

BIM, The Law, and The Revolution In Project Delivery

Mobius LA June 25, 2009

Part 1: Building Information Modeling

Introduction

Doug Childers, Morris Architects

How BIM changes the design process

Christof Spieler, Morris Architects

How BIM changes the construction process

Roy Griffith, Gehry Technologies

BIM pitfalls, challenges, and lessons learned

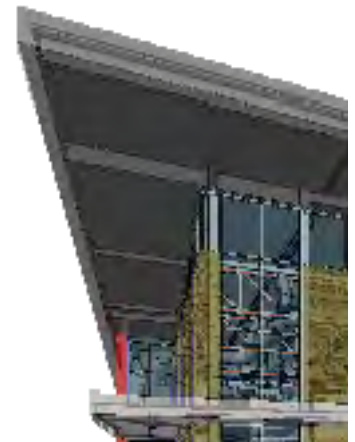
Bob Vanech, CADFORCE

Questions and Answers

Christof Spieler, Morris Architects

Roy Griffith, Gehry Technologies

Bob Vanech, CADFORCE





AIA Los Angeles

A Chapter of the American Institute of Architects

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Learning Objectives

- Participants will be able to assess the impact of the BIM transition compared to previous transitions in the design/construction industry.
- Participants will be able to identify five benefits of using BIM in design.
- Participants will be able to identify five benefits of using BIM in construction.
- Participants will be able to avoid some common pitfalls of BIM.

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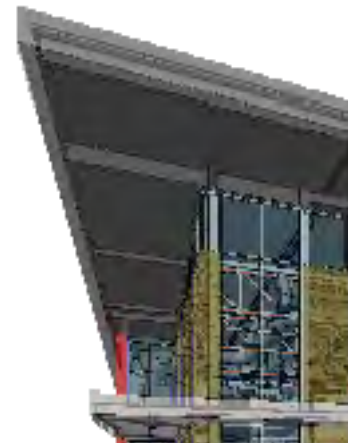
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Building Information Modeling: Introduction

Doug Childers

Principal, Urban Studio

MORRIS
ARCHITECTS



The Panelists:

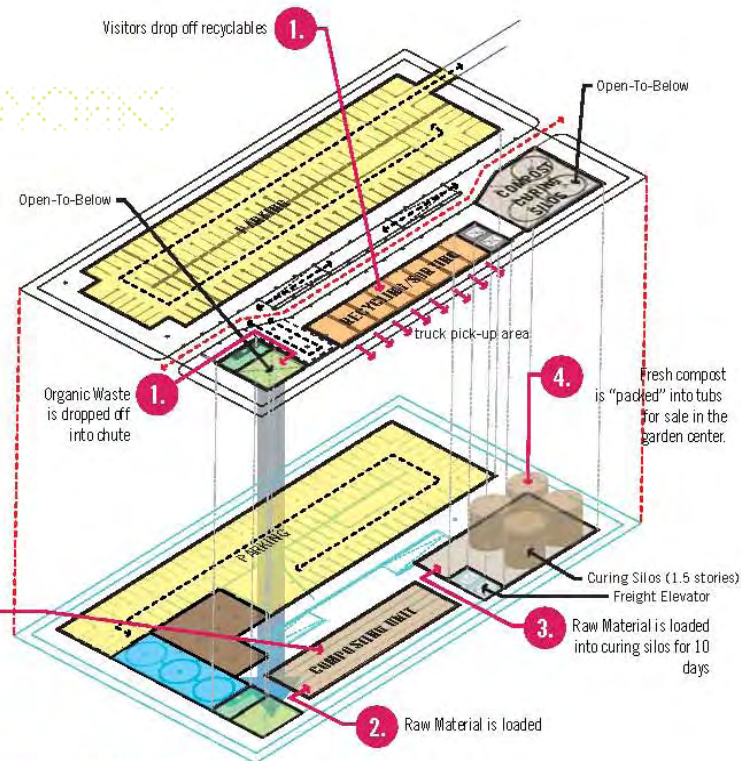
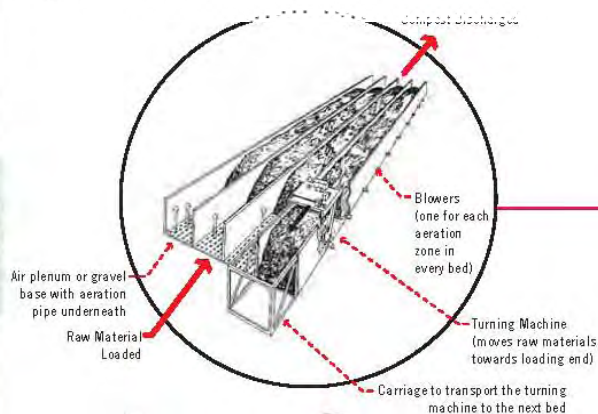
- Christof Spieler, Director of Technology and Innovation, Morris Architects
- Roy F. Griffith, Director of Corporate Development, Gehry Technologies
- Bob Vanech, Founder & CEO, CADFORCE

The Promise of BIM:



WASTE-CRUNCHING BASEMENT Recycling Everything Is What You Do

The...
 after...
 was...
 system...
 - By...
 Ven...
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 Com...



World changing

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DATATECTURE



World changing

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“The Annihilation of Space by Time”

1. Google search results returned in .15 seconds is now an expectation
2. “...it is estimated that a 100 millisecond delay reduces Amazon’s sales by 1%”
3. “Data Centers worldwide consume more energy annually than Sweden”

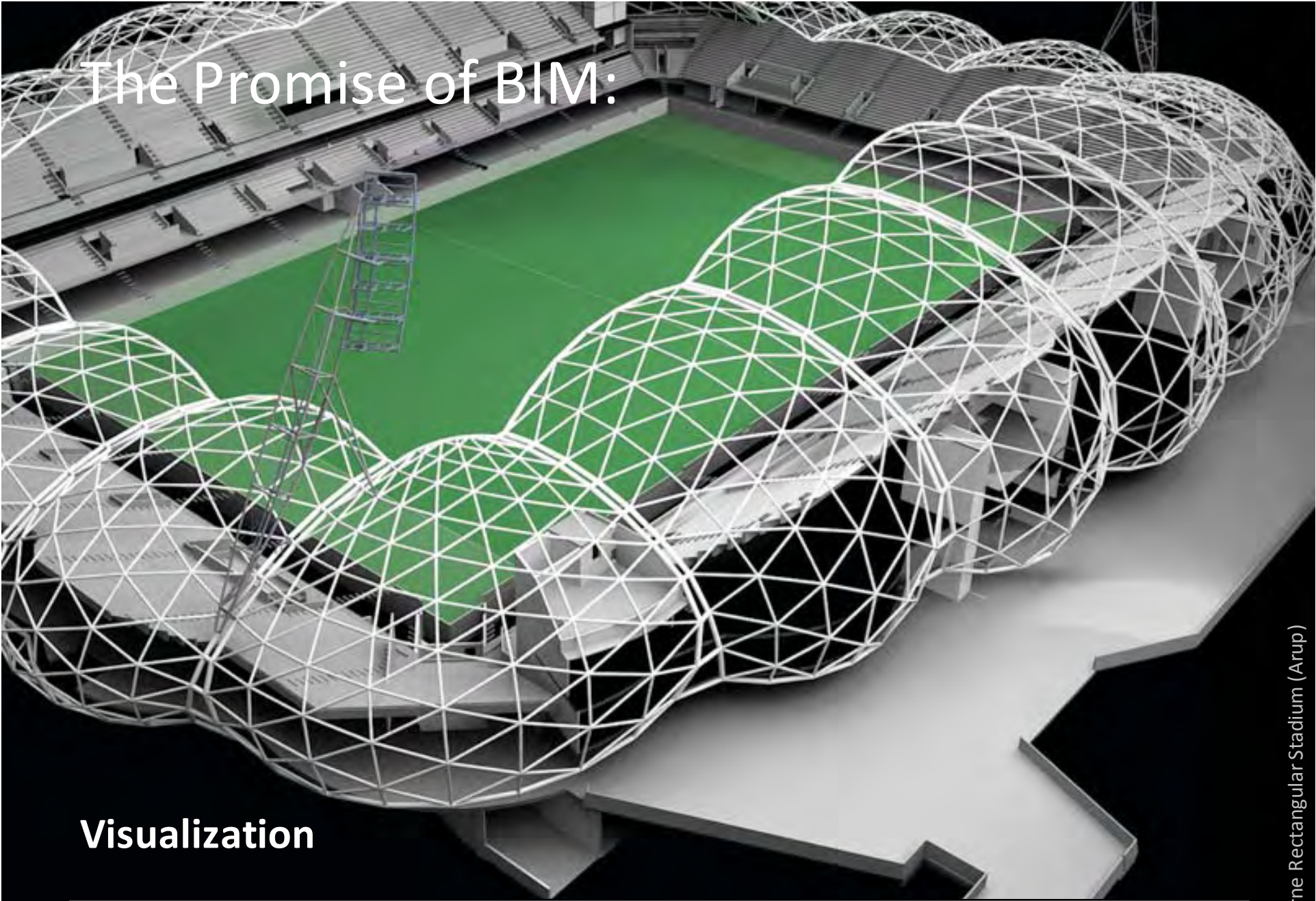
In commercial terms, expectations will be framed by the speed of light, not the rate of human activity or thought.

World changing

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New York Times Magazine Mobius LA June 25, 2009

The Promise of BIM:



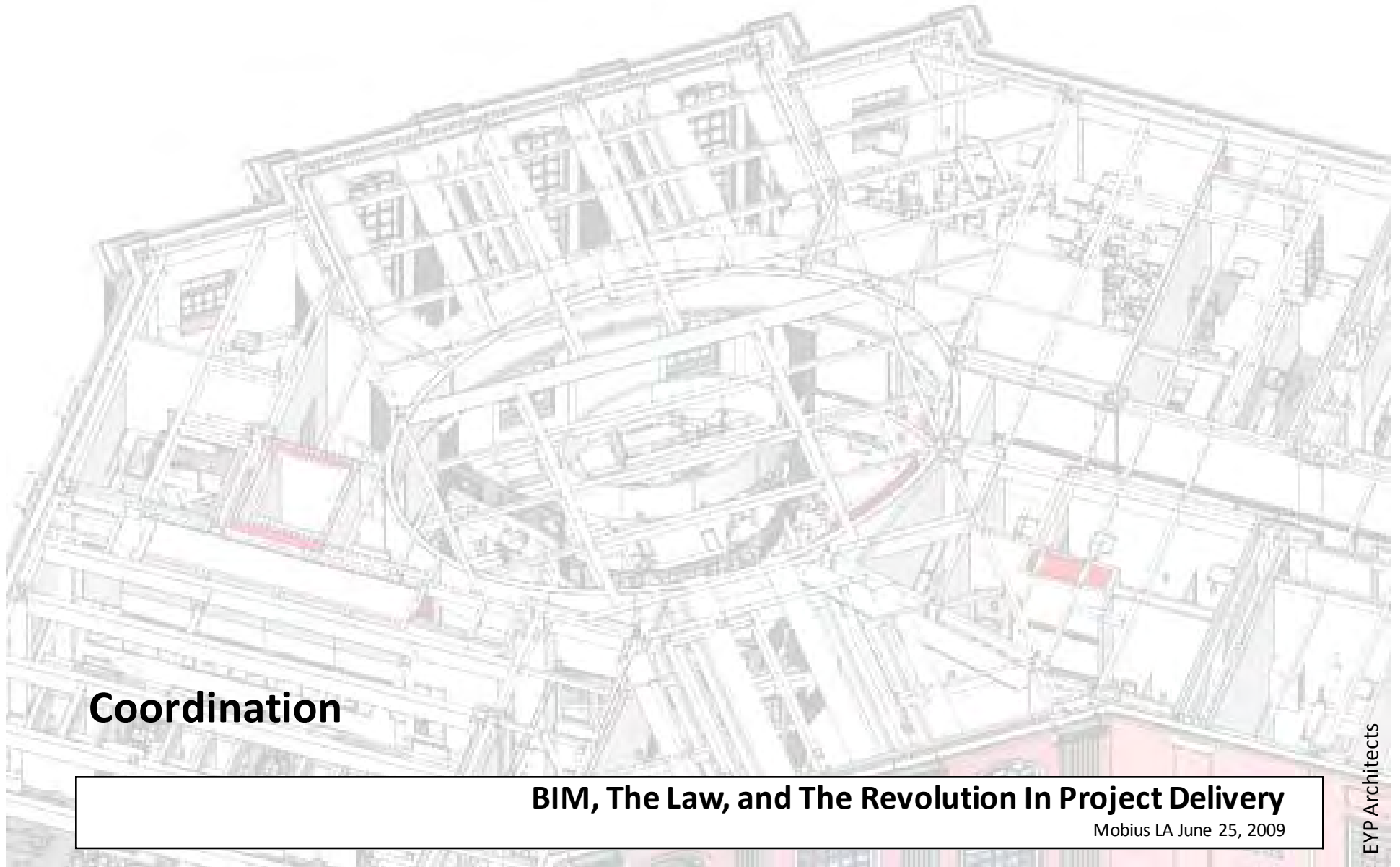
Visualization

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Melbourne Rectangular Stadium (Arup)

The Promise of BIM:

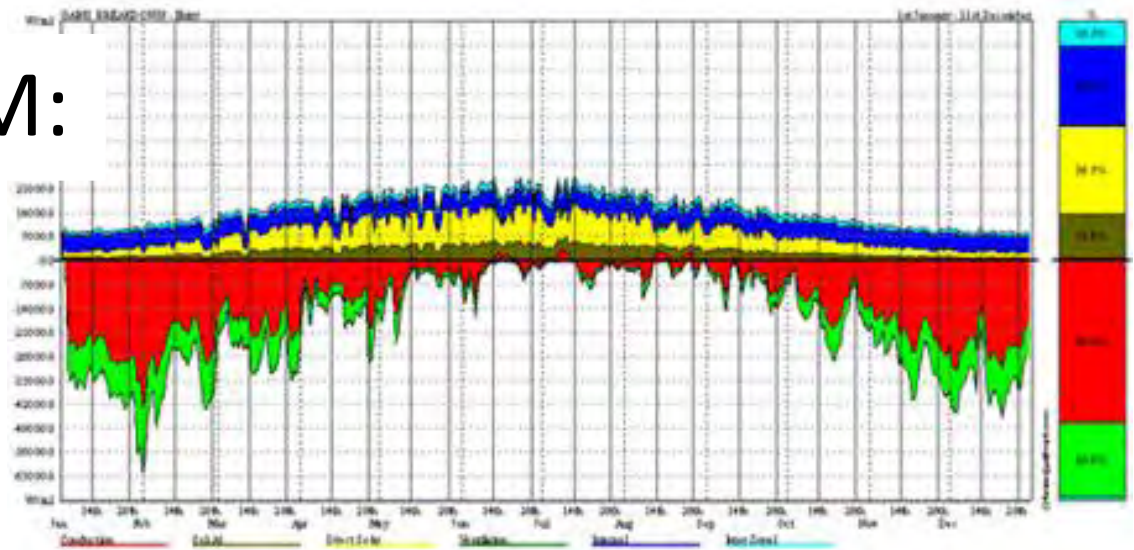


Coordination

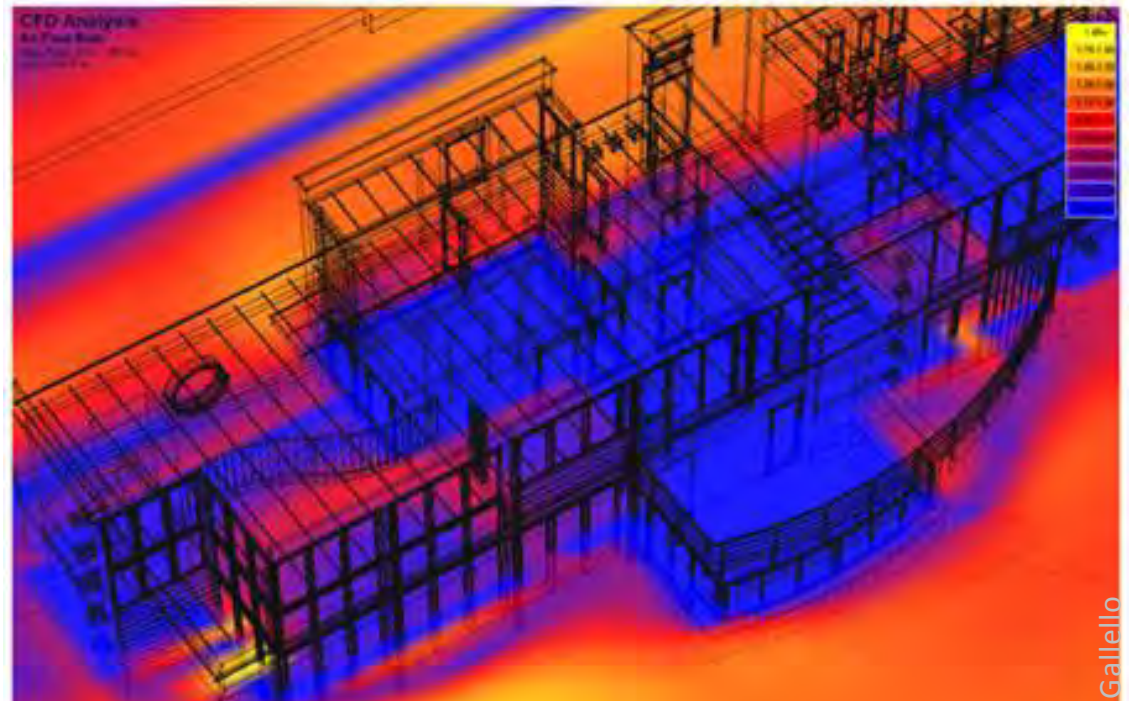
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The Promise of BIM:



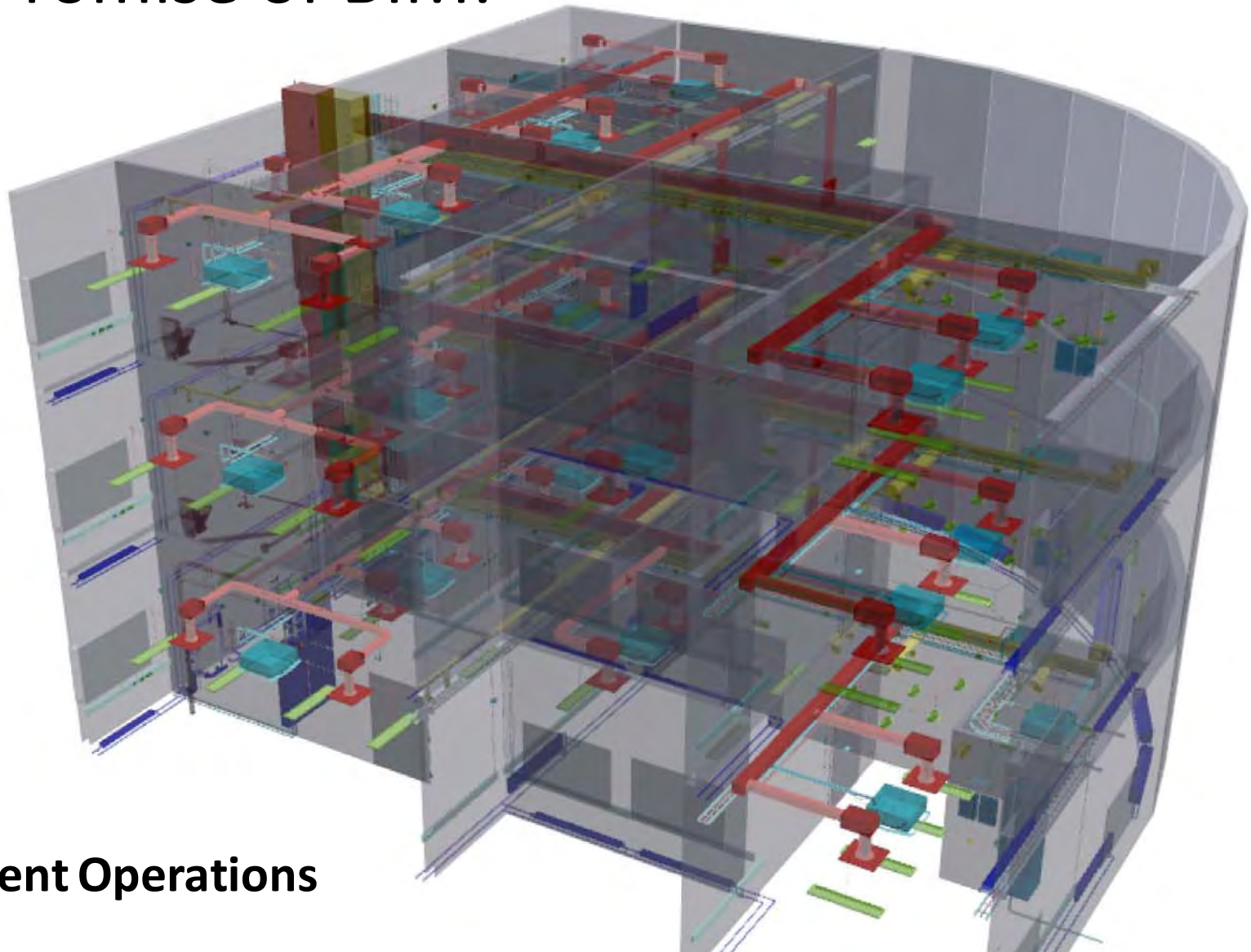
Optimization



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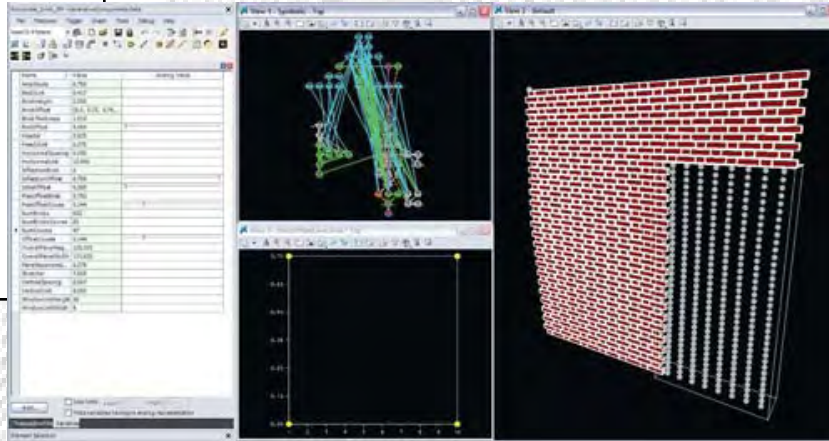
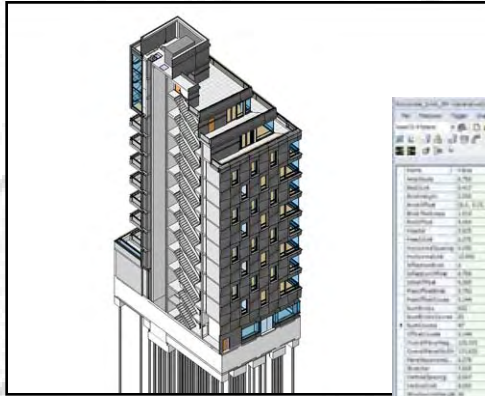


