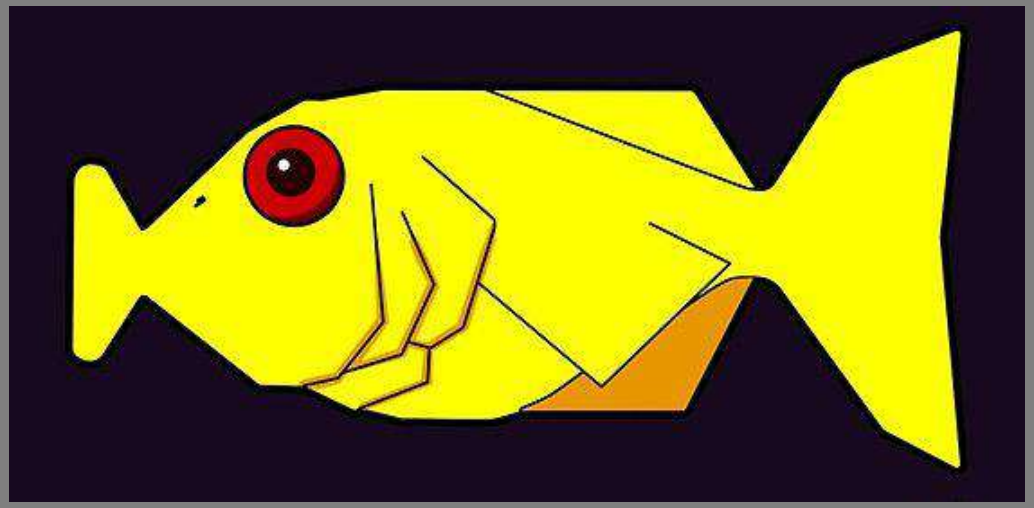
- Content Design / Consultant
- Application Frameworks
- User Interface
- Building Interface
- Custom APIs
- Specialty Commissioning
- Occupant Training
- Maintenance Services
- Sustaining programming

