Harness the Technology Innovation Revolution

Course Number TH204

Thursday, June 21, 2018, 7:30 AM – 9:00 AM

Learning Units 1.5 LU RIBA

A'18 AIA Conference on Architecture 2018
June 21-23, New York City

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Questions related to specific products and services may be addressed at the conclusion of this presentation.

Acknowledgements/Credits

Onuma Inc

BIMStorm

Hagan Technologies LLC

Construction.com

Construction Data Ventures LLC

Jeff Gravatte and CADD Micro

Speakers List

Stephen Hagan FAIA
- President | CEO, Hagan Technologies
- Principal, Construction Data Ventures

Kimon Onuma FAIA
- President, Onuma, Inc.

Jonathan Widney
- Principal, Construction Data Ventures

Steve Jones
- Senior Director, Dodge Data & Analytics

Course / Learning Objectives

1. Upon completion, participants will be able to establish and prioritize the top 3 or 4 emerging technologies that interest them and their firms and pose great opportunities for the future of their practice. These innovative technologies enable the architect and architectural practice to increase the value of the built environment in terms of safety, occupant comfort and well-being, often using data and technology feedback for human-centric and experiential design processes.

Course / Learning Objectives

2. Upon completion, participants will be able to understand what path-breaking and leading firms are doing to dramatically improve outcomes and provide innovative services to their clients and customers. These firms have transformed their practices through the immersive use of these innovative technologies and processes, thereby increasing productivity and profitability, in addition to improving building systems, materials and methods, as well as quality and integrative of design and construction documents and follow-on construction contract administration.

Course / Learning Objectives

3. Upon completion, participants will be able to understand how the built environment, form and function of architecture, and everything from small components to entire buildings to regions and urban scale can be dramatically improved by new emerging technologies--whether it is wearable computing, cloud computing, or big data. A special focus of the presentations and interaction with attendees will be on critical building systems, materials and methods, as well as design and construction processes (codes and standards, environmental compliance, new as well as renovation and historic preservation).

Course / Learning Objectives

4. Upon completion, participants will be able to take key ideas back to the office on Monday and create their own Innovative Technology Execution Plans for their in-house projects and firm-wide business planning. Included in the workshop is a workbook with exercises throughout the day and a process and strategy to create a personal Game-Changing Innovation Technology Execution Plan. Each attendee will select one or more of critical topic areas to address in their Execution Plan: Building systems, construction contract administration and documents, design (including urban planning), environmental and legal project constraints and opportunities, materials and methods, pre-design and historic preservation).

Stephen R Hagan FAIA

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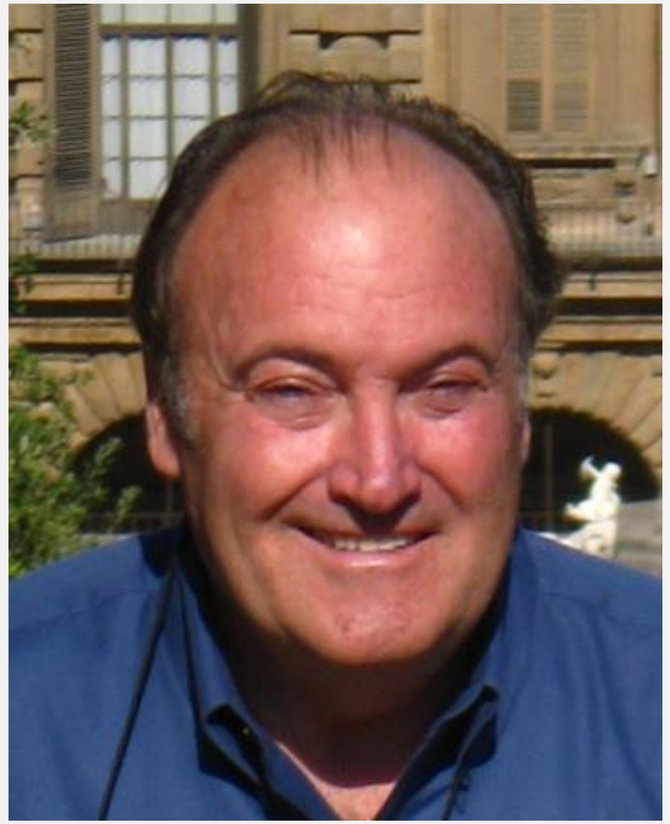
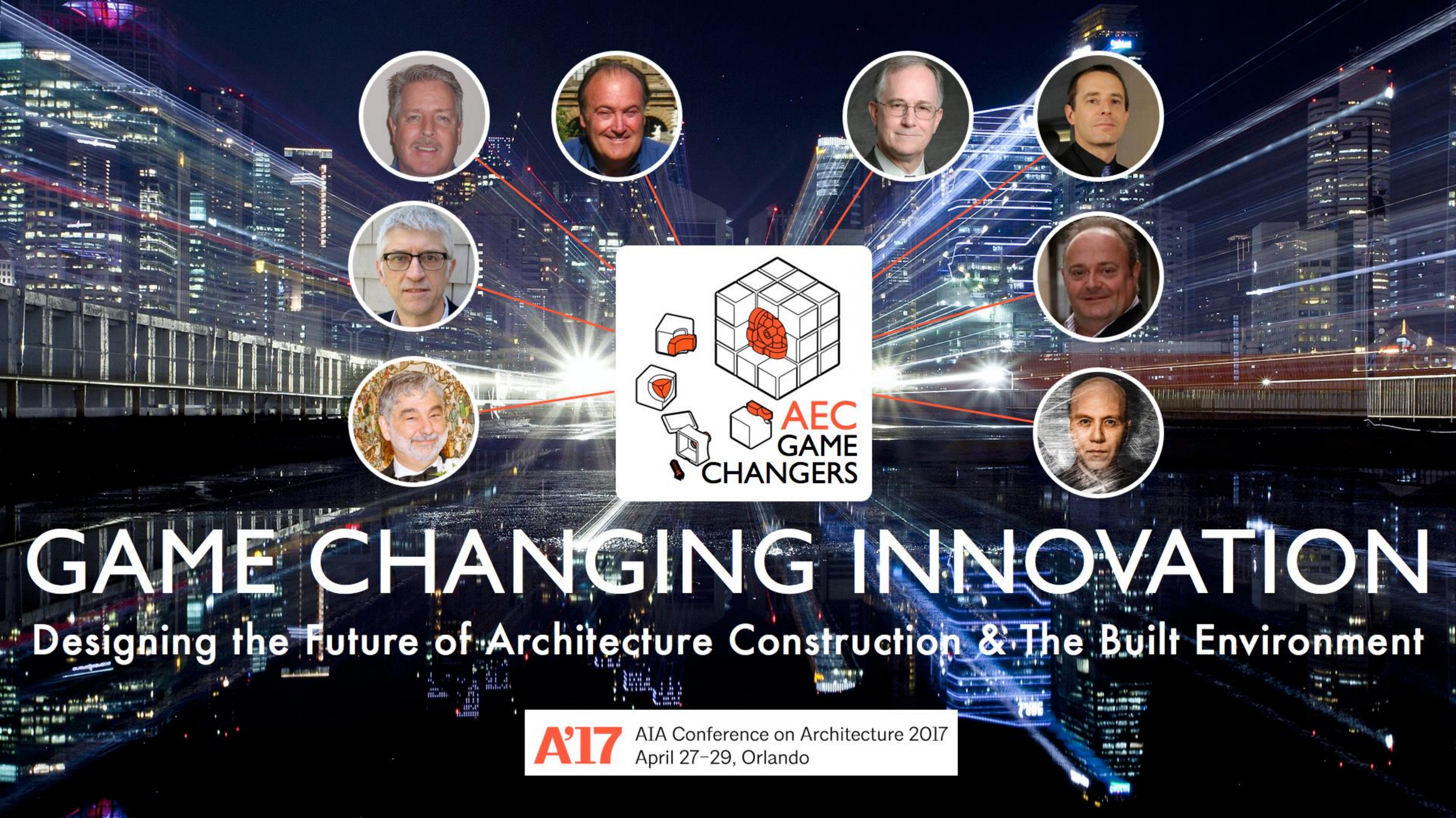


Harness the Technology Innovation Revolution

- A Tsunami of New Technologies
- Kimon Onuma
- Jonathan Widney
- Steve Jones
- Are You an *#AECGameChanger* ?
- Town Hall Discussion



GAME CHANGING INNOVATION

Designing the Future of Architecture Construction & The Built Environment

A'17 AIA Conference on Architecture 2017
April 27–29, Orlando

“ If you don’t change…you’re going to perish”

“If you want to survive, you’re going to change; if you don’t, you’re going to perish. It’s as simple as that.”—*Thom Mayne, FAIA, 2005 Pritzker Prize Winner*

Game Changing Innovations

- What are Game Changing Innovations?
- Metrics | ROI are Key
- Focus on Data
- Game Changing Innovation Execution Plan
- AI Blockchain and the Future

A Tsunami of Game Changing Innovations

A'18 AIA Conference on Architecture 2018
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A Tsunami of Game Changing Innovations

Model Authoring / Checking Tools

- BIM
- CAD
- CAFM | CMMS / IWMS
- Clash Detection
- Model Checking
- Simulation

A Tsunami of Game Changing Innovations

Immersive Technologies

- 3D Printing
- 3D Reality Model
- 3D / Laser Scanning
- 4D Scheduling
- Augmented Reality | Virtual Reality
- Reality Capture

A Tsunami of Game Changing Innovations

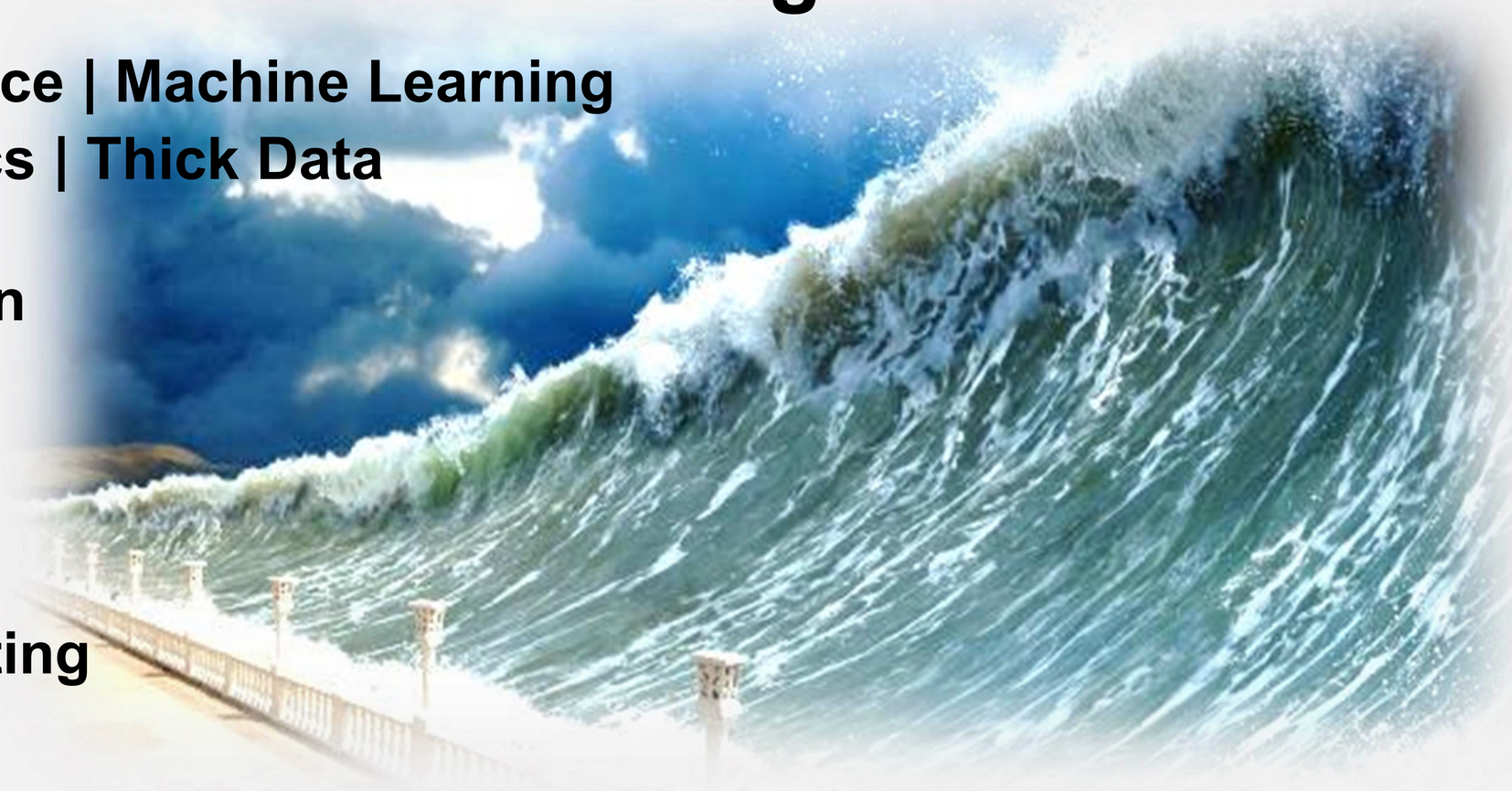
Internet Technologies

- Cloud Computing
- Cybersecurity
- Fog Computer | Edge Computing
- Geo-Spatial | GIS | Location
- Sensors /Sensor Web
- Mobile
- Platforms | Platform as a Service
- Software as a Service
- Web Services

A Tsunami of Game Changing Innovations

Machine / Computational Technologies

Artificial Intelligence | Machine Learning
Big Data | Analytics | Thick Data
Blockchain
Design Automation
Digital Fabrication
Drones
Internet of Things
Robotics
Pervasive Computing



A Tsunami of Game Changing Innovations

Social Networking

- **Social Networking and Media**
- **Wearable Computing**
- **Gamification**
- **Crowd Sourcing**

Powerful ROI Example

GSA Model Checking

Model Checking

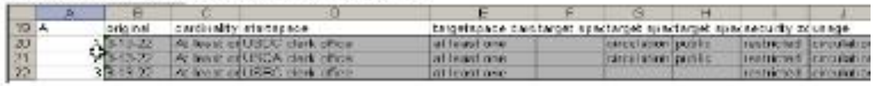
Automated Circulation Validation Using BIM

Court design guide

Selected circulation issues

Define standard syntax and structure for Language

Normalized circulation issues



Reference back to Design Guide description

Show where design fails

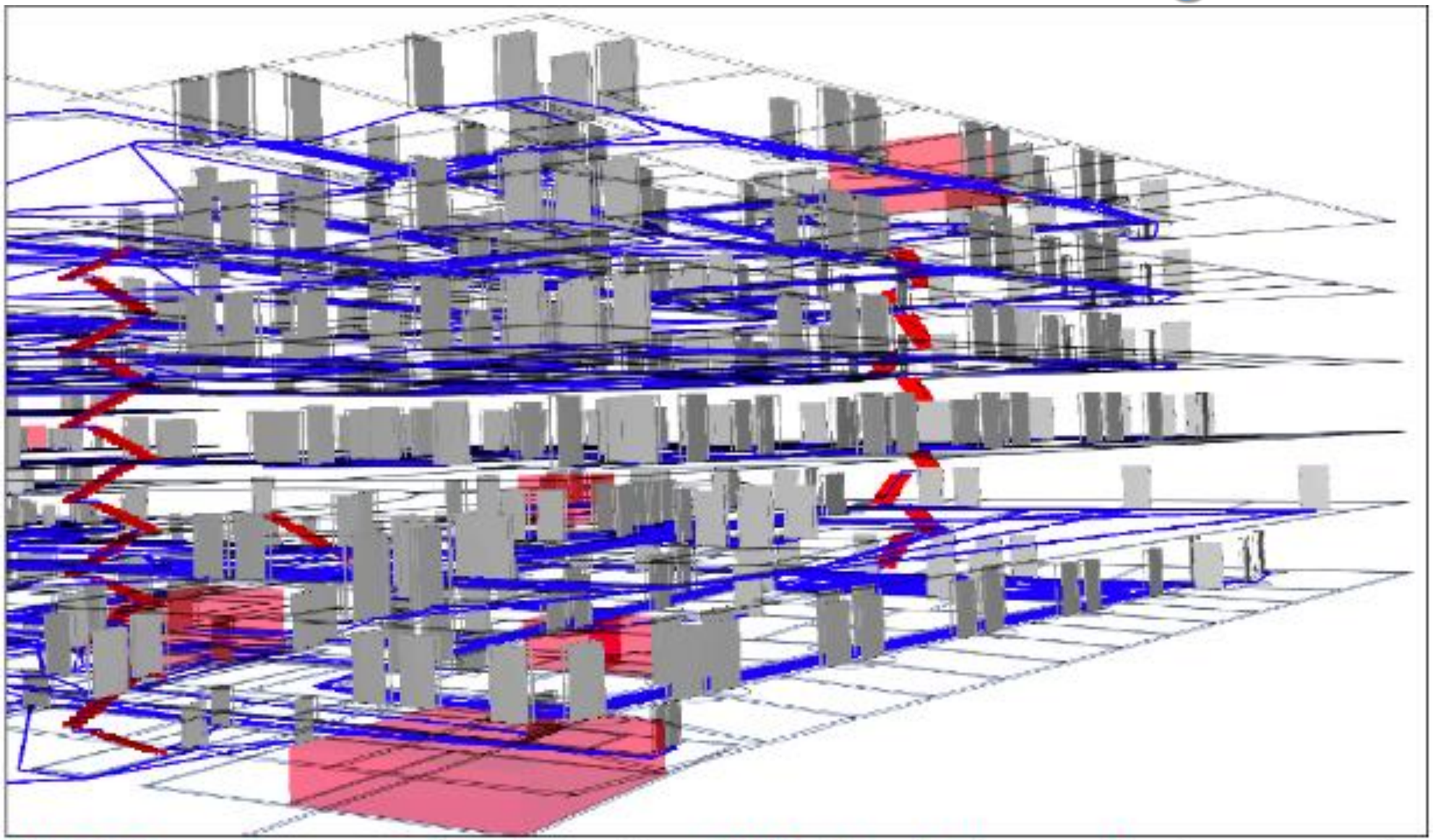
Generate rule set

Rule Sets

IFC Court house Data

Testing a court house model on Rule Checking SW

Model Checking



27,000 routes were tested using ***302 circulation rules*** in approximately ***20 seconds***.