Intelligent Operations

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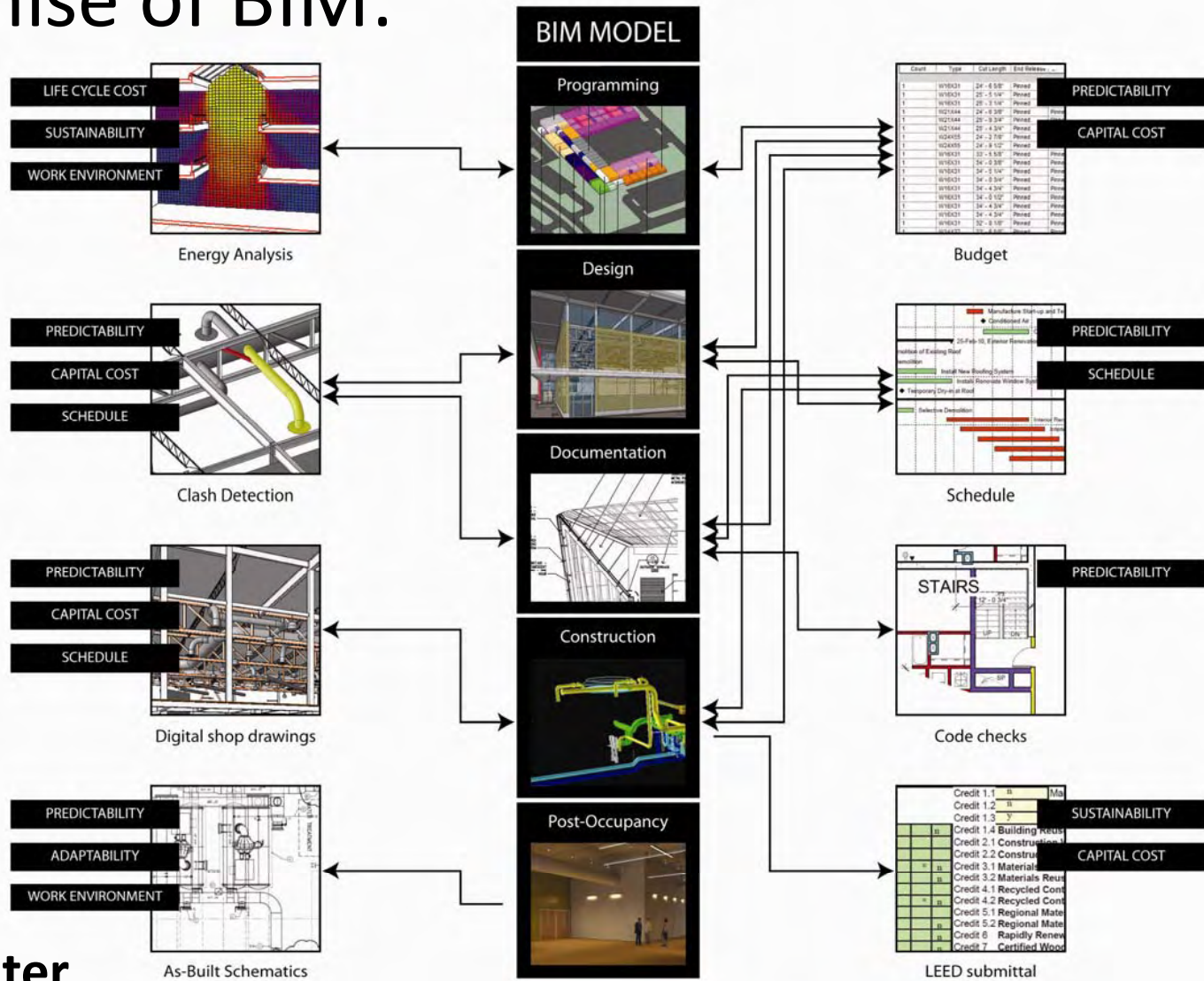


Better

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The Promise of BIM:



Cheaper - faster

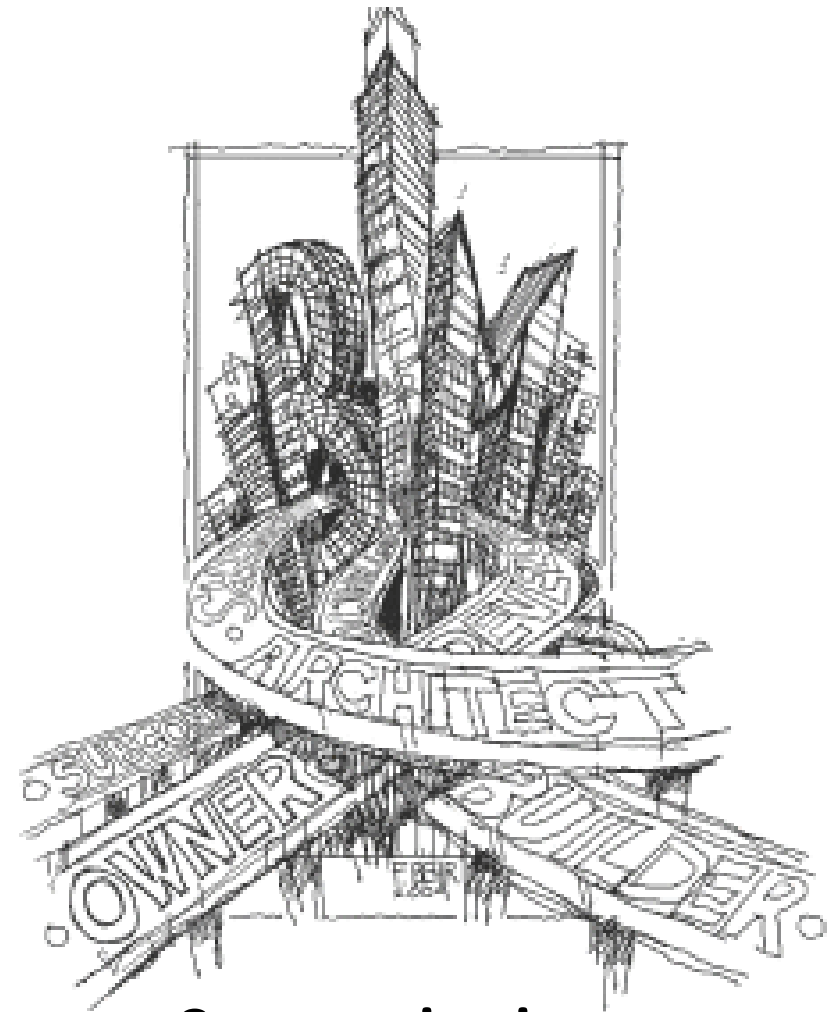
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The Promise of BIM:



Unifying Theory



Communications

The Promise of BIM:



Radical Collaboration

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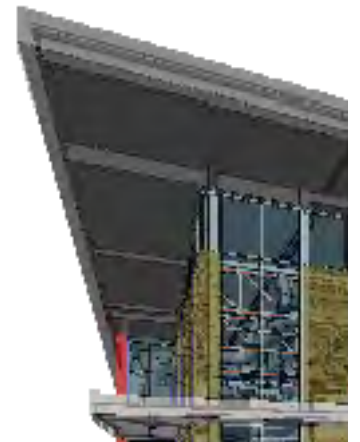
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How BIM changes the design process

Christof Spieler

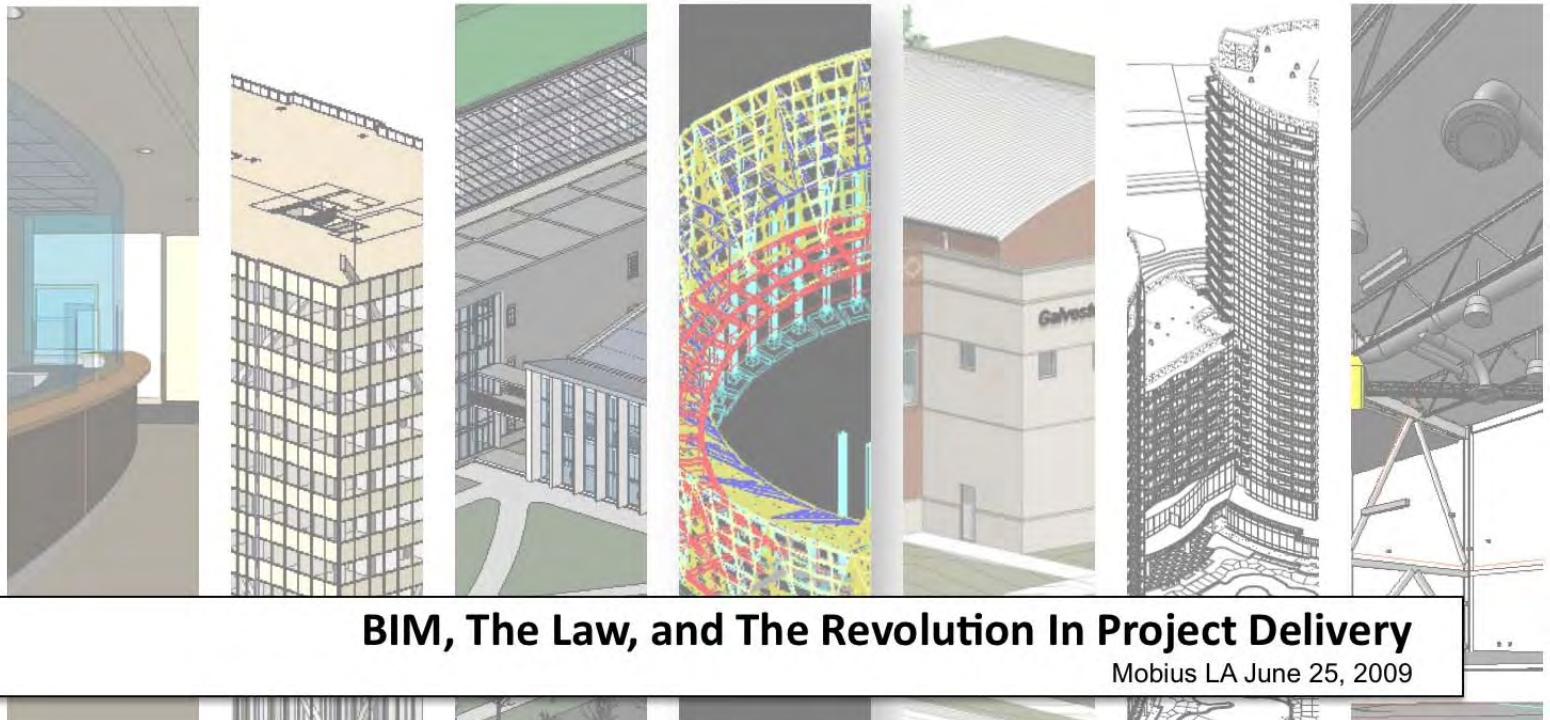
Director of Technology and Innovation

MORRIS
ARCHITECTS



MORRIS ARCHITECTS

- Founded in 1938 in Houston, Texas
- Offices in Los Angeles, Houston, and Orlando
- Civic, Corporate, Education, Entertainment, Healthcare, Hospitality, Public Assembly
- Work in 23 States, Europe, Caribbean, South America, and Pacific Rim



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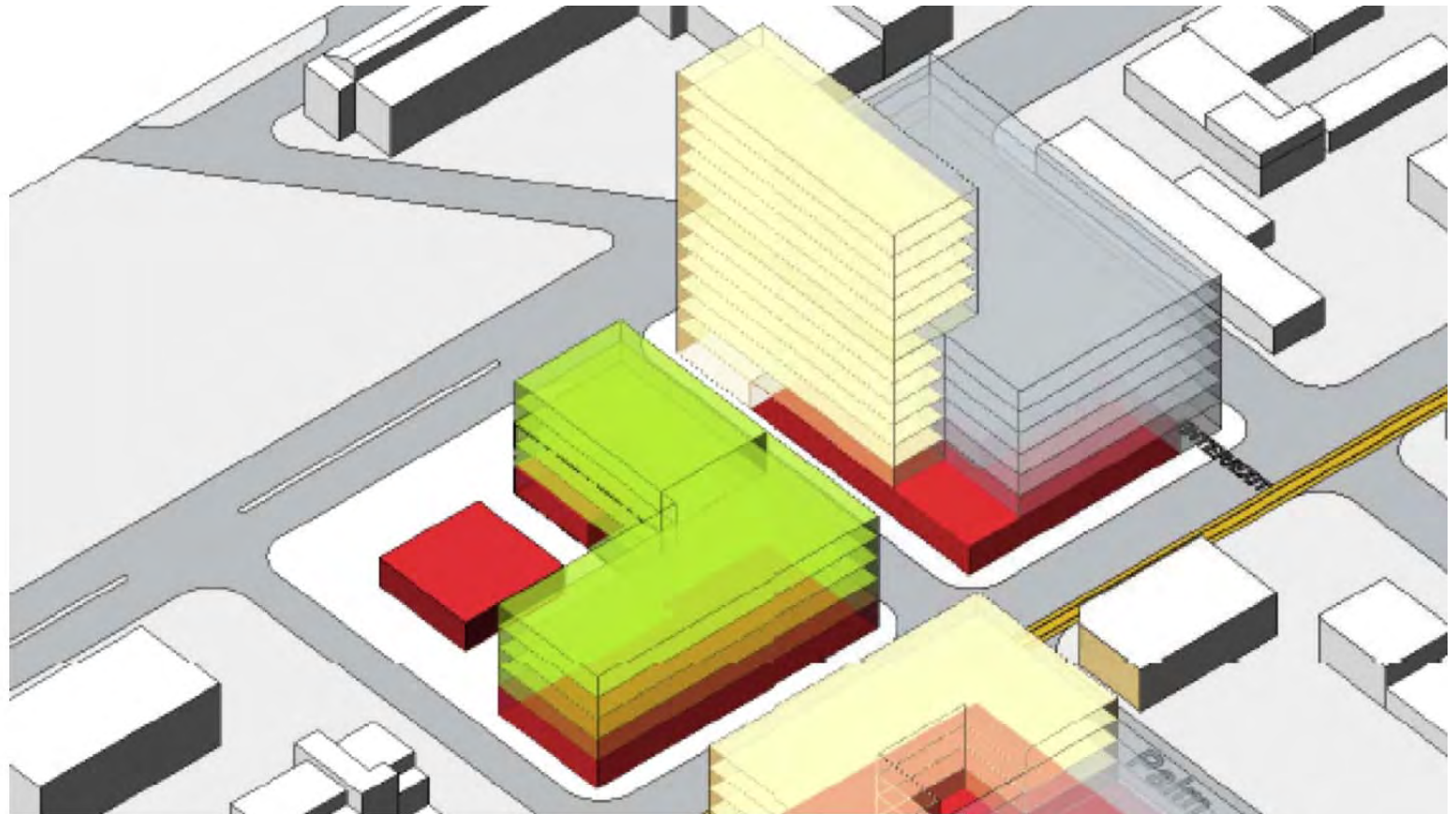
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Benefits of BIM: Design

INFORMATION

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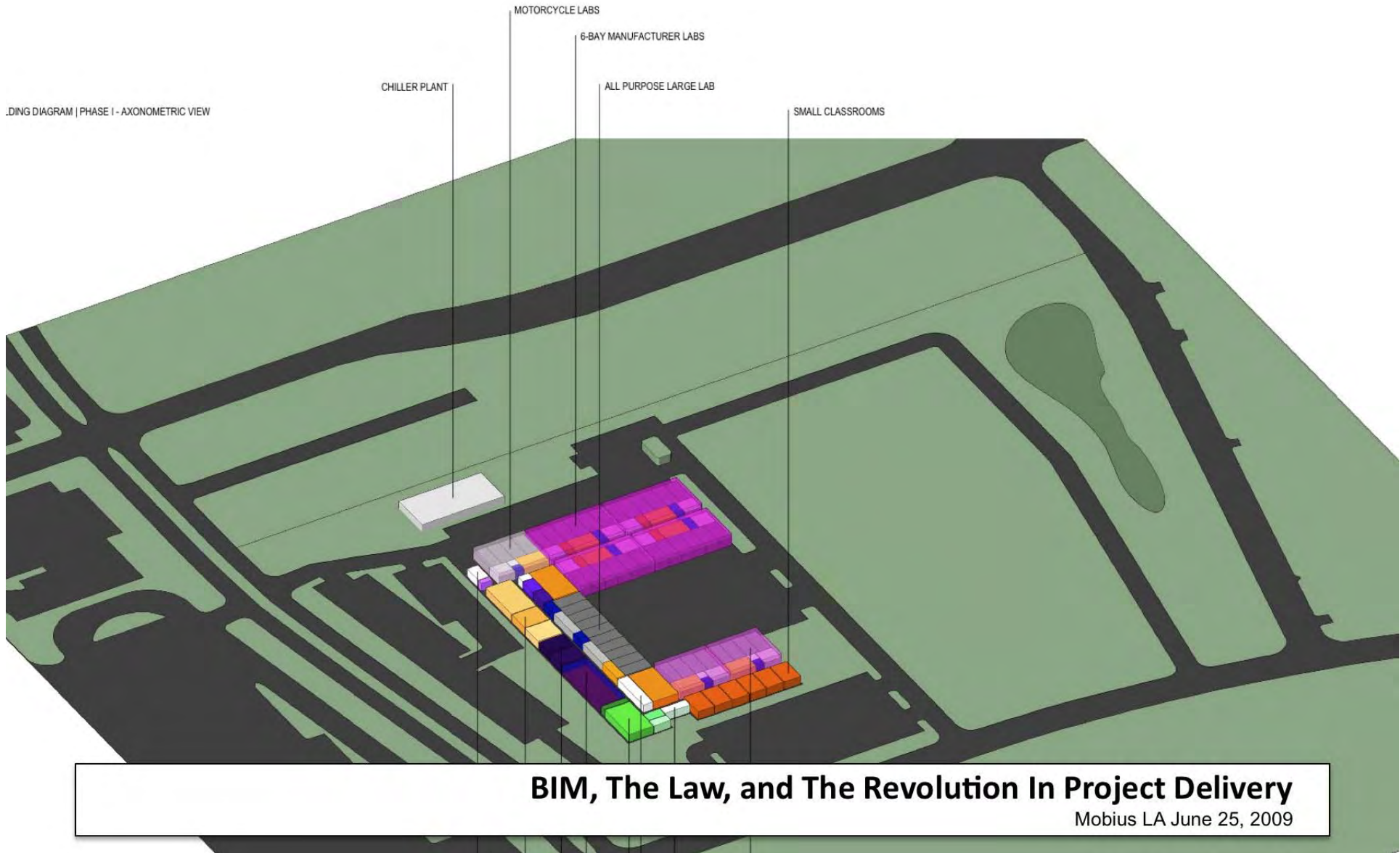


