The Paradox of Standardization

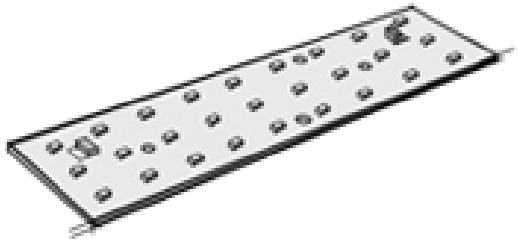
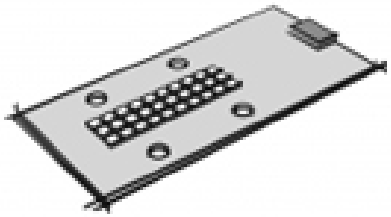
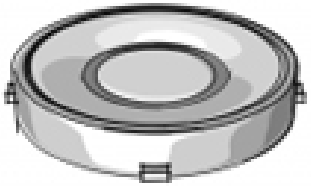
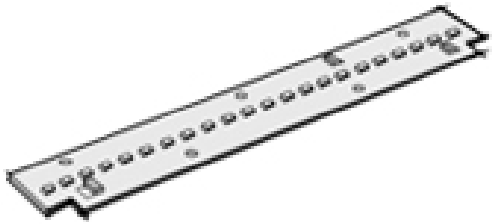
Smart standards enable innovative lighting applications

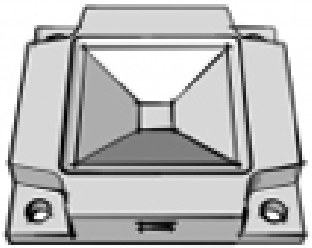
Brad Koerner

Director of Experience Design

Philips Lighting






Zhaga

Making LED light sources interchangeable.

STANDARDIZATION

STIFLES

INNOVATION

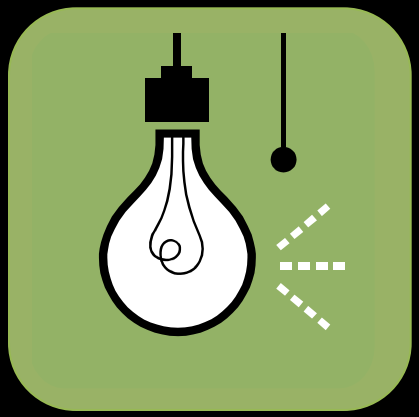
YOUR CONSTRAINTS ARE

YOUR CUSTOMER'S

PLATFORM

LIGHTING TECH

ARCHITECTURE

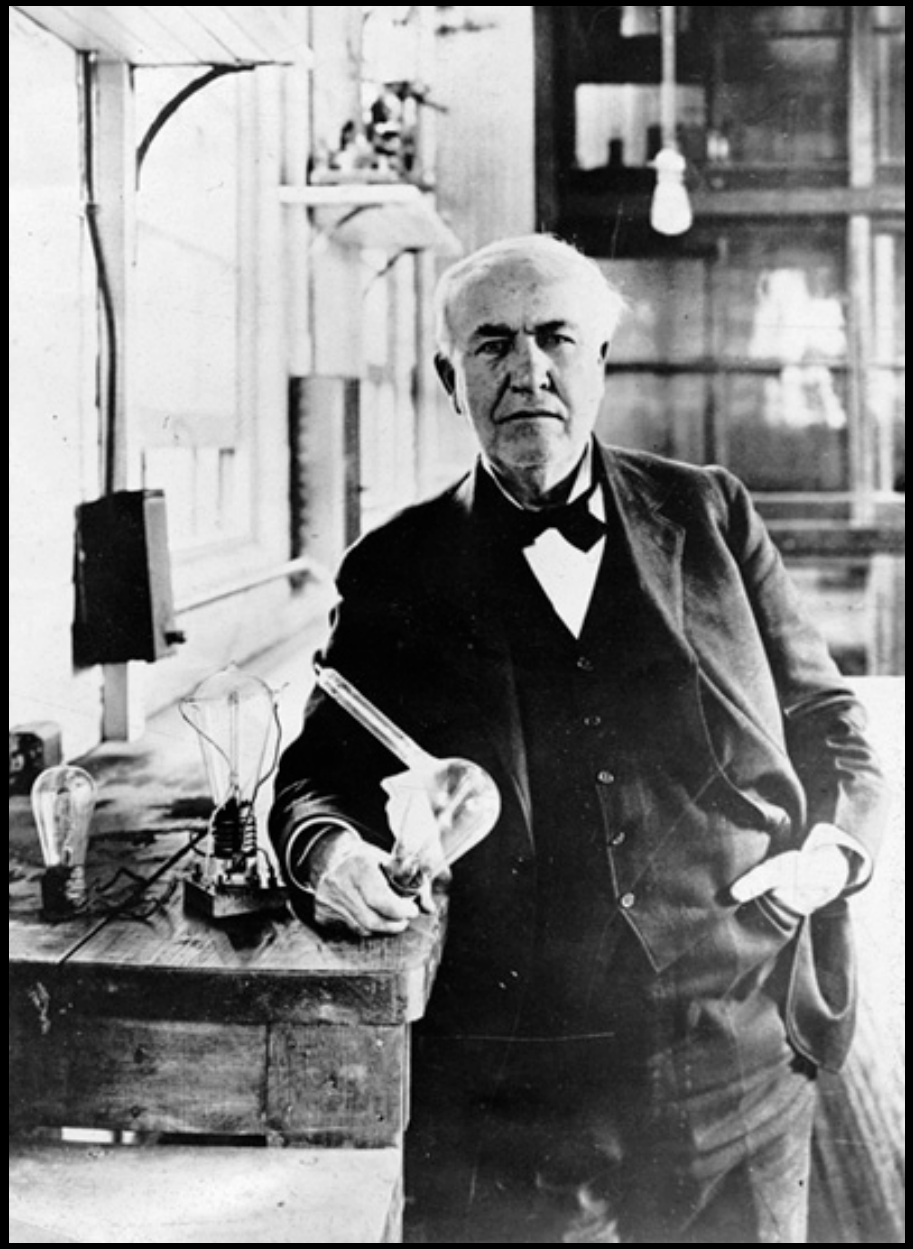


LIGHTING DESIGN

STANDARDS >>> APPLICATION INNOVATIONS

architecture as socket	LIGHTING EMBEDDED INTO MASS-CUSTOMIZED ARCHITECTURAL SYSTEMS
digital simulation	BIM, PERFORMANCE MODELING
lean commissioning	COMMUNICATIONS STANDARDS, SIMULATED SYSTEM DYNAMICS

ARCHITECTURE AS SOCKET

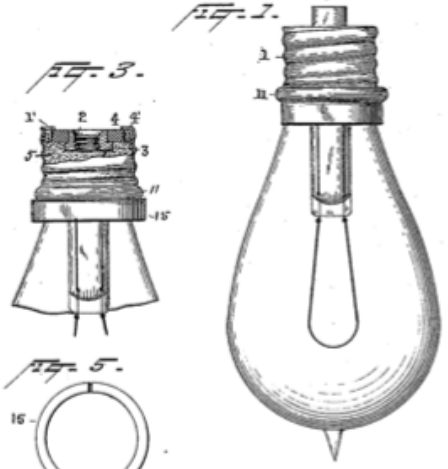


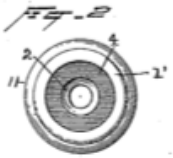
(No Model.)

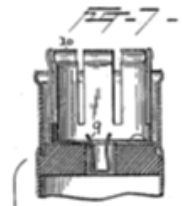
T. A. EDISON.

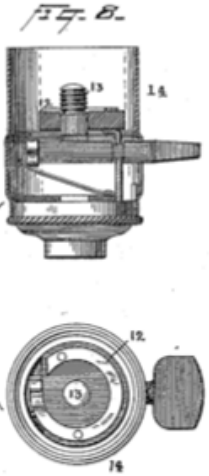
LAMP BASE.

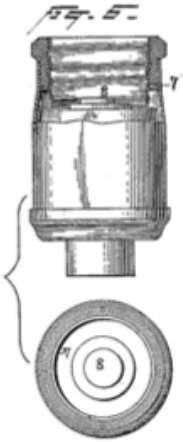
No. 438,310. Patented Oct. 14, 1890.











Witnesses:
Norris A. Clarke.
Charles M. Catlin.

Inventor
By his Attorneys T. A. Edison.
Dyer & Seely.