3D Printing

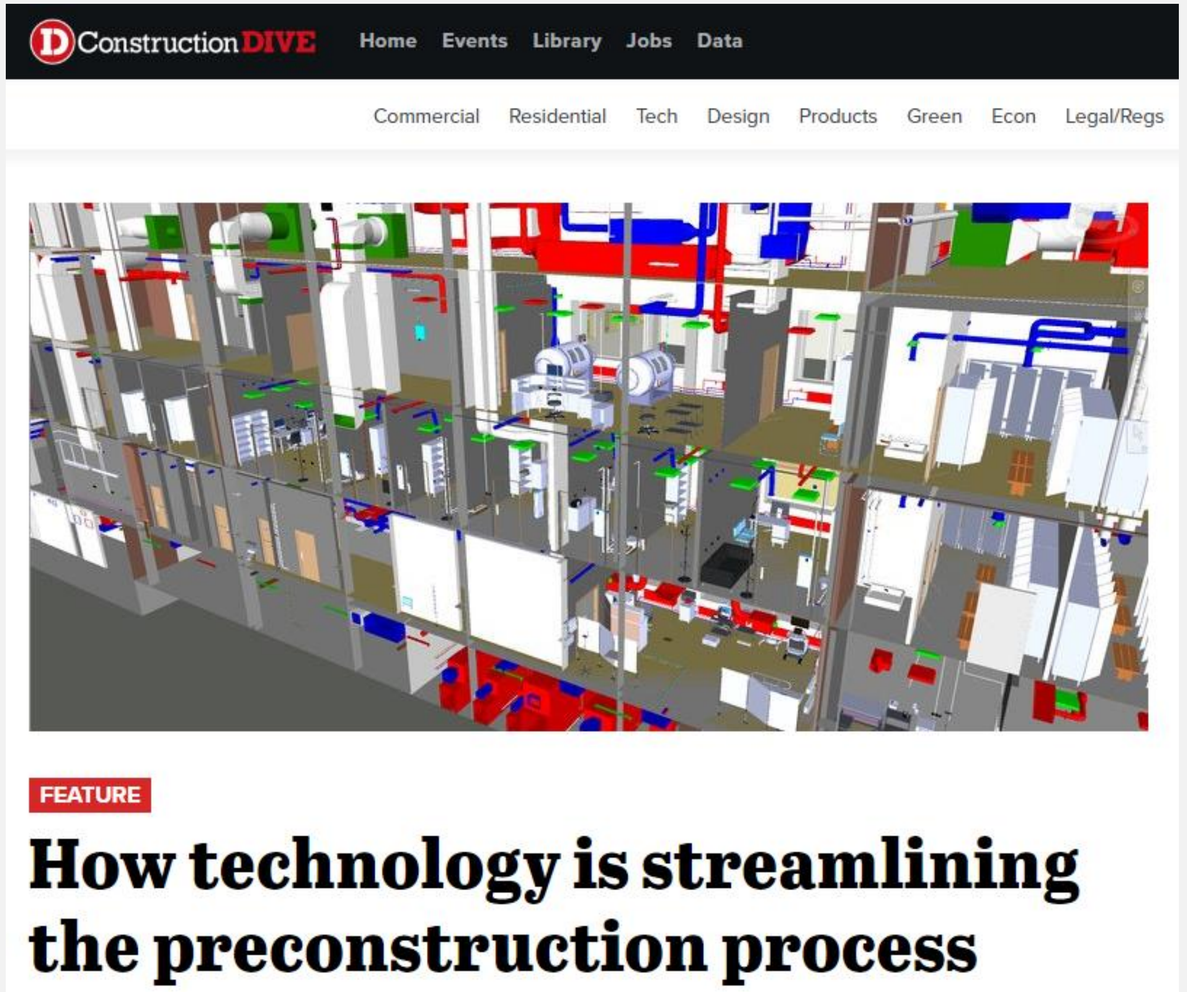

10 ways 3D printing is disrupting the architecture industry

3D Printing

3D-printed bridge by Heijmans

Contractors Are Out in Front

- Beck’ Destini Estimator
- JBKnowledge SmartBid
- Assemble
- iSQFT
- DotProduct
- ProCore
- Autodesk BIM 360

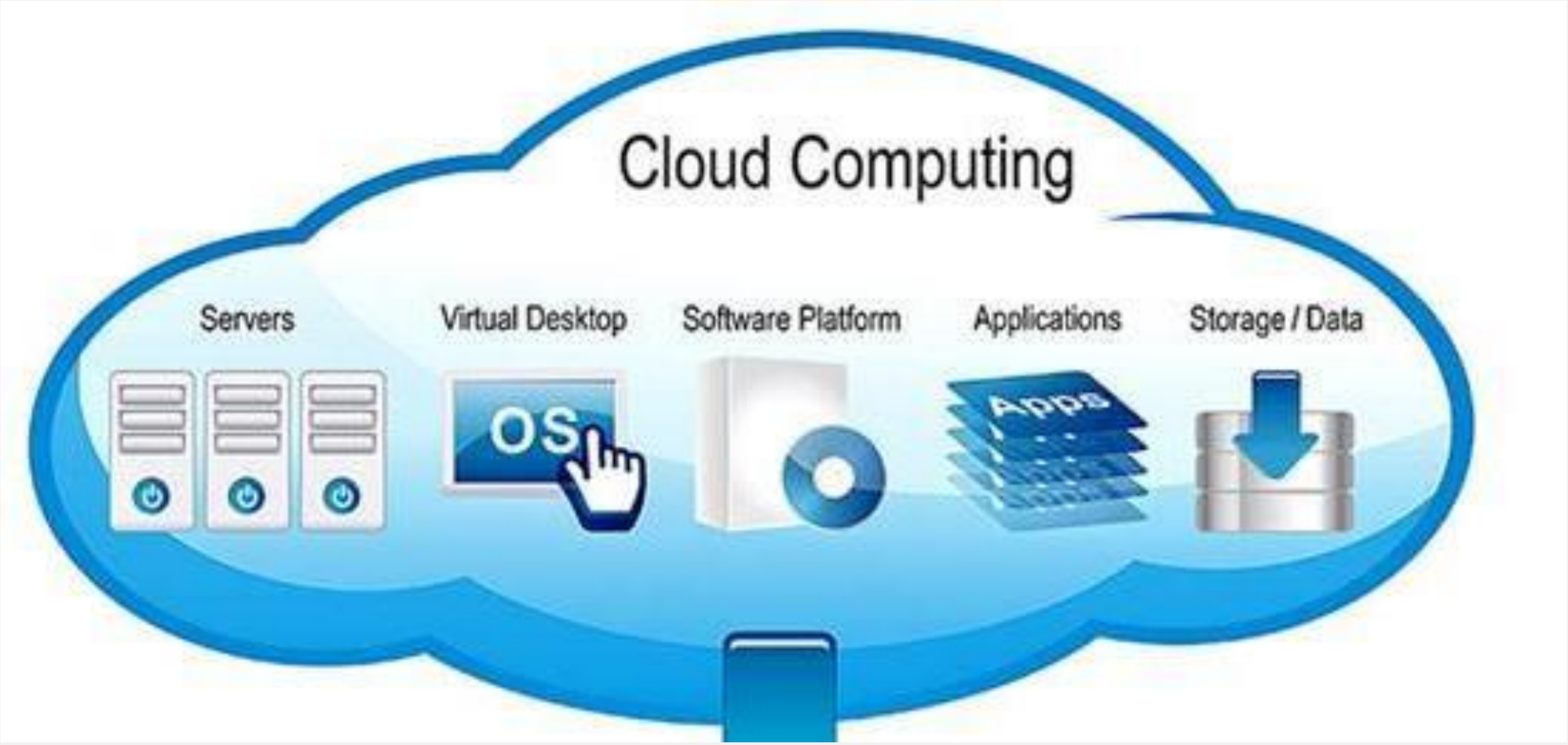


BlockChain and Virtual Reality

This blockchain-based platform creates entire cities in virtual reality

by THECOINTELEGRAPH — 14 days ago in VIRTUAL REALITY

Mobile/Cloud/Shared Data

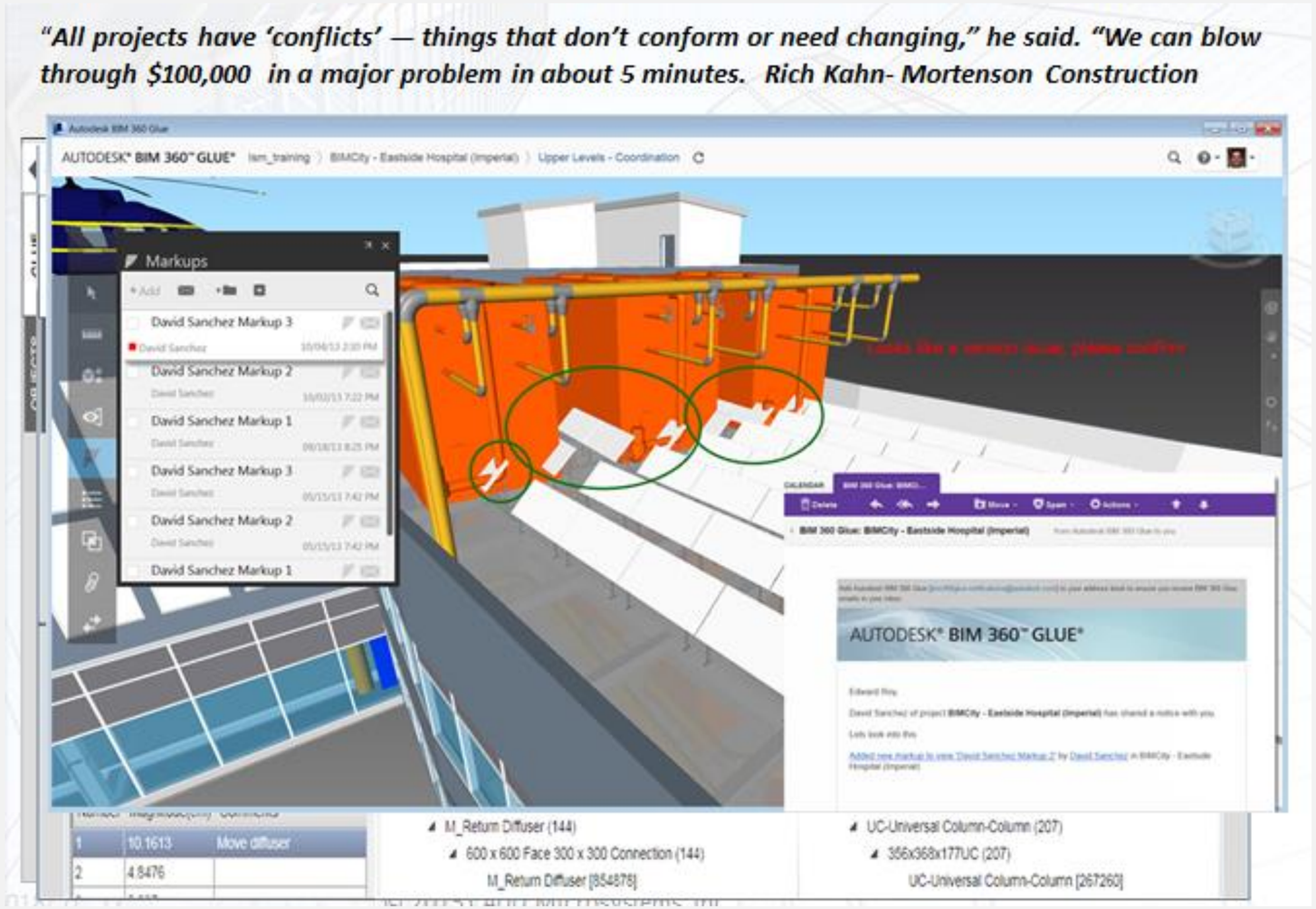


Mobile/Cloud/Shared Data

JE Dunn estimated **127,000** hours to post and draw documents manually on this project. At **$79** per hour, it would have added an astounding **$10,058,017** in paper-related costs.

Mobile/Cloud/Shared Data

"All projects have 'conflicts' — things that don't conform or need changing," he said. "We can blow through $100,000 in a major problem in about 5 minutes. Rich Kahn- Mortenson Construction



Robots / Drones / Lasers

Robots / Drones / Lasers

Robots / Drones / Lasers

Laser Scanning | Drones to Save Antiquities

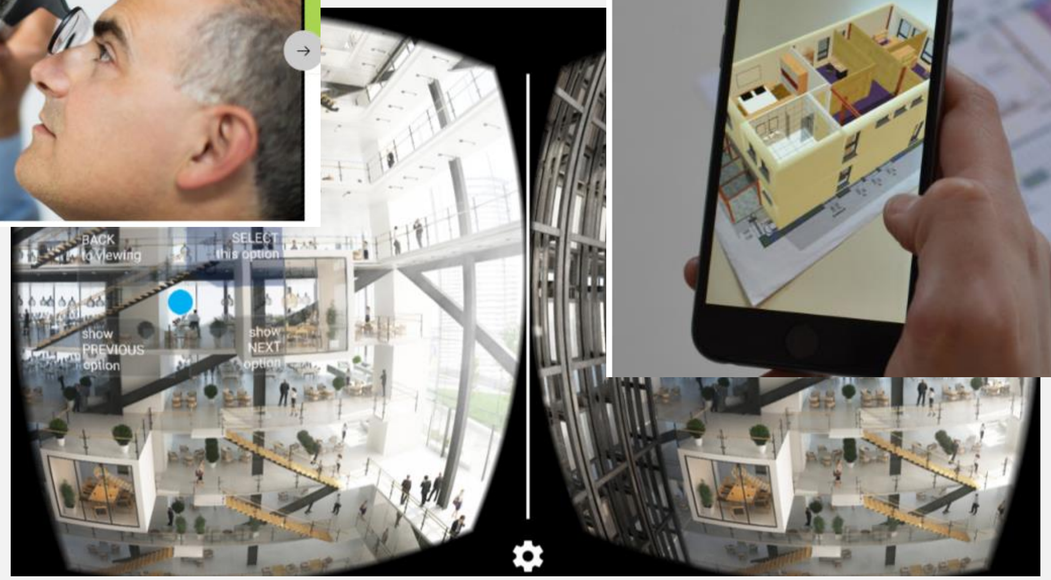
Hope for Palmyra's Future

After Islamic State retreated last month, a plan to rebuild an ancient city

VR and AR are Powerful for Architects

This Architecture Firm Is Turning VR Into The Next Great Productivity Tool

NBBJ is the first major architecture firm jumping headlong into VR—by incubating its own platform.