ELEMENTS	GROSS FLOOR AREA	# RES UNITS	# PARKING REQ	# PARKING PROVIDED
A3 - RETAIL				
A3 - HOTEL	105219 SF	89	155	
A3 - PARKING STRUCTURE	222541 SF			636
B1 - EXISTING CLINIC	22201 SF	0	78	
B1 - RETAIL	16870 SF	0	67	
B1 - INSTITUTE/OFFICE EXPANSION	85210 SF	0	298	
B1 - EXISTING PAVILION	4929 SF	0	20	
B1-EXISTING CLINIC RETAIL	4396 SF	0	18	
C1 - RETAIL	28402 SF	0	114	
C1 - RESIDENTIAL TOWER	75790 SF	64	96	
C1 - PARKING				
Grand total	565557 SF	152	845	636

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.DING DIAGRAM | PHASE I - AXONOMETRIC VIEW



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MOTORCYCLE LABS

6-BAY MANUFACTURER LABS

.DING DIAGRAM | PHASE I - AXONOMETRIC VIEW

MORRIS ARCHITECTS

SJCD Transportation Center San Jacinto College

Department	Group	Room Schedule	Name	Area	Comments
Academic Administration		Conference Room	563 SF		
Academic Administration		Division MGR	118 SF		
Academic Administration		Dept. Head	148 SF		
Academic Administration		Manuf. Plan O.	115 SF		
Academic Administration		Faculty Office	110 SF		
Academic Administration		Secure File S.	70 SF		
Academic Administration		Faculty Office	133 SF		
Academic Administration		Reception	85 SF		
Academic Administration		Admin. Asst.	109 SF		
Academic Administration		Adjunct Fac. Workroom	154 SF		
Academic Administration		Breakroom	137 SF		
Academic Administration 11			1807 SF		
All Purpose Lab		Office	80 SF		
All Purpose Lab		Storage Room	265 SF		
All Purpose Lab		Office	80 SF		
All Purpose Lab		Office	80 SF		
All Purpose Lab		Storage Room	265 SF		
All Purpose Lab		Office	80 SF		
All Purpose Lab		S. Instruction 5	307 SF		
All Purpose Lab		All Purpose Car Lift Stations	5028 SF		
All Purpose Lab: 8			6027 SF		
Building Support		Recycle/Recyd	567 SF		
Building Support		Computer Storage	119 SF		
Building Support		Men Lockers	848 SF		
Building Support		Women Restrooms	479 SF		
Building Support		Women Lockers	848 SF		
Building Support		Men Restroom	479 SF		
Building Support		Large Equipment Tool Room	758 SF		
Building Support		Insult Test Room	785 SF		
Building Support: 8			4721 SF		
Instructional Areas		Small Classroom	593 SF		
Instructional Areas		Small Classroom	593 SF		
Instructional Areas		Small Classroom	593 SF		
Instructional Areas		Small Classroom	593 SF		
Instructional Areas		Small Classroom	593 SF		
Instructional Areas		Small Classroom	593 SF		
Instructional Areas		Engine Repair Classroom	1532 SF		
Instructional Areas		Engine Repair Classroom	1532 SF		
Instructional Areas		Transmission Classroom	1818 SF		
Instructional Areas		Engine Performance Parts	788 SF		
Instructional Areas		Electrical Classroom	301 SF		

Department	Group	Room Schedule	Name	Area	Comments
Instructional Areas: 11				9625 SF	
Manufacturer Labs 6 Bay Labs	6-Bay Lab	L. Storage R.	388 SF		
Manufacturer Labs 6 Bay Labs	6-Bay Lab	S. Storage R.	190 SF		
Manufacturer Labs 6 Bay Labs	6-Bay Lab	Office	92 SF		
Manufacturer Labs 6 Bay Labs	6-Bay Lab	Office	94 SF		
Manufacturer Labs 6 Bay Labs	6-Bay Lab	L. Storage R.	388 SF		
Manufacturer Labs 6 Bay Labs	6-Bay Lab	S. Storage R.	388 SF		
Manufacturer Labs 6 Bay Labs	6-Bay Lab	Office	92 SF		
Manufacturer Labs 6 Bay Labs	6-Bay Lab	Office	94 SF		
Manufacturer Labs 6 Bay Labs	6-Bay Lab	L. Storage R.	387 SF		
Manufacturer Labs 6 Bay Labs	6-Bay Lab	S. Storage R.	387 SF		
Manufacturer Labs 6 Bay Labs	6-Bay Lab	S. Storage R.	192 SF		
Manufacturer Labs 6 Bay Labs	6-Bay Lab	Office	89 SF		
Manufacturer Labs 6 Bay Labs	6-Bay Lab	Office	89 SF		
Manufacturer Labs 6 Bay Labs	6-Bay Lab	L. Storage R.	371 SF		
Manufacturer Labs 6 Bay Labs	6-Bay Lab	L. Storage R.	371 SF		
Manufacturer Labs 6 Bay Labs	6-Bay Lab	S. Storage R.	182 SF		
Manufacturer Labs 6 Bay Labs	6-Bay Lab	Office	89 SF		
Manufacturer Labs 6 Bay Labs	6-Bay Lab	Office	89 SF		
Manufacturer Labs 6 Bay Labs	6-Bay Lab	L. Storage R.	381 SF		
Manufacturer Labs 6 Bay Labs	6-Bay Lab	Classroom (6-Bay L.)	558 SF		
Manufacturer Labs 6 Bay Labs	6-Bay Lab	6 - Bay Car Lift Stations	5300 SF		
Manufacturer Labs 6 Bay Labs	6-Bay Lab	Classroom (6-Bay L.)	558 SF		
Manufacturer Labs 6 Bay Labs	6-Bay Lab	6 - Bay Car Lift Stations	5300 SF		
Manufacturer Labs 6 Bay Labs	6-Bay Lab	Classroom (6-Bay L.)	558 SF		
Manufacturer Labs 6 Bay Labs	6-Bay Lab	6 - Bay Car Lift Stations	5304 SF		
Manufacturer Labs 6 Bay Labs	6-Bay Lab	Classroom (6-Bay L.)	567 SF		
Manufacturer Labs 6 Bay Labs	6-Bay Lab	6 - Bay Car Lift Stations	5306 SF		
Manufacturer Labs 6 Bay Labs: 28			19008 SF		
Manufacturer Labs - 4 Bay Labs	4-Bay Lab	L. Storage R.	381 SF		
Manufacturer Labs - 4 Bay Labs	4-Bay Lab	L. Storage R.	371 SF		
Manufacturer Labs - 4 Bay Labs	4-Bay Lab	S. Storage R.	89 SF		
Manufacturer Labs - 4 Bay Labs	4-Bay Lab	Office	89 SF		
Manufacturer Labs - 4 Bay Labs	4-Bay Lab	Motorcycle Lab	89 SF		
Manufacturer Labs - 4 Bay Labs	4-Bay Lab	Office	89 SF		
Manufacturer Labs - 4 Bay Labs	4-Bay Lab	Classroom (4-Bay L.)	560 SF		
Manufacturer Labs - 4 Bay Labs	4-Bay Lab	Classroom (4-Bay L.)	560 SF		
Manufacturer Labs - 4 Bay Labs	4-Bay Lab	6 - Bay Car Lift Stations	5212 SF		
Manufacturer Labs - 4 Bay Labs	4-Bay Lab	4 - Bay Car Lift Stations	5218 SF		
Manufacturer Labs - 4 Bay Labs: 10			6289 SF		
Manufacturer Labs Motorcycle Labs	4-Bay Labs	L. Storage R.	388 SF		
Manufacturer Labs Motorcycle Labs	4-Bay Labs	S. Storage R.	192 SF		
Manufacturer Labs Motorcycle Labs	6-Bay Lab	Office	94 SF		
Manufacturer Labs Motorcycle Labs	Motorcycle Lab	Classroom (Motor. L.)	582 SF		
Manufacturer Labs Motorcycle Labs	Motorcycle Lab	Motorcycle Car Lift Stations	5218 SF		
Manufacturer Labs Motorcycle Labs: 4			3791 SF		
Non Assignable Spaces		MDF Elevator	254 SF		
Non Assignable Spaces		Entry	293 SF		
Non Assignable Spaces		Mechanical Room	387 SF		
Non Assignable Spaces		Jan. Storage	88 SF		
Non Assignable Spaces		Jan. Storage	88 SF		
Non Assignable Spaces: 5			1410 SF		
Public Areas		Multi Purpose Room	1909 SF		
Public Areas		Furniture Storage	235 SF		
Public Areas		Prep Room	202 SF		
Public Areas		Student Breakroom	299 SF		
Public Areas		Vestibul	180 SF		
Public Areas: 5			2945 SF		
Grand Total: 91			55661 SF		

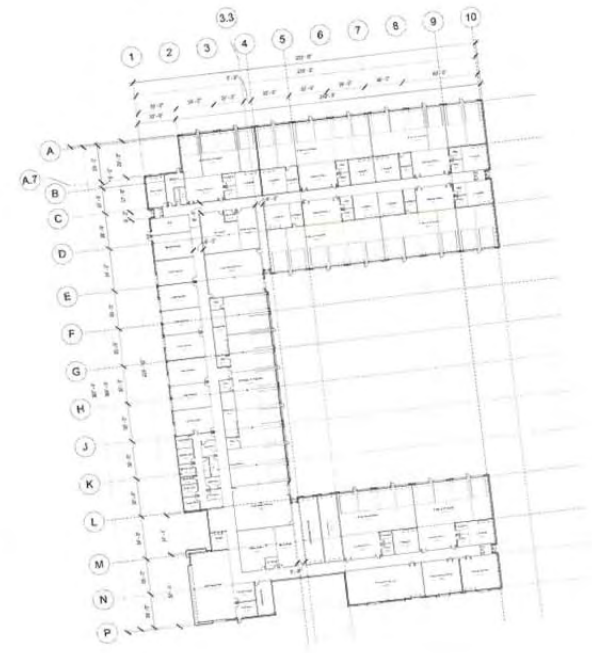
WITHIN DESIGN

DRIVING THE LAW, AND THE REVOLUTION IN PROJECT DELIVERY
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.DIN



Program



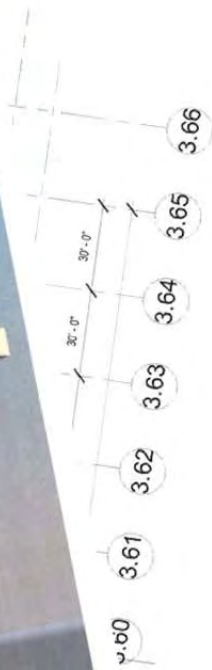
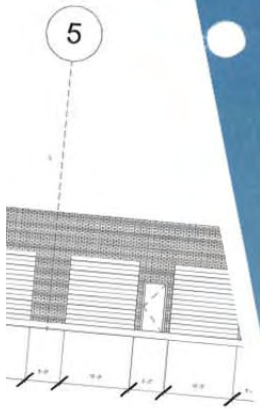
Floorplan

Program + Floorplan
2-08

WIMMELDESIGN

... and the Revolution in Project Delivery

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Floorplan

ADVANCED DESIGN

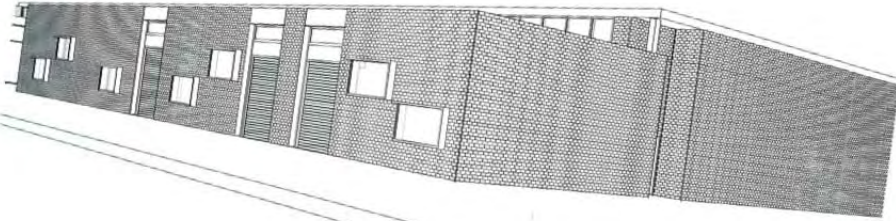
IGB

009

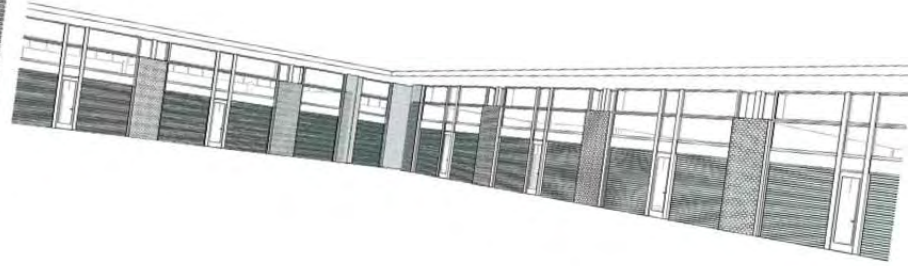
ito Colleg

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ARCHITECTS

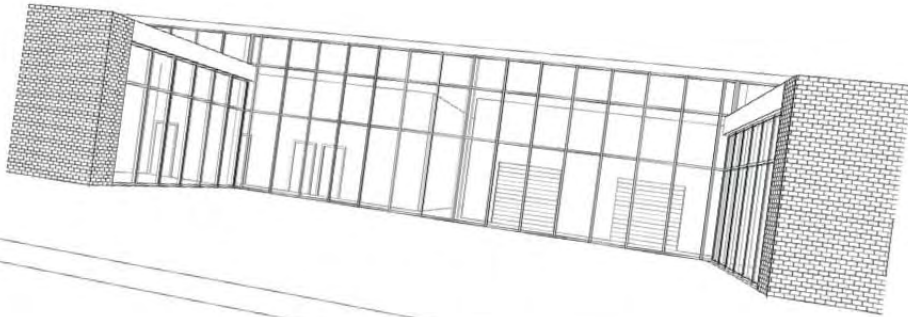
SJCD Transportation Center San Jacinto College



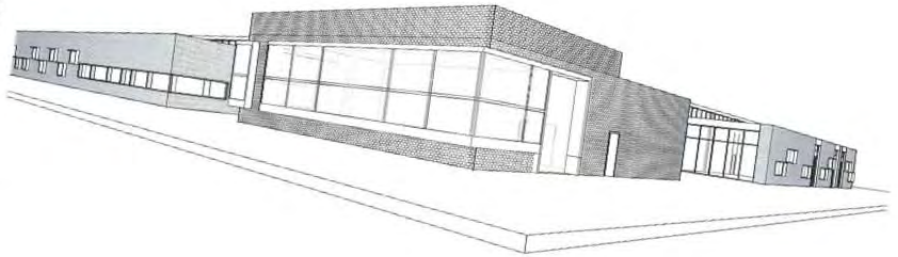
Perspective - SE Corner



Perspective - Courtyard



Perspective - S Breakroom Courtyard



Perspective - SW Corner

2:16
Active Line Drawings

ADVANCE DESIGN

San Jacinto College

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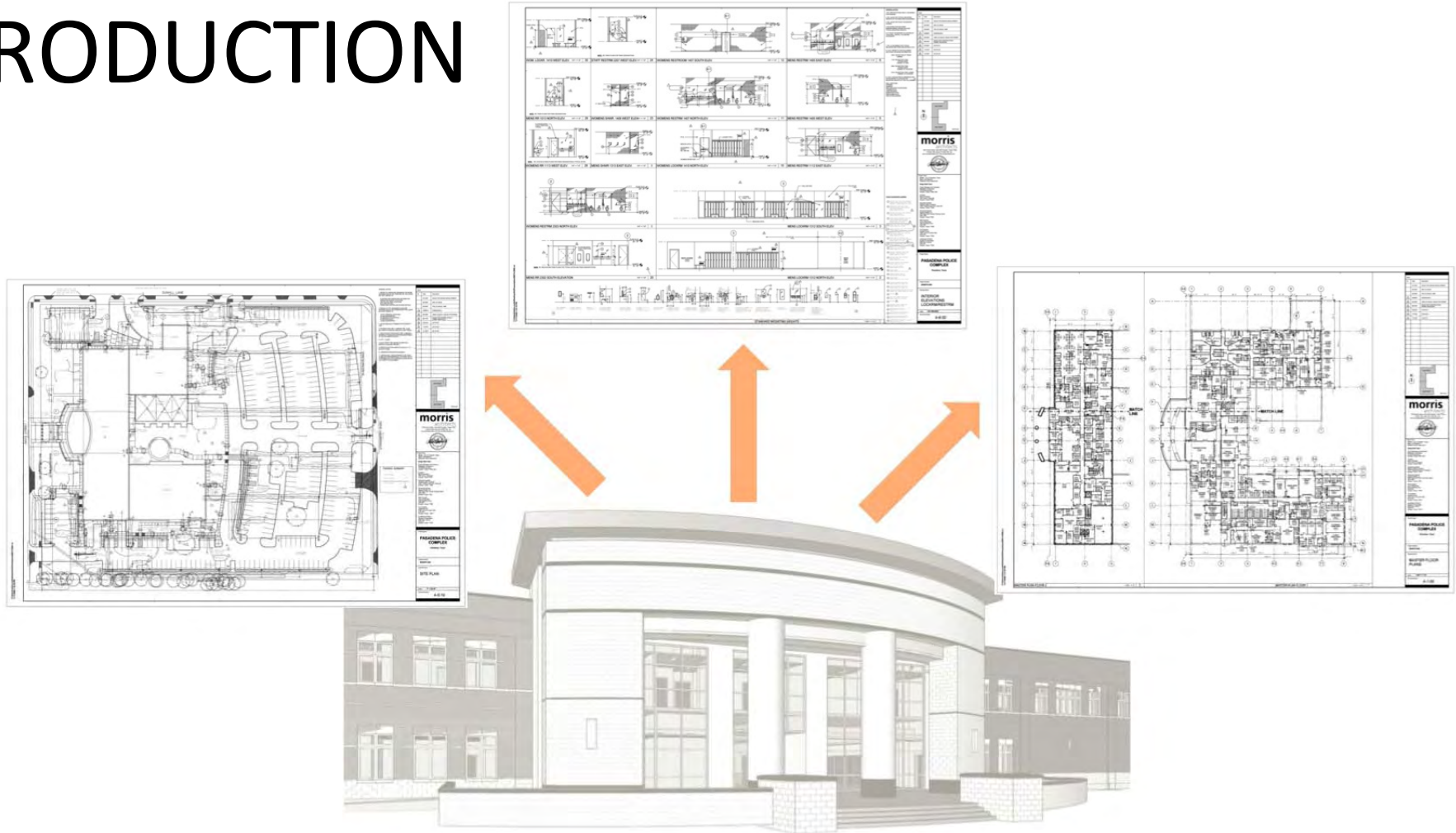
SJCD Transportation

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SJCD Transportation
Center San Jacinto College