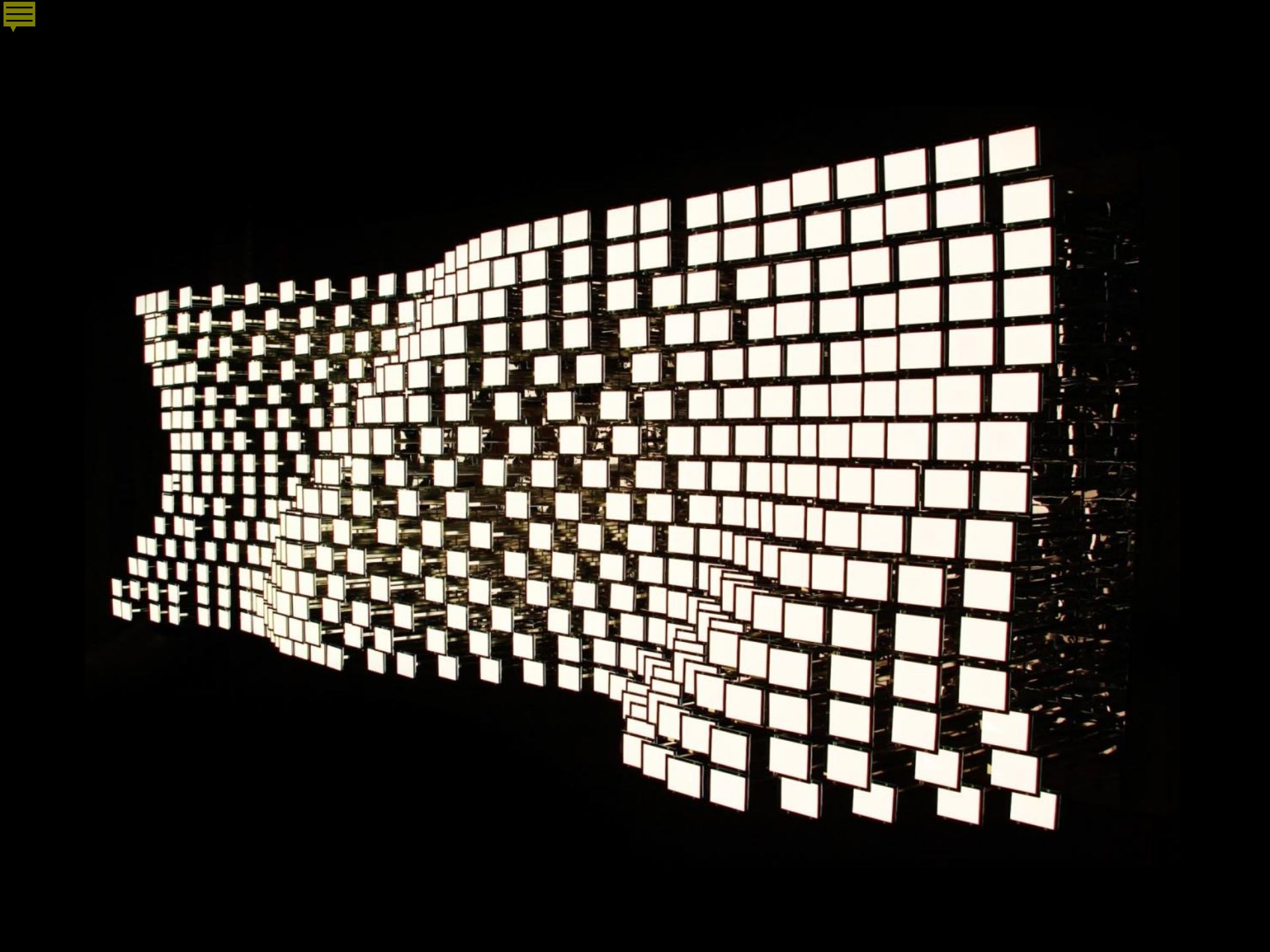
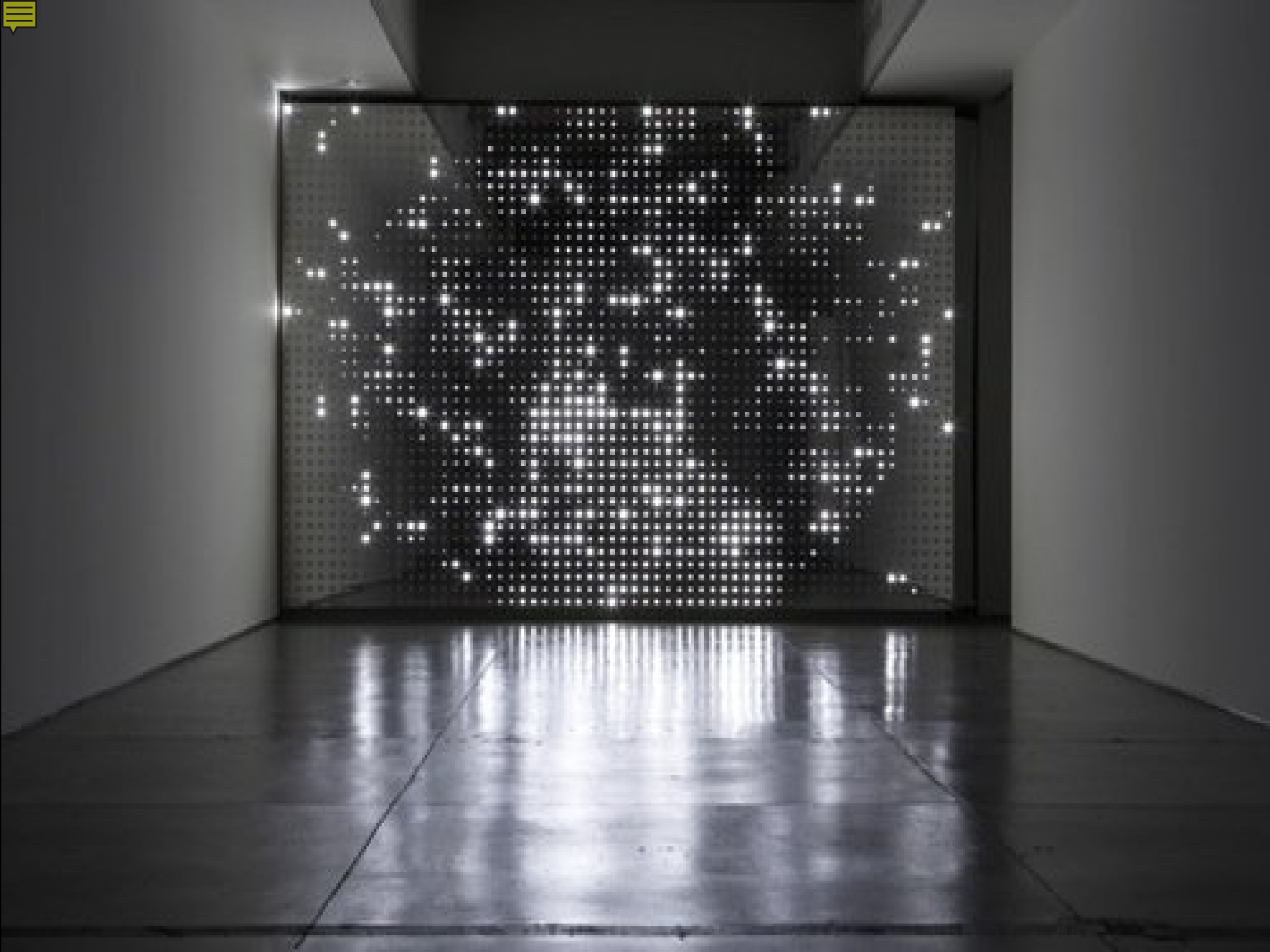
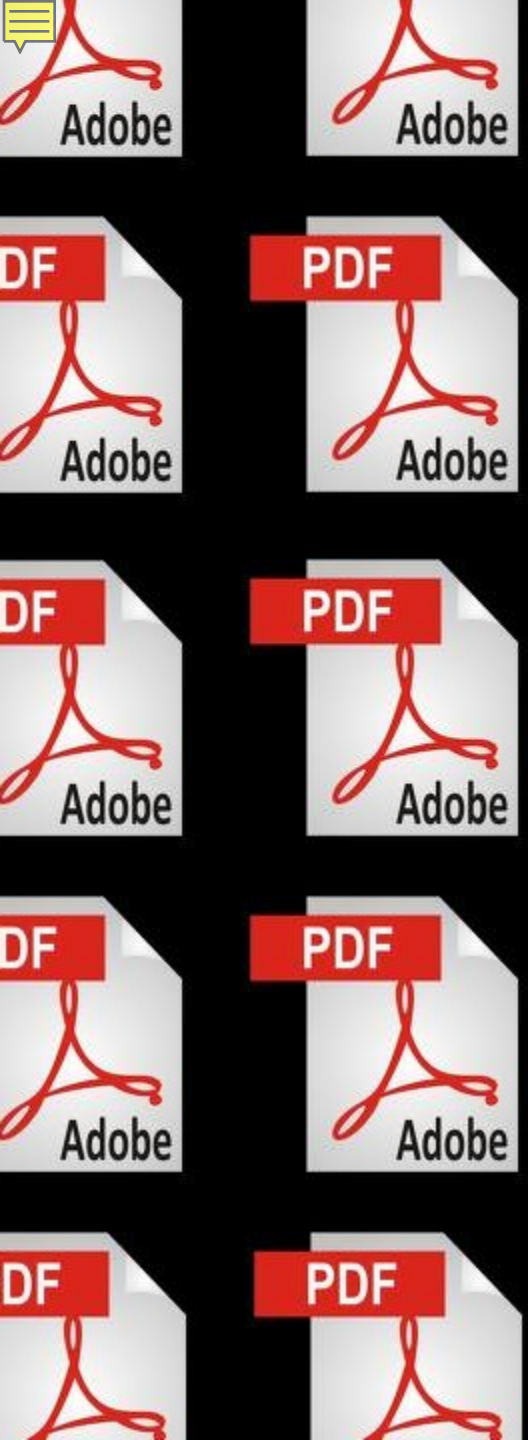
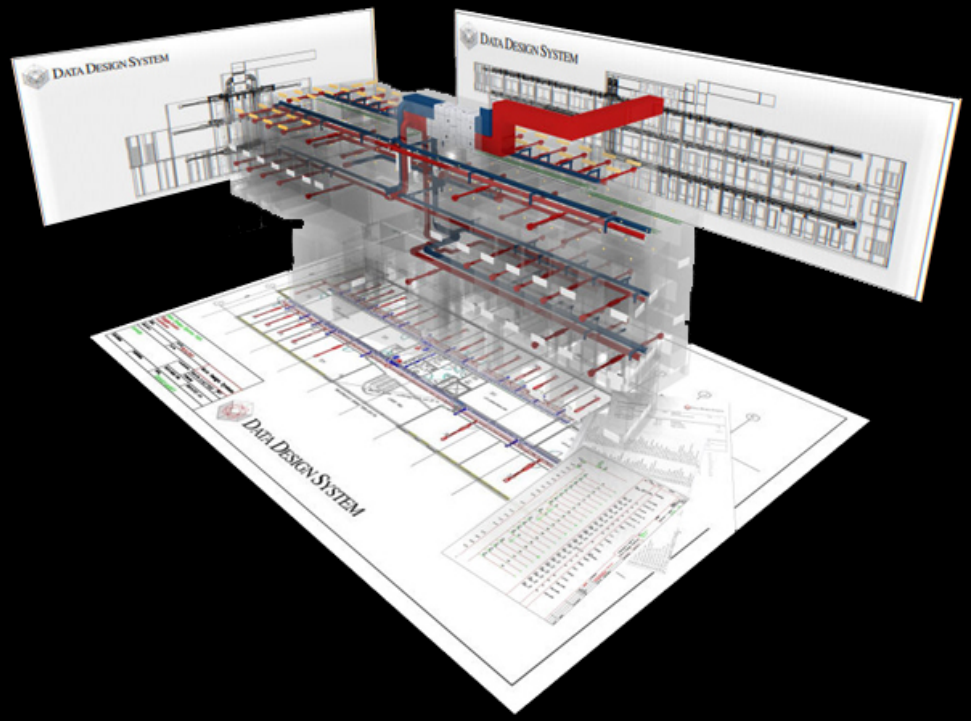


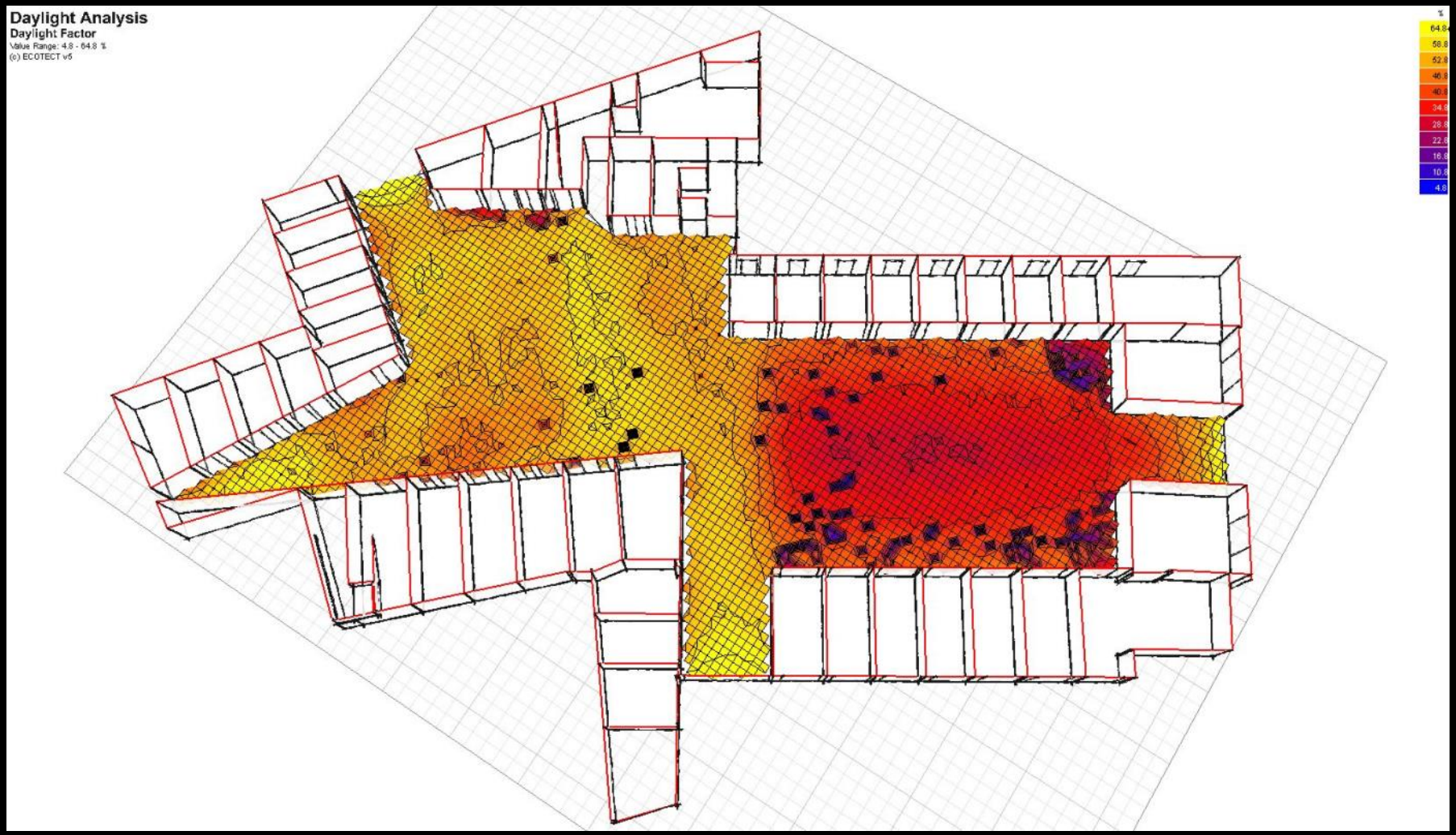
IMAGE: LEO VILLAREAL



BUILDING INFORMATION MANAGEMENT


Adobe
PDF

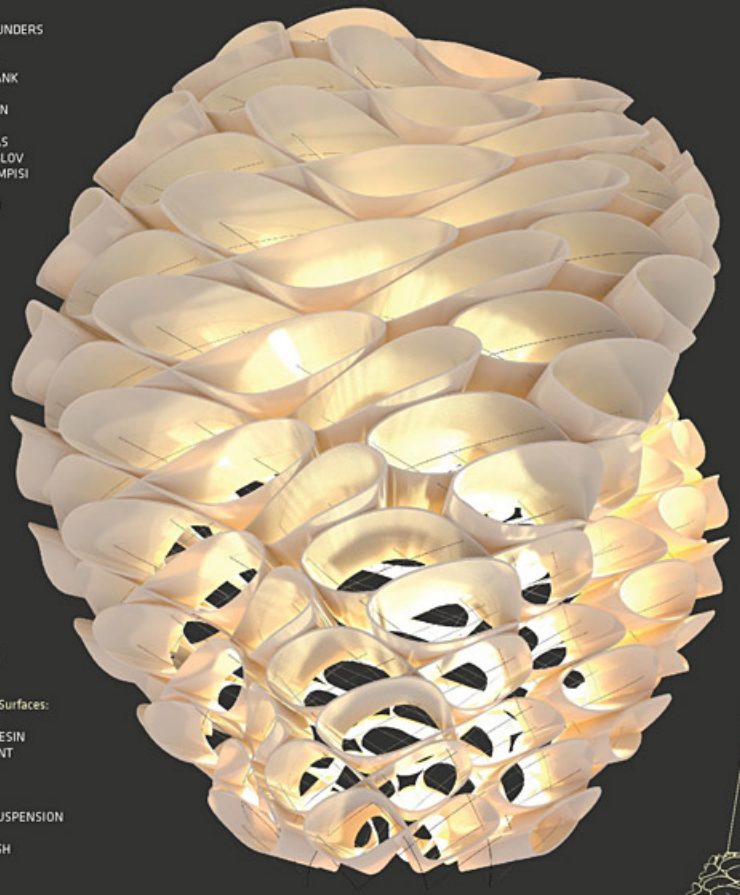

DATA DESIGN SYSTEM


Daylight Analysis
Daylight Factor
Value Range: 4.8 - 64.8 %
(c) ECOTECT v5
%
64.8
58.8
52.8
46.8
40.8
34.8
28.8
22.8
16.8
10.8
4.8