Assemble Your Content Team



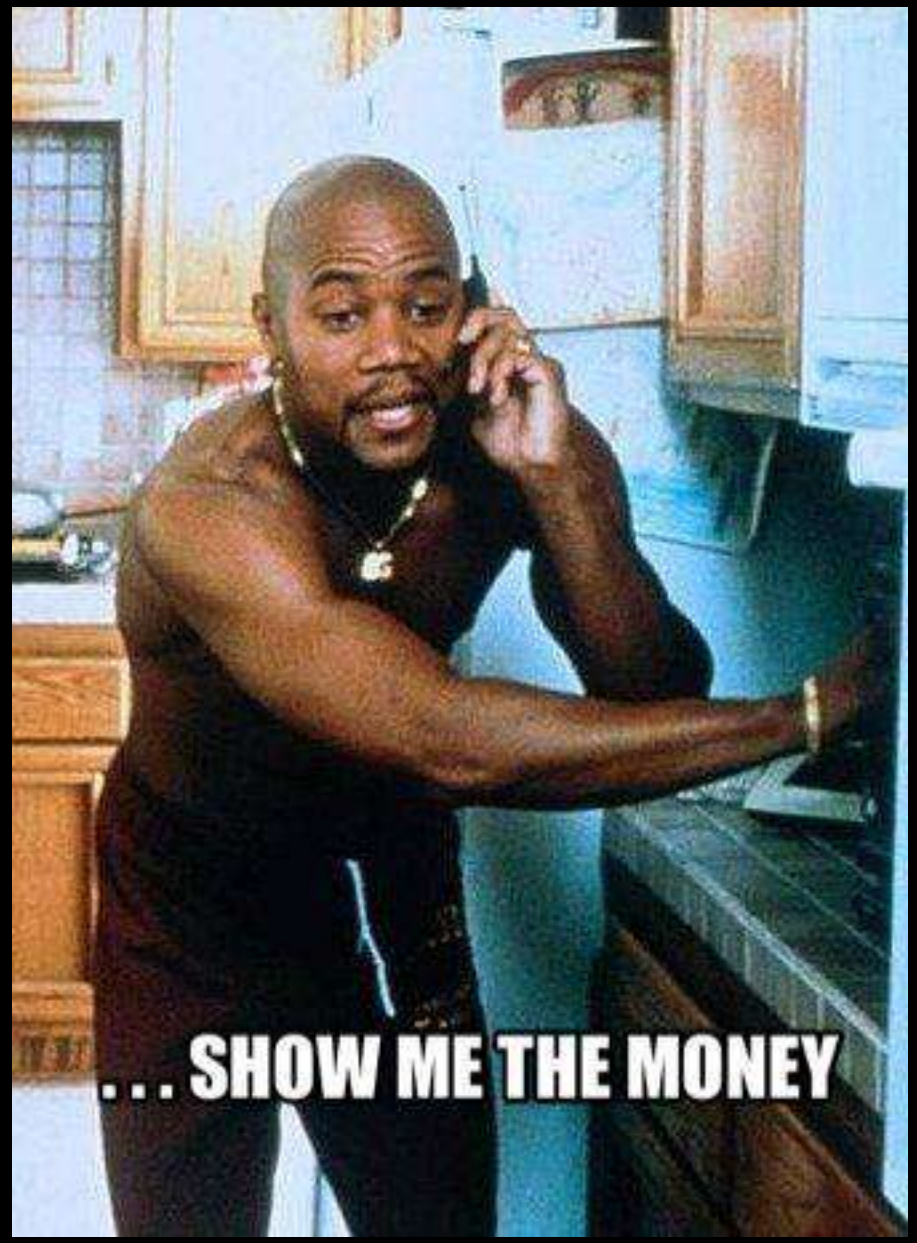
Found in Translation

- Speak the building's language
- Turn data into actionable commands
- Find the signal in the noise
- Create project-specific lingo
- Execute Project Content Vision



Show Me The Money!!!

Embracing change without loosing your shirt (like CGJ).



Creating Content Services

- New Market Sectors $
- New Services $
- On-going Revenue Streams $

Expansion Opportunities

Improving Building Value Through Design

- Better Productivity
- Strengthen Aesthetics
- Increase Reliability
- Improve Health & Well Being
- Adaptable Space

Expansion Opportunities

Health Care

- Patient rooms
- Corridors
- Nurses Stations
- Family & Waiting Rooms
- Surgical Suites
- Restrooms (public & private)

Commercial

- Open Offices
- Lobby
- Conference Rooms
- Private Offices
- Feature Spaces
- Data Banks

Retail

- Dressing Room
- Feature Display
- Storefront Window
- Big Box
- Produce
- Jewelry / Specialty Items
- General Display

Hospitality

- Lobby
- Amenity Spaces
- Guest Rooms
- Dining Room
- Party/Ball Rooms
- Corridors
- Specialty Spaces

Education

- Classrooms
- Gym/Cafeteria
- Laboratories
- Athletic Spaces
- Corridors
- Lobbies

Residential

- Entries
- Living Areas
- Sleeping Areas
- Landscape
- Bathroom
- Home Office

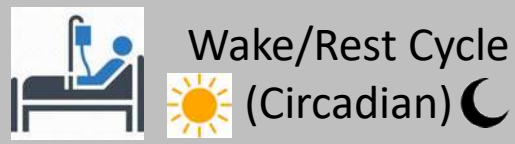
Potential Places & Markets for Content Design

Application Framework

Residential

Healthcare

Shop



Wake/Rest Cycle (Circadian)

Meds Distinction 3000K 98 CRI

Visual Exam

Night Shift (Circadian)

Emergency State

SETTING: Visual Analysis

LOCATION: Patient Room

TYPE: Override

TRIGGER: Manual trigger

OCC: MD/RN badge present

FADE TIME: 3s up; 30s out

LEVELS: 90%; 4000K; No Color

SUSPRESSION: Daylight, Relative

SUSPRESSION: Night, 50%

R9: Maximum

RELEASE: MD/RN badges exit

RESTORE TO: Previous state

Content

AREA	TITLE / CAPABILITY	DESCRIPTION
Patient Rooms	Circadian Cycle	Track time-of-day lighting -100lx @ 3000K (8 a.m.); 400lx @ 6500K (noon); 1lx @1650K (midnight)
Patient Rooms	Examination	High Intensity, 4000K (day); Low Intensity w/o Blue, 2000K (night)
Nurses Station	3-Shift Focus	1st Shift: 400lx @ 4000K 2nd Shift: 300lx @ 3000K 3rd Shift: 200lx @ 3000K, high-blue
Surgical Suit	Tissue Identification	Red/Green Optimized @ 700lx
Corridor	Baseline Circadian Cycle	4000k, 200lx (noon); 2700K, 50lx (midnight)