PRODUCTS

Three Augmented and Virtual Reality Apps for Design and Construction

Step inside your CAD and BIM models with new software for mobile devices.

By HALLIE BUSTA

Apple's Next Big Thing: Augmented Reality

CEO Tim Cook is betting on augmented reality, a cousin of VR that he believes will keep his company on top and may even supplant the iPhone.

by **Mark Gurman**
March 20, 2017, 6:00 AM EDT

Artificial Intelligence / Machine Learning

Embracing artificial intelligence in architecture

In recent years, technology and automation in architecture have soared. But not all architects have taken advantage of emerging technologies, and there is a growing sense that if firms don't incorporate artificial intelligence into practice, they'll get left behind.

Read more >

Architecture of the Future

Manuel Jimenez Garcia and Gilles Retsin are literally setting the foundations for an architecture of the future. They are co-founders of the Design Computation Lab at The Bartlett School of Architecture, University College London, where they work with students to speculate how digitalization, automation and robotics are transforming our built environment.

2004 – 2018 AIA TAP Building Connections Congress – Future of Design

Building Connections Congress 2018

Register Now

When: Jan 8, 2018 from 8:30 AM to 5:00 PM (ET)
Associated with Technology in Architectural Practice

AIA

The Future of Design

TAP Building Connections Congress 2018

Artificial Intelligence

Randy Deutsch, AIA, associate director for graduate studies at the University of Illinois at Urbana-Champaign School of Architecture:

"We're soon going to see super intelligence enter just about every sector, market, and field," he says. "It would behoove architects to imagine that it's going to enter our field, and we have the opportunity now to do something about it, to look at ways it can actually improve what we're doing and make us more profitable as practitioners as opposed to being victim to somebody else taking it and running with it."

It’s the Data!

“Change or Perish”

"If you want to survive, you're going to have to change.
If you don't change, you're going to perish. Simple as that."
2005, AIA National Convention
Thom Mayne, FAIA

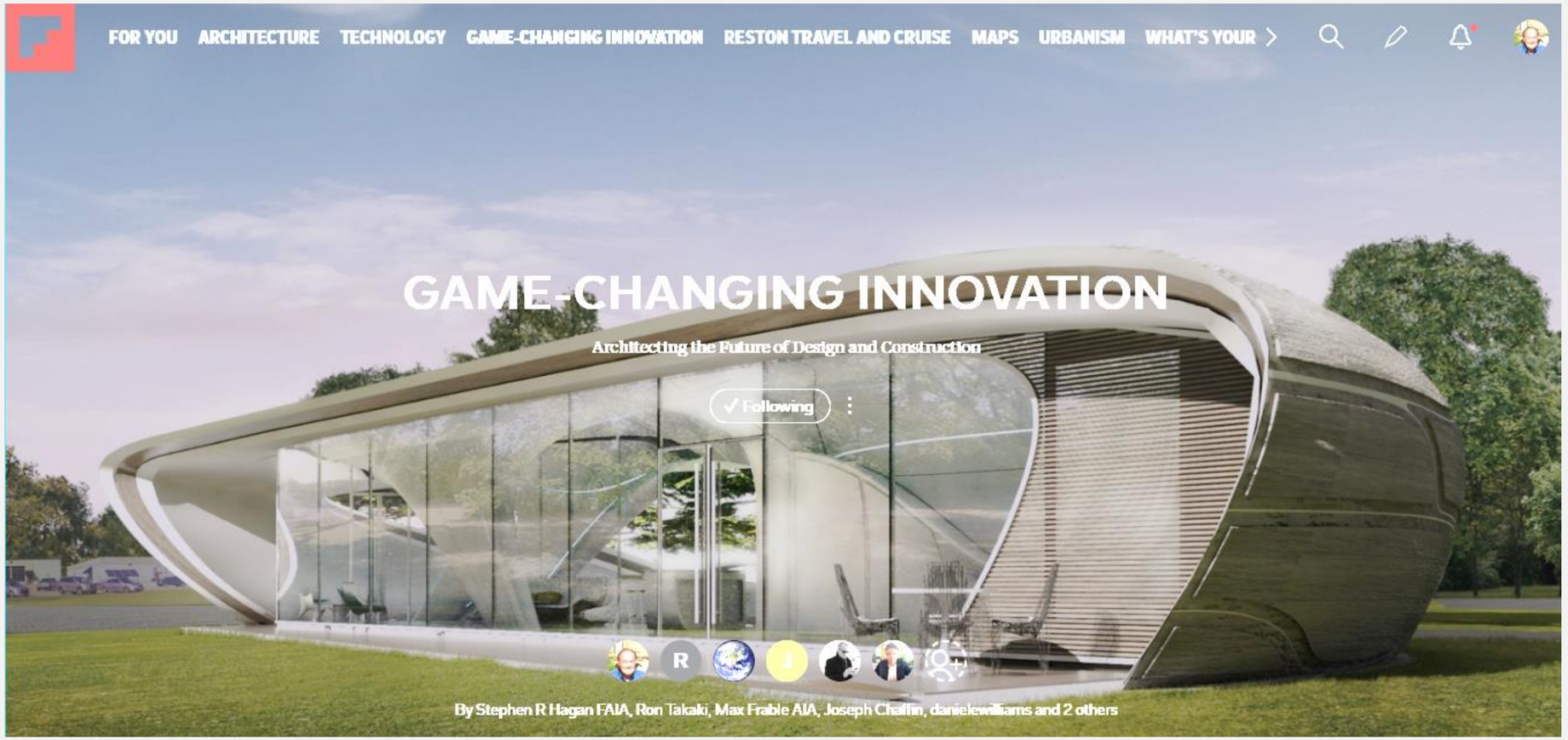
BIM (and Innovative Technologies) Execution Planning

BIM (and Innovative Technologies) Execution Planning

- **Team Building**: Either with a project team or within a firm, gather stakeholders and discuss the goals of the plan
- **Educate**: Present a range of technologies such as the ones listed in this course. Discuss both concepts and case studies
- Discuss how **3 or 4 of these technologies** can be the initial focus for a project or for a firm's digital and innovative transformation
- **Make a specific action plan**, including goals, objectives, and tasks and a timetable to complete them
- **Award all participants** a certificate as an AEC Game Changer!
- **Iterate** as New Stakeholders Join the Project Lifecycle

Are YOU an AECGameChanger?

GAME-CHANGING INNOVATION FlipBoard http://flip.it/_T5b84



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Report on integrated practice

10

Information for the facility life cycle

Kristine K. Fallon FAIA
Kristine Fallon Associates, Inc., Chicago IL

Stephen R. Hagan FAIA
U.S. General Services Administration, Washington, D.C.

2006

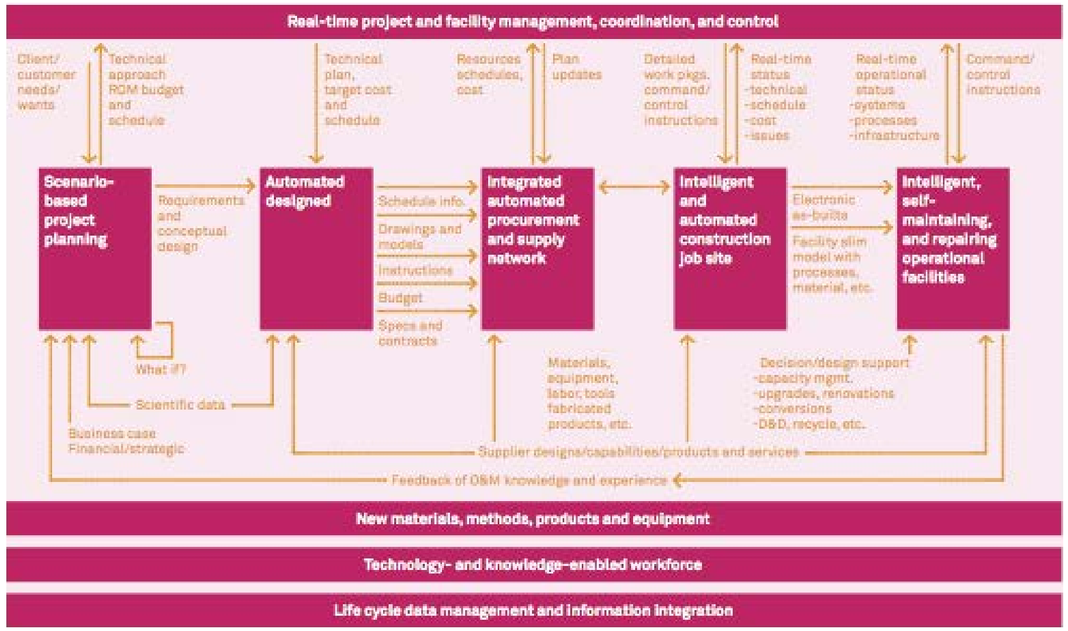


Figure 1
The FIATECH Capital Projects Technology Roadmap Vision Model .
(Source: FIATECH, 2004b)

Much work on these frameworks and process change diagrams remains to be done; much is well underway. What is notable and crucial for progress in this area is described in the excerpts of the Capital Facilities Information Handover Guide, Part 1, which follows: taxonomies, definitions, and the characterization of information are critical building blocks in the foundation of the Information for the Facility Life Cycle.

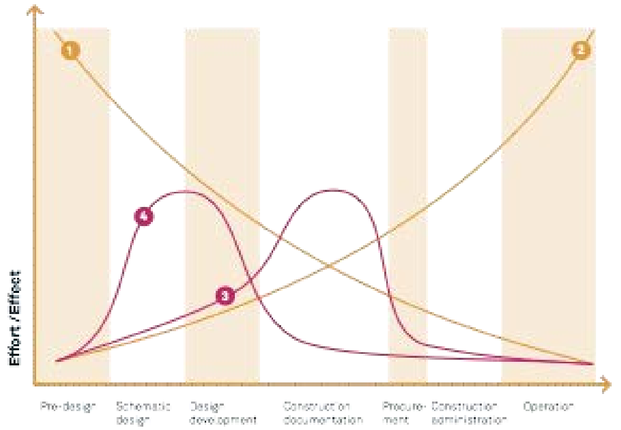


Figure 2
Collaboration, integrated information, and the life cycle in building design, construction and operation.
(Source: CURT, August 2004)

1. Ability to impact cost and functional capabilities
2. Cost of design changes
3. Traditional design process
4. Preferred design process

American Institute of Architects

Report on integrated practice

The twenty-first century practitioner

Transformed by process not software

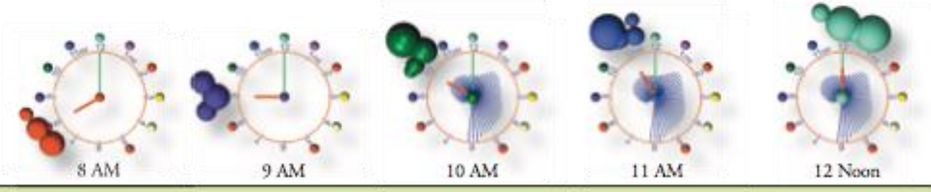
AIA

6

Kimon G. Onuma AIA
Onuma & Associates, Tokyo and Pasadena, CA

2006

The twenty-first century practitioner: transformed by process, not software



The Design Charette

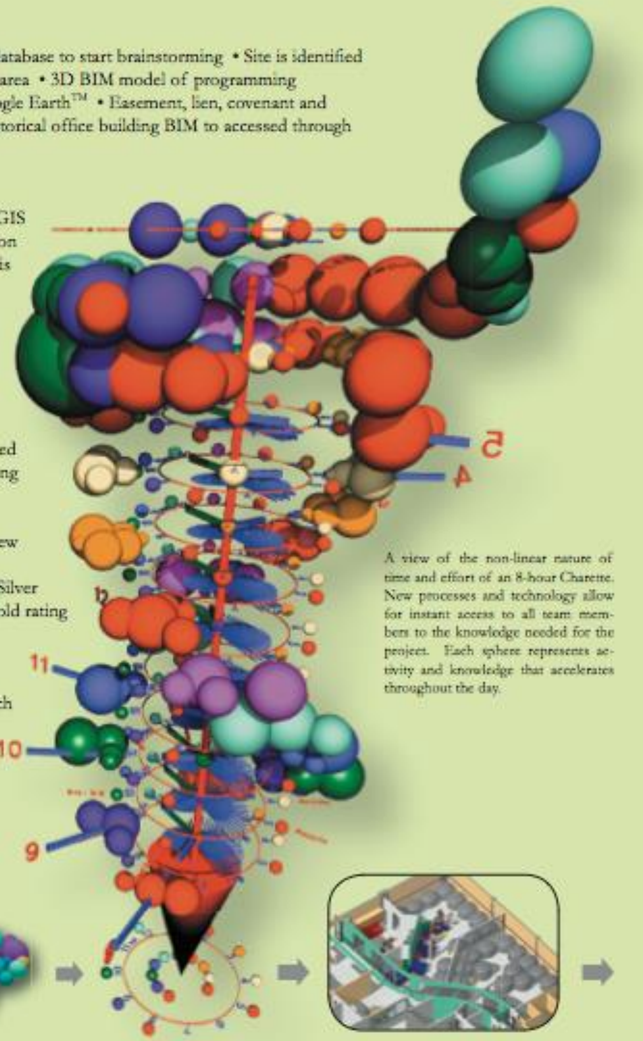
8 am Start Project
• Client contacts pre-qualified team in project database to start brainstorming • Site is identified on a Google Earth™ 3D model of the Boston area • 3D BIM model of programming requirements auto generated and placed in Google Earth™ • Easement, lien, covenant and restriction database(s) checked • Data from historical office building BIM to accessed through the project database

9 am Site and GIS Review
• Confirm size of site and soil condition from GIS data in 2D and 3D • Rate each footprint location and pass data of conditions to structural analysis for foundation design • Automatically perform a preliminary code analysis by submitting the project to the city planning and zoning database • Rate distance to transportation and housing

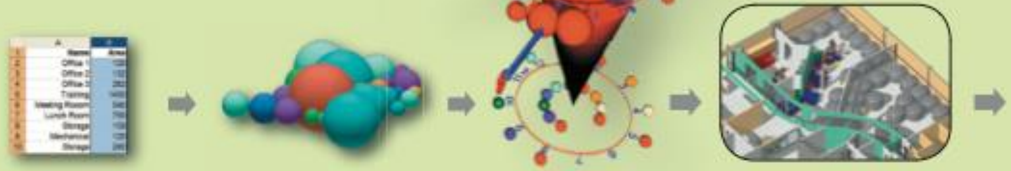
10 am Architectural Review
• BIM review by team members who are assigned based on availability • Data from existing building analyzed • Potential schemes studied

11 am Mechanical, Electrical, Plumbing Review
• Determine systems and costs • Performance requirements defined • Recommend to pursue Silver LEED rating on manufacturing portion and Gold rating for the rest

12 pm Structural Review
• One plan includes a multi-story building, which triggers need for underground parking • Soil conditions from GIS dictate various foundation systems • Review long span requirements



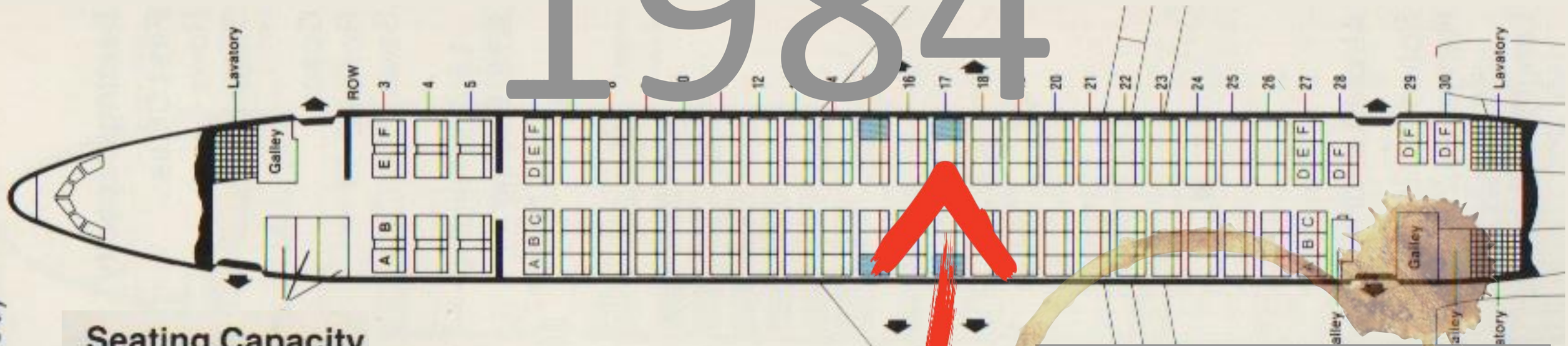
A view of the non-linear nature of time and effort of an 8-hour Charette. New processes and technology allow for instant access to all team members to the knowledge needed for the project. Each sphere represents activity and knowledge that accelerates throughout the day.