PARAMETRIC DESIGN

Design:
ANDREW SAUNDERS

Design Team:
FLORIAN FRANK
KATE LISI
TRAVIS LYDON
LUCA TESIO
ANDREA URAS
OLESIA KRUGLOV
STEFANO CAMPISI
ALEX ROHR
CARESSA SIU



Dimensions:
30" x 36"

Developable Surfaces:
3FORM
VARIA ECORESIN
TRANSLUCENT
1/16 GAUGE

Wire Frame:
AIRCRAFT SUSPENSION
CABLE
SILVER FINISH

Lamping:
1 X 120V /
100W MEDIUM BASE E27

ACADIA 2011 Design + Fabrication Competition: Lighting

LUMINESCENT LIMAÇON

The portraits by Flemish baroque painter Cornelis de Vos (1584-1651) and his contemporaries are renowned for their precise articulation and illumination of the flamboyant linen collars considered fashionable during this period. What is interesting in relation ship to the performance and affect of this work is how the Dutch Ruff is transformed into a vehicle for manipulating light. This occurs at two levels, both as an ephemeral-reflective source and as a figural volume with a material presence. This device accumulation of light is achieved through a combination of the chiaroscuro painting technique, which uses dramatic contrast of light to build volume, and by trapping light through a process of periodic folding that creates a deep translucent ruffle. Borrowing from the affects of these baroque portraits, the Luminescent Limaçon, integrates equation-based geometry, material performance and cartonial fabrication techniques to produce unique diaphonous and volumetric lighting affects.

Equation-based geometry
One of the advantages of a script-based, computational approach to design is that it enables geometric parameters to be defined with variables. The changeability of these flexible relationships allows quick, fluid, and iterative design evolution. By the very nature of deploying variables, equations are inherently parametric and it is no coincidence that the ability to create instantaneous versions has generated a renewed interest in mathematics in all design fields and in turn a new intuitive way to utilize equation-based geometry.

The global geometry of the Luminescent Limaçon is defined by the polar equation-based Limaçon curve. This roulette curve rolls at varying speeds to generate precisely choreographed self-similar profiles that are combined vertically to construct a number of volumetric formations. The variables can be calibrated to accommodate and produce a host of different lighting conditions and affects depending on environmental factors and performance criteria.

At the local level, a similar roulette curve is plotted using the surface domain of the Limaçon variants. These produce profiles for folds that are nested diagonally and can be interconnected when they meet flush. Extension lengths of the folds alternate periodically to blur the profile of the global geometry and mimic the diffused lighting affects of the Dutch Ruff.

Material performance
To achieve both the lighting affects and the geometric configuration, the light is composed of 3form Varia Ecoresin. The thin 1/16th gauge is flexible and can accommodate a specific range of curvature. These tolerances are fed directly into the script and define the minimum radius allowed within the developable surfaces. When folded and nested, the ecoresin ruffles are laced together with an associative woven lattice of aircraft suspension cable. The material properties of the ecoresin combined with the strength of the aircraft cable produce a combination of tensile and compressive forces for rigid structural stability.
In addition, the translucency of the ecoresin provides indirect, volumetric lighting and is available in a wide range of colors and textures. It is not a chlorine-based polymer making it safe to laser cut flat sheets of the unrolled patterns.

Sartorial fabrication techniques
All individually folded ruffles used to compose the Luminescent Limaçon are constructed as ruled, developable surfaces. Just as a tailor constructs and measures two-dimensional patterns on rolled fabric, pieces of the fixture can be unrolled flat and cut from planer material. To optimize material use, a computational script systematically unrolls, labels and arranges the flattened surfaces into the most efficient, nested configurations without overlap.

For fabrication and assembly, these surfaces are embedded with a number of parameters including placement of apertures for connection points, material thickness, tabbing and indexing. Each individual unrolled developable surface contains a unique and specific location and assembly instruction. This piece-specific DNA ensures a precise and accurate re-construction of the global equation-based Limaçon.

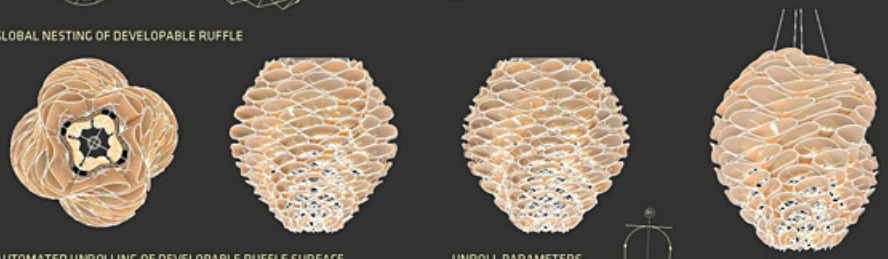
Integration
The Luminescent Limaçon is the product of an integral design process that combines computation, mathematics, material performance and fabrication. The process privileges neither of the predominant design approaches of bottom-up (internally driven) nor a top-down (deterministic). Instead, it is emblematic of an emerging design process of multiplicity, characterized by an intelligence that is motivated to generate difference through repetition in order to accommodate both intrinsic and extrinsic desires simultaneously.

GLOBAL POLAR EQUATION : LIMAÇON [r = b + 2a cos(θ)]