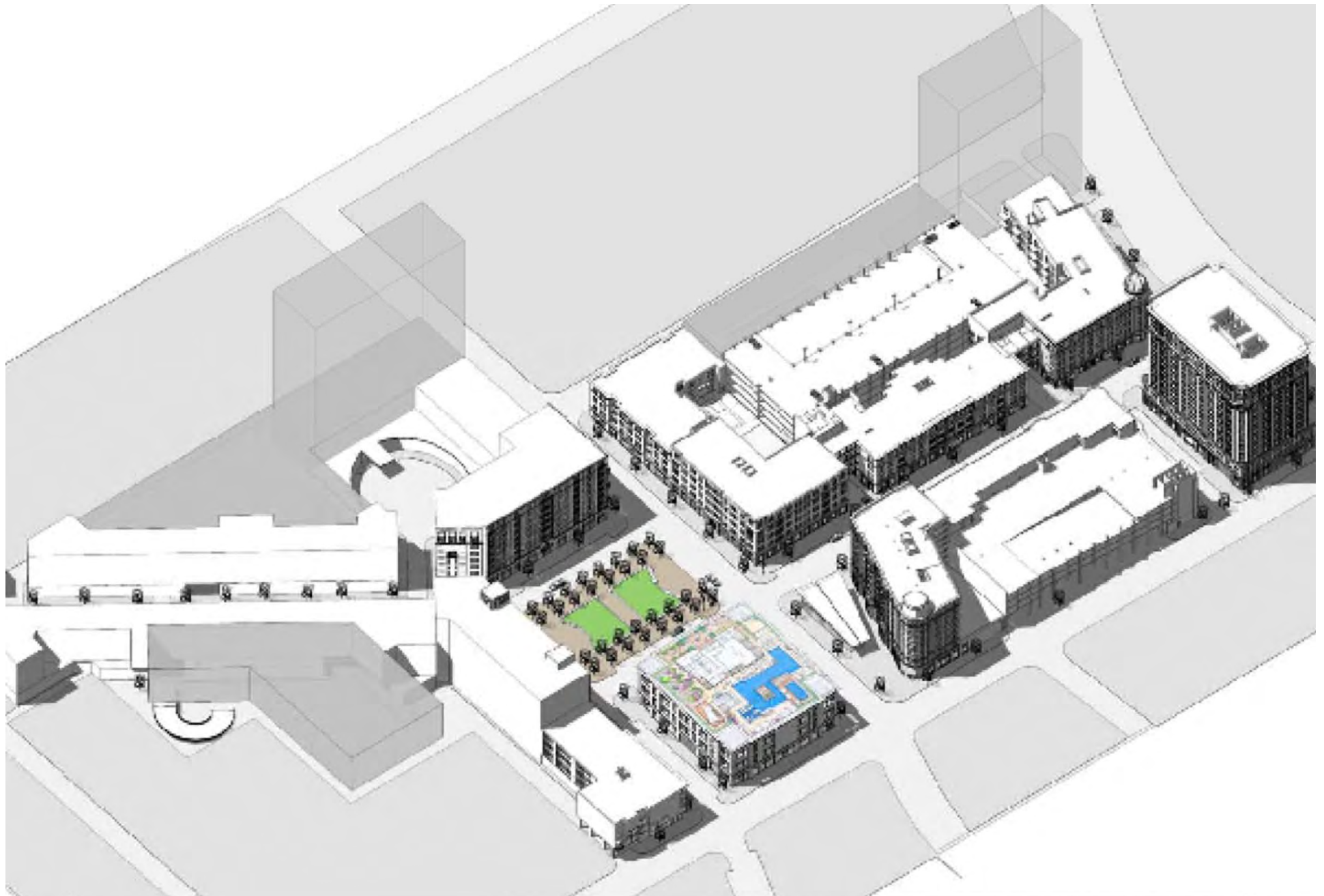


Benefits of BIM: Design **PRODUCTION**



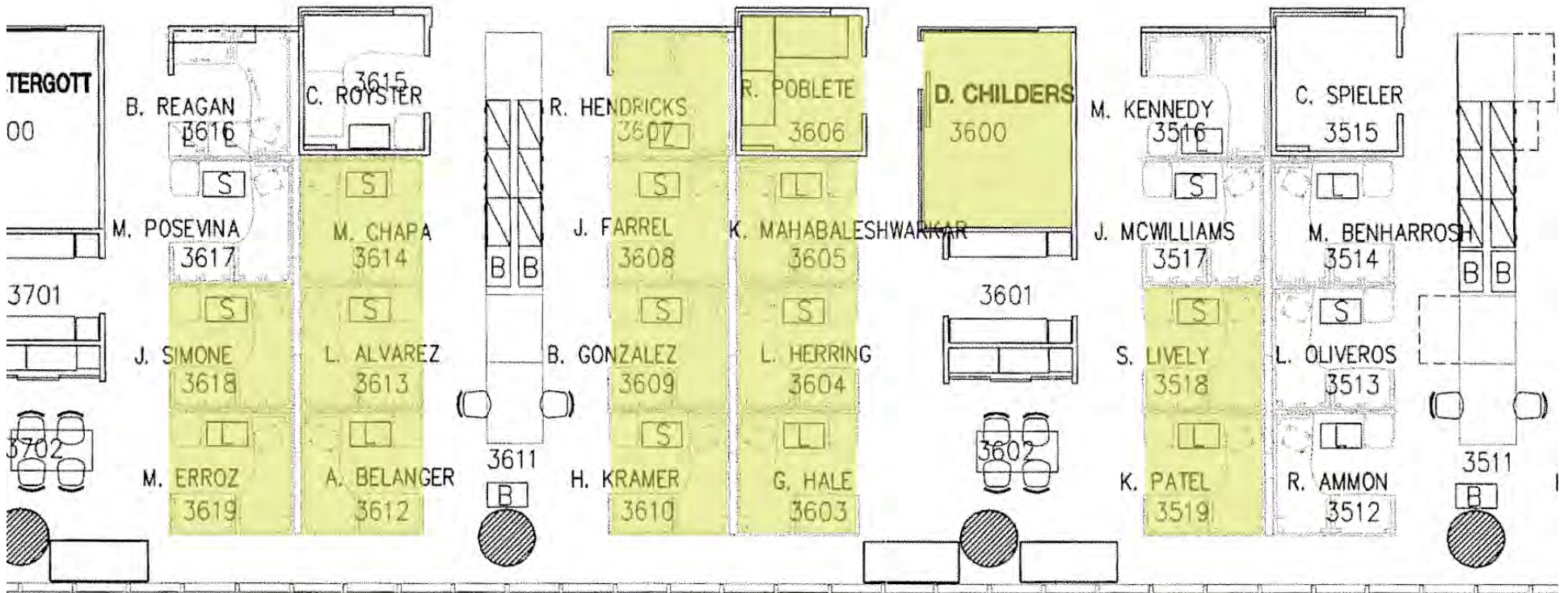
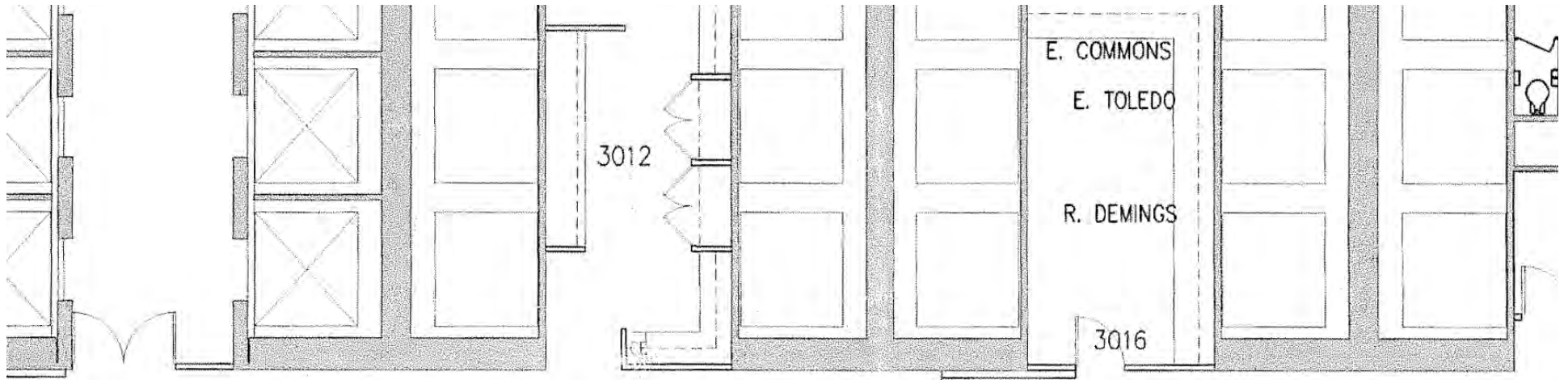
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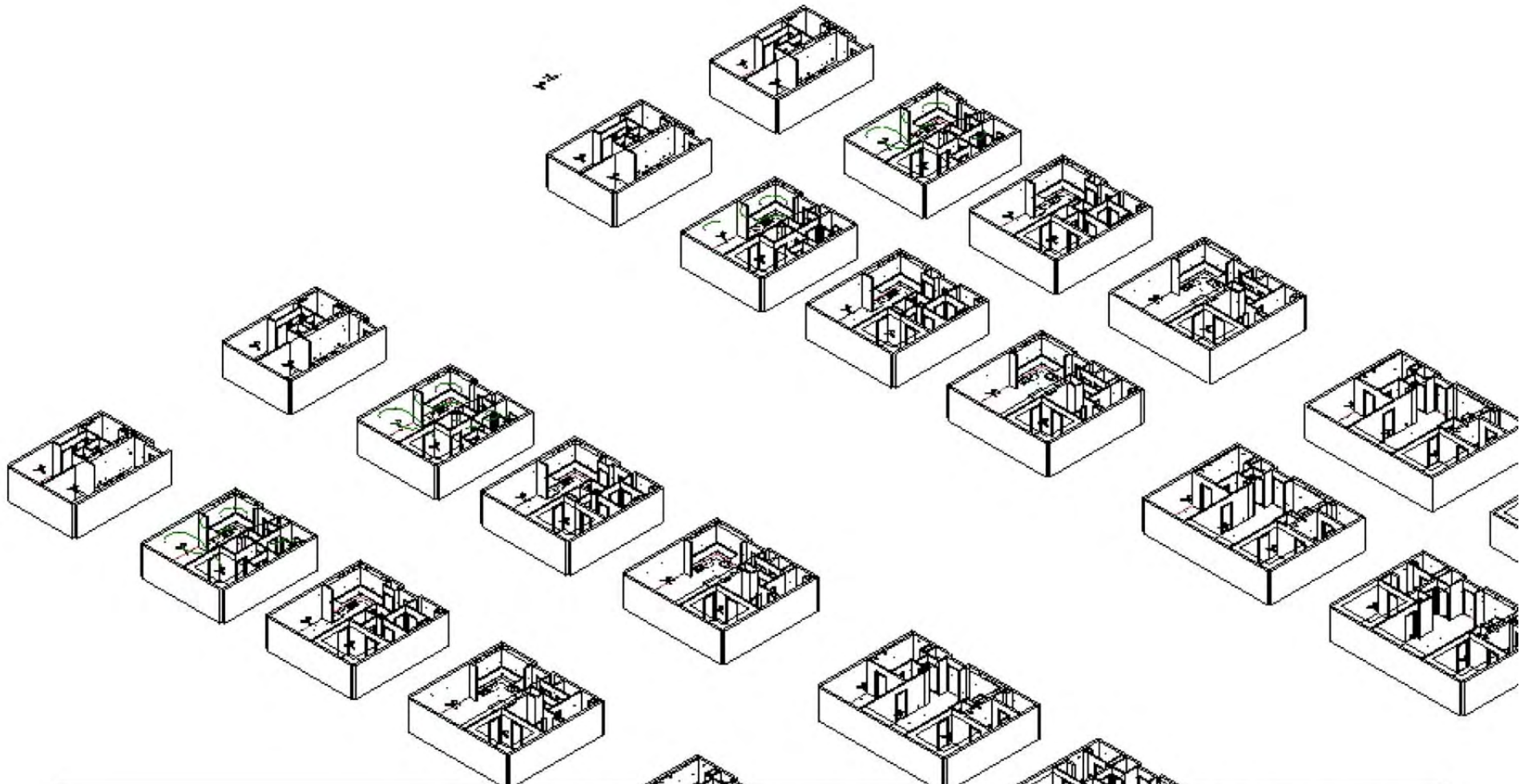
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8"



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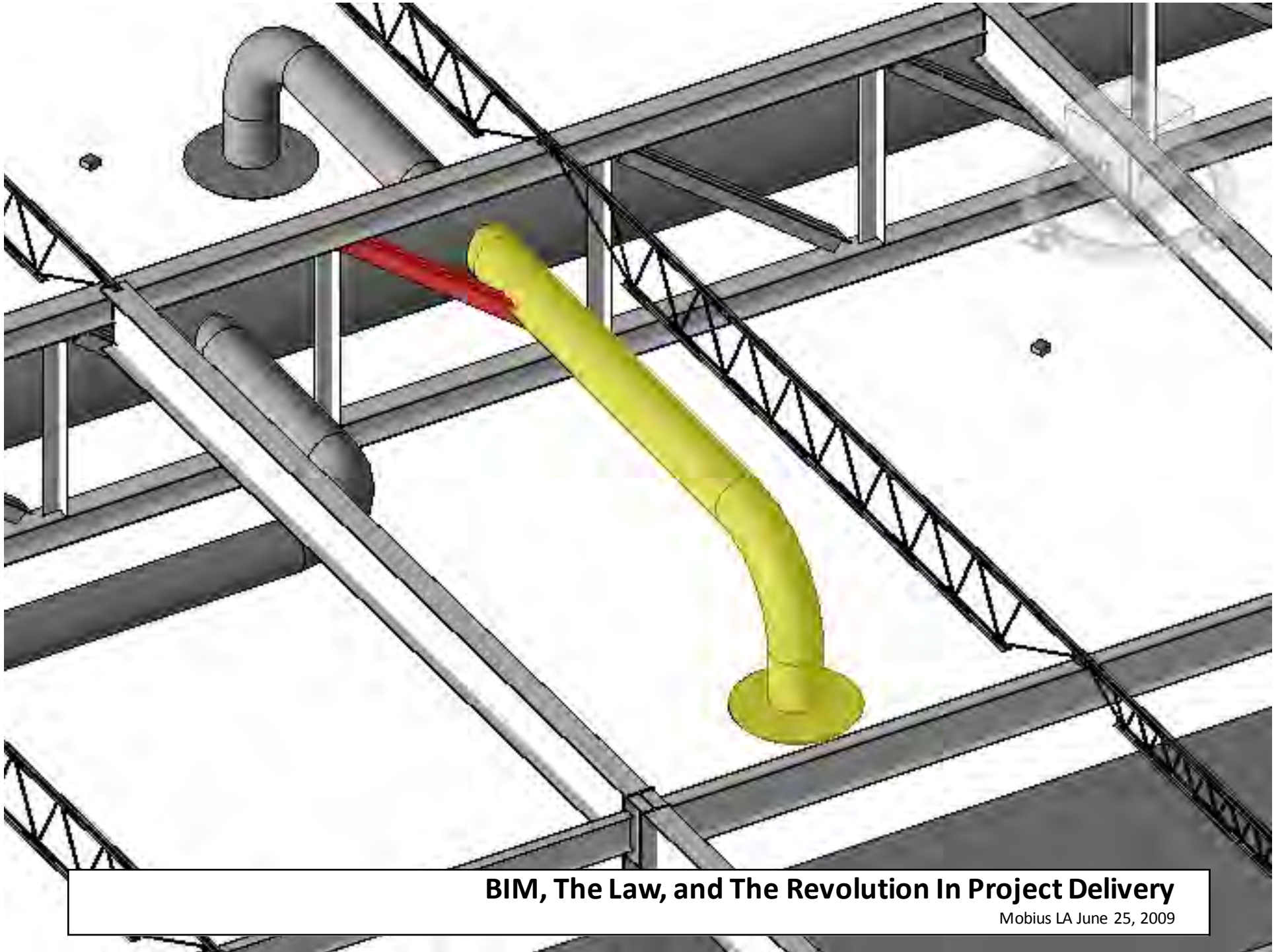


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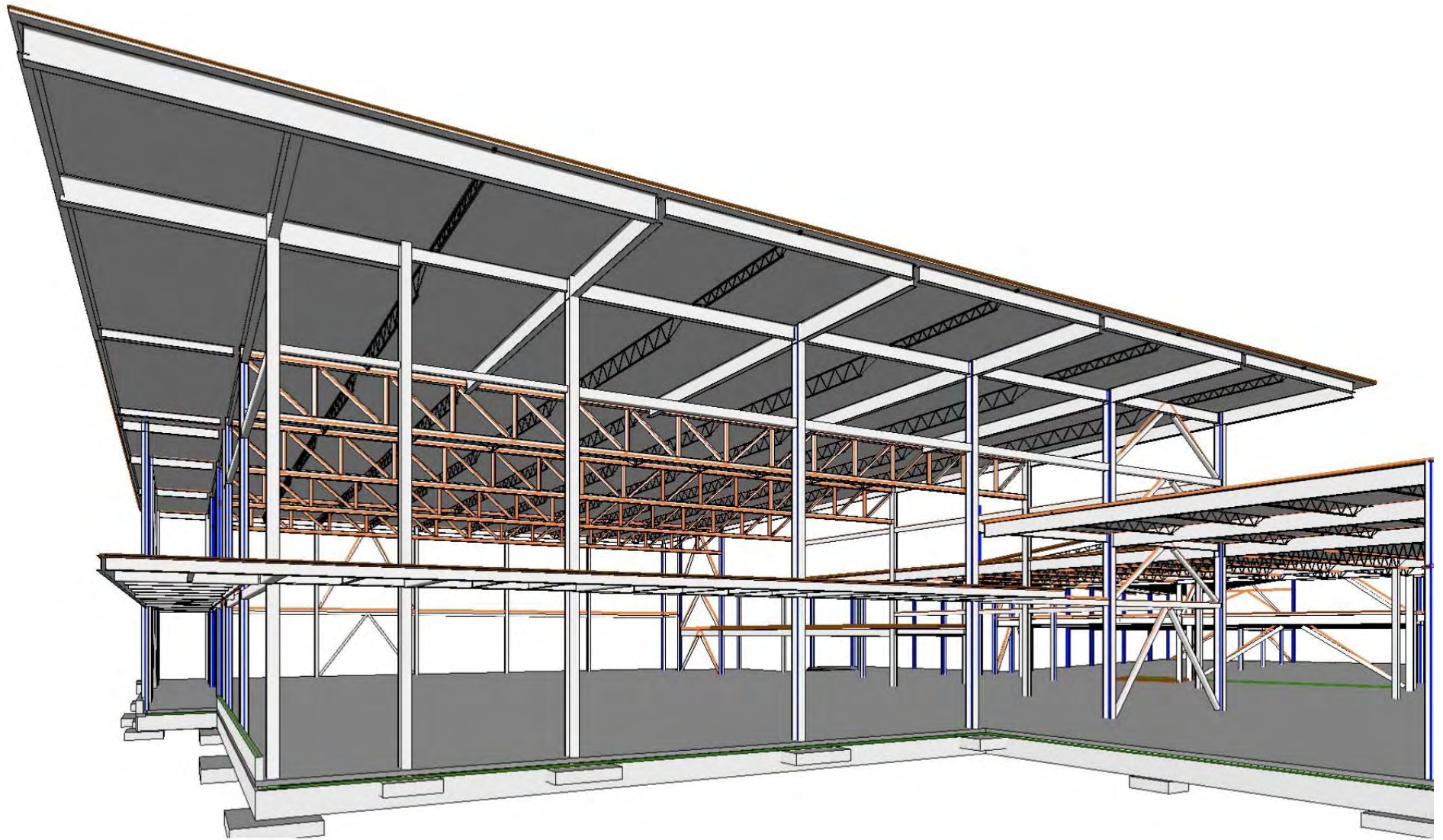
Benefits of BIM: Design **COORDINATION**