Program Requirements | BIMblobs™ of Program Requirements | Knowledge of Team Inserted into Project | Functional Requirements in BIM

The 21st Century Practitioner: - Transformed by Process not Software - Kimon G. Onuma AIA

1984



(Type 200)

Seating Capacity

First Class
Rows 3-5
Seats 12

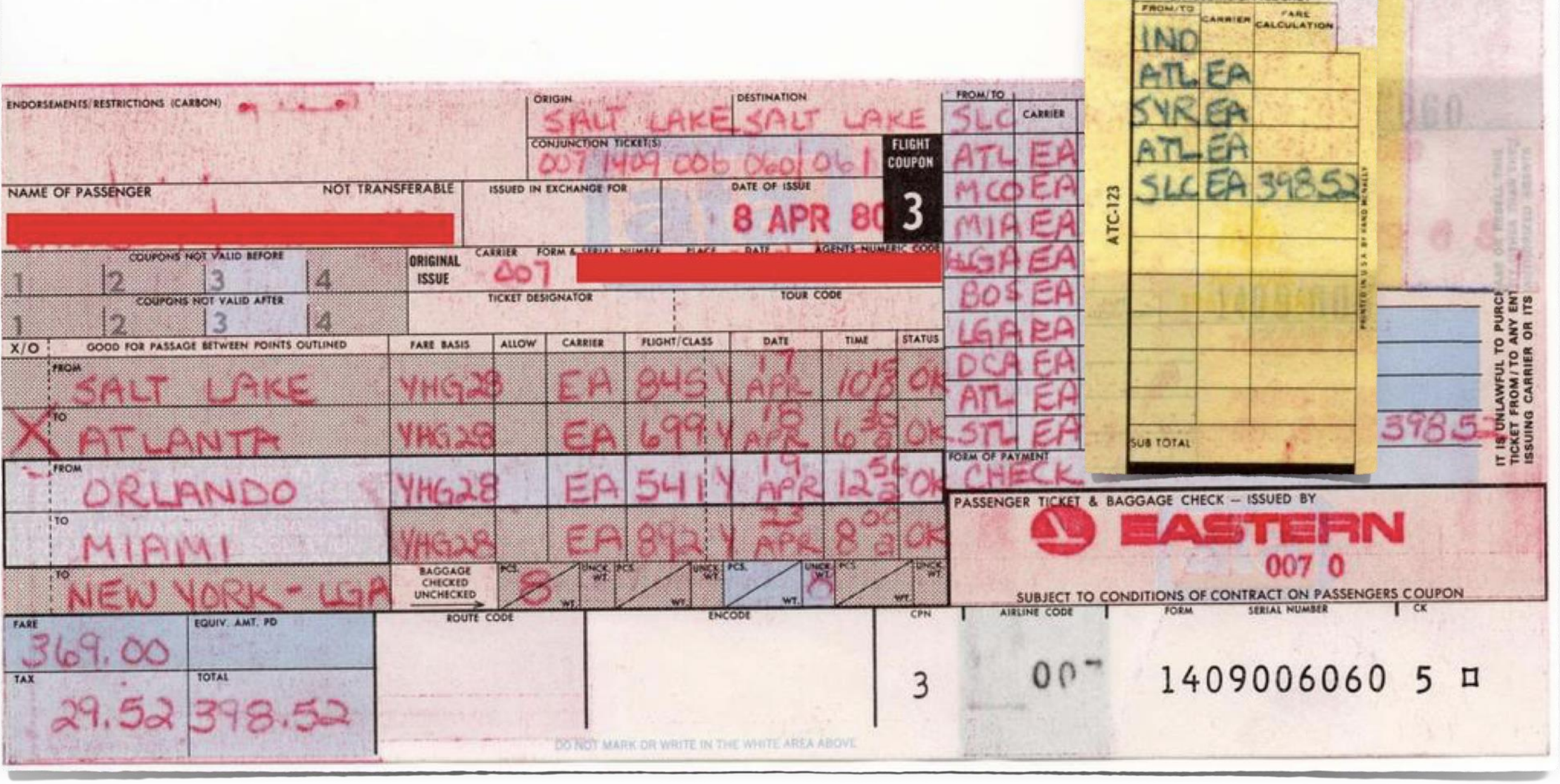
Coach
Rows 6-30
Seats 138

No Recline

727

LuxuryJet

(Type 200)


ENDORSEMENTS/RESTRICTIONS (CARBON)
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FORM & SERIAL NUMBER
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ISSUING CARRIER OR ITS
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TAX 29.52
TOTAL 398.52
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CPN 3
AIRLINE CODE 007
FORM SERIAL NUMBER CK 1409006060 5
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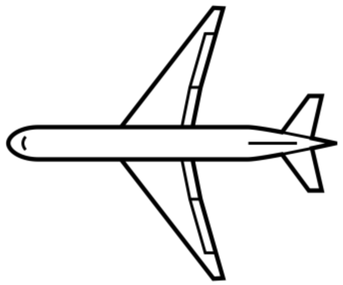
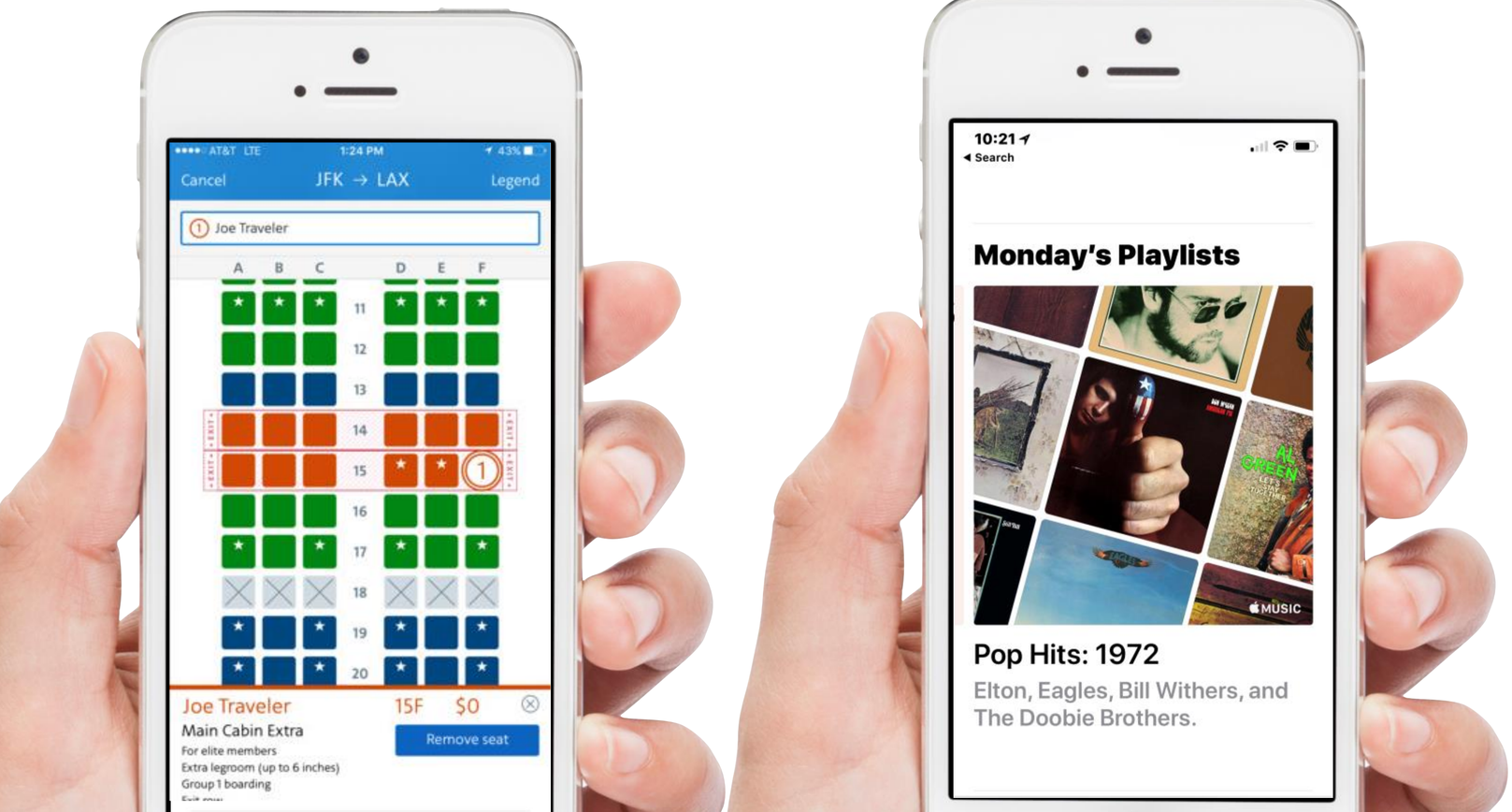
More Buttons are Better….

PLATFORM

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Joe Traveler
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Joe Traveler
15F
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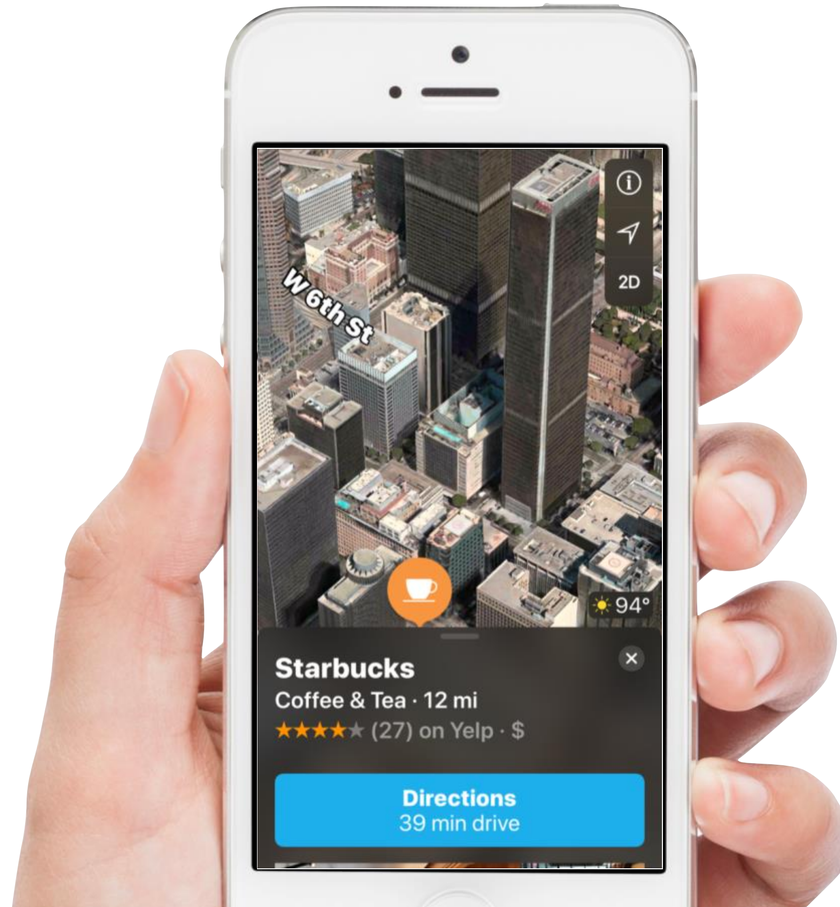
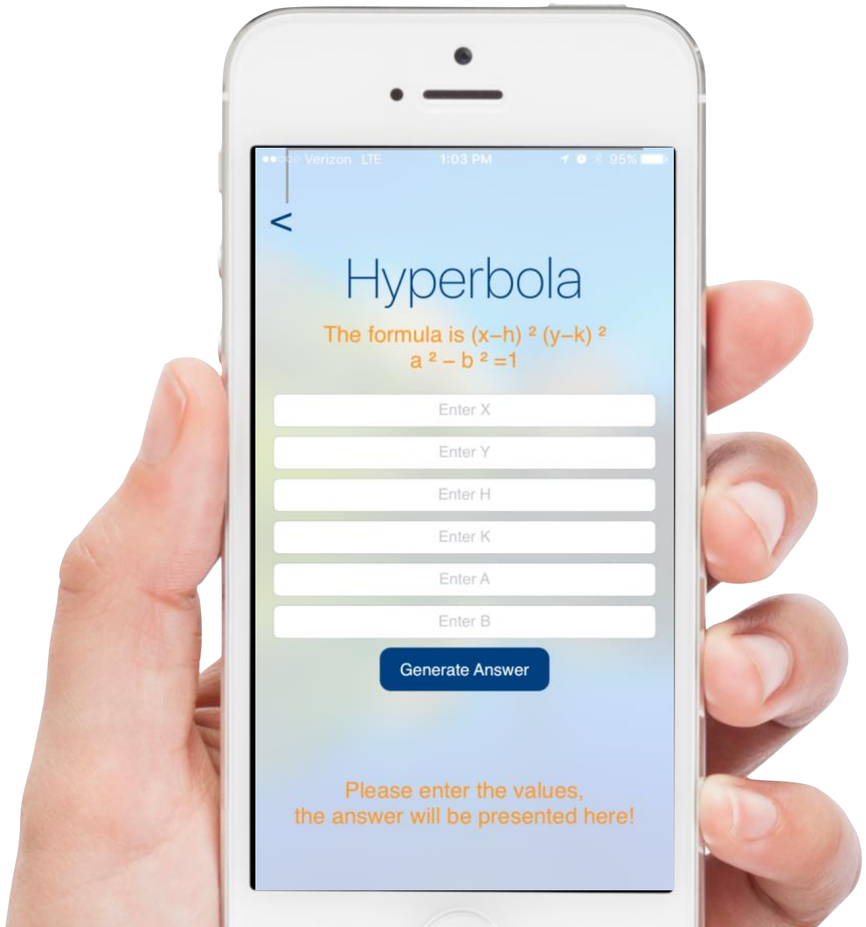
Main Cabin Extra
Remove seat
For elite members
Extra legroom (up to 6 inches)
Group 1 boarding

10:21
Search
Monday's Playlists
MUSIC
Pop Hits: 1972
Elton, Eagles, Bill Withers, and
The Doobie Brothers.