THREE-DIMENSIANAL DIFFERENTIAL VARIANTS OF THE LIMAÇON

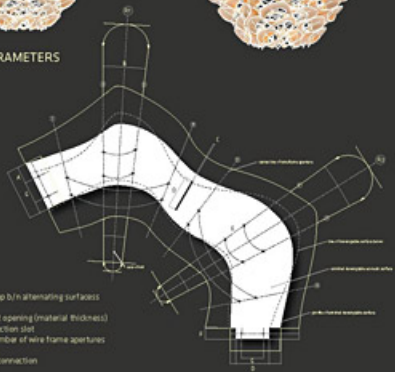
SURFACE DOMAIN : DEVELOPABLE RUFFLE MATRIX

GLOBAL NESTING OF DEVELOPABLE RUFFLE



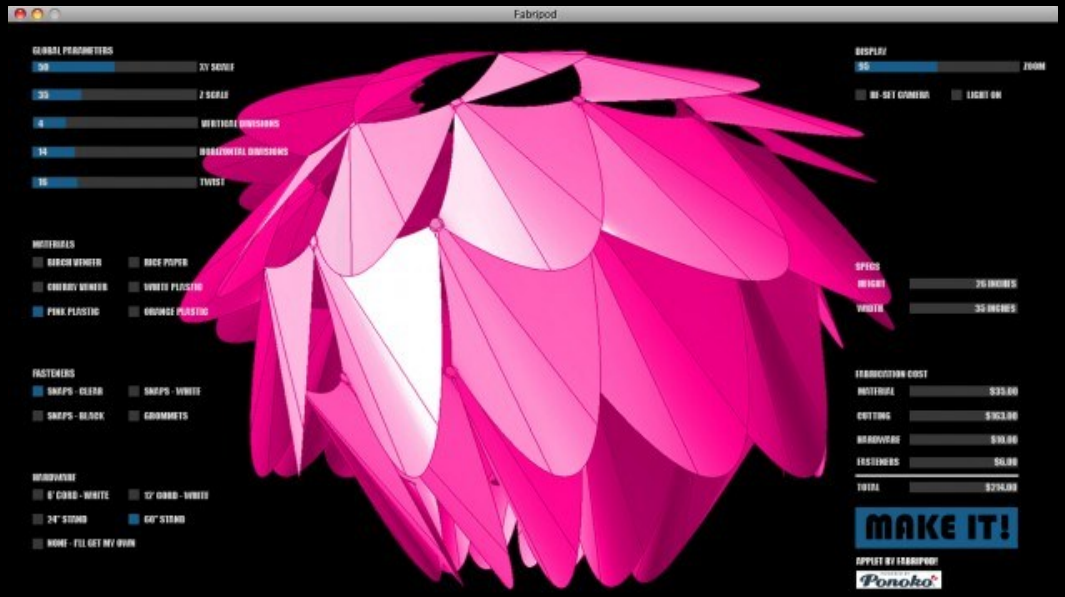
AUTOMATED UNROLLING OF DEVELOPABLE RUFFLE SURFACE

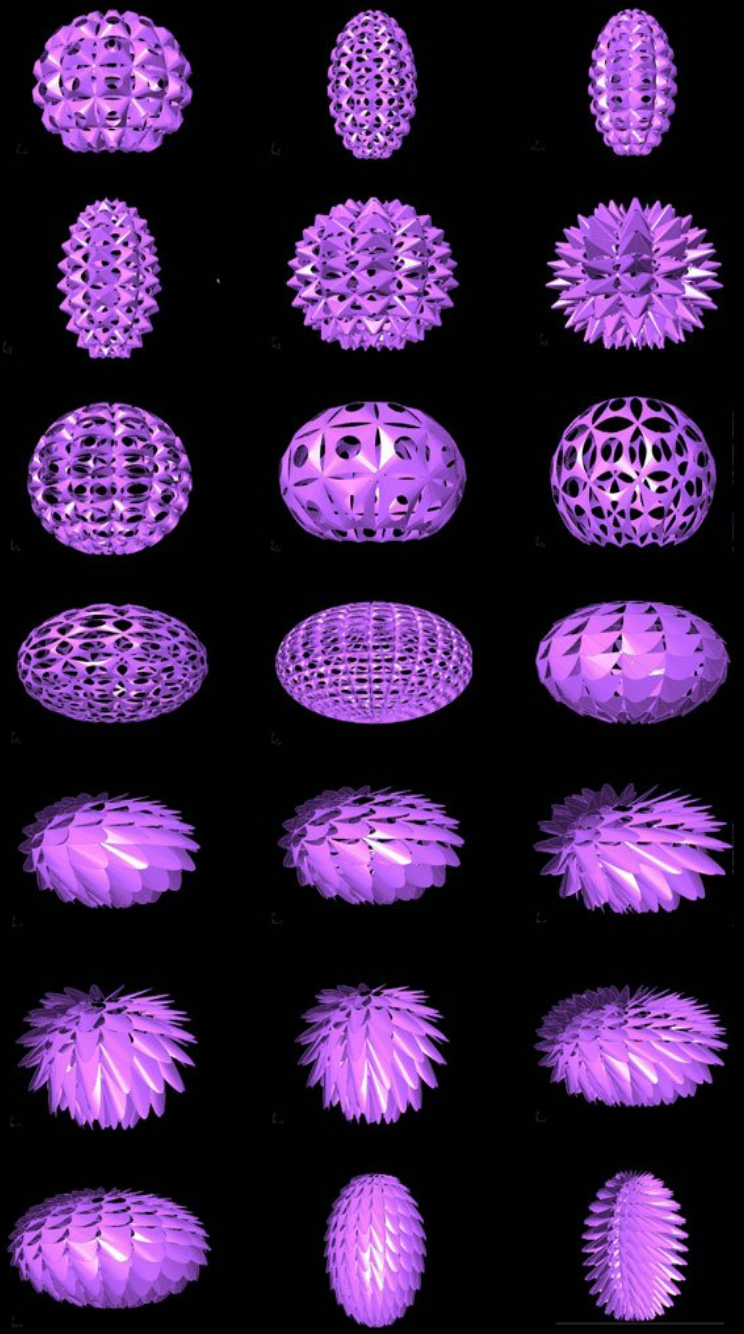
UNROLL PARAMETERS



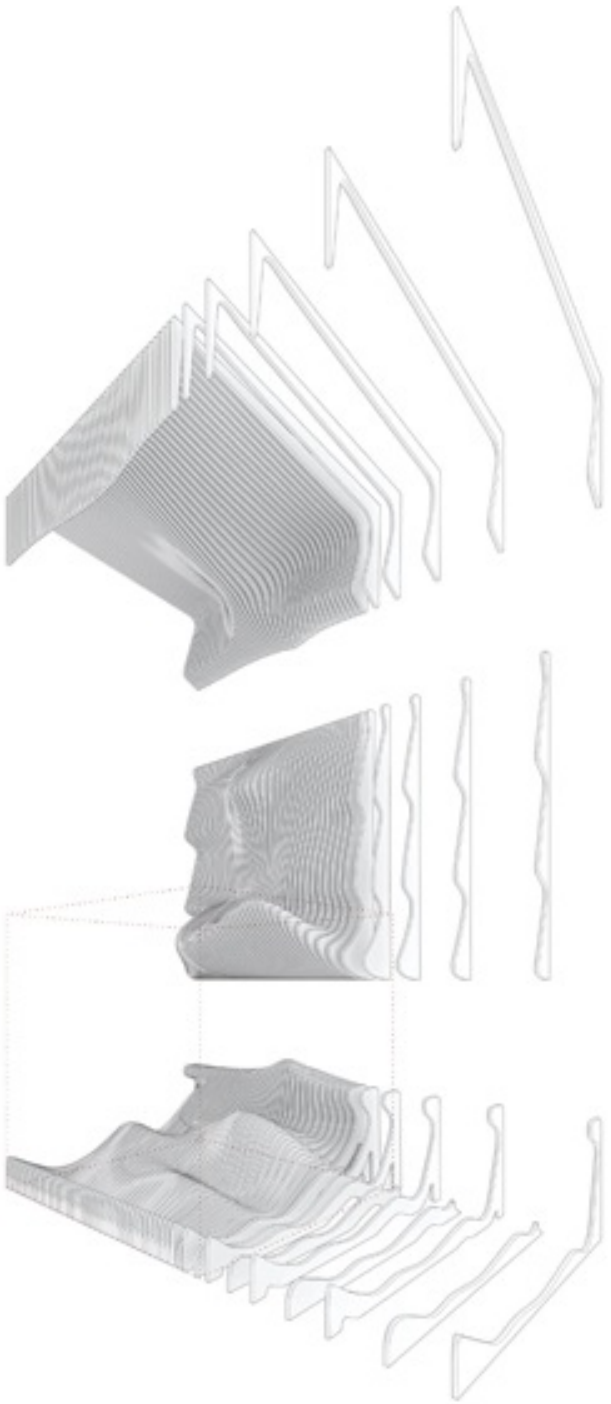
A. degree of overlap b/n alternating surfaces
B. angle of roll
C. intersection slot opening (material thickness)
D. width of intersection slot
E. location and number of wire frame apertures
F. length of tab
G. location of tab connection

ASSEMBLY TECTONIC FOR DEVELOPABLE RUFFLE:
3FORM VARIA ECORESIN (1/16 GAUGE)


Fabripod
GLOBAL PARAMETERS
XY SCALE
Z SCALE
VERTICAL DIVISIONS
HORIZONTAL DIVISIONS
TWIST
MATERIALS
BIRCH VENEER
RICE PAPER
CHERRY VENEER
WHITE PLASTIC
PINK PLASTIC
ORANGE PLASTIC
FASTENERS
SNAPS - CLEAR
SNAPS - WHITE
SNAPS - BLACK
GROMMETS
HARDWARE
8' CORD - WHITE
12' CORD - WHITE
24" STAND
60" STAND
NONE - I'LL GET MY OWN
DISPLAY
ZOOM
RE-SET CAMERA
LIGHT ON
SPECS
HEIGHT
26 INCHES
WIDTH
35 INCHES
FABRICATION COST
MATERIAL
$35.00
CUTTING
$163.00
HARDWARE
$10.00
FASTENERS
$6.00
TOTAL
$214.00
MAKE IT!
APPLET BY FABRIPOD!
Ponoko