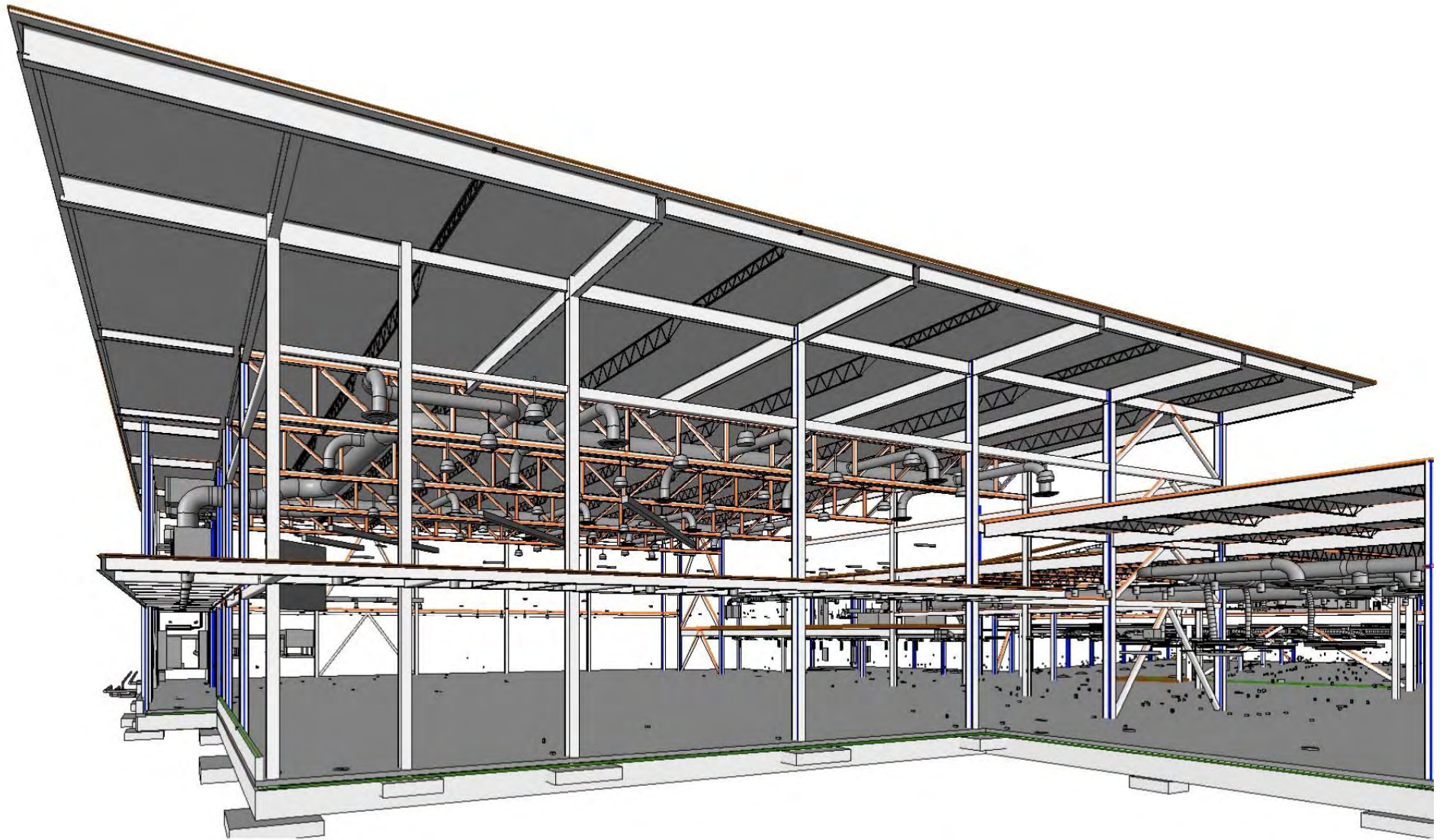
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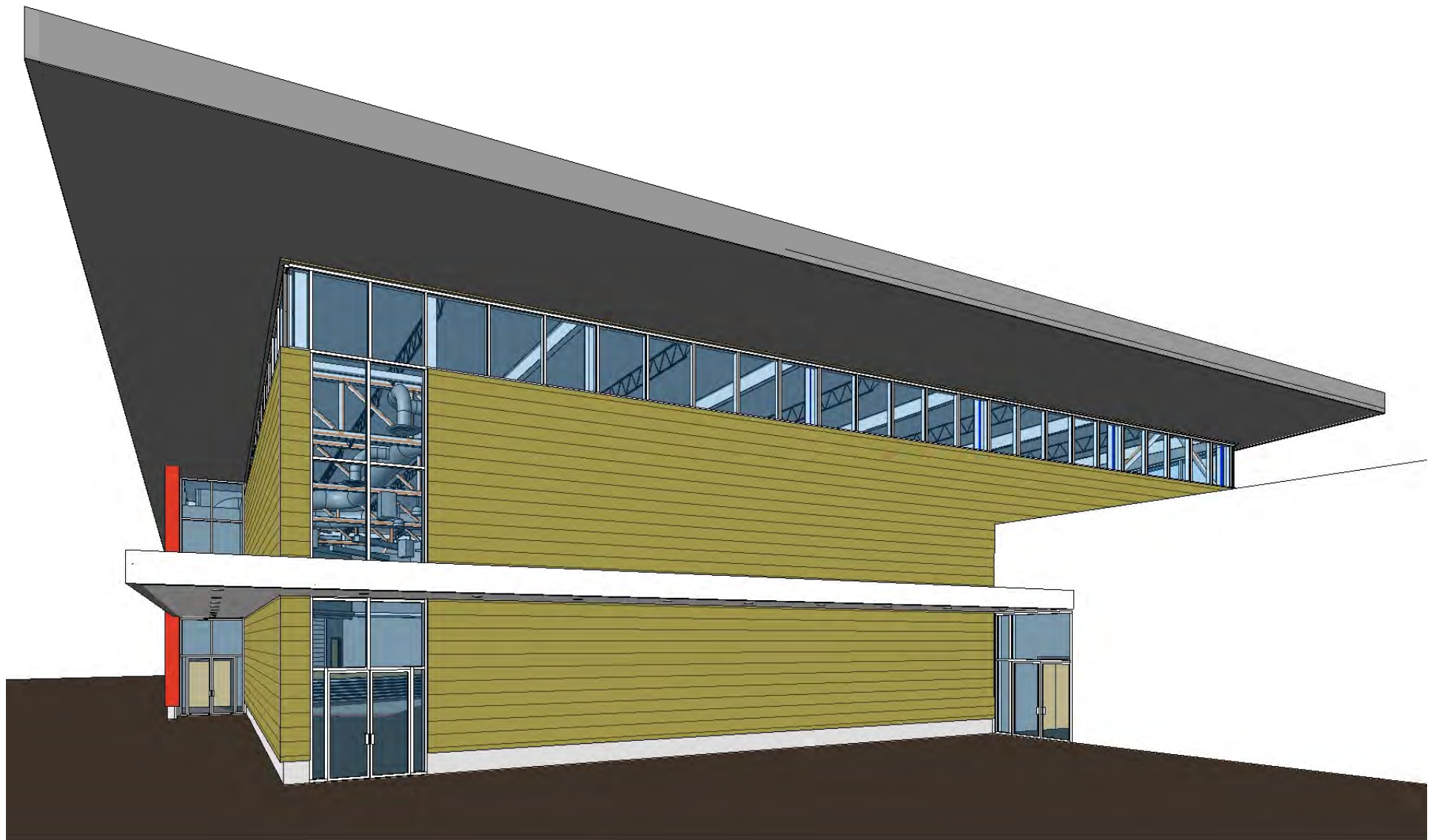
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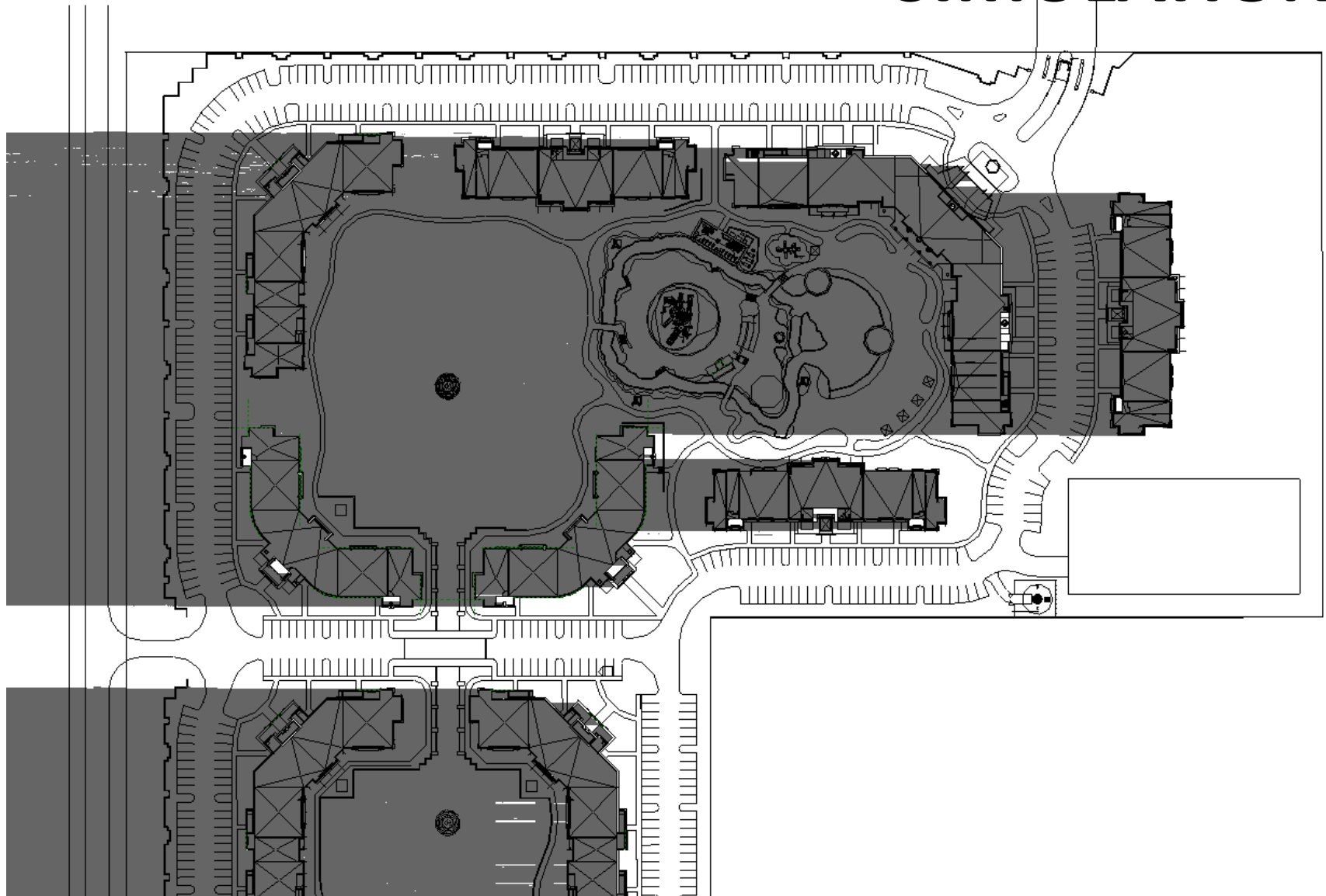
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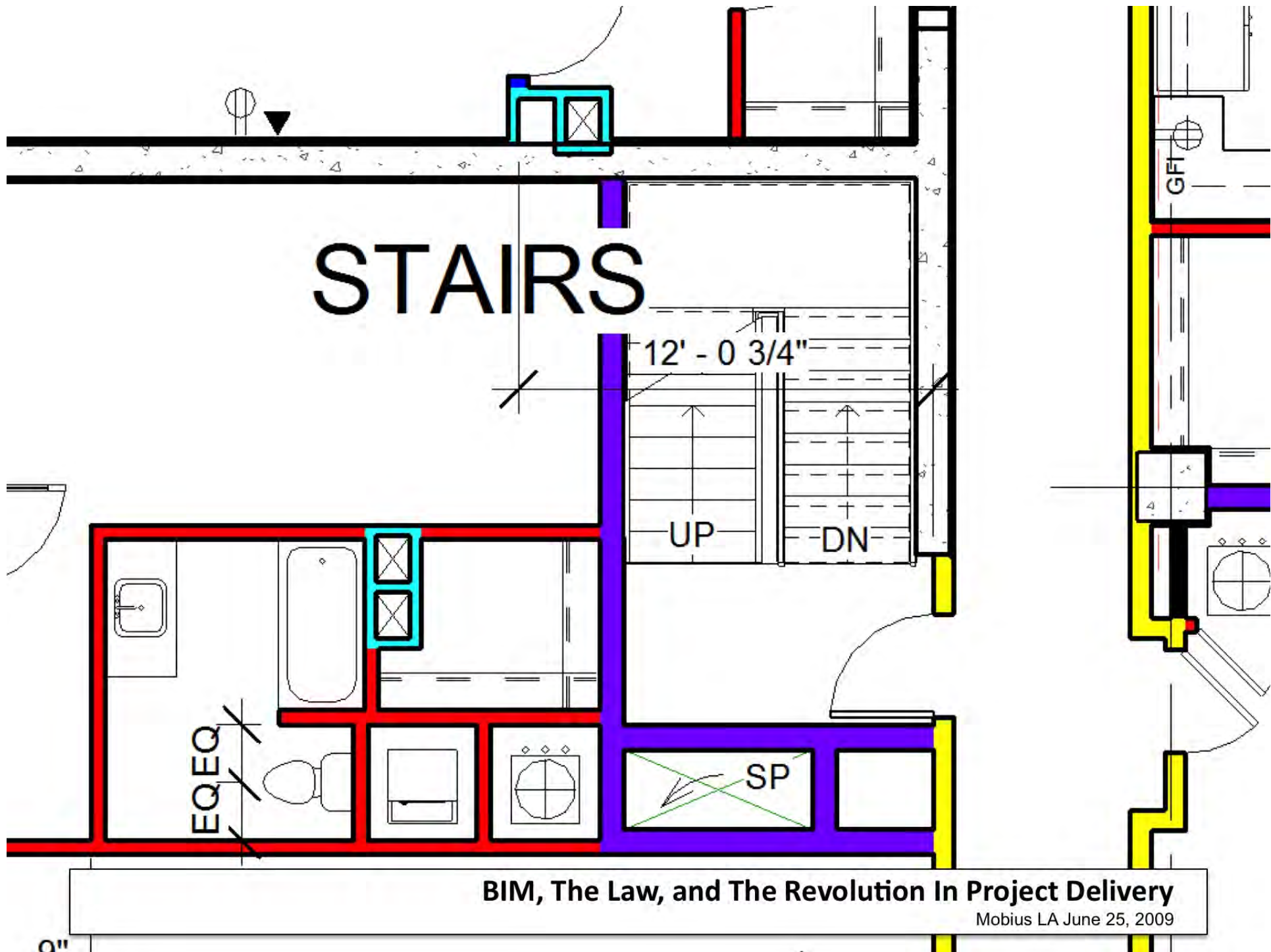
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Benefits of BIM: Design
SIMULATION



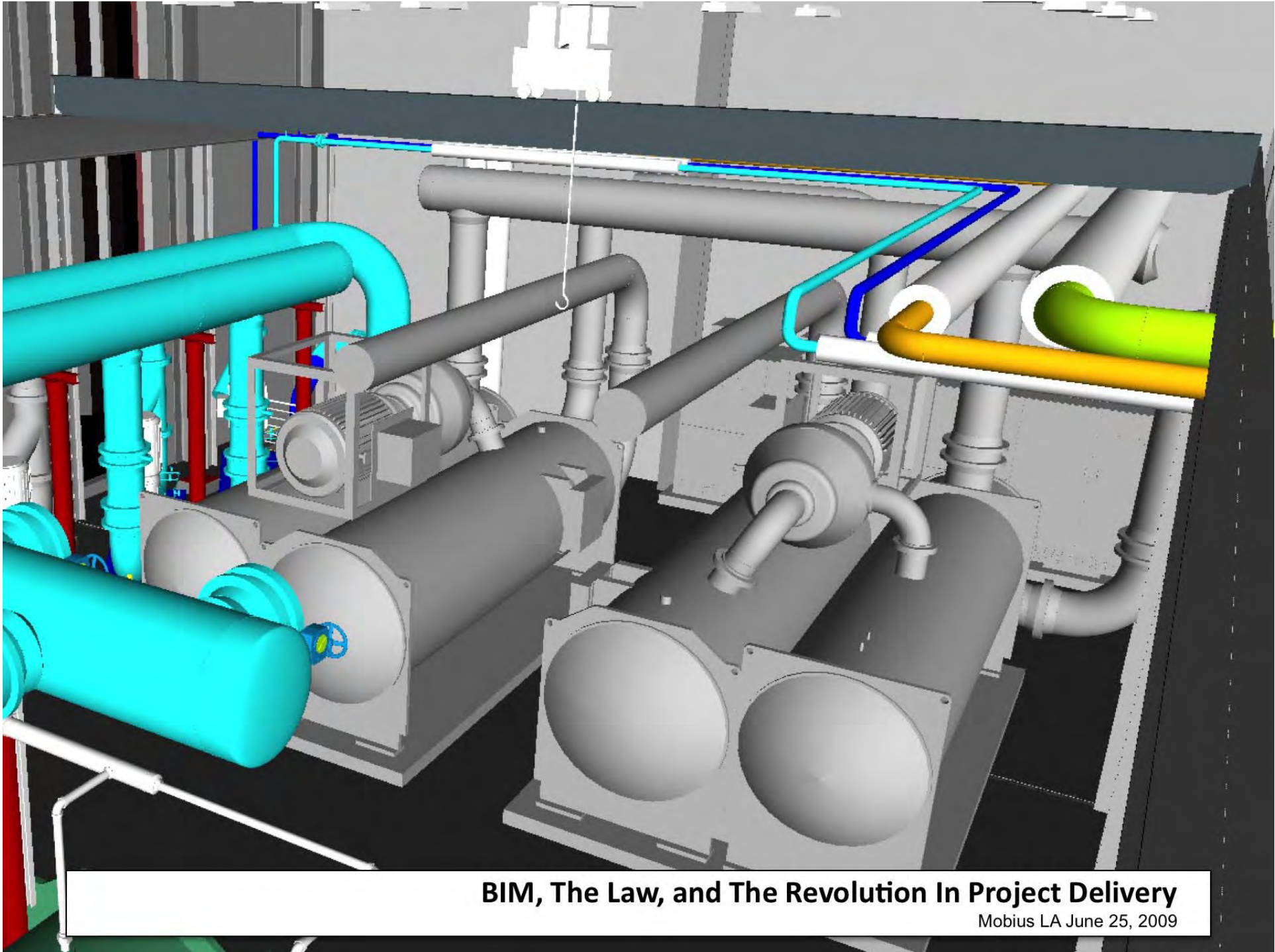
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Benefits of BIM: Design VISUALIZATION

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Benefits of BIM:

THREE DIMENSIONAL UNDERSTANDING



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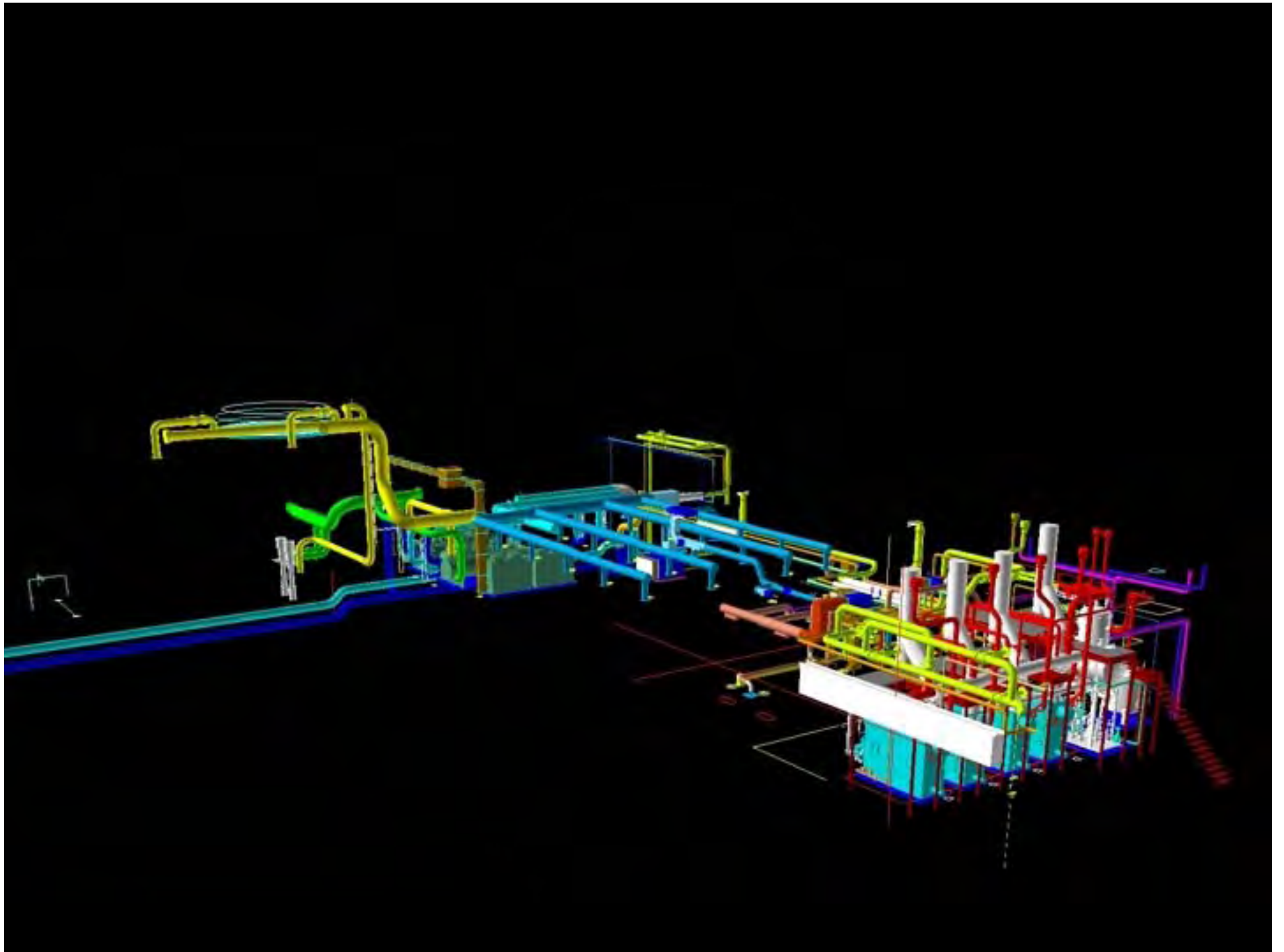
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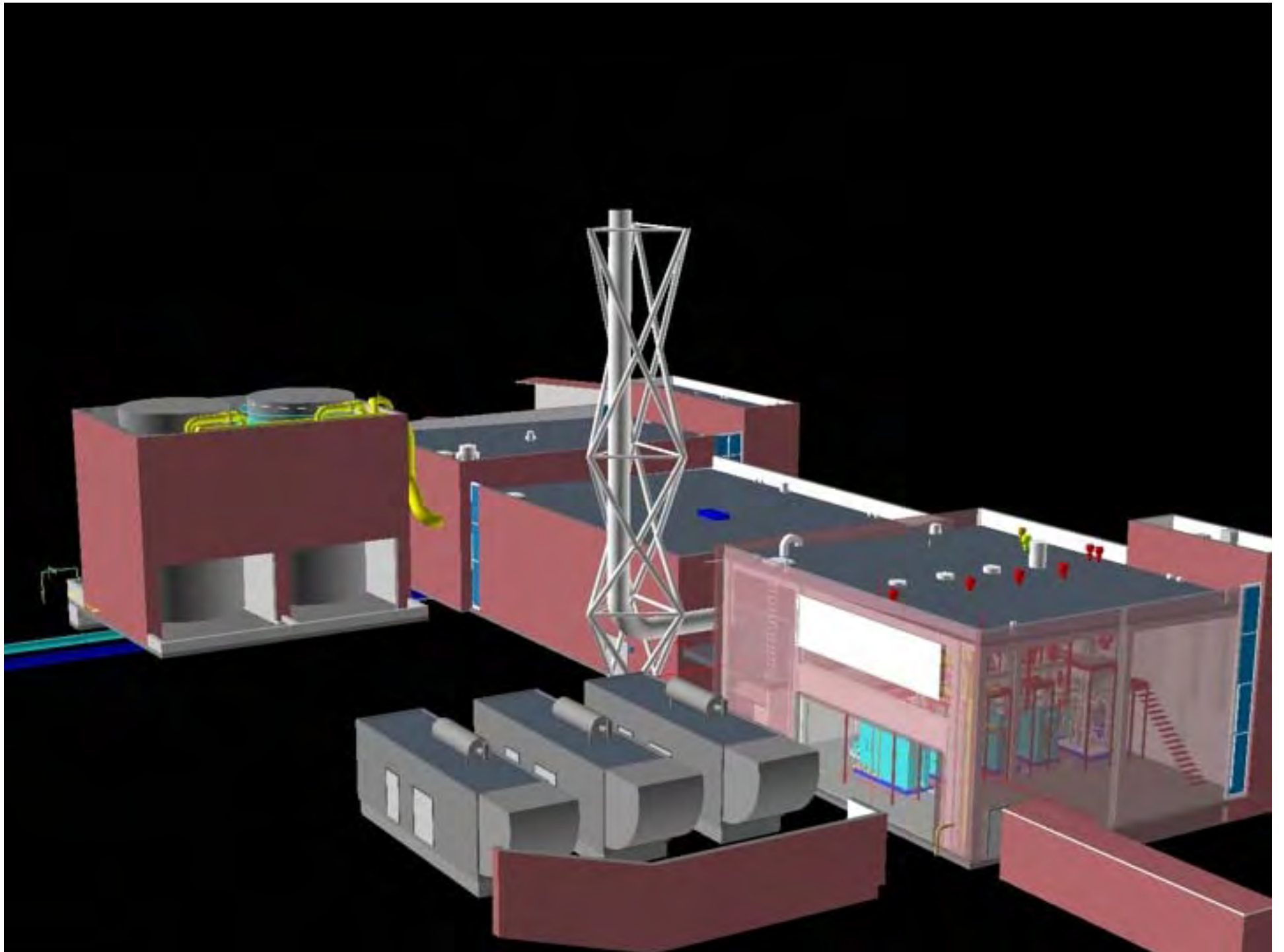