W 6th St
2D
94°
Starbucks
Coffee & Tea · 12 mi
(27) on Yelp · $
Directions
39 min drive

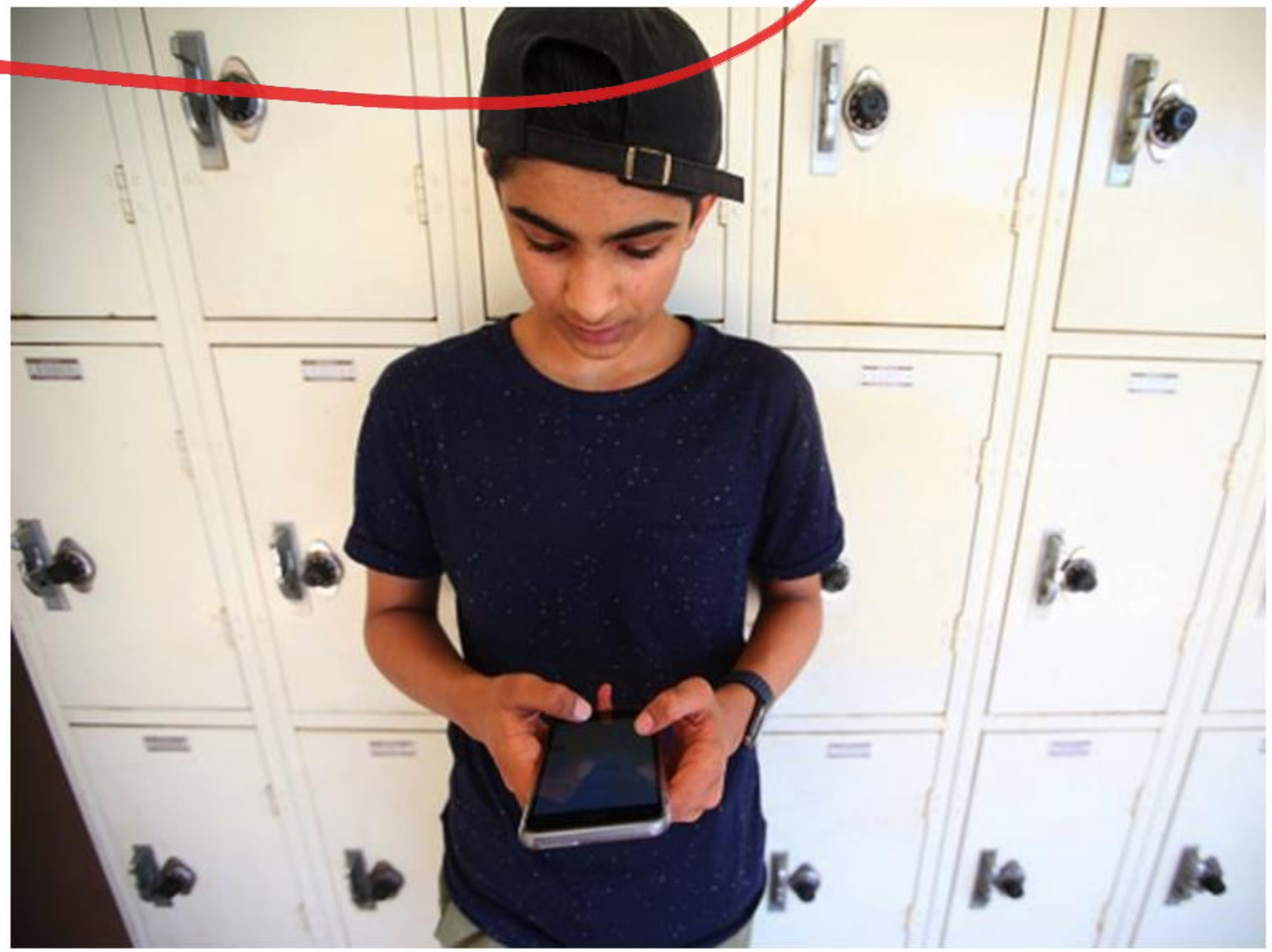
It’s easier than ever to build software. **Software** is now a **commodity**.

https://techcrunch.com/2018/03/27/data-is-not-the-new-oil/



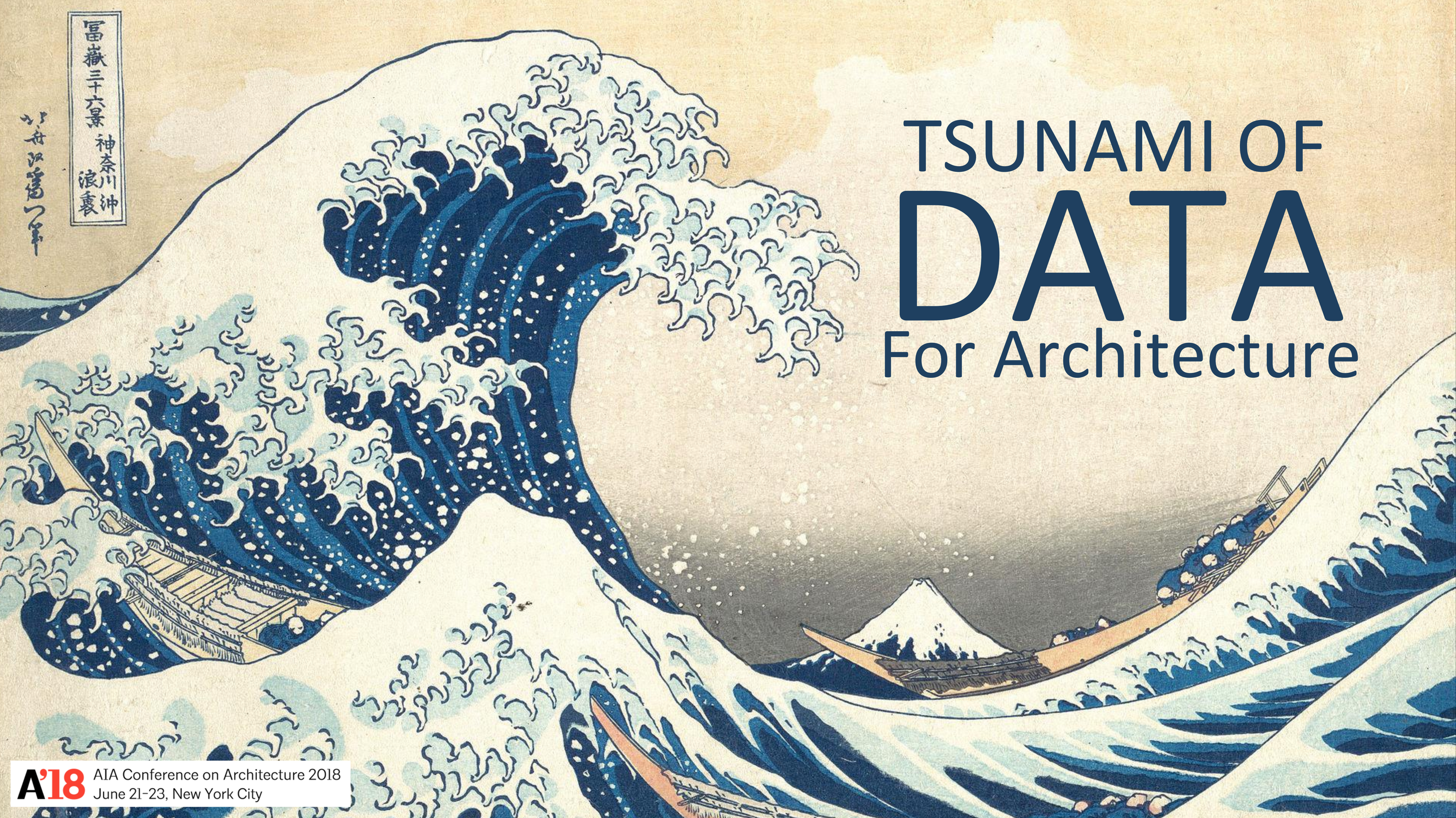
This 16-year-old kid fell behind in math class, so he built an app to do it for him

Oct. 5, 2016, 4:20 PM 56,727



Amit Kalra

http://www.businessinsider.com/amit-kalra-6284-calc-app-2016-10



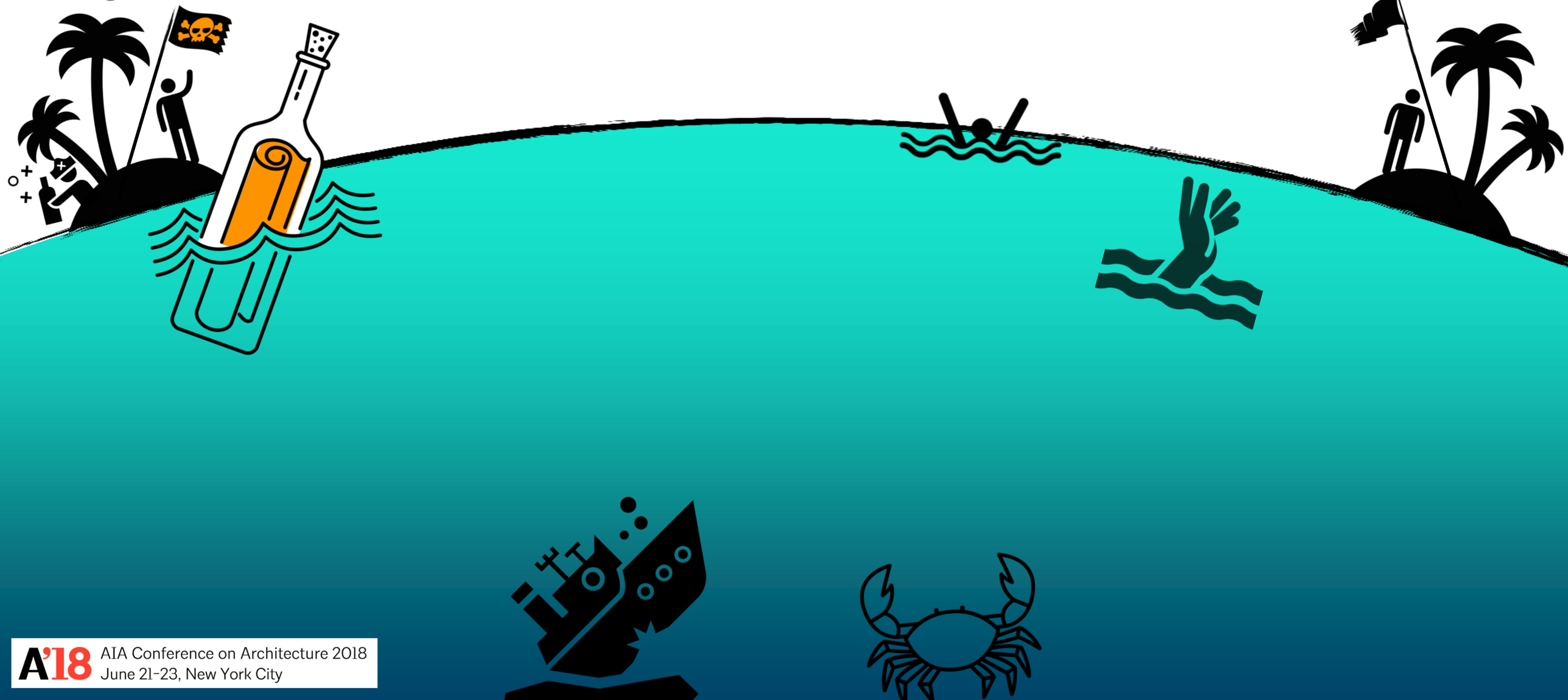
TSUNAMI OF DATA

For Architecture

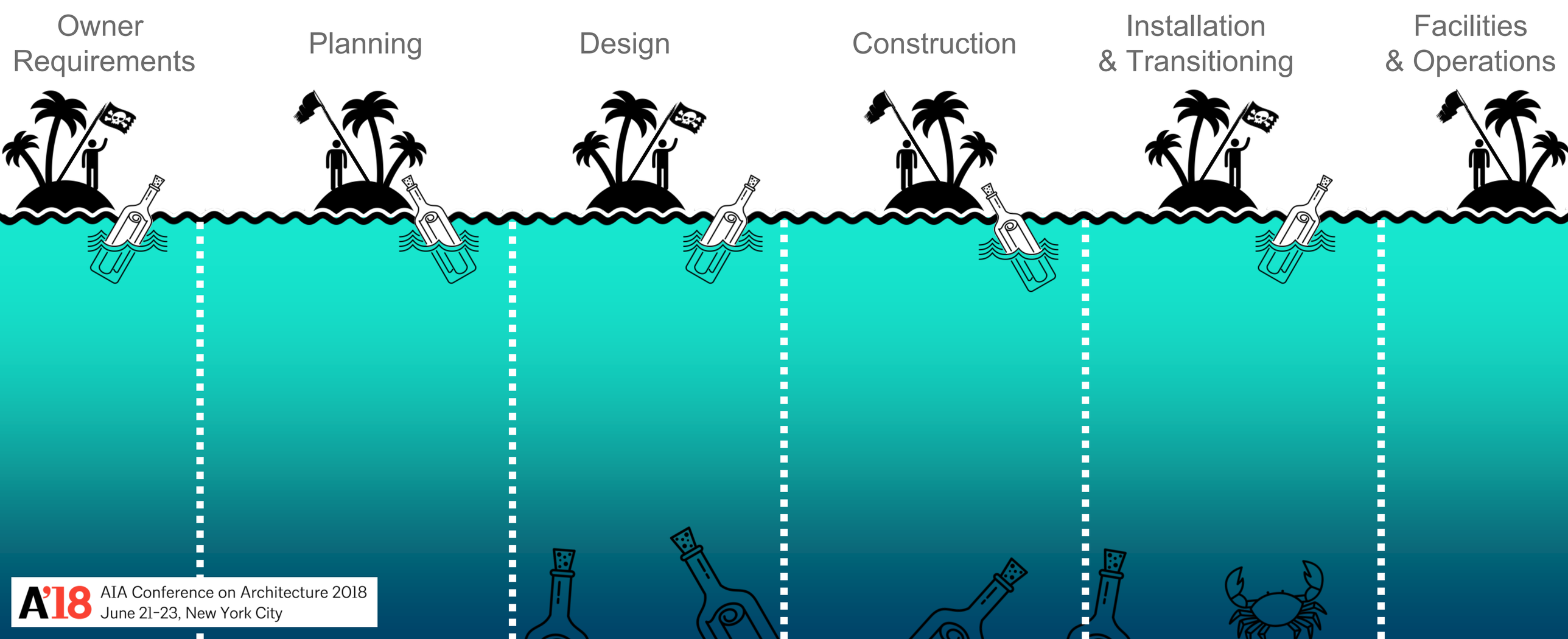
A'18 AIA Conference on Architecture 2018
June 21-23, New York City

Design & Construction

Facilities & Operations

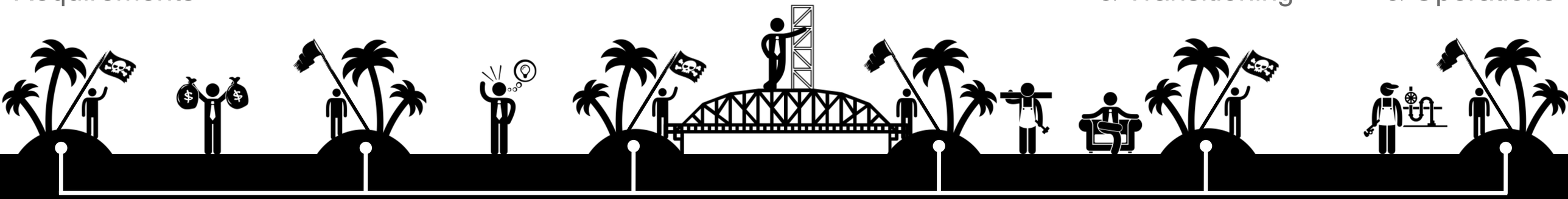


SILOS


Owner Requirements
Planning
Design
Construction
Installation & Transitioning
Facilities & Operations