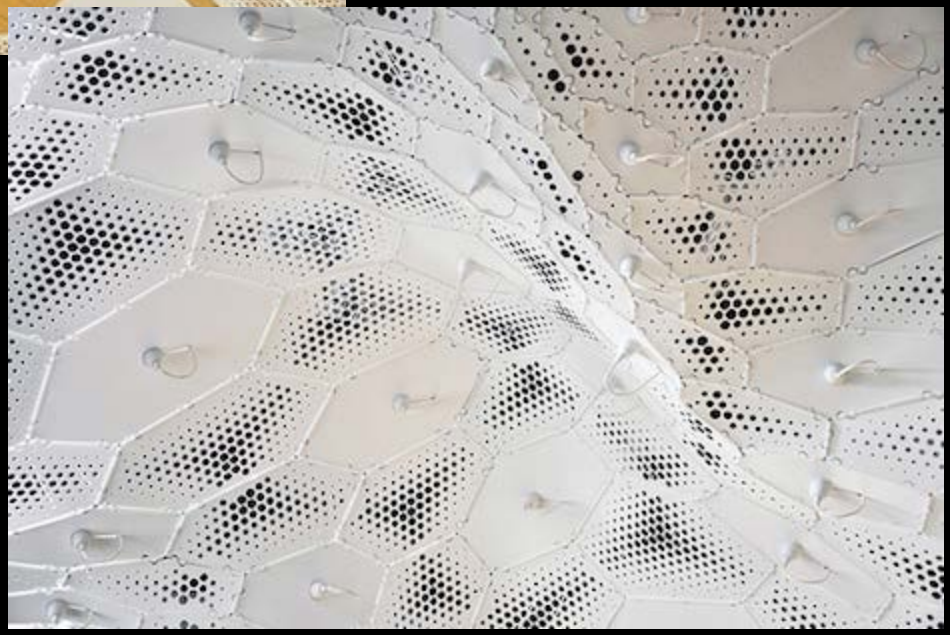


DIGITAL FABRICATION

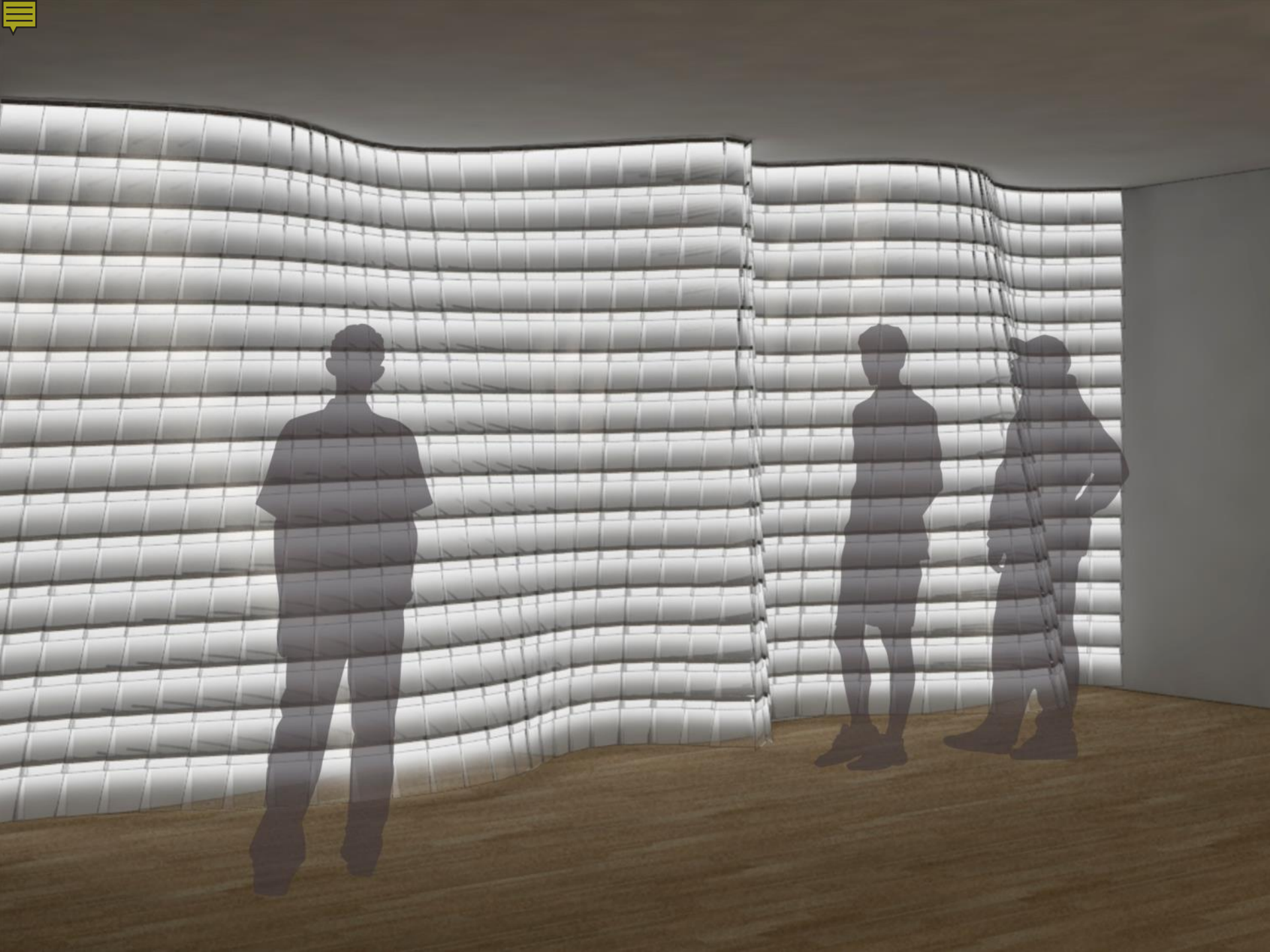


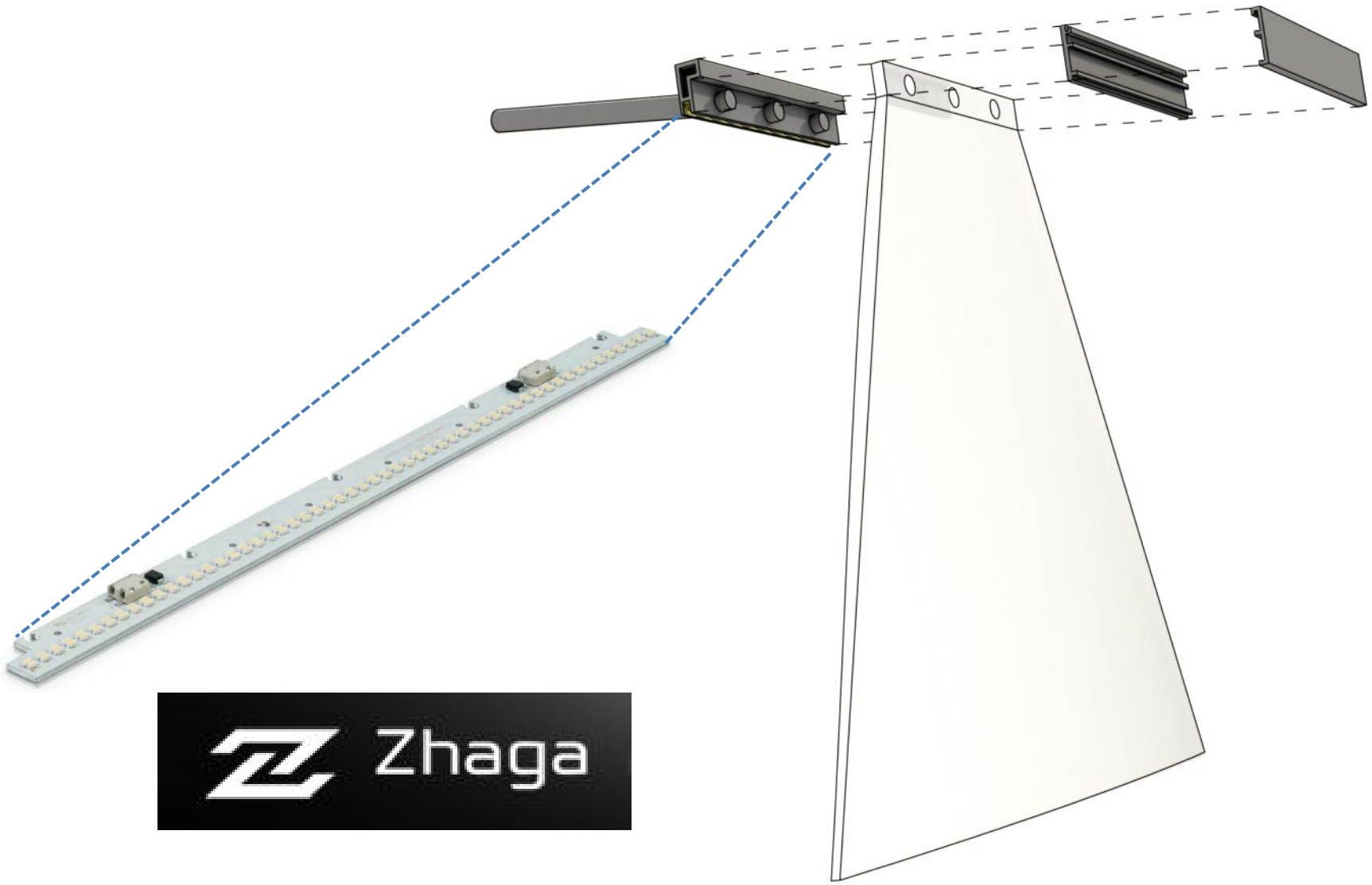

PHILIPS
TITANIUM

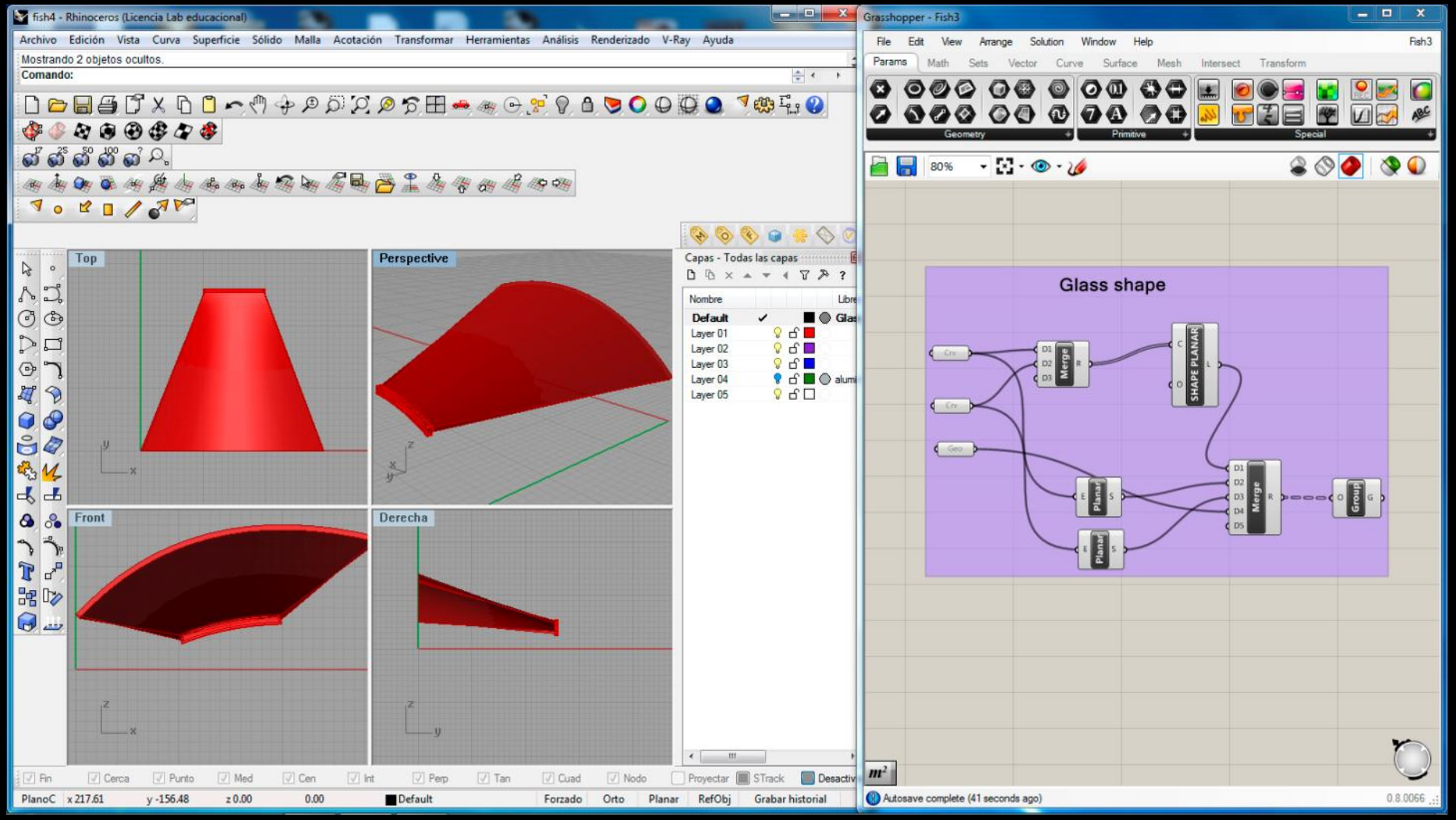
EDISON AND THE MILLENIAL GENERATION

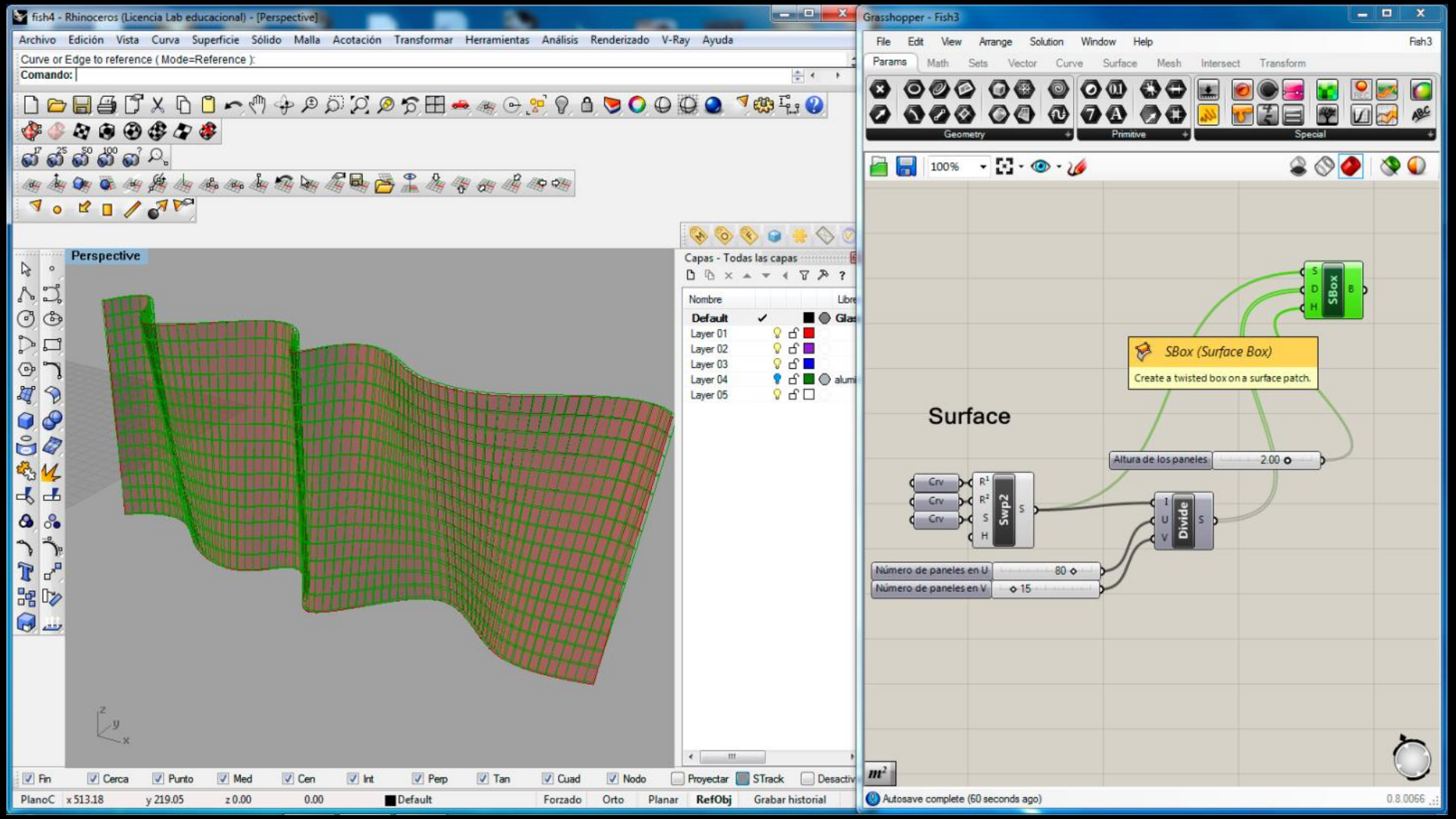


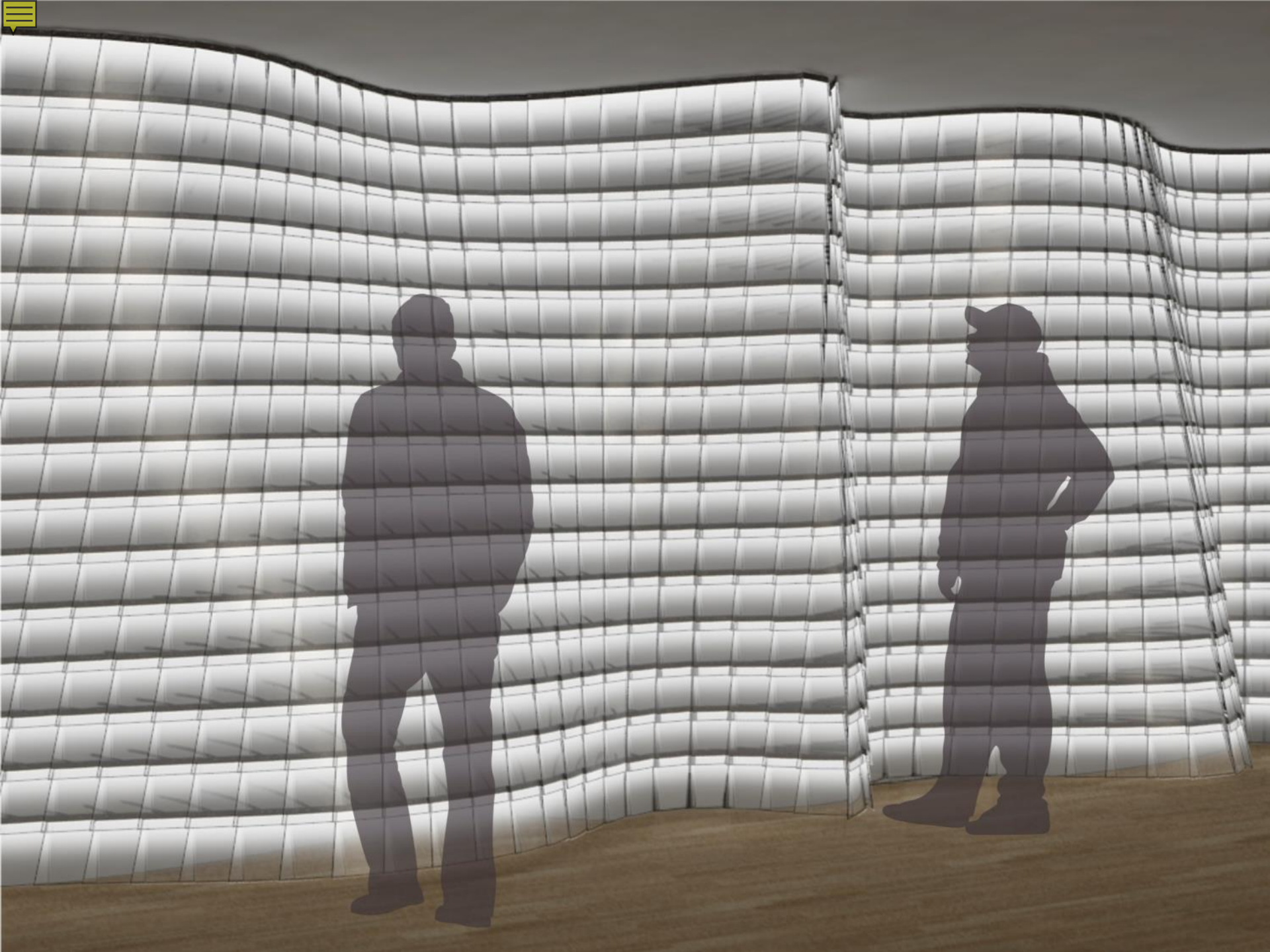
A DESIGN EXAMPLE…




Zhaga

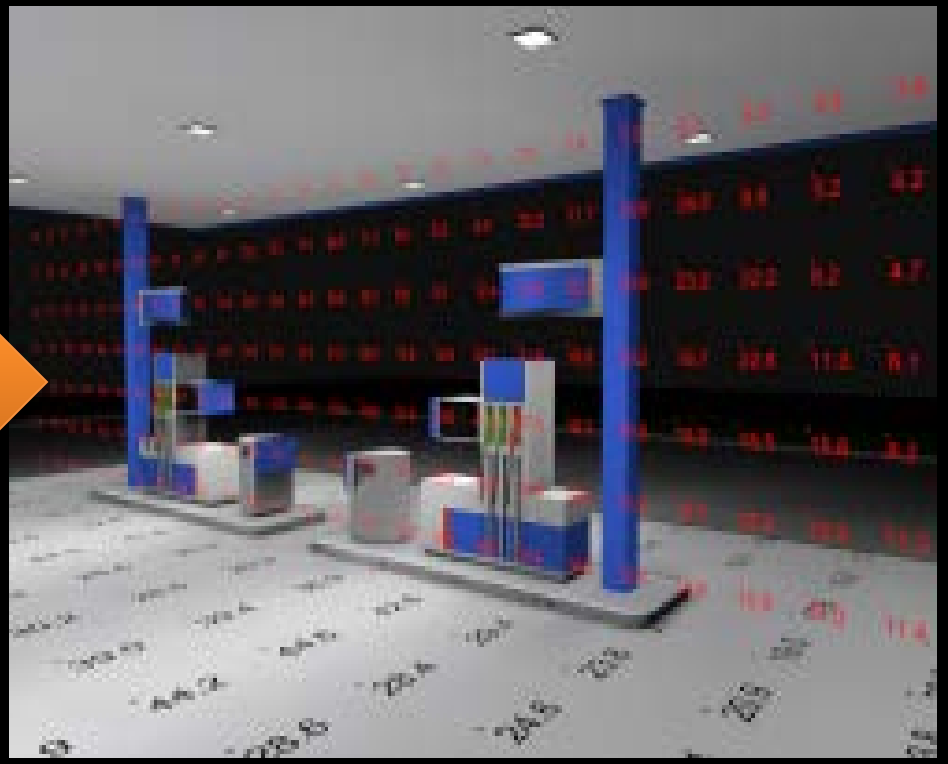

fish4 - Rhinoceros (Licencia Lab educacional)
Archivo Edición Vista Curva Superficie Sólido Malla Acotación Transformar Herramientas Análisis Renderizado V-Ray Ayuda
Mostrando 2 objetos ocultos.
Comando:
Top
Perspective
Front
Derecha
Capas - Todas las capas
Nombre
Default
Layer 01
Layer 02
Layer 03
Layer 04
Layer 05
Fin Cerca Punto Med Cen Int Perp Tan Cuad Nodo Proyectar STrack Desactiv
PlanoC x 217.61 y -156.48 z 0.00 0.00 Default Forzado Orto Planar RefObj Grabar historial
Grasshopper - Fish3
File Edit View Arrange Solution Window Help
Params Math Sets Vector Curve Surface Mesh Intersect Transform
Geometry Primitive Special
80%
Glass shape
Merge
SHAPE PLANAR
Planar
Merge
Group
Autosave complete (41 seconds ago)
0.8.0066


fish4 - Rhinoceros (Licencia Lab educacional) - [Perspective]
Archivo Edición Vista Curva Superficie Sólido Malla Acotación Transformar Herramientas Análisis Renderizado V-Ray Ayuda