Commercial Building

Content

Owner Benefit

AREA	TITLE / CAPABILITY	DESCRIPTION	KEY BENEFIT	TYPICAL CONTROL	CONTROL PROTOCOL	PRODUCT
Patient Rooms	Circadian Cycle	Track time-of-day lighting - 100lx @ 3000K (8 a.m.); 400lx @ 6500K (noon); 1lx @1650K (midnight)	Health Well Being			
Patient Rooms	Examination	High Intensity, 4000K (day); Low Intensity w/o Blue, 2000K (night)	Visual Acuity			
Nurses Station	3-Shift Focus	1st Shift: 400lx @ 4000K 2nd Shift: 300lx @ 3000K 3rd Shift: 200lx @ 3000K, high-blue	Productivity Visual Acuity			
Surgical Suit	Tissue Identification	Red/Green Optimized @ 700lx	Specialty Visual Acuity Health			
Corridor	Baseline Circadian Cycle	4000k, 200lx (noon); 2700K, 50lx (midnight)	Health Well Being			

Commercial Building

	Content		Owner Benefit	Design		
AREA	TITLE / CAPABILITY	DESCRIPTION	KEY BENEFIT	TYPICAL CONTROL	CONTROL PROTOCOL	PRODUCT
Patient Rooms	Circadian Cycle	Track time-of-day lighting - 100lx @ 3000K (8 a.m.); 400lx @ 6500K (noon); 1lx @1650K (midnight)	Health Well Being	Wall Station with Timeclock Override	DLM DMX ECOS	
Patient Rooms	Examination	High Intensity, 4000K (day); Low Intensity w/o Blue, 2000K (night)	Visual Acuity	Wallbox Pre-set Keypad	DMX ECOS (w/ BT) 0-10V (w/ BT)	
Nurses Station	3-Shift Focus	1st Shift: 400lx @ 4000K 2nd Shift: 300lx @ 3000K 3rd Shift: 200lx @ 3000K, high-blue	Productivity Visual Acuity	Timeclock with local on/off	DLM DMX ECOS 0-10V	
Surgical Suit	Tissue Identification	Red/Green Optimized @ 700lx	Specialty Visual Acuity Health	Wallbox Pre-Set Keypad	DLM (w/ BT) DMX ECOS (w/ BT)	
Corridor	Baseline Circadian Cycle	4000k, 200lx (noon); 2700K, 50lx (midnight)	Health Well Being	Timeclock / System Based	DLM DMX ECOS	