PLATFORMS

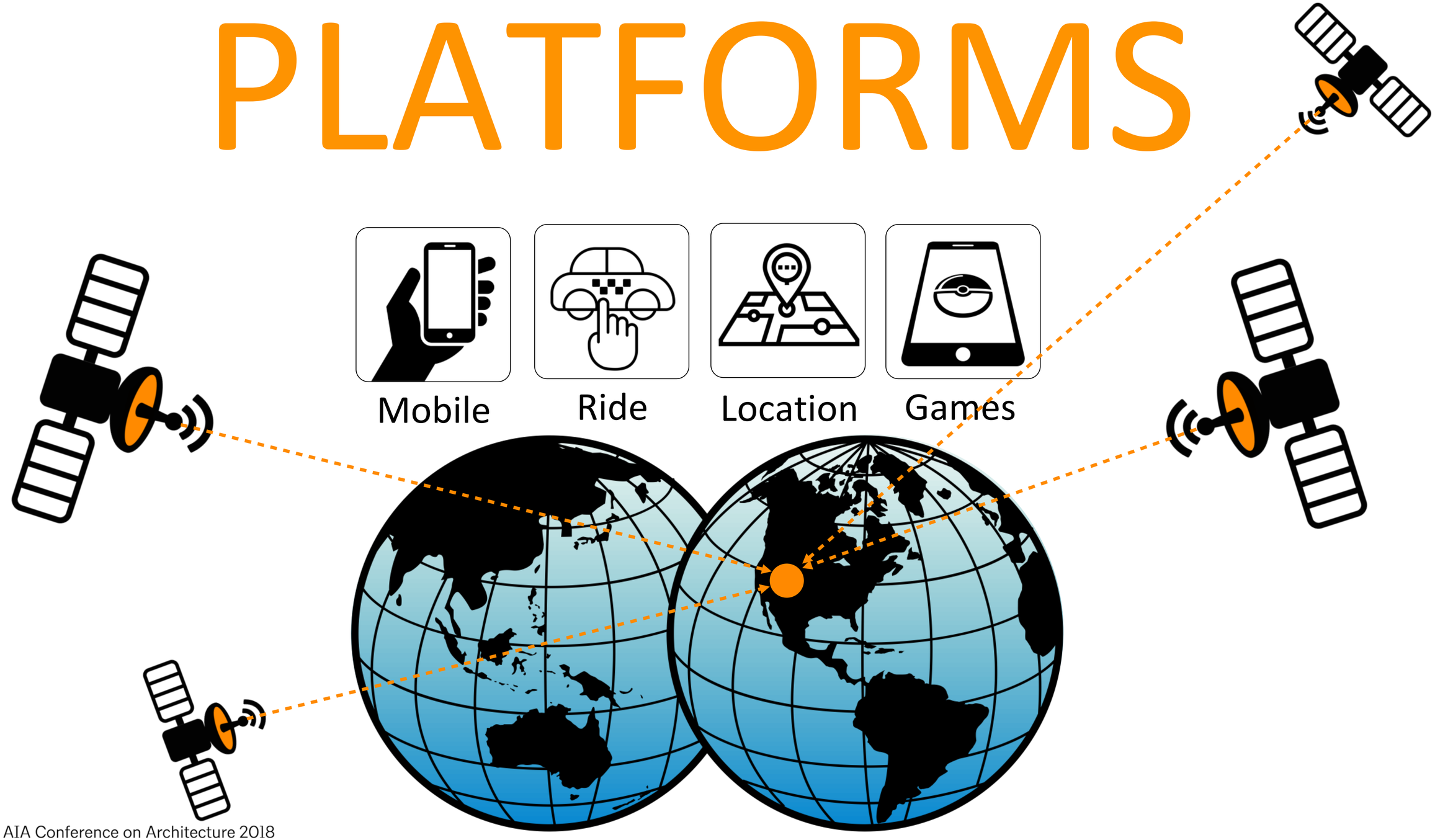
Owner Requirements | Planning | Design | Construction | Installation & Transitioning | Facilities & Operations



DIGITAL PLATFORM

DATA

PLATFORMS



Room Data

JSN D0685

Ceiling Finish:T1

Ceiling Height
102 Inches

JSN D600

Wall Finish: G

JSN DO685

JSN12345

Filtration
14%

Air Balance
4

Dental
Low Vac

Power
Outlets
63/RC

JSN X6600

JSN DO685

JSN DO685

JSN 9060

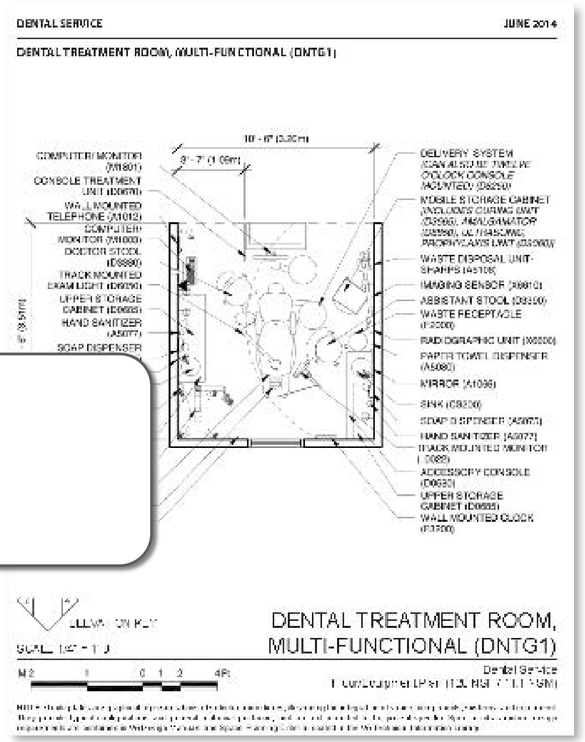
JSN D9060

JSN D7090

Space

7. **Treatment Room, Maxillo-Facial (DNTG1)..... 150 NSF (14.0 N**
Provide one per Maxillo-Facial Treatment Room authorized if in Concept of Operations.

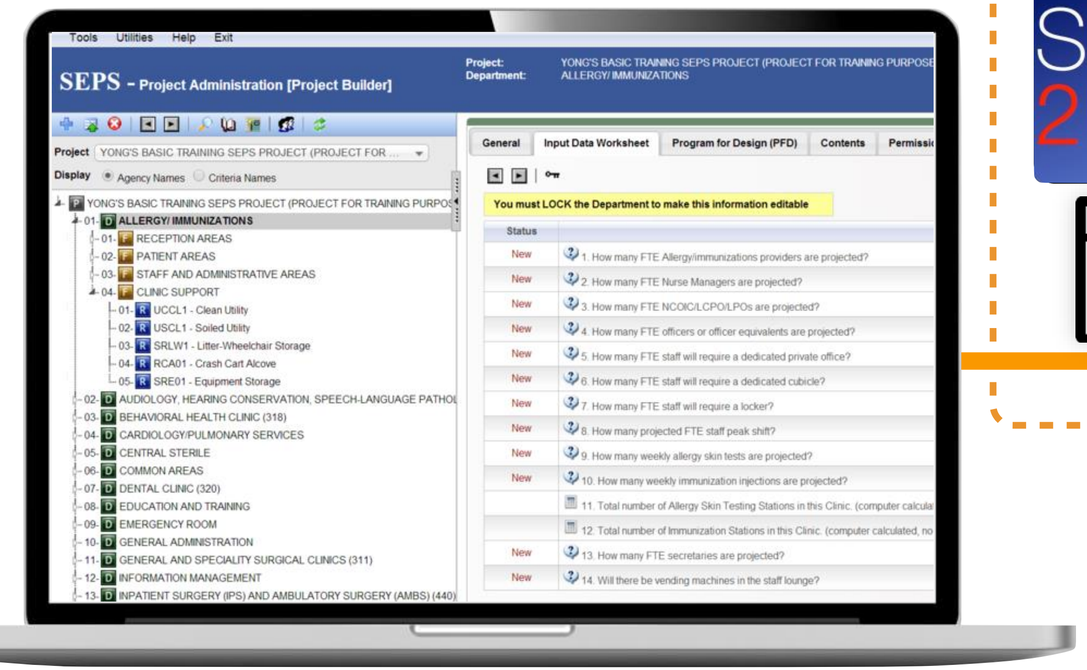
This room is for prosthetic treatment of patients with abnormal conditions of th face and oral structures.



Equipment

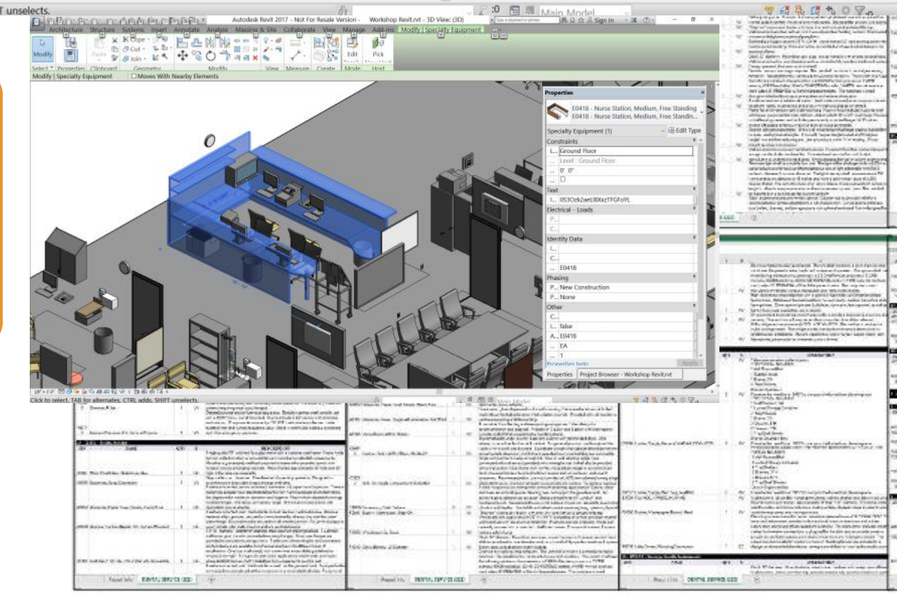
National Institute of BUILDING SCIENCES

SEPS2BIM



SEPS 2BIM

Excel



SEPS2BIM PLATFORM

Data: Equipment, Criteria & More

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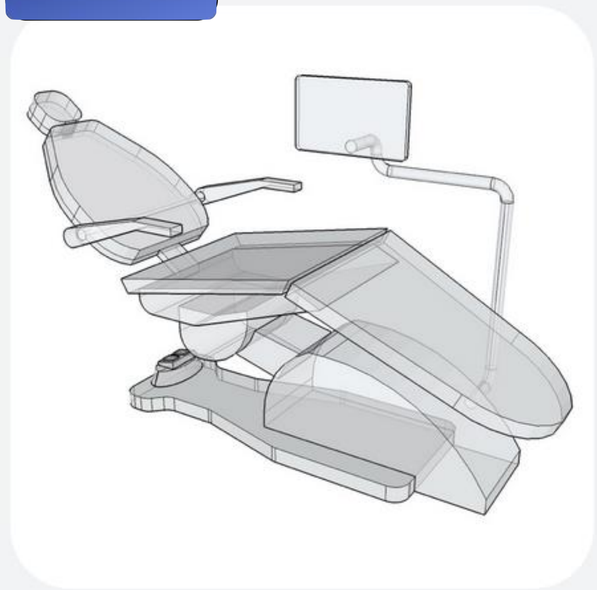
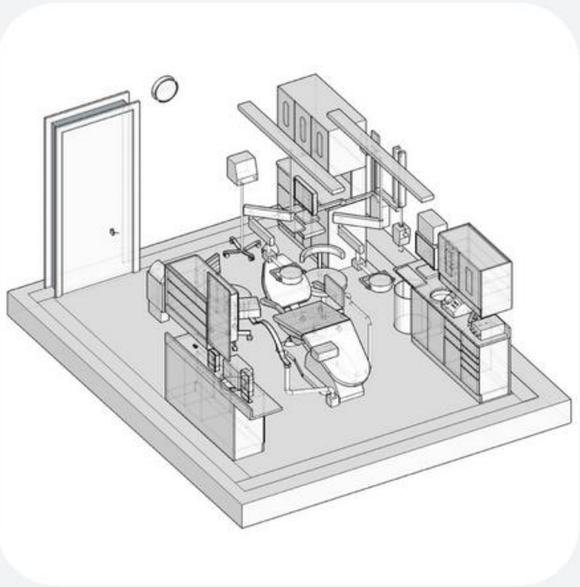
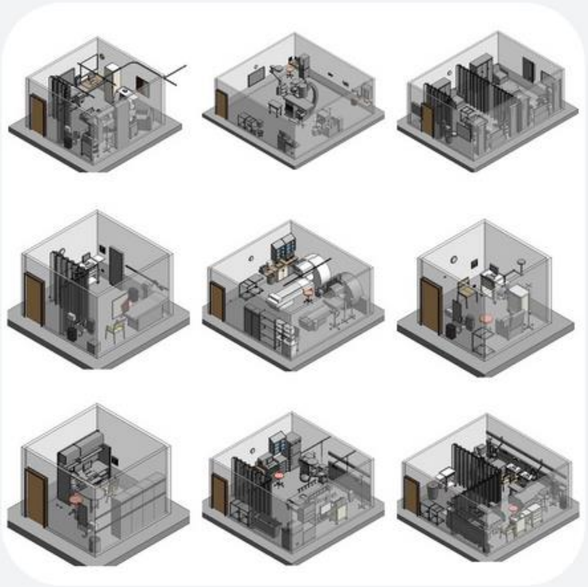
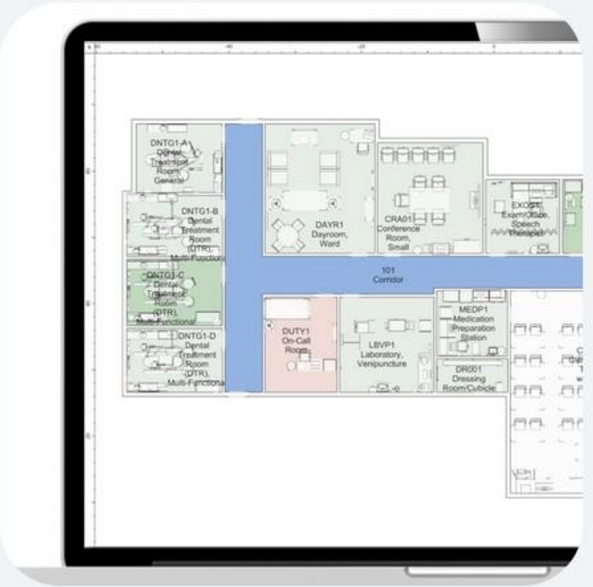
June 21-23, New York City

SEPS 2BIM









Objects

~2,100 Objects
Used in Templates

+ Templates

~1,100 Space Templates
Used in Departments

+ Departments

Multiple Departments
Used in Projects

= Projects

Generate Infinite Variations
for Facility Projects

SEPS2BIM PLATFORM

Data: Equipment, Criteria & More

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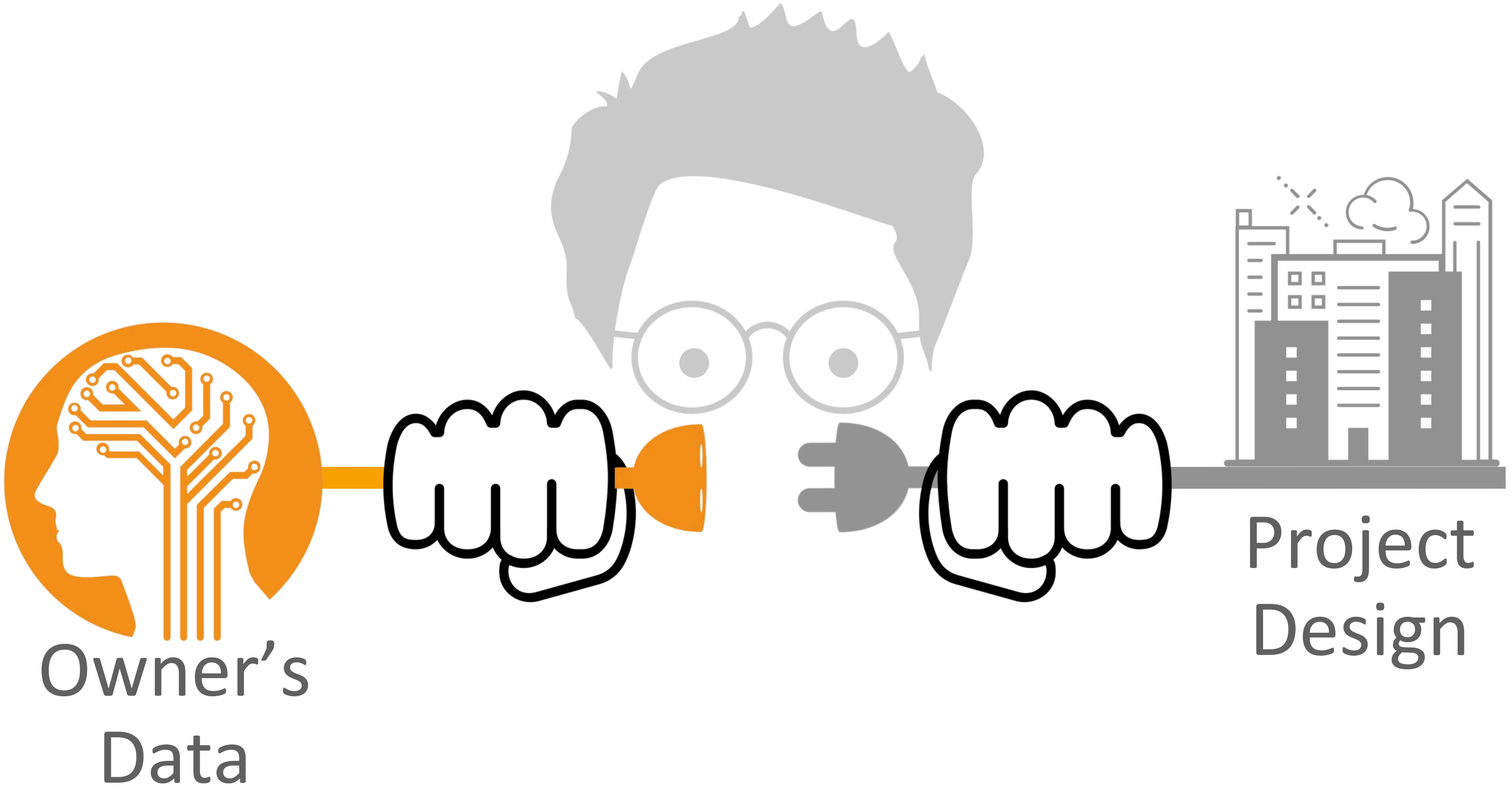
Owner's Data