Curve or Edge to reference (Mode=Reference):
Comando:
Perspective
Capas - Todas las capas
Nombre
Default
Layer 01
Layer 02
Layer 03
Layer 04
Layer 05
Fin Cerca Punto Med Cen Int Perp Tan Cuad Nodo Proyectar STrack Desactiv
PlanoC x 513.18 y 219.05 z 0.00 0.00 Default Forzado Orto Planar RefObj Grabar historial
Grasshopper - Fish3
File Edit View Arrange Solution Window Help
Params Math Sets Vector Curve Surface Mesh Intersect Transform
Geometry Primitive Special
100%
SBox (Surface Box)
Create a twisted box on a surface patch.
Surface
Altura de los paneles
2.00
Crv
Crv
Crv
Swp2
Divide
Número de paneles en U
80
Número de paneles en V
15
Autosave complete (60 seconds ago)
0.8.0066



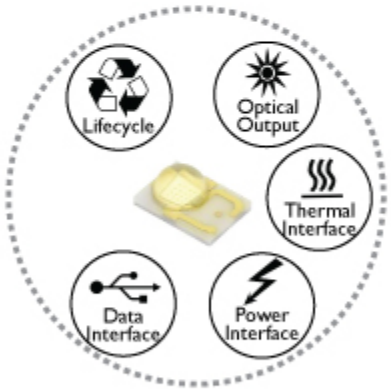
DATA SIMULATION

```
IESNA91
[TEST] Simple demo intensity distribution
[MANUFAC] Lightscape Technologies, Inc.
TILT=NONE
1
-1
1
8
1
1
2
0.0 0.0 0.0
1.0 1.0 0.0
0.0 5.0 10.0 20.0 30.0 45.0 65.0 90.0
0.0
1000.0 1100.0 1300.0 1150.0 930.0 650.0 350.0 0.0
```



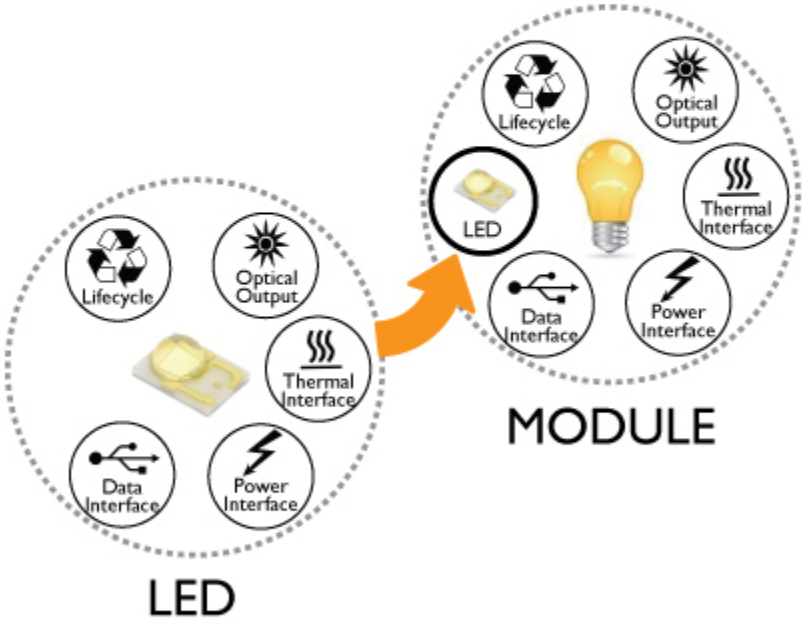
NESTING FILE STANDARDS

NESTING FILE STANDARDS



LED

NESTING FILE STANDARDS



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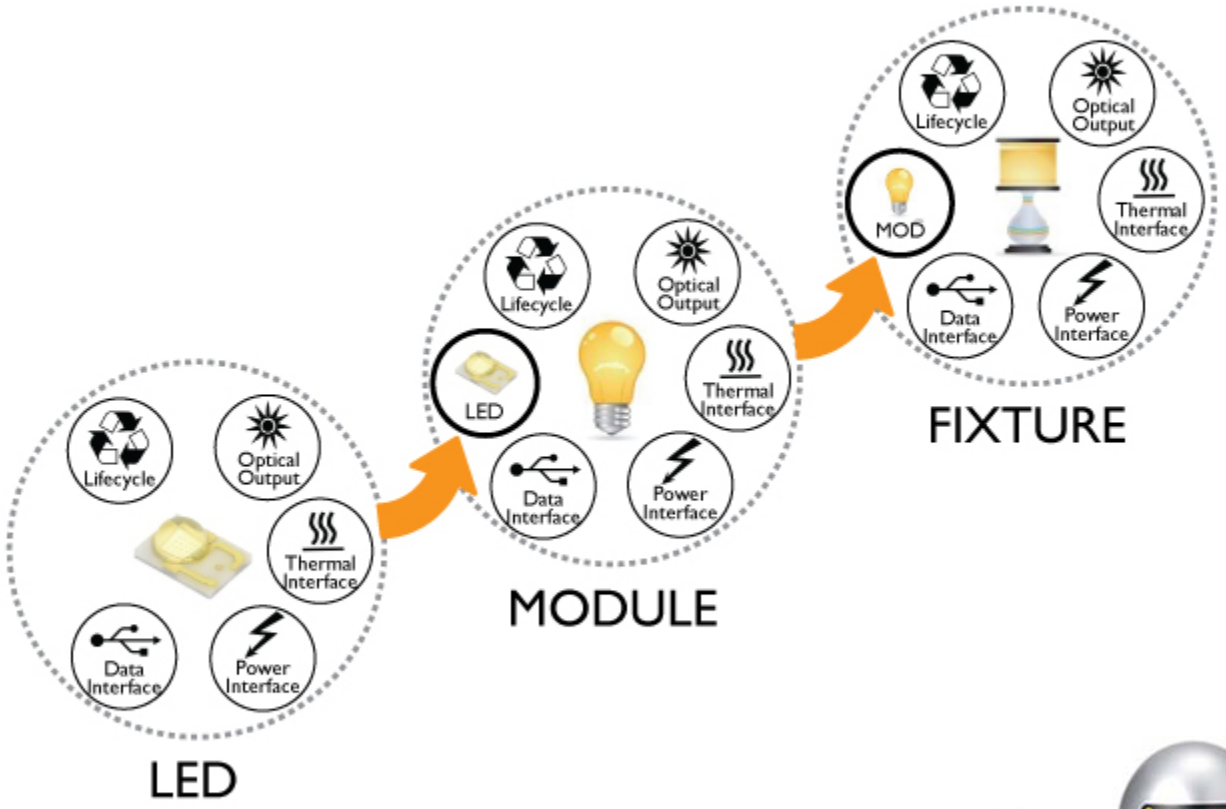