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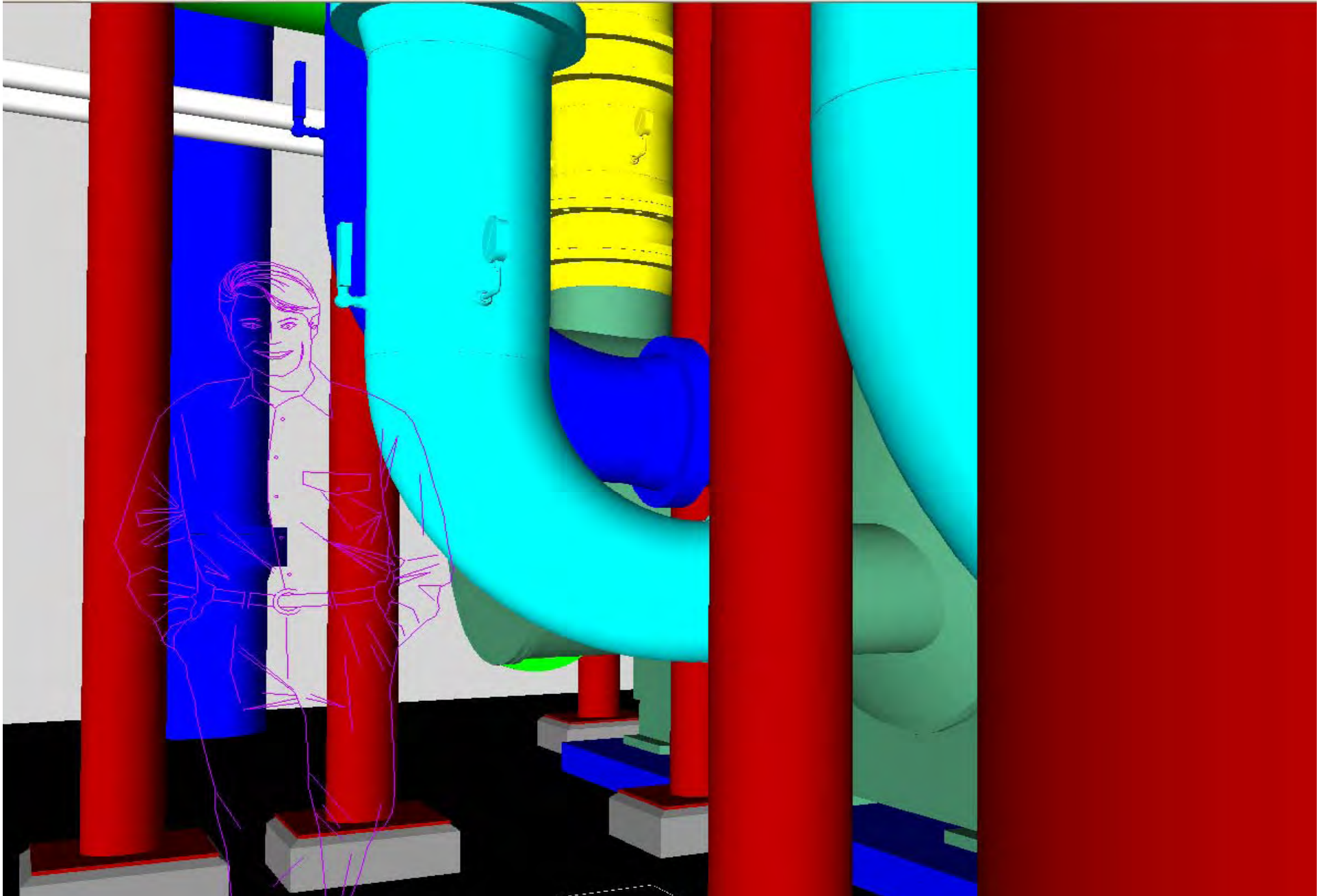


Benefits of BIM: Design

COMMUNICATION

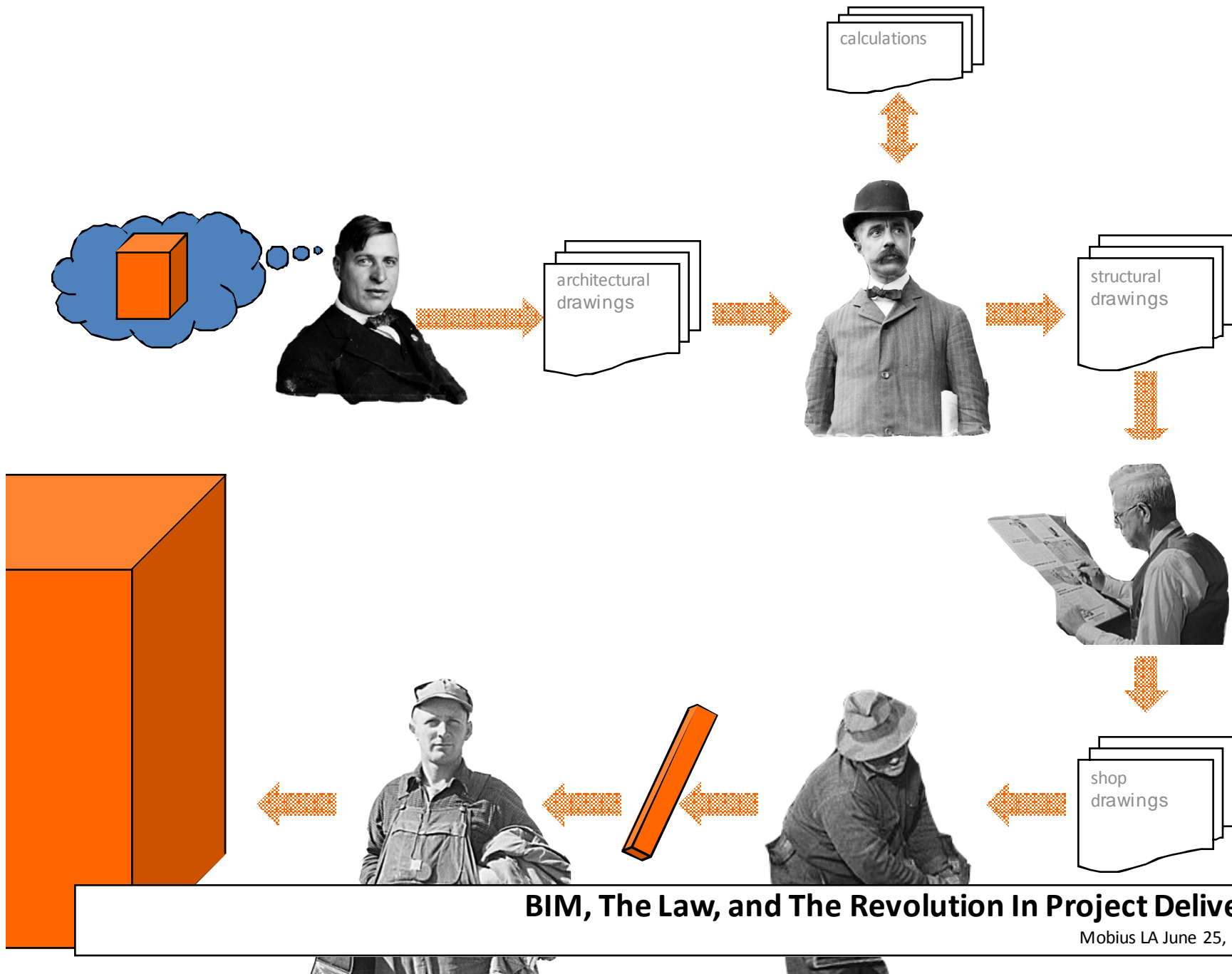
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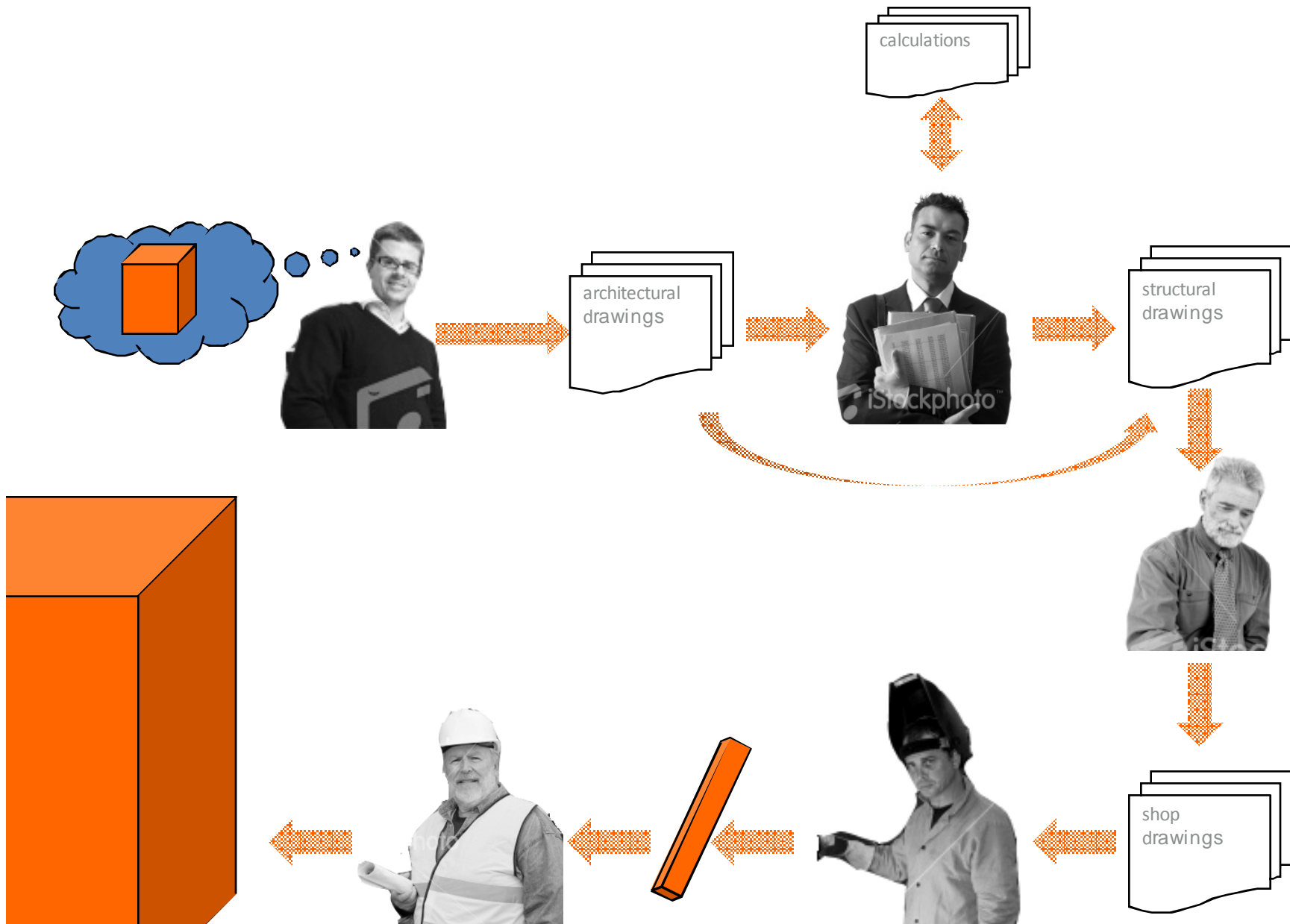
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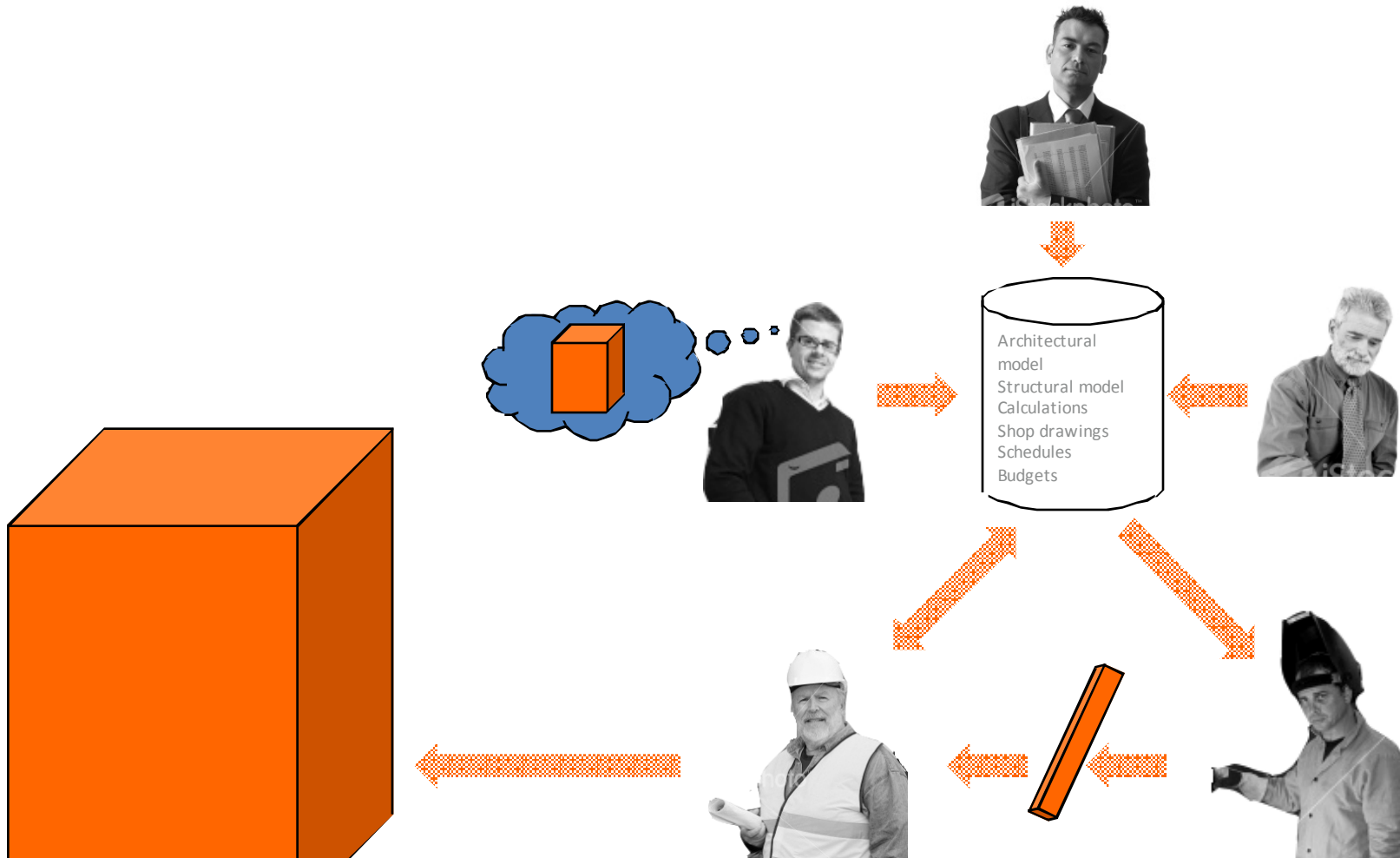
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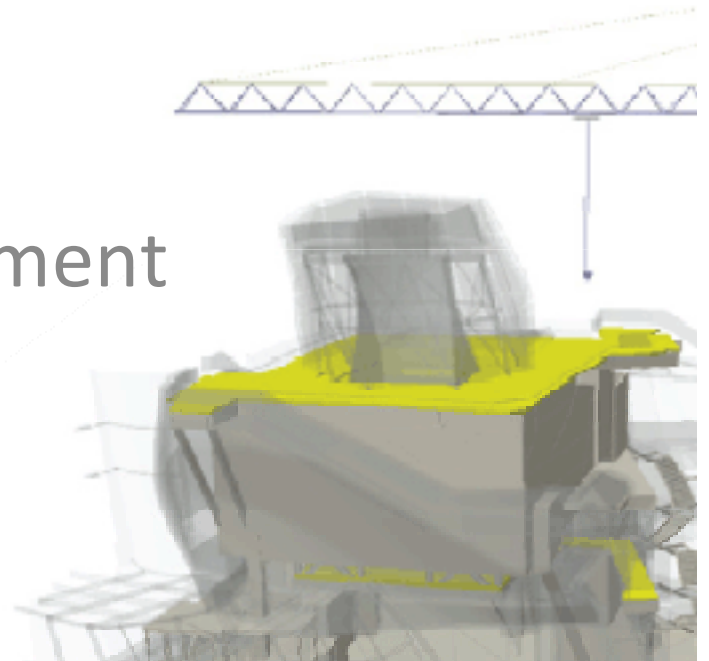
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How BIM changes the construction process

Roy F. Griffith

Director of Corporate Development

Gehry Technologies (gt)



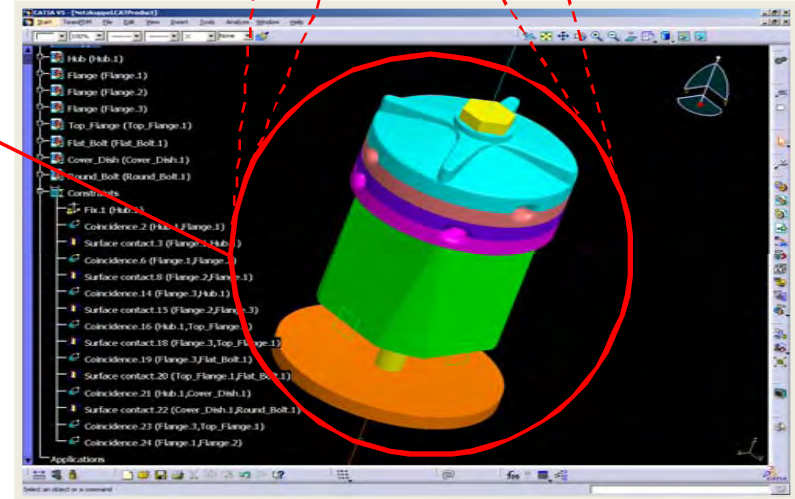
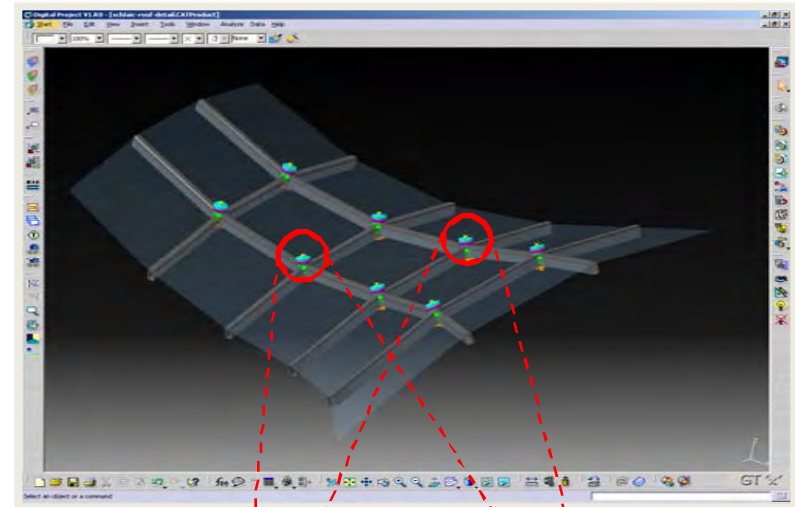
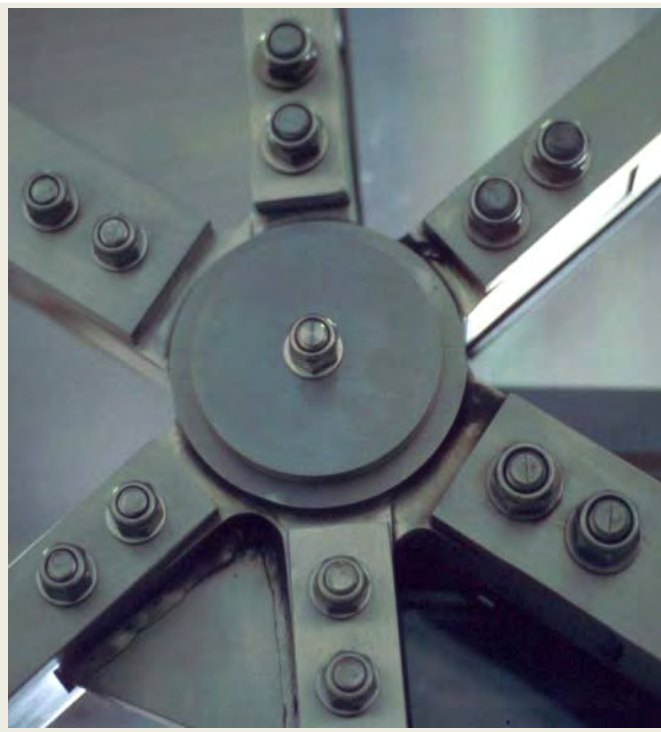
The BIM Process or