Owner’s Data


Owner's
Data
Project
Design

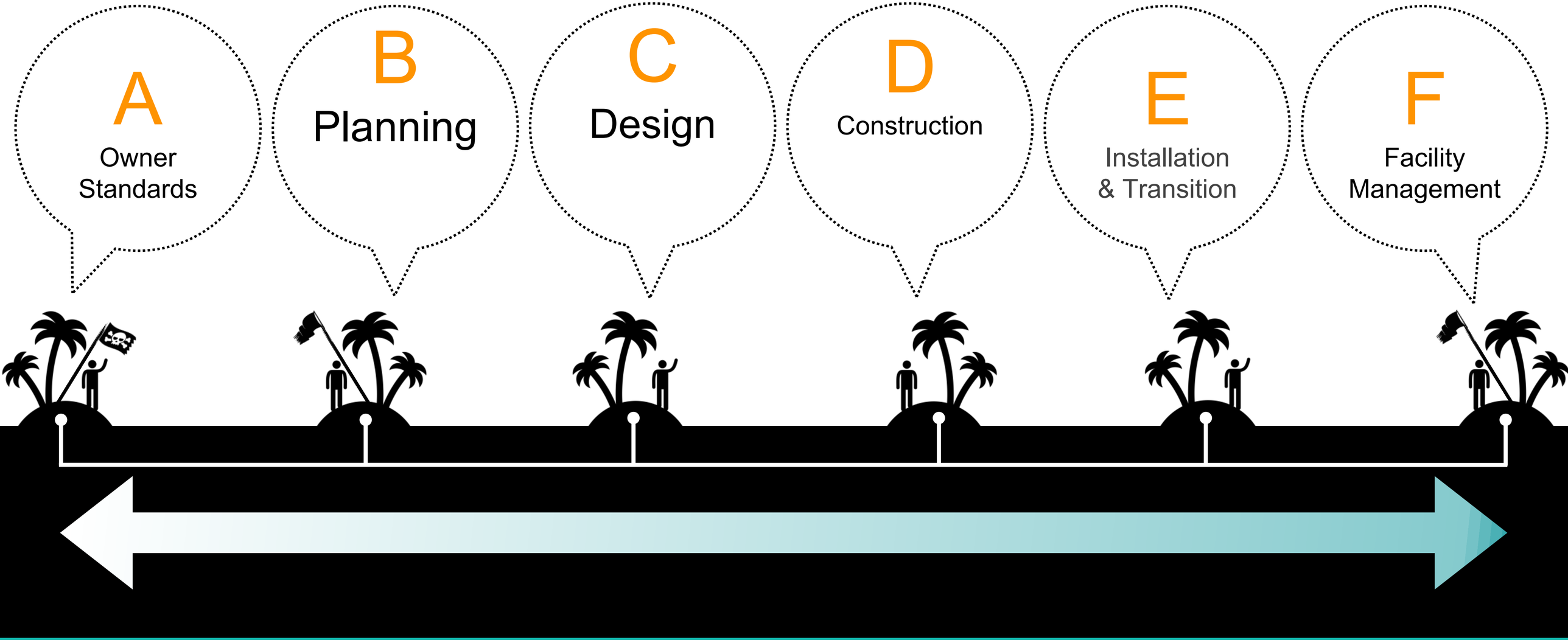

Owner's
Data
Project
Design

Owner's Data

BIM Ecosystem

ECOSYSTEM

A healthy ecosystem does not have an end date, it just supports itself and adjusts to change.



Life Cycle Platform

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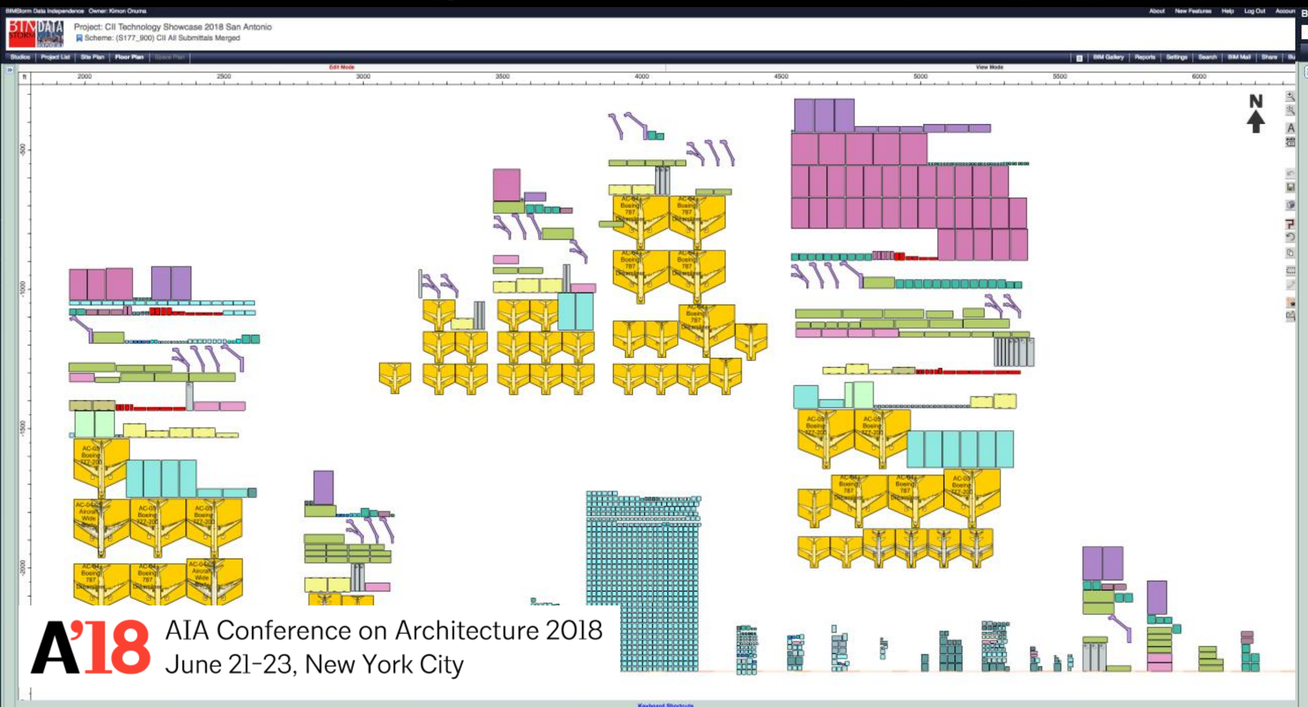
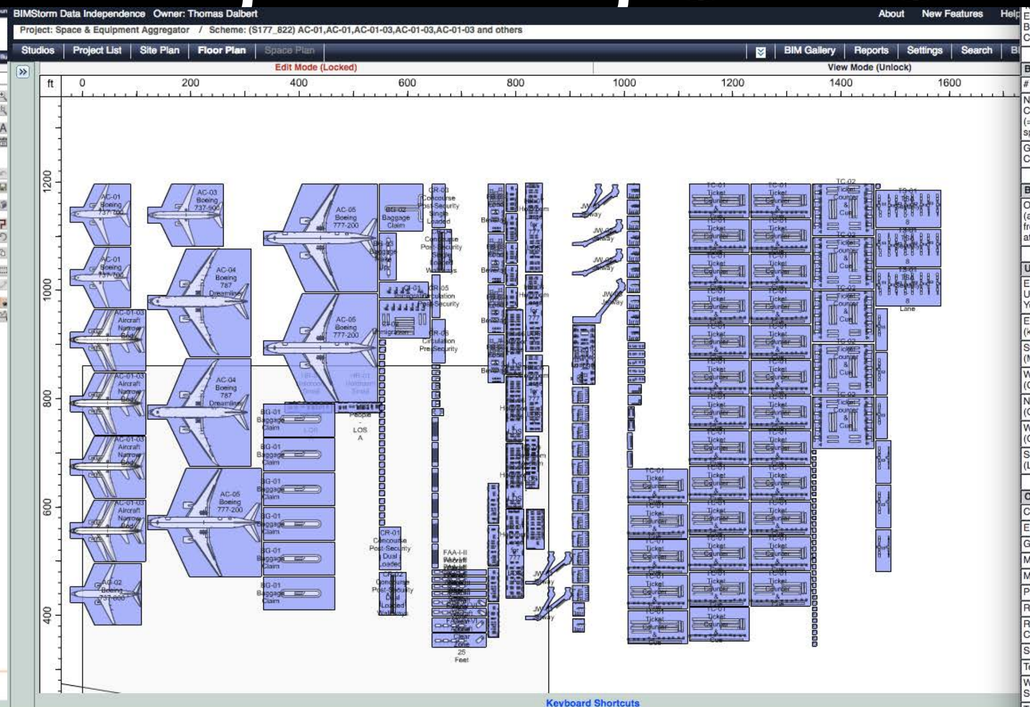
Photo by: [Luis Urrego](#) [@LuisUrrego_PMP](#)

BIM STORM 15 Minutes: 2,727,676 SF





Estimated Building Cost	$485,472,394
Building Areas	
# of Floors	1
Net Calculated (=modelled spaces)	509,653 sqft
Gross Calculated	739,874 sqft
Building Occupancy	
Occupancy (aggregated from space attributes)	596
Utilities Summary	
Electricity Used(kWh / Year)	13,983,624
Energy Use (kBTU/Year)	66,588,688
Steam (MLB/Year)	14,797
Water (Gal/Year)	14,797,486
Natural Gas (CUFT/Year)	369,937
Waste Water (Gal/Year)	11,098,115
Solid Waste (Lbs/Year)	66,589
O & M Cost Summary	
Custodial	$1,827,490
Energy	$2,108,642
Grounds	$184,969
M&R	$2,101,243
Management	$1,768,300
Pest Control	$96,184
Refuse	$59,190
Road Clearance	$7,399
Security	$362,538
Telecom	$184,969
Water / Sewer	$288,551

BIM STORM

7.12.17
Alexandria, VA

11.7.17
San Diego, CA

11.14.17
Washington DC

2.14.18
Chandler, AZ

3.1.18
Denver, CO

3.20.18
San Antonio, TX

ARCH-i-TECH.TV
giuliani ASSOCIATES • ARCHITECTS

Create Space Templates

ACC

1,044,924 sf

NATIONAL ACADEMY OF SCIENCES
Asset Leadership Network

2,373,306 sf

2018 CURT National Conference

627,959 sf

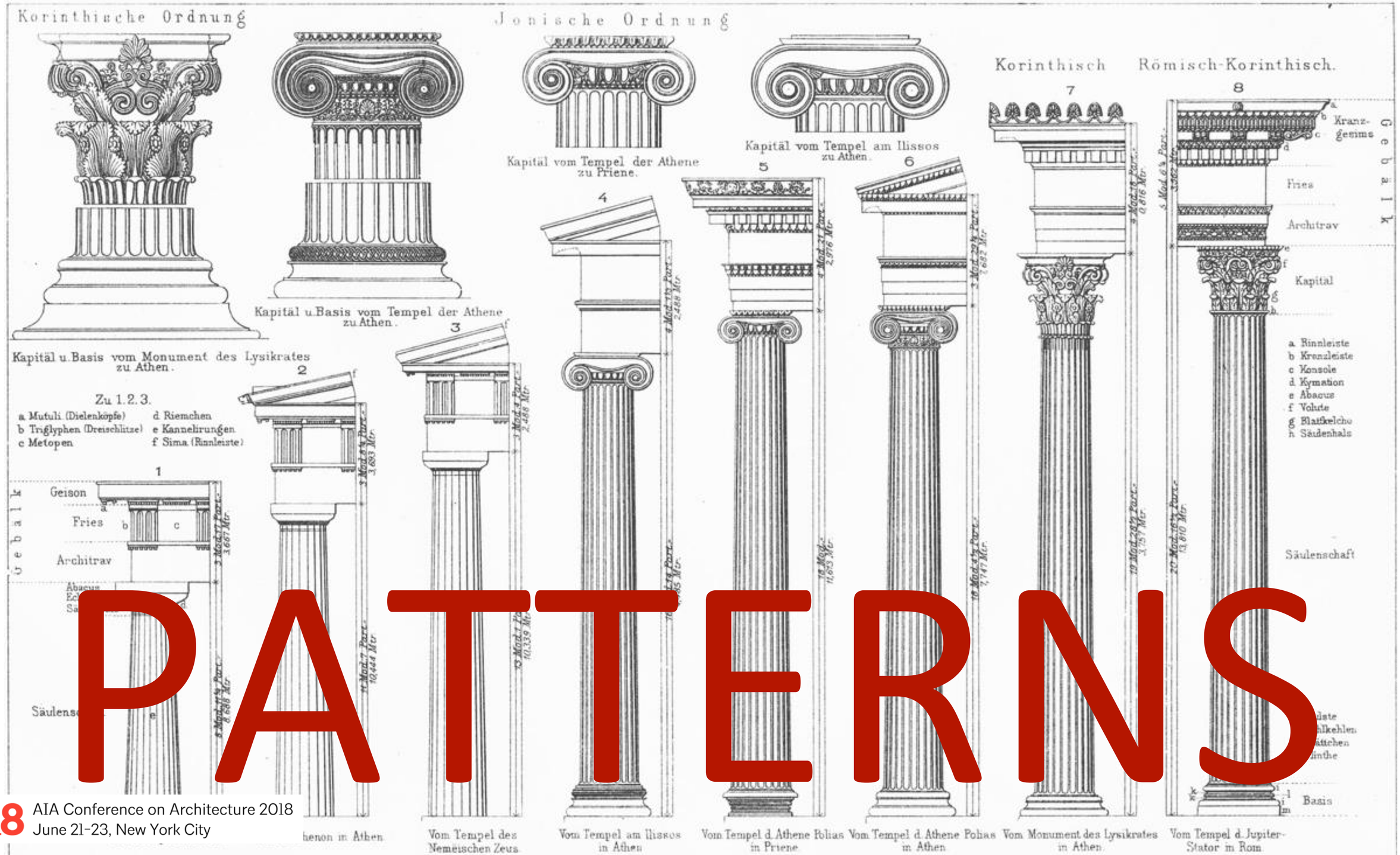
DEN

1,610,266 sf

CII TECHNOLOGY SHOWCASE

2,727,676 sf

Total: 8,384,131 sf



PATTERNS

600 BC 480 BC 340 BC

https://en.wikipedia.org/wiki/Sounion_Kouros

https://en.wikipedia.org/wiki/Kritios_Boy

https://goo.gl/5ymMuk

PATTERNS

ONUMA.com

TH403 6/21/2018 9:45 AM - 11:15 AM

ARCHITECTURE AS A PLATFORM FOR THE NEW URBAN AGENDA

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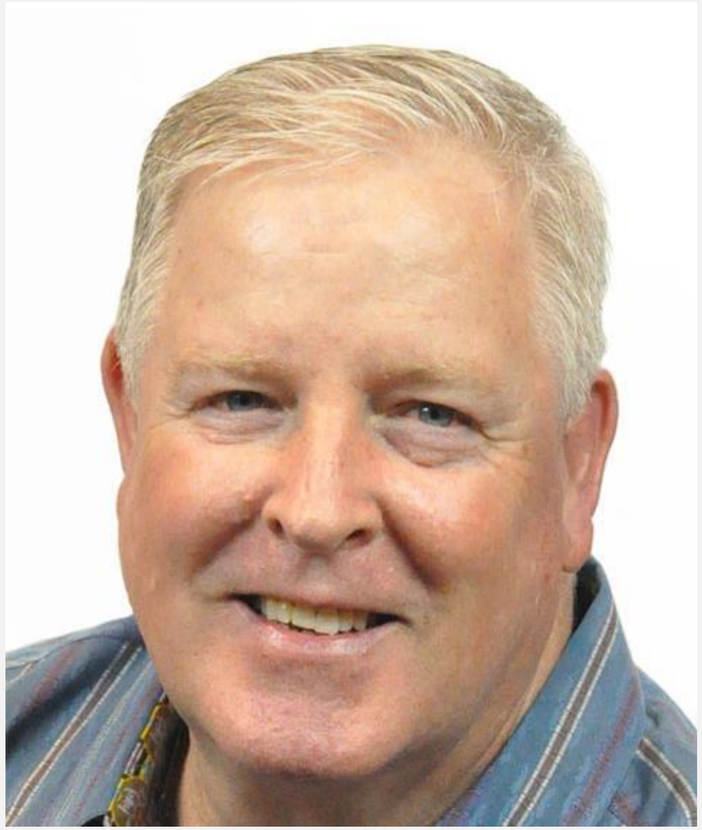
Jonathan Widney

Stephen Hagan FAIA
- President | CEO, Hagan Technologies
- Principal, Construction Data Ventures

Kimon Onuma FAIA
- President, Onuma, Inc.