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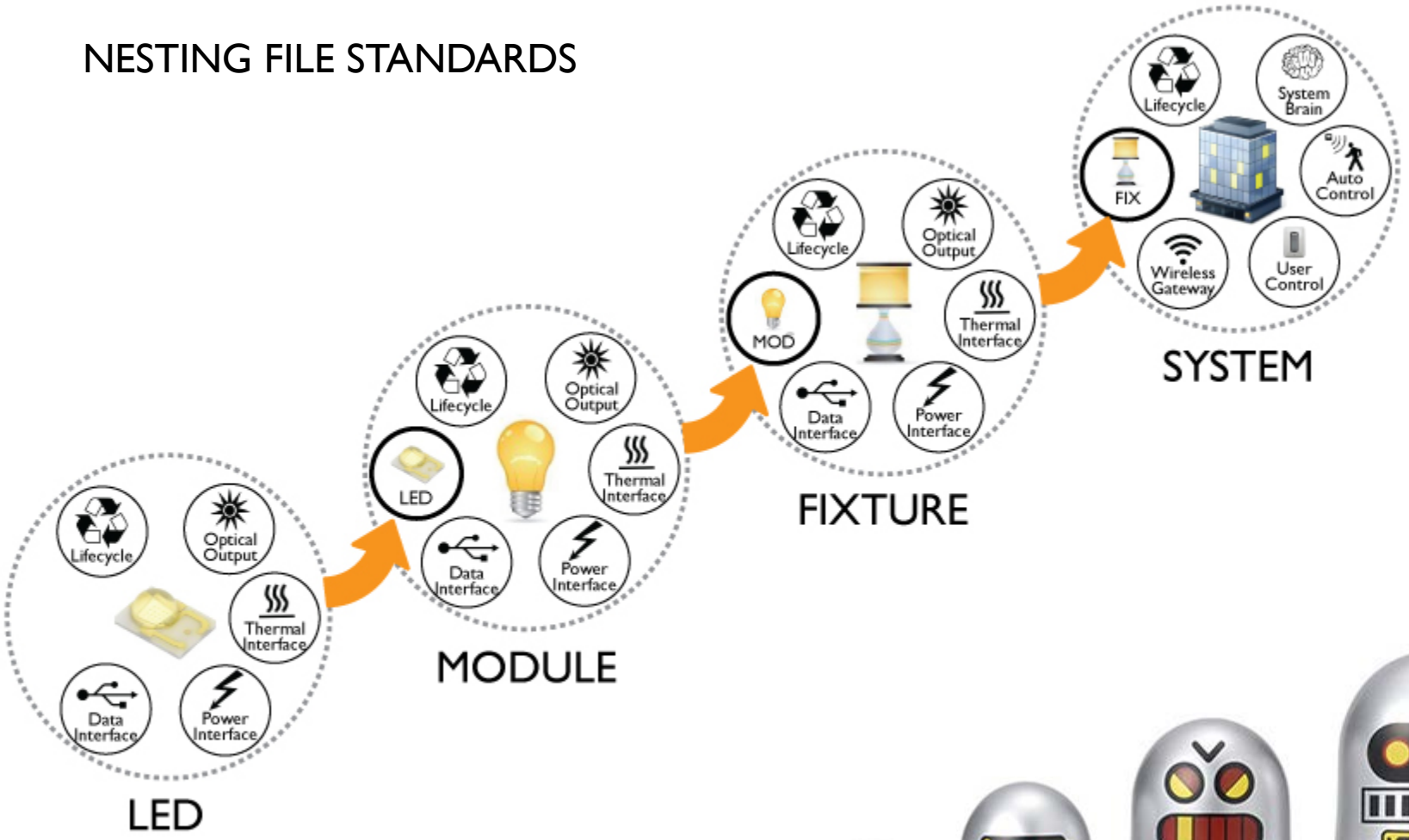
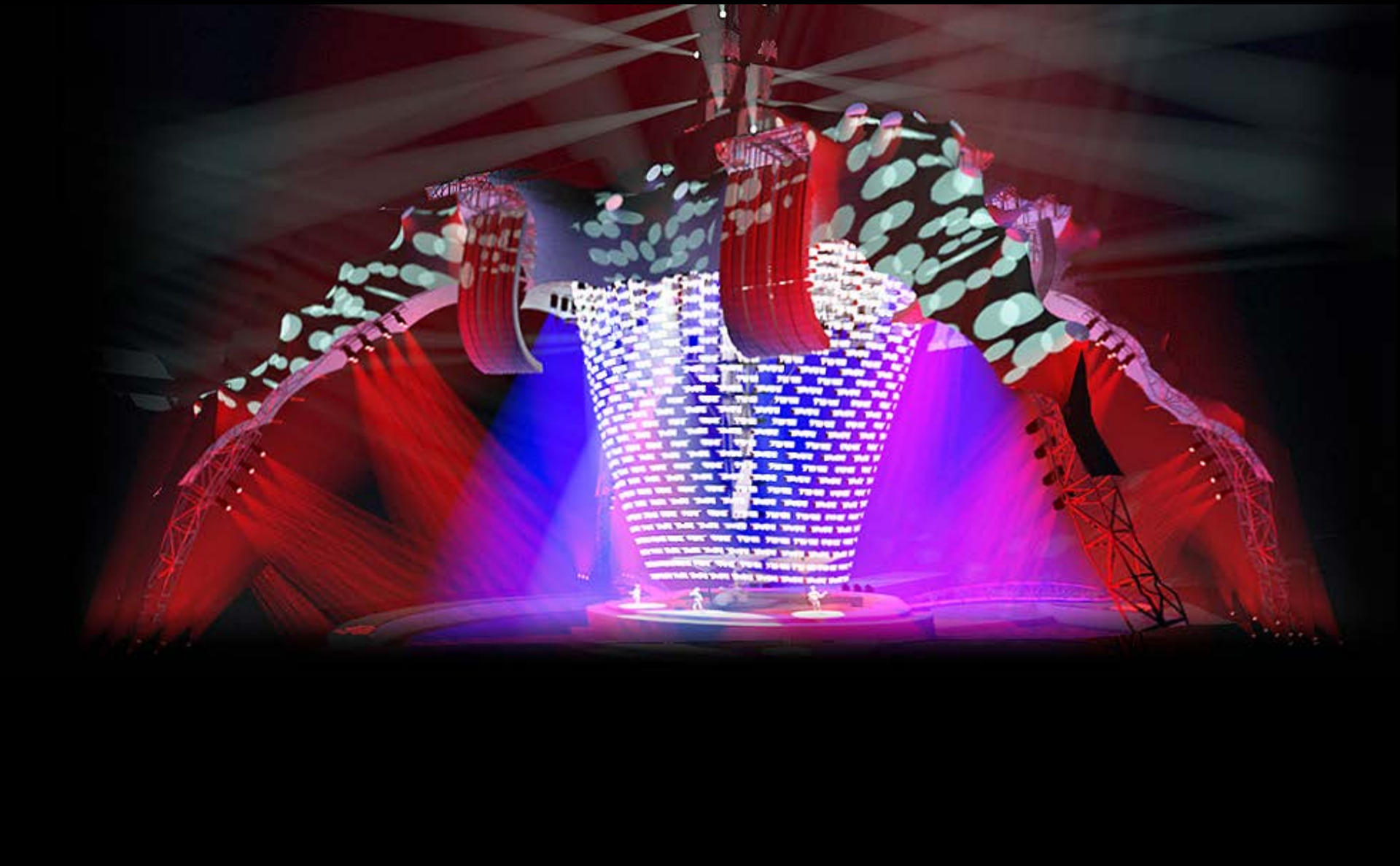
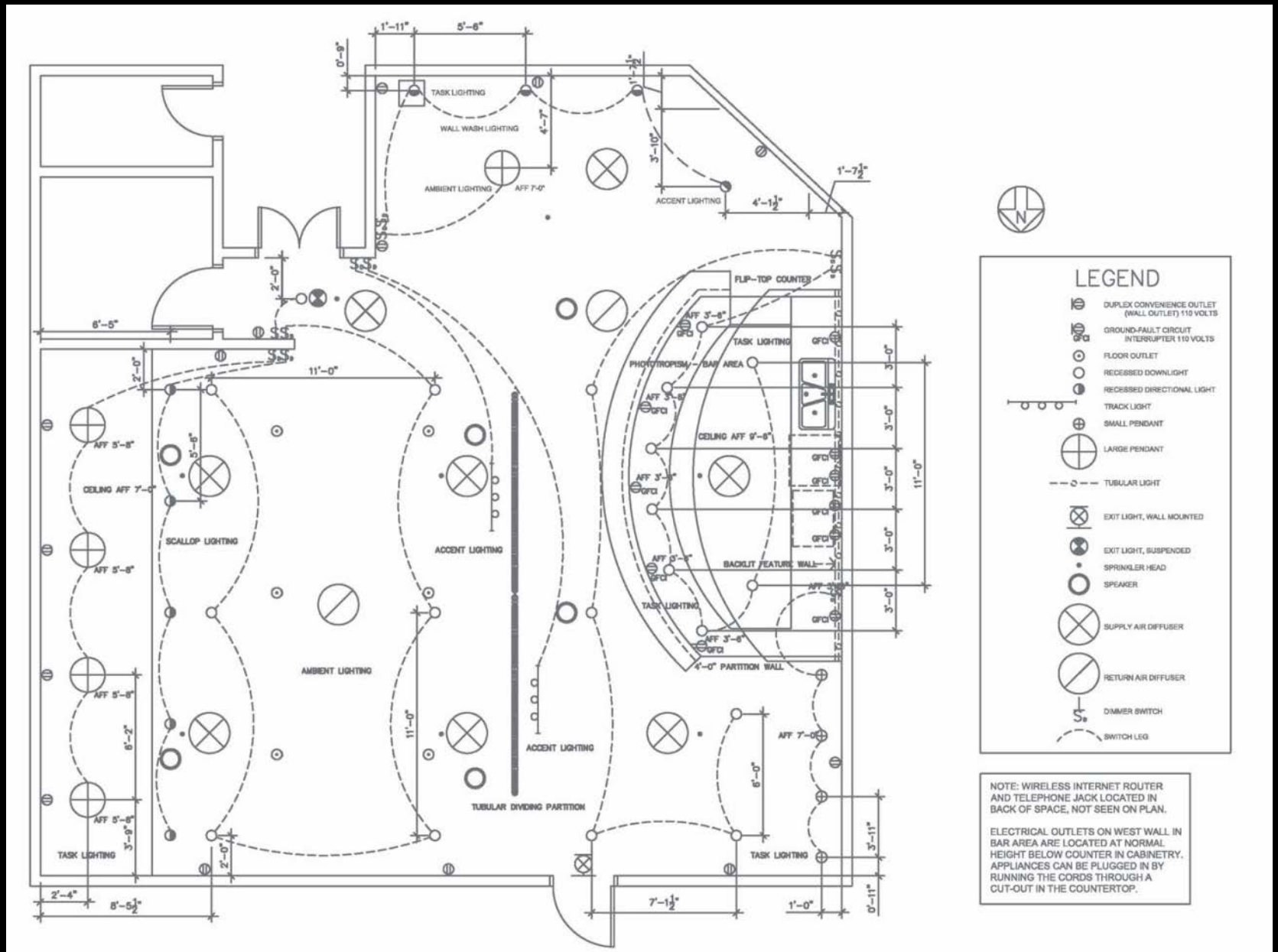
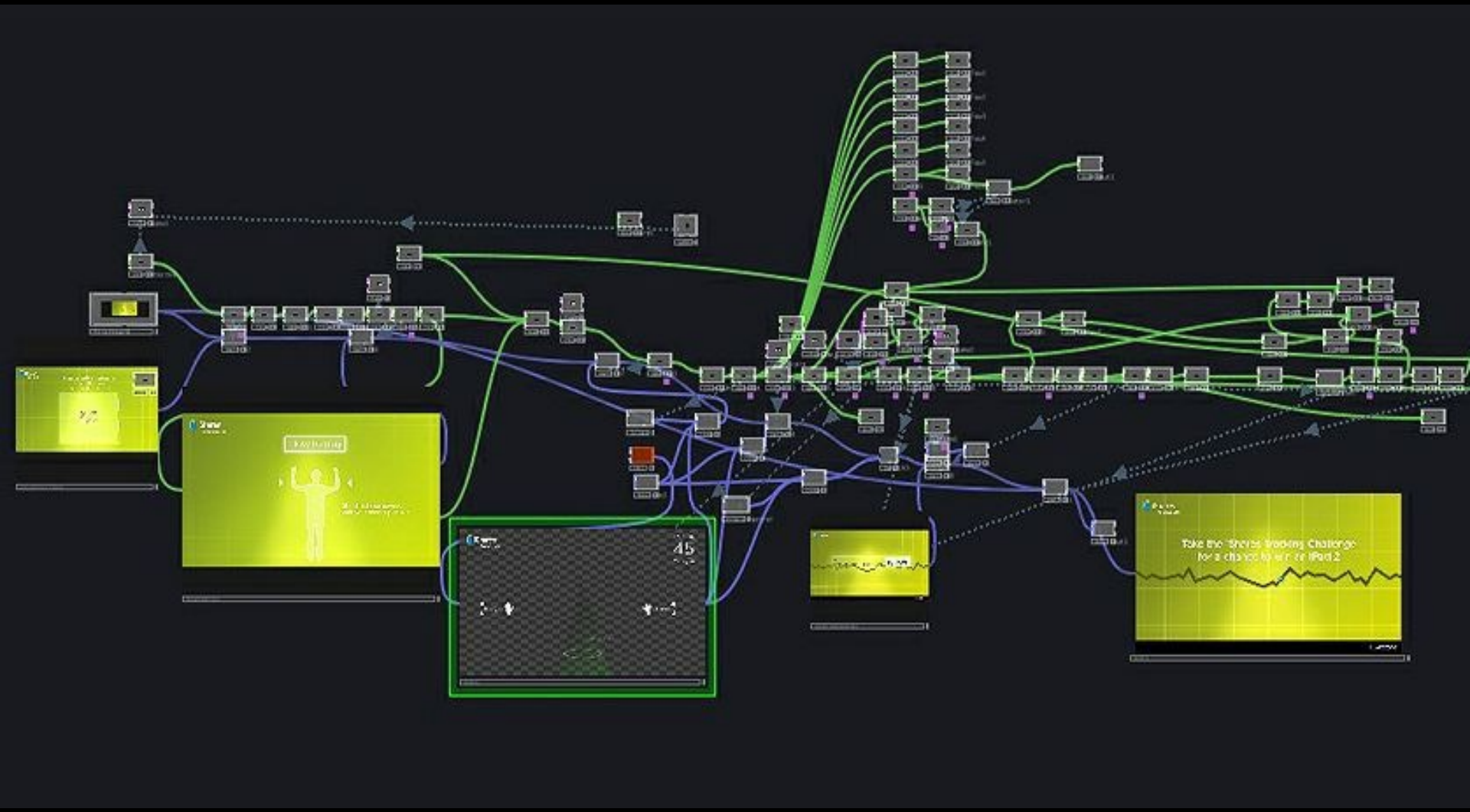




LEAN
SPECIFICATION & COMMISIONING


TASK LIGHTING
WALL WASH LIGHTING
AMBIENT LIGHTING
AFF 7'-0"
ACCENT LIGHTING
FLIP-TOP COUNTER
PHOTOTROPISM - BAR AREA
CEILING AFF 9'-6"
BACKLIT FEATURE WALL
4'-0" PARTITION WALL
CEILING AFF 7'-0"
SCALLOP LIGHTING
ACCENT LIGHTING
AMBIENT LIGHTING
TUBULAR DIVIDING PARTITION
TASK LIGHTING
LEGEND
DUPLEX CONVENIENCE OUTLET (WALL OUTLET) 110 VOLTS
GROUND-FAULT CIRCUIT INTERRUPTER 110 VOLTS
FLOOR OUTLET
RECESSED DOWNLIGHT
RECESSED DIRECTIONAL LIGHT
TRACK LIGHT
SMALL PENDANT
LARGE PENDANT
TUBULAR LIGHT
EXIT LIGHT, WALL MOUNTED
EXIT LIGHT, SUSPENDED
SPRINKLER HEAD
SPEAKER
SUPPLY AIR DIFFUSER
RETURN AIR DIFFUSER
DIMMER SWITCH
SWITCH LEG
NOTE: WIRELESS INTERNET ROUTER AND TELEPHONE JACK LOCATED IN BACK OF SPACE, NOT SEEN ON PLAN.
ELECTRICAL OUTLETS ON WEST WALL IN BAR AREA ARE LOCATED AT NORMAL HEIGHT BELOW COUNTER IN CABINETRY. APPLIANCES CAN BE PLUGGED IN BY RUNNING THE CORDS THROUGH A CUT-OUT IN THE COUNTERTOP.