Virtual Design and Construction (VDC)

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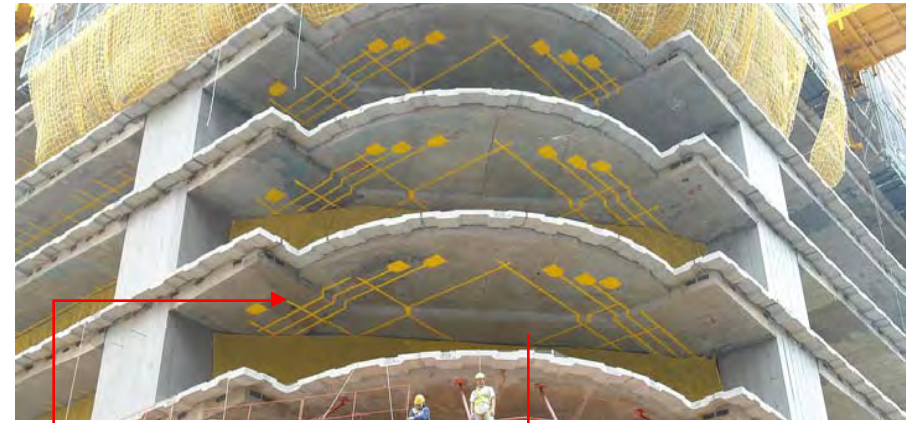
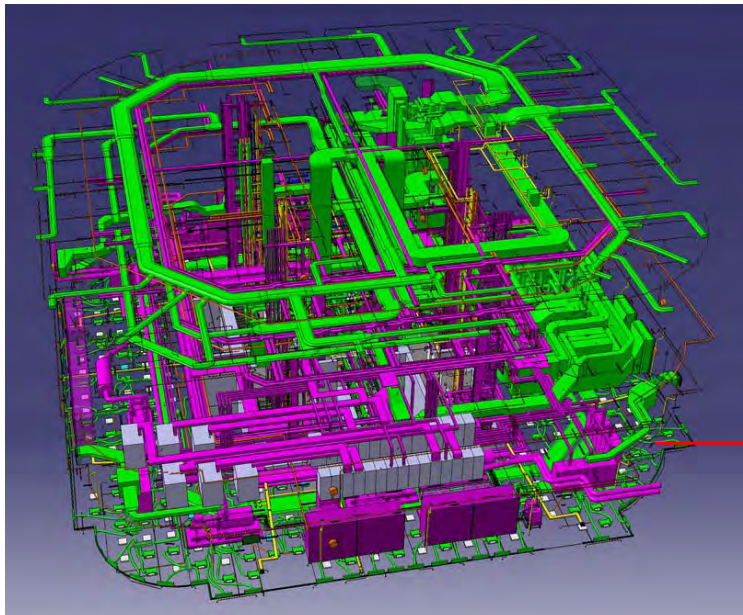
VDC as a digital fabrication process



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VDC as a digital installation process



+2,000 clashes resolved before construction

Tightly coordinated ceiling = higher revenue per floor

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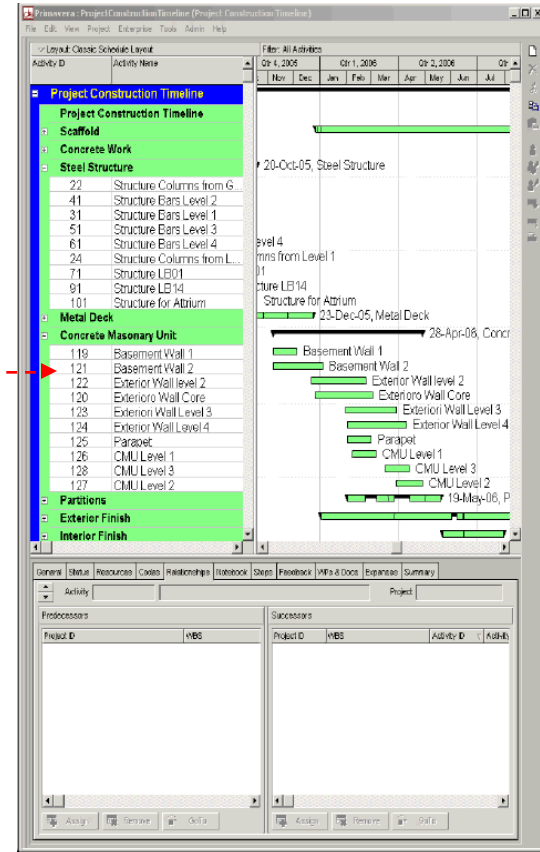
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VDC as a scheduling process



Microsoft Excel - HK150001

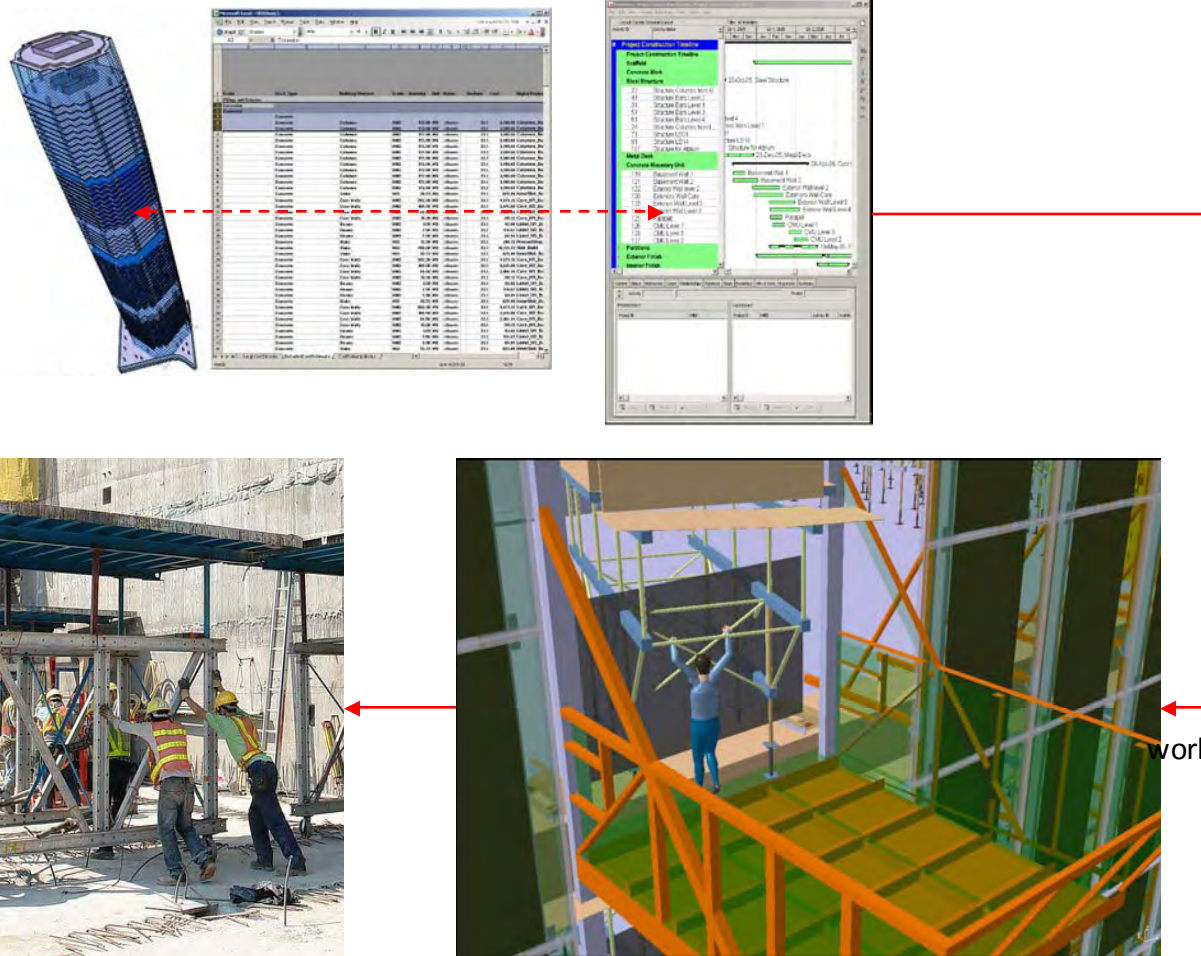
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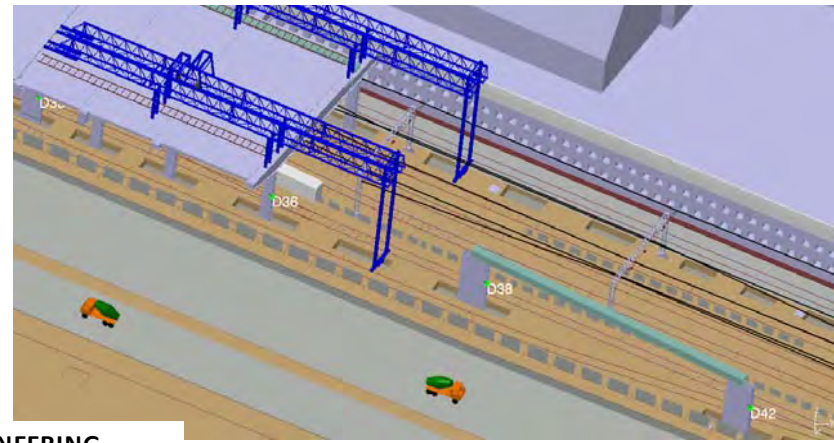
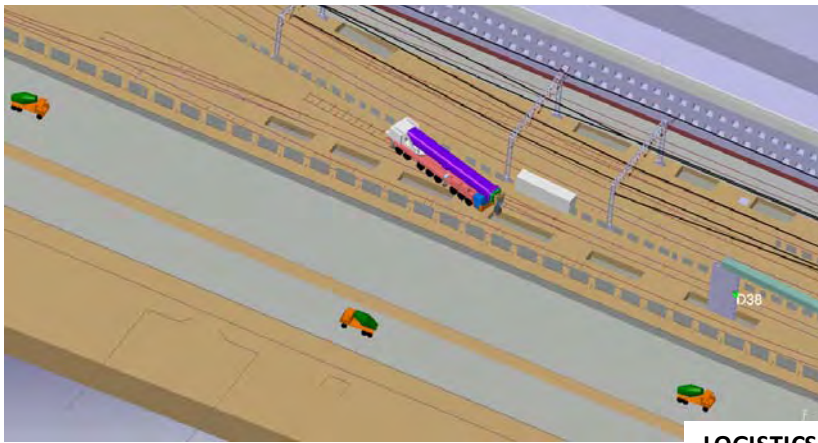
VDC as a scheduling process



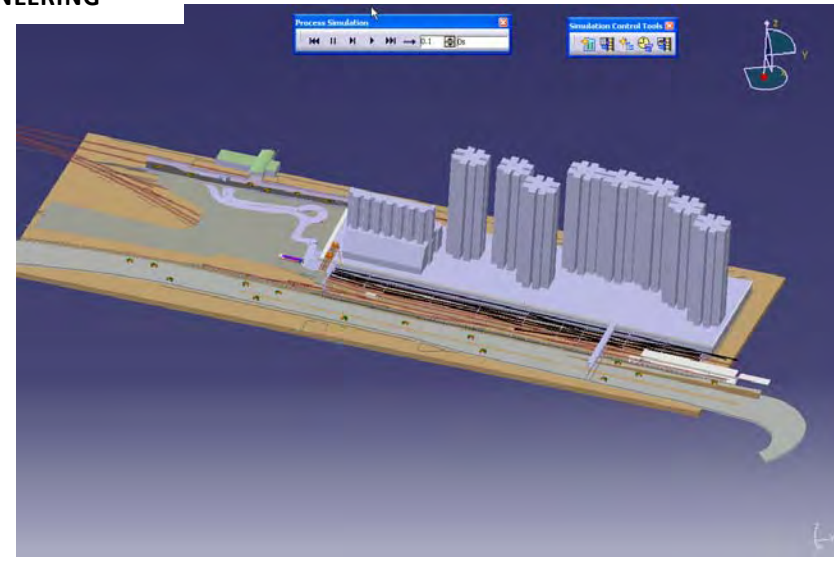
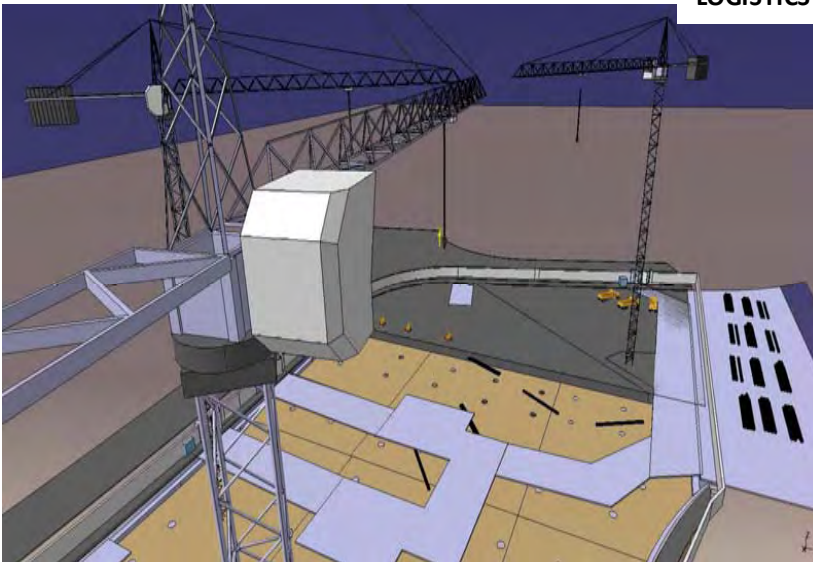
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VDC as a logistics process



LOGISTICS OPTIONEERING



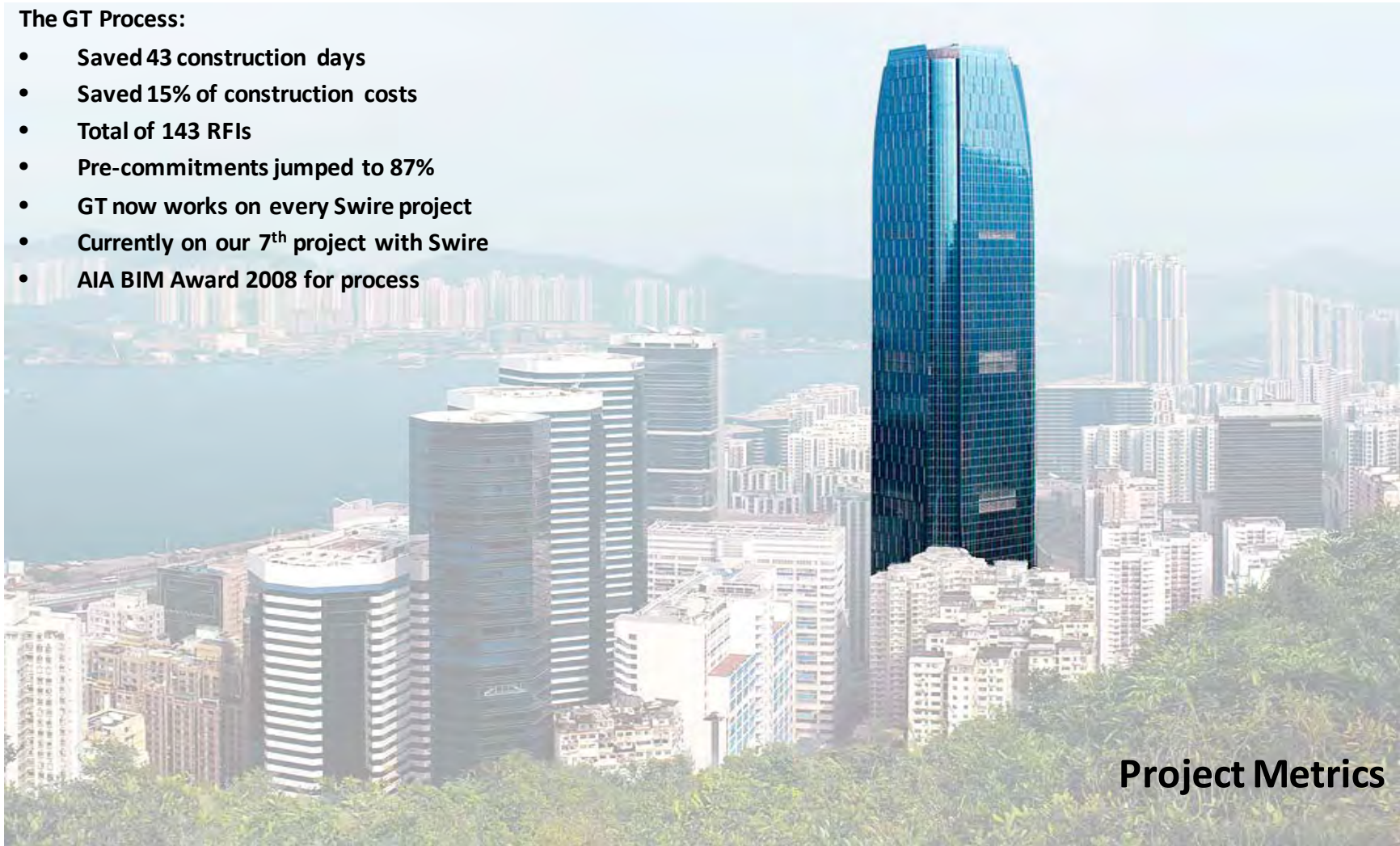
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The VDC payoff in construction

The GT Process:

- Saved 43 construction days
- Saved 15% of construction costs
- Total of 143 RFIs
- Pre-commitments jumped to 87%
- GT now works on every Swire project
- Currently on our 7th project with Swire
- AIA BIM Award 2008 for process