Jonathan Widney
- Principal, Construction Data Ventures

Steve Jones
- Senior Director, Dodge Data & Analytics



Game Changers in Architectural Practice

A Discussion of Perspective & Observations

1. What is happening today within the AECO Sector?
2. Chaos, concern or confusion – what about confidence?
3. Adoption – what is really impacting the decision to change?
4. Evolution – why should we really change? What about risk?
5. Reality – why isn’t there more DEMAND for higher Quality?

Game Changers in Architectural Practice

A Discussion of Perspective & Observations

Observations from the past 25+ years and what has been done to try to make a difference. Discussion will include the practical application of current capabilities, specifically in the area of Measuring Design (Model) Quality and compliance with company, project or owner requirements. I will also touch on automation, while maintaining consistency. Finally, recognition that momentum is critical to industry adoption.

Game Changers in Architectural Practice

Questions to ask Ourselves

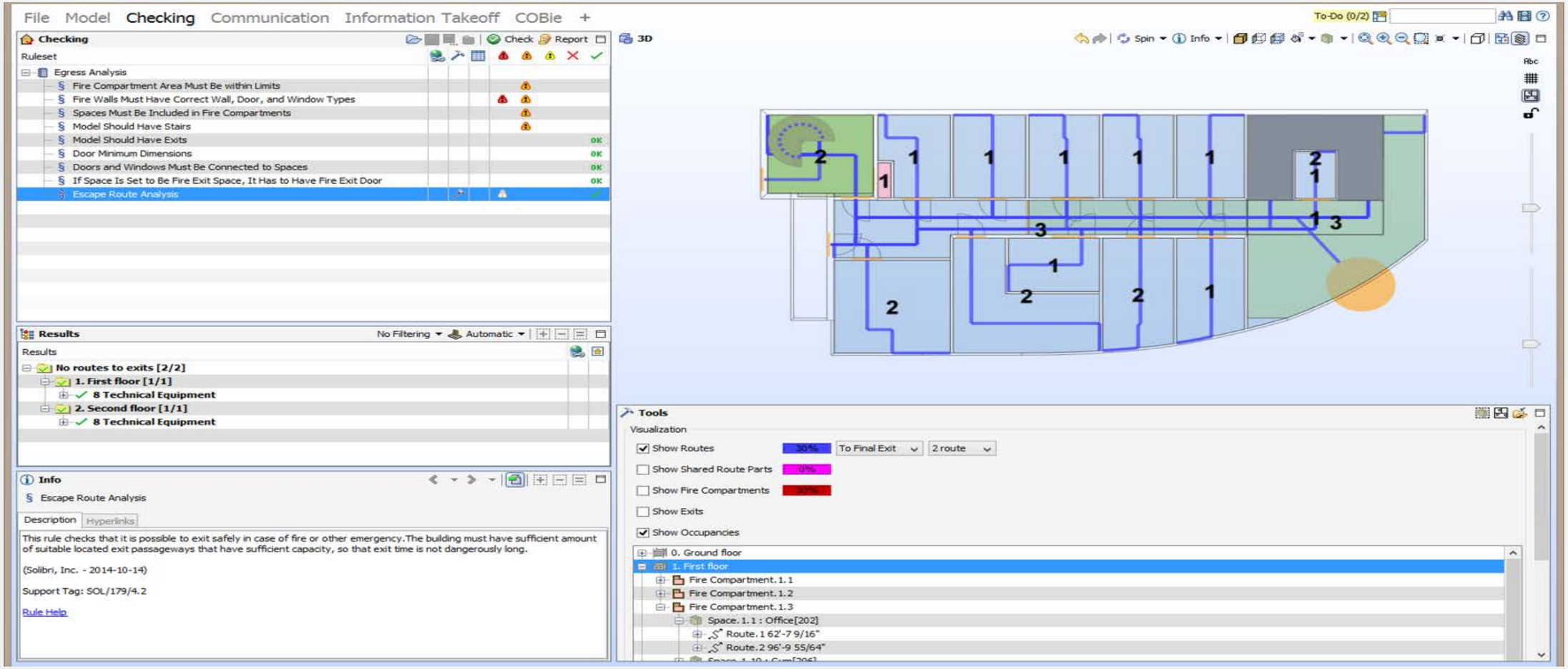
1. Who is controlling the evolution of technology innovation?
2. What happened to commitment to continuous improvement?
3. What BIM Use Cases can be supported TODAY?
4. Introduction of logic and behavior ‘checks’ that are possible TODAY
5. Where are the bottlenecks that are impacting the potential of BIM workflows
6. Why is consistency of Quality not the #1 driver?

BIM Use Cases – a Small Sampling

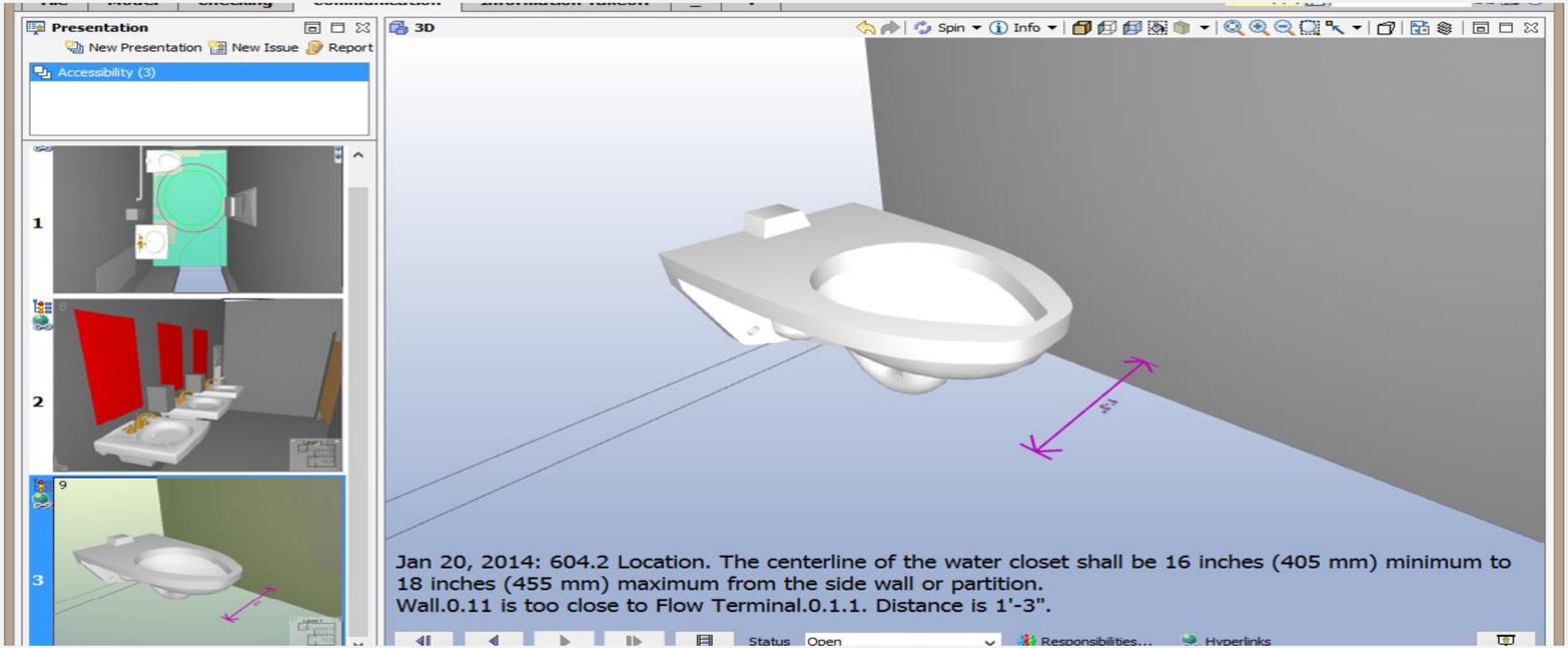
- Code Compliance
- Model QA/QC
- COBie
- LoD Verification
- Government Requirements

- Space Audits
- Coordination
- Site Safety
- Risk Management & Mitigation
- BIM Validation

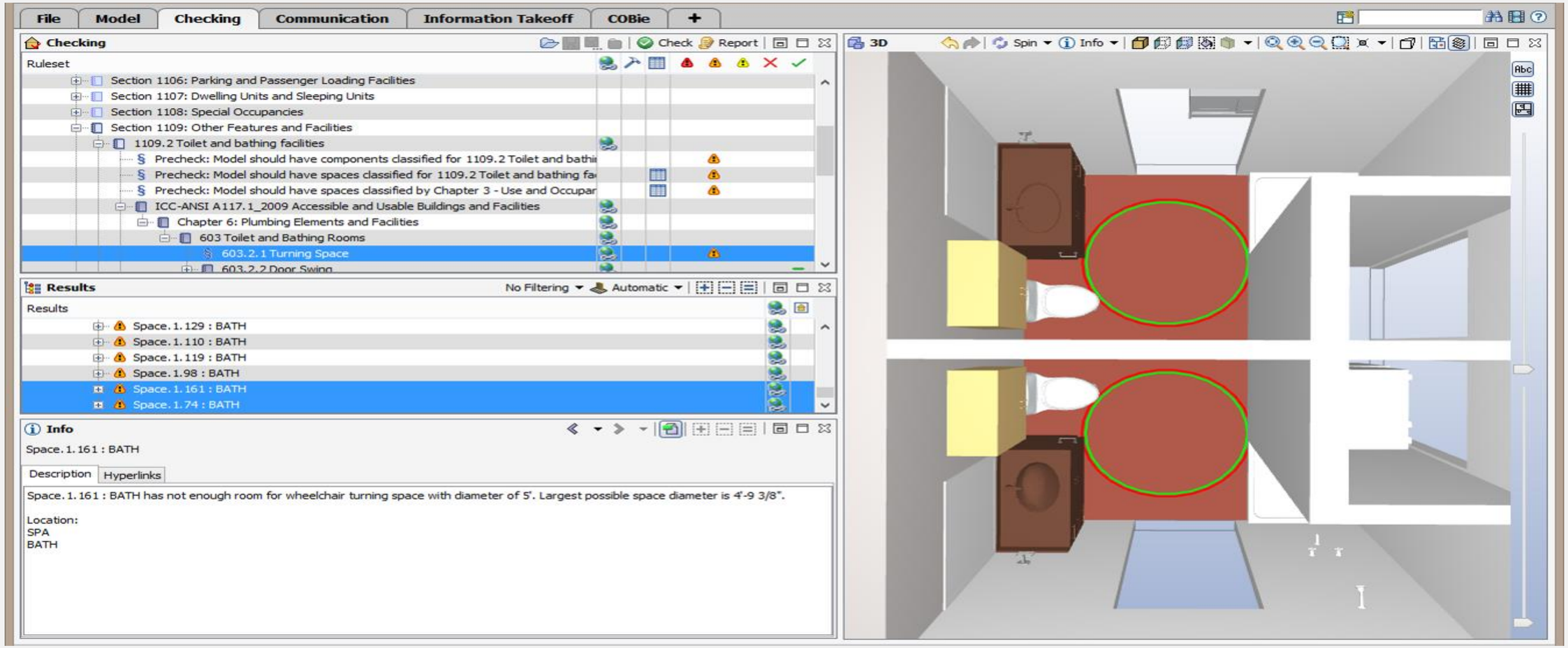
Information at our Fingertips – TODAY
Code Compliance - Occupancy and Egress



Code Compliance – (604.2) Toilet Rooms

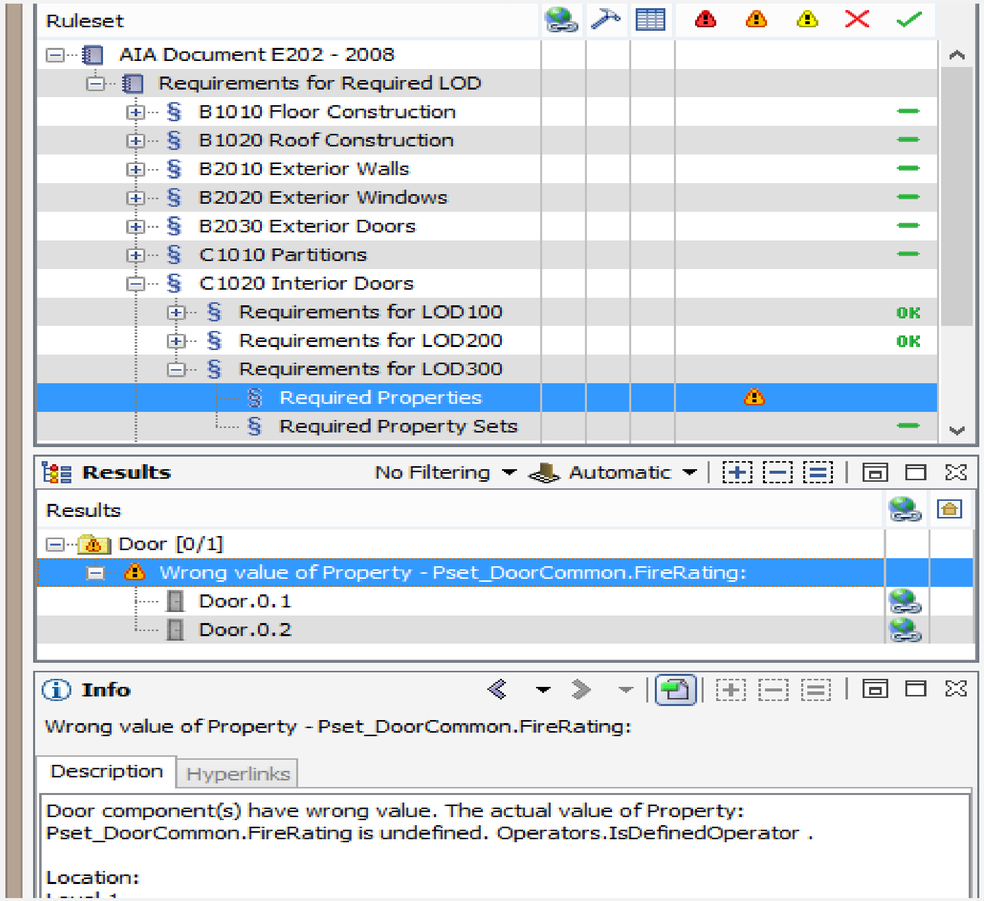