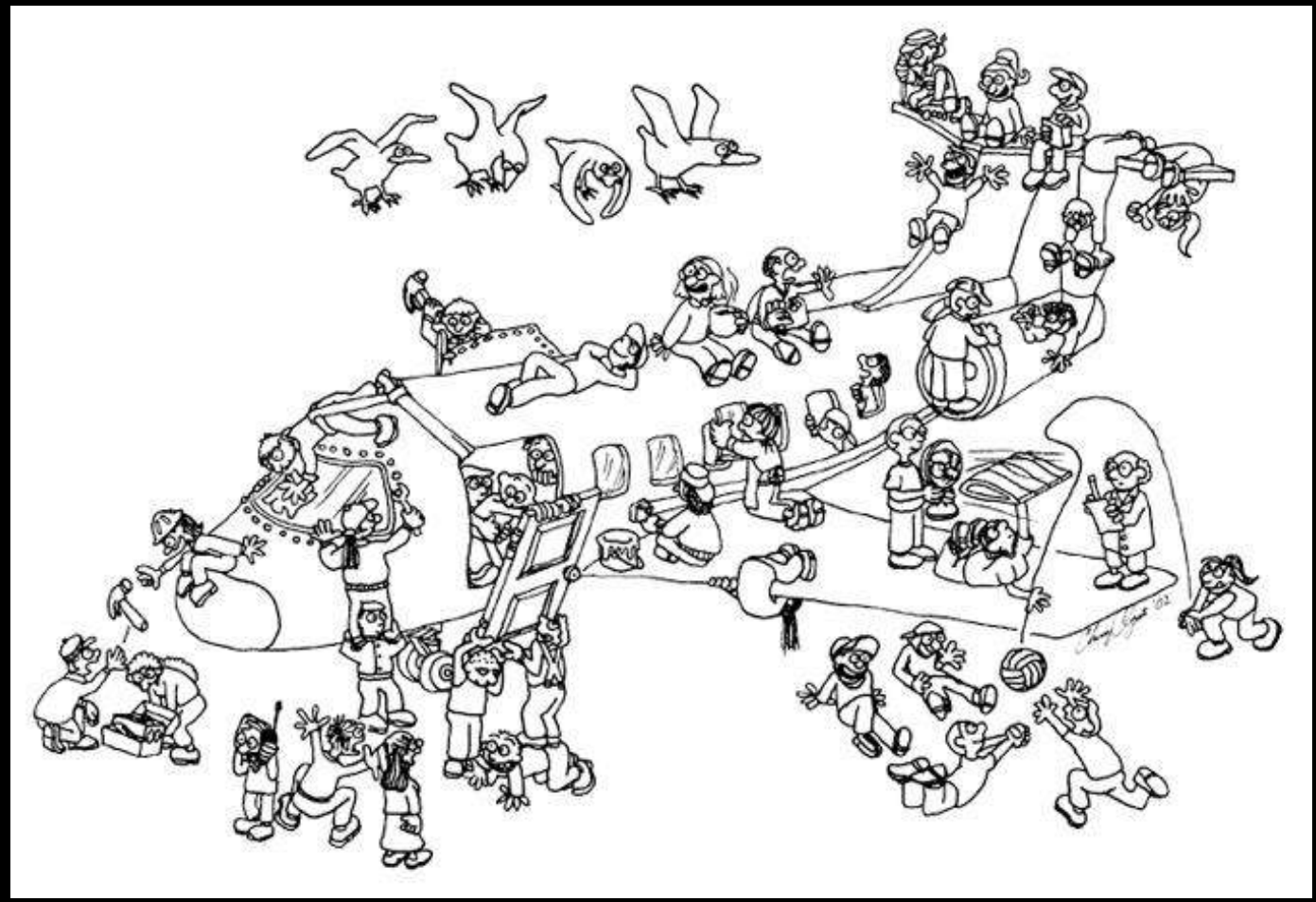
Commercial Building

	Content		Owner Benefit	Design		
AREA	TITLE / CAPABILITY	DESCRIPTION	KEY BENEFIT	TYPICAL CONTROL	CONTROL PROTOCOL	PRODUCT
Patient Rooms	Circadian Cycle	Track time-of-day lighting - 100lx @ 3000K (8 a.m.); 400lx @ 6500K (noon); 1lx @1650K (midnight)	Health Well Being	Wall Station with Timeclock Override	DLM DMX ECOS	5-channel 3-channel
Patient Rooms	Examination	High Intensity, 4000K (day); Low Intensity w/o Blue, 2000K (night)	Visual Acuity	Wallbox Pre-set Keypad	DMX ECOS (w/ BT) 0-10V (w/ BT)	5-channel
Nurses Station	3-Shift Focus	1st Shift: 400lx @ 4000K 2nd Shift: 300lx @ 3000K 3rd Shift: 200lx @ 3000K, high-blue	Productivity Visual Acuity	Timeclock with local on/off	DLM DMX ECOS 0-10V	5-channel tunable white RGB
Surgical Suit	Tissue Identification	Red/Green Optimized @ 700lx	Specialty Visual Acuity Health	Wallbox Pre-Set Keypad	DLM (w/ BT) DMX ECOS (w/ BT)	5-channel RGB-full saturation
Corridor	Baseline Circadian Cycle	4000k, 200lx (noon); 2700K, 50lx (midnight)	Health Well Being	Timeclock / System Based	DLM DMX ECOS	Tunable whtie

Commercial Building

Sustaining Services

…Rebuilding a plane, mid-air
(and training the pilot)



Sustaining Services

…Rebuilding a plane, mid-air
(and training the pilot)

- Occupant and Staff training.
- System maintenance in response to upgrades to other system components.
- Program updates to enable new features.
- Repair or replace faulty hardware.
- Avoid occupant disruption and lost building revenue.

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Thank you!

We hope you are *content* with the presentation.

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This concludes The American Institute of Architects Continuing Education Systems Course

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