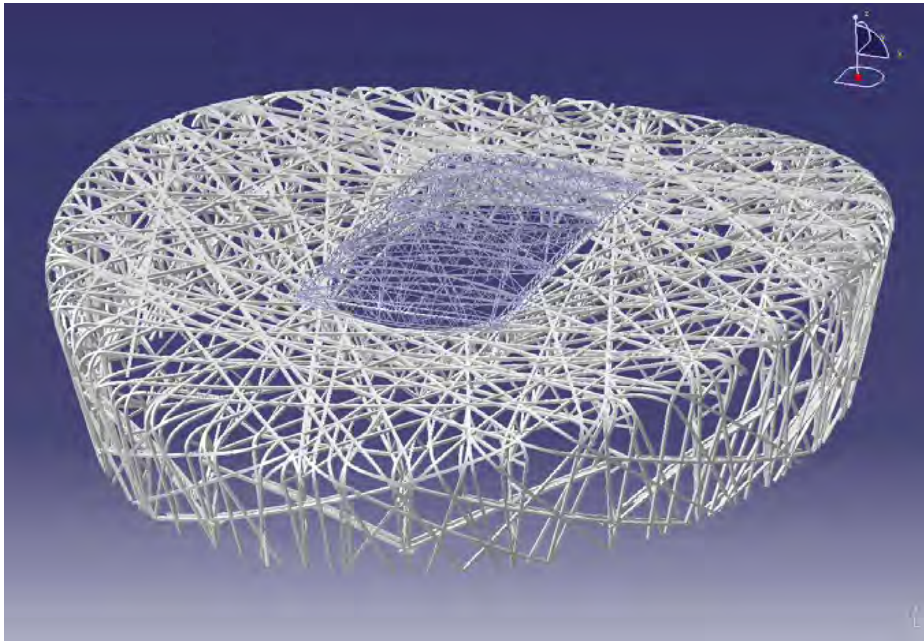
Project Metrics

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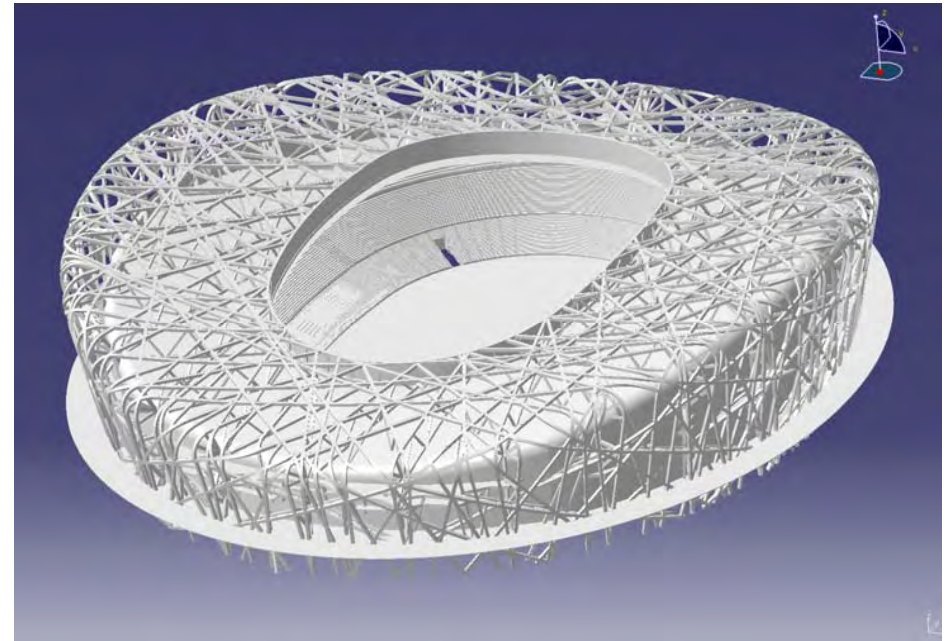
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The VDC payoff is construction

original intent



final building

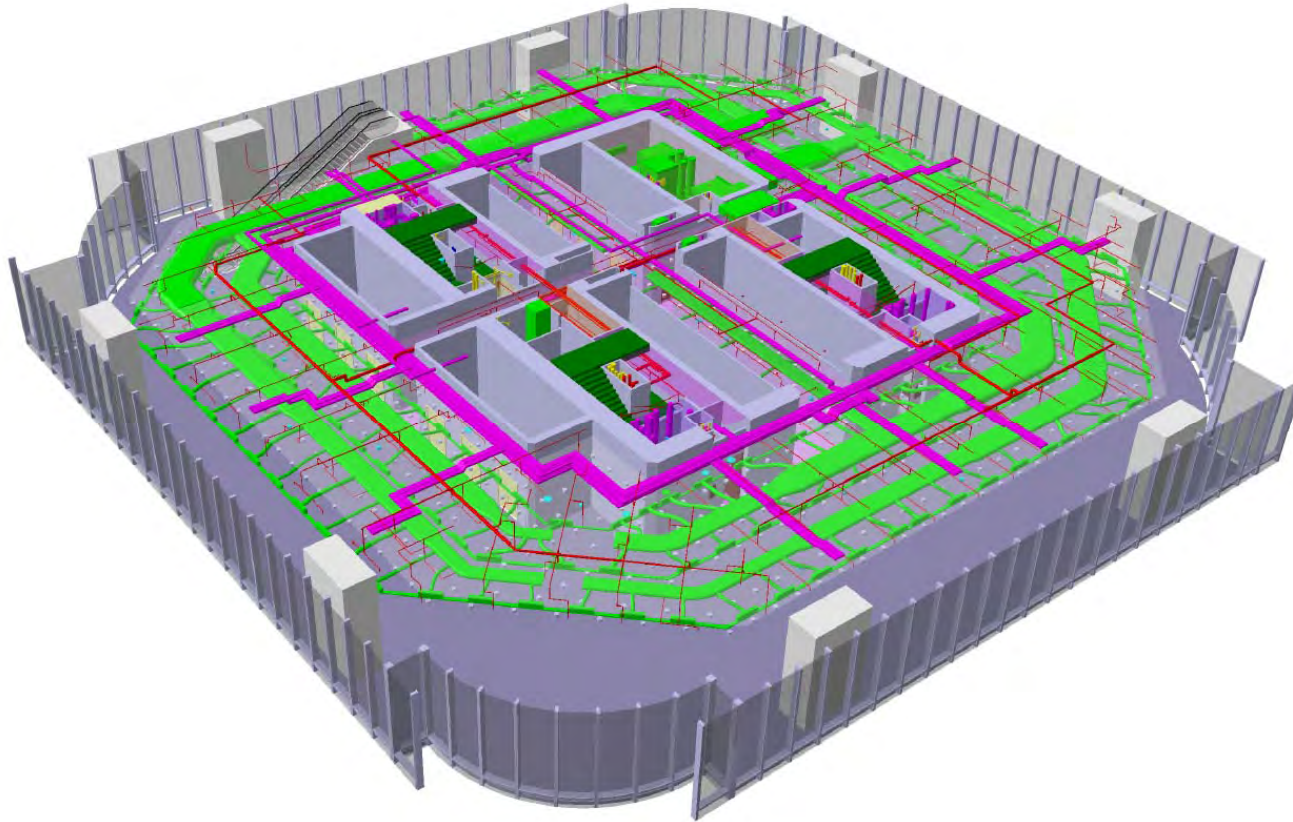


REDUCED 30% OF PROJECT STEEL
Retained the architects' design intent
Retained / developed structural integrity

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The VDC payoff in operation



As-built web-based model for FM integration



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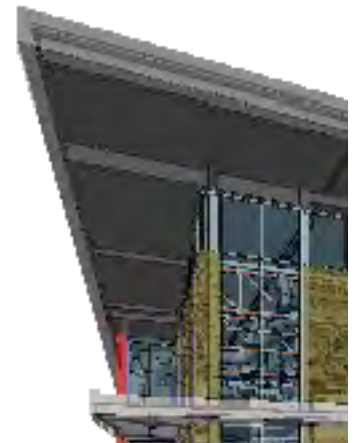
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BIM pitfalls, challenges, and lessons learned

Robert W. Vanech

Chairman & CEO

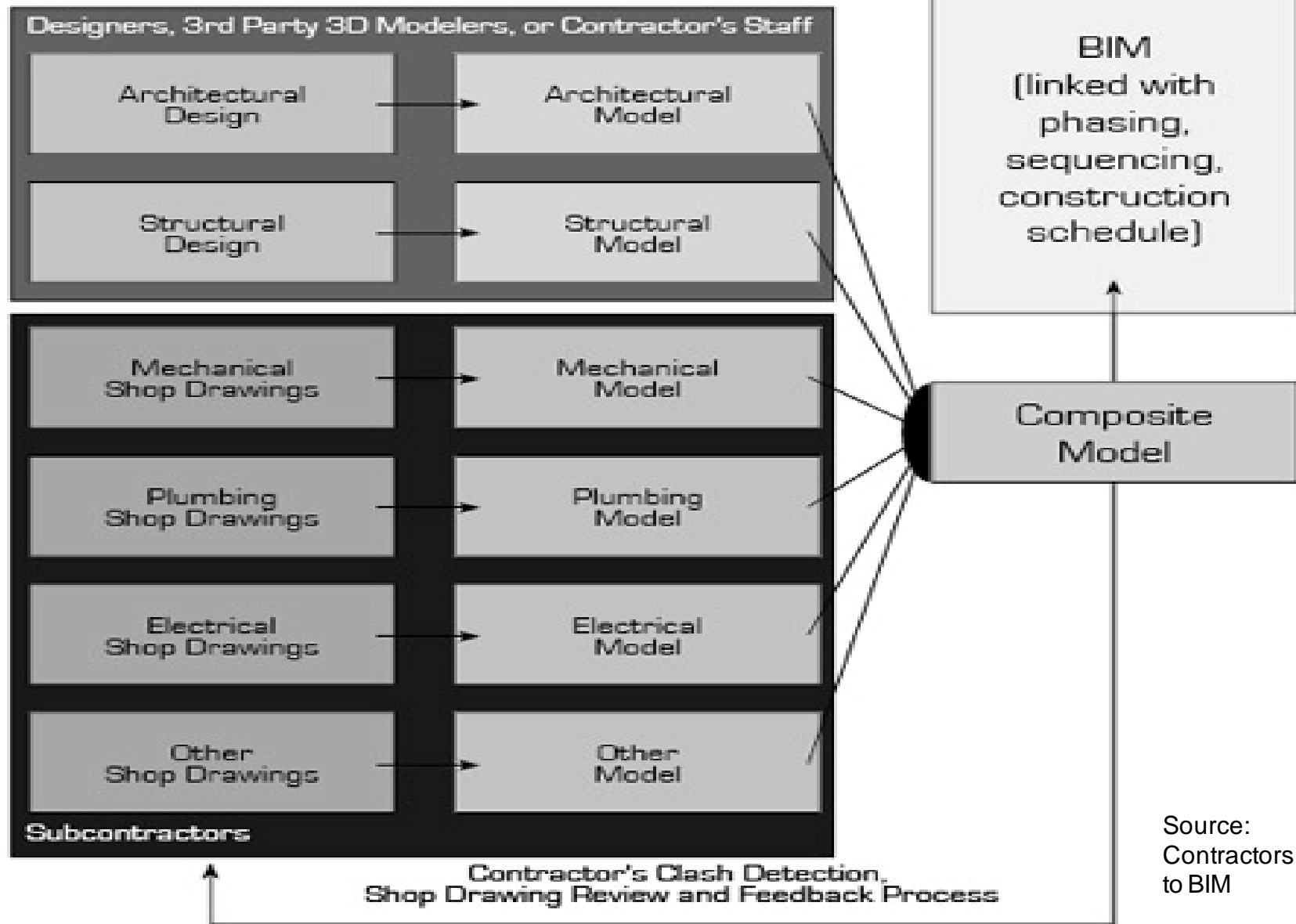
CADFORCE, Inc.



- The lack of adequate interoperability and complexity among BIM software tools
- New expensive technology infrastructure needed for large projects
- Changing roles and responsibilities of individuals and firms
- The need to develop new workflows, standards, and communication tools when using BIM tools
- A shortage of personnel skilled in BIM who *also* have real life architecture experience
- The relatively high initial investment needed for training, setup of templates and custom component libraries, and software purchase

Things that make BIM tough

Multiple Models into a "Composite Model"

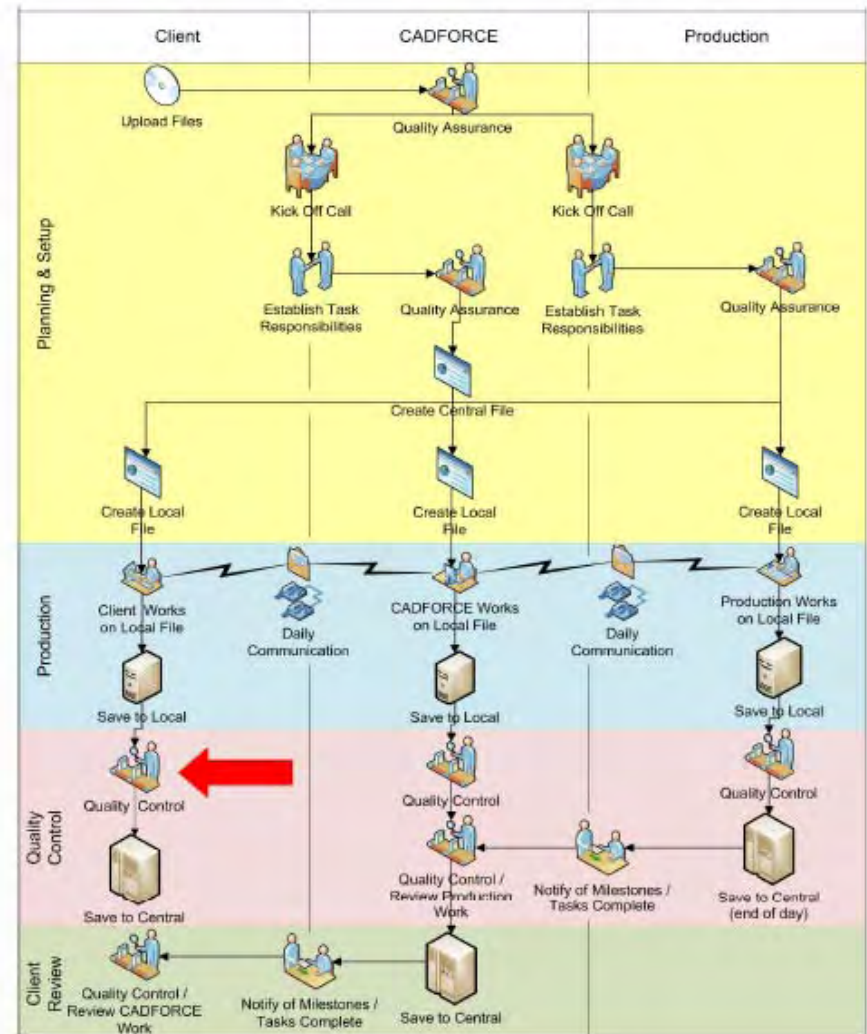
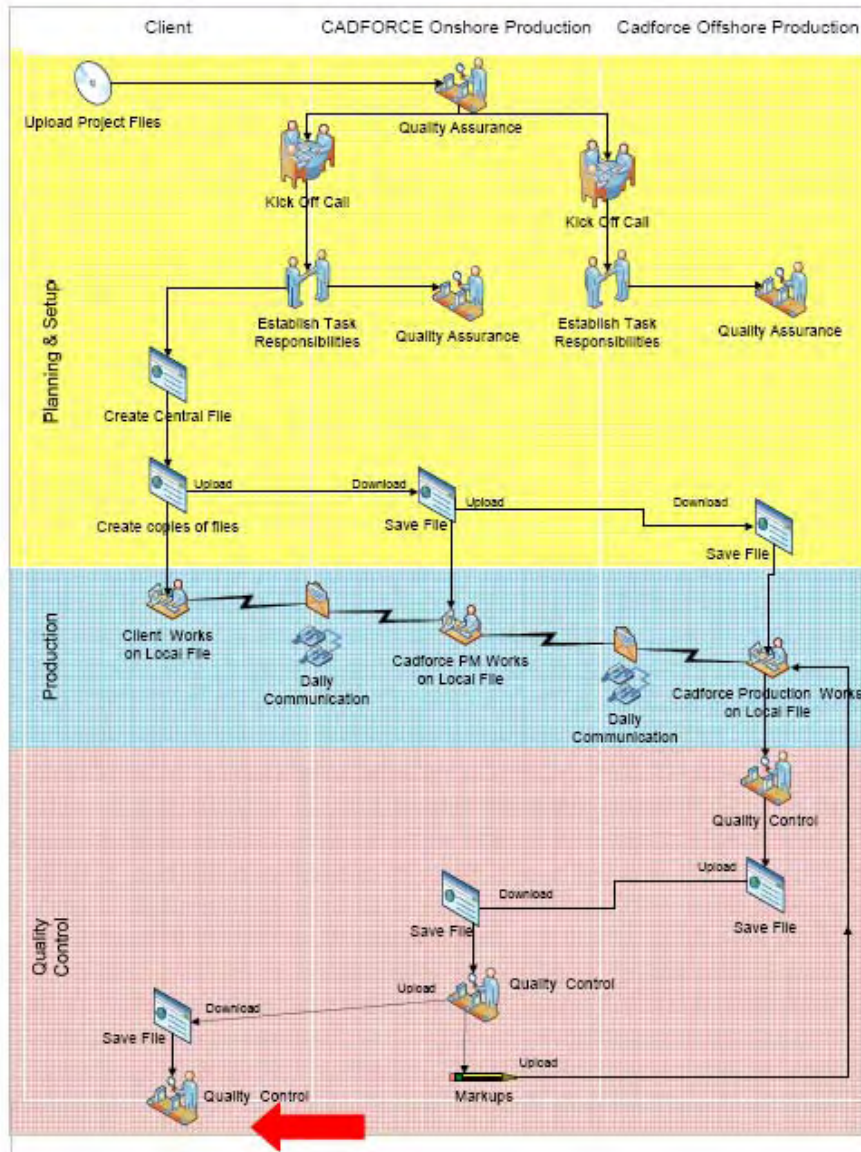


Source:
Contractors Guide
to BIM

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Asynchronous Modeling vs. Concurrent Workflow



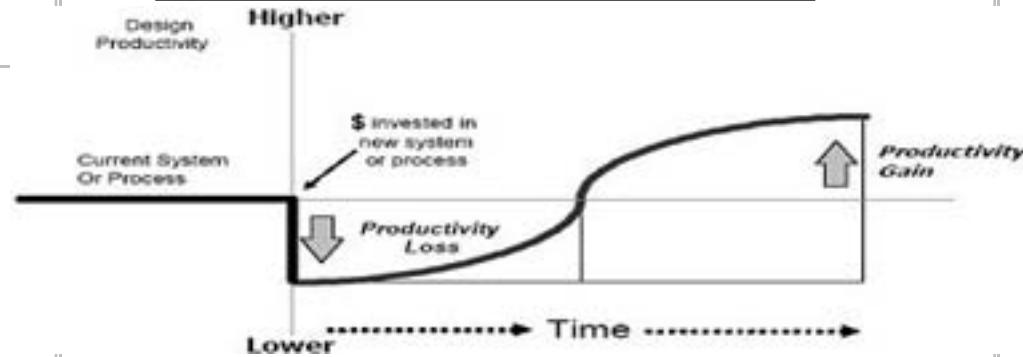
- EBIM
- Infrastructure lease options
- Process, planning, training, continual improvement
- Teaming
- Incremental Darwinian adoption, client-funded, ROI-based decisions

Ways to make things easier

ROI

First Year ROI Calculator For Technology Investments

$$\frac{\left(B - \left(\frac{B}{1 + E} \right) \right) \times (12 - C)}{A + (B \times C \times D)}$$



Source: Cadalyst.com, Rick Rundell, AIA, 2004

A= Cost of Hardware and Software (\$)
 B= Monthly Labor Cost (\$)
 C= Training Time (months)
 D= Productivity Lost During Training (%)
 E= Productivity Gain After Training (%)

Editable variables	
	\$100,000
	\$10,000
	3.00
	50%
	25%
ROI %	16%

Hosting Composite Models and Concurrent Modeling

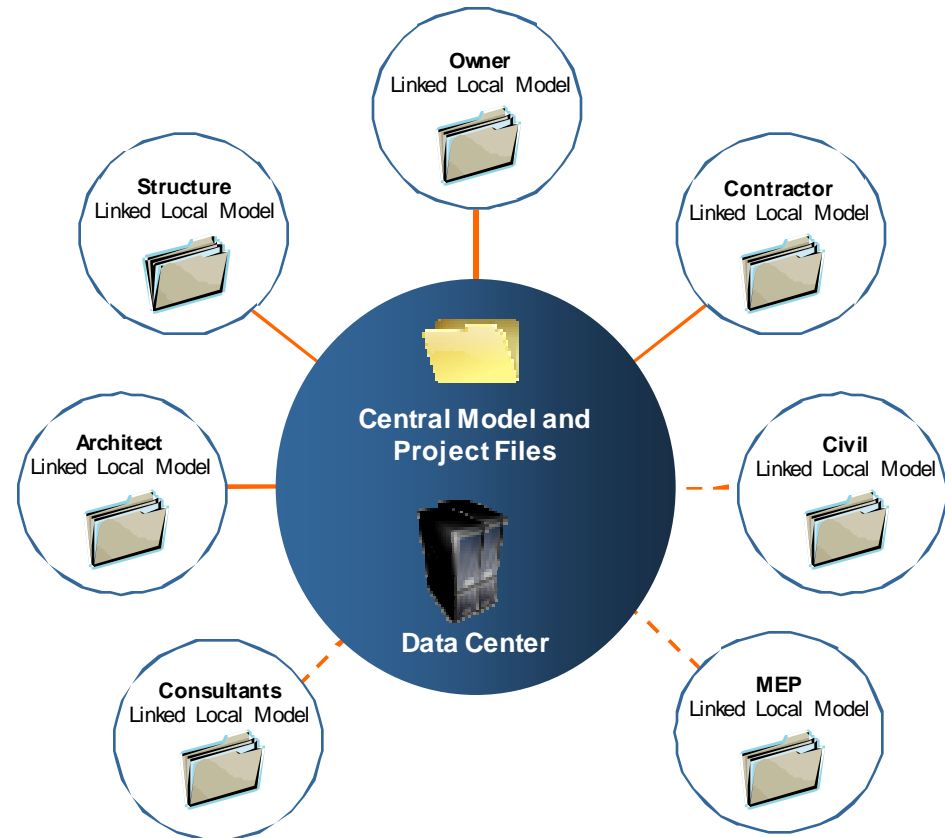
Managed Infrastructure

Managed data center

Model hosting

Private secure network

Serving infrastructure for BIMApps



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BIM Issues catalyze opportunity

Emerging BIM Service offerings for Owners

- ★ Executive BIM (EBIM).
- ★ BIM Integration.
- ★ BIM Coordination and Management.
- ★ Value Added Applications (BIMApps).
 - ★ Clash
 - ★ Sequencing and Visualization
 - ★ Scheduling
 - ★ 5D
 - ★ 6D

Thank you for your time!

This concludes the American Institute of Architects
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