45

Grasshopper - Fish3

File Edit View Arrange Solution Window Help Fish3

Params Math Sets Vector Curve Surface Mesh Intersect Transform

Geometry Primitive Special

100%

S D H SBox B

SBox (Surface Box)

Create a twisted box on a surface patch.

Surface

Altura de los paneles 2.00

Crv Crv Crv R¹ R² S H Swp2 S

I U V Divide S

Número de paneles en U 80

Número de paneles en V 15

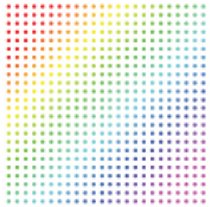
m²

Autosave complete (60 seconds ago)

0.8.0066

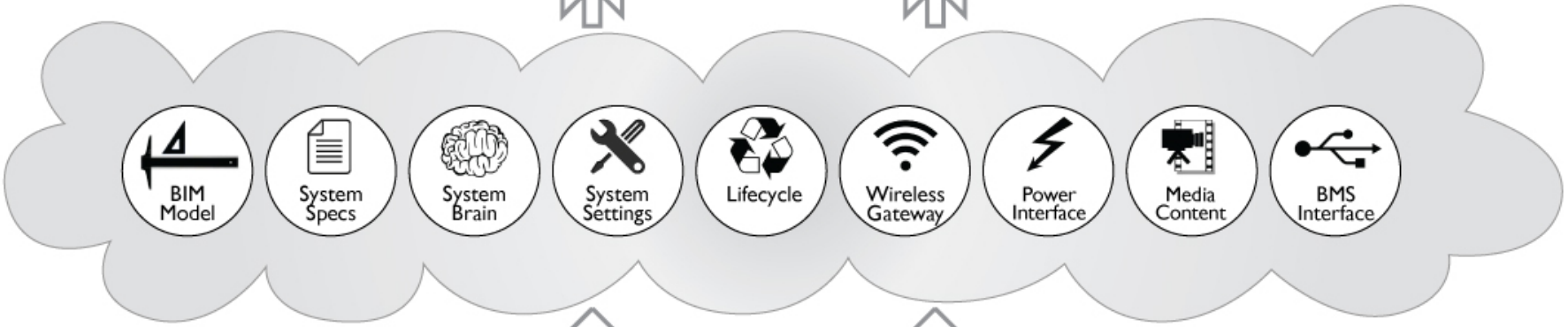
LIGHT
(BINARY)

LIGHT
(MULTI-SPECTRUM)



VIDEO
(LOW-RES)

VIDEO
(HI-RES)



SWITCH
(BINARY)

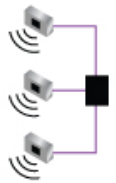
SWITCH
(VALUE)

SWITCH
(SCENE)

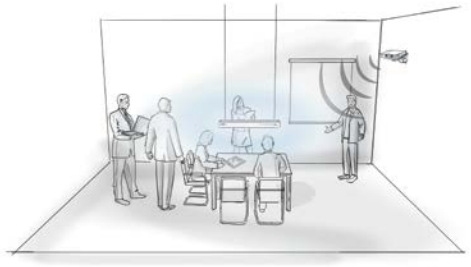
GRAPHICAL
INTERFACE

OCCUPANCY
SENSOR

VISION
SYSTEM



PROXIMITY
SENSORS



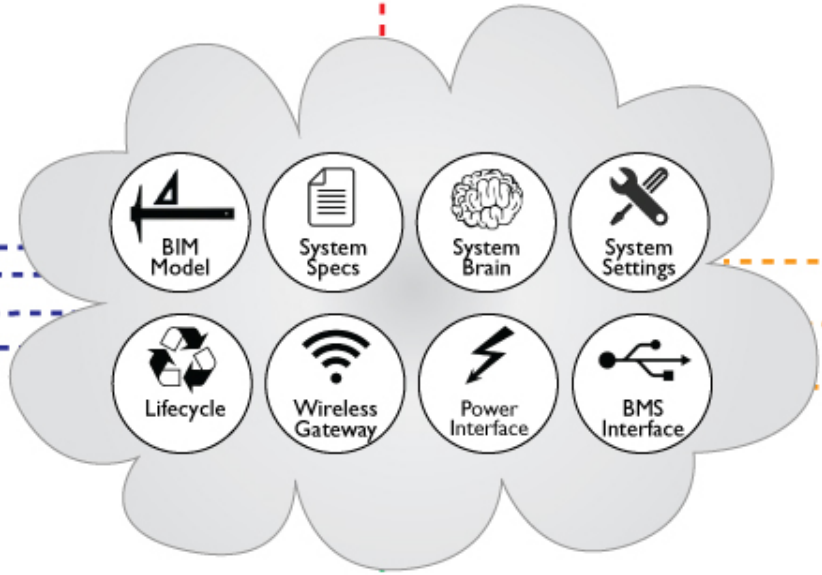
CONSTRUCTION DOCUMENTATION

BIM Model

VISION SYSTEM

FIXTURE

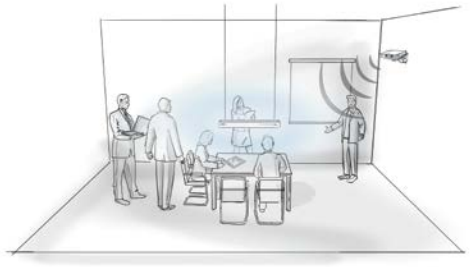
GRAPHICAL INTERFACE



SYSTEM

LIGHT (MULTI-SPECTRUM)

VIRTUAL SIMULATION



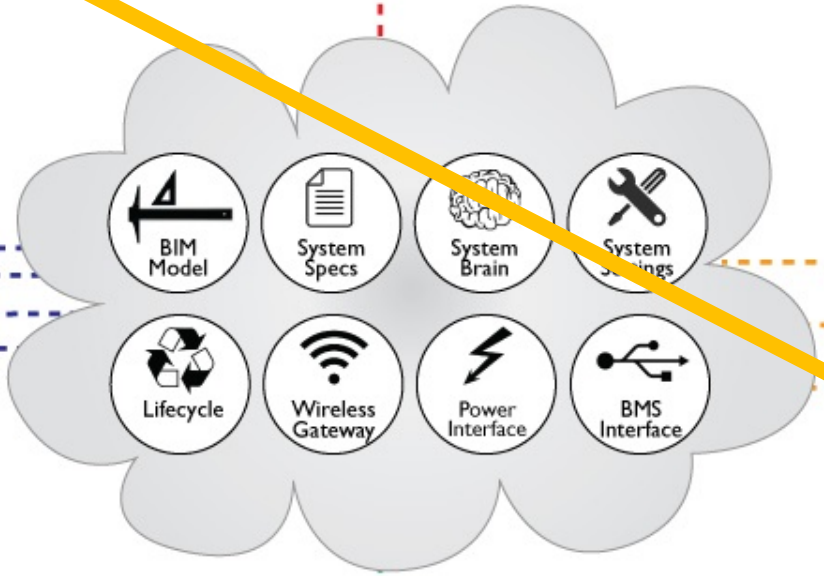
CONSTRUCTION DOCUMENTATION

BIM Model

VISION SYSTEM

GRAPHICAL INTERFACE

FIXTURE



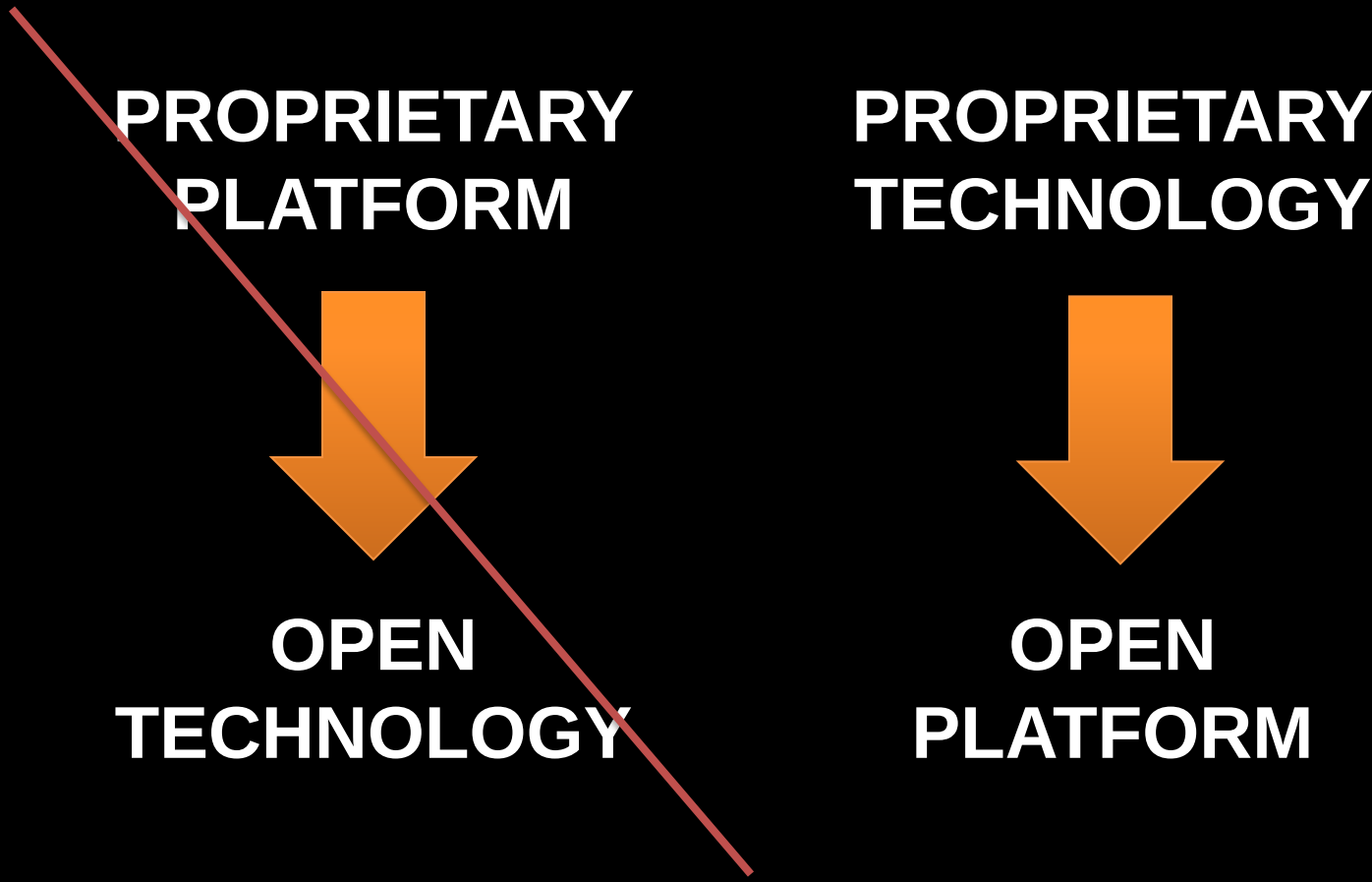
LIGHT (MULTI-SPECTRUM)

SYSTEM

VIRTUAL SIMULATION

How to avoid commodification?

How to avoid commodification?



THANK YOU!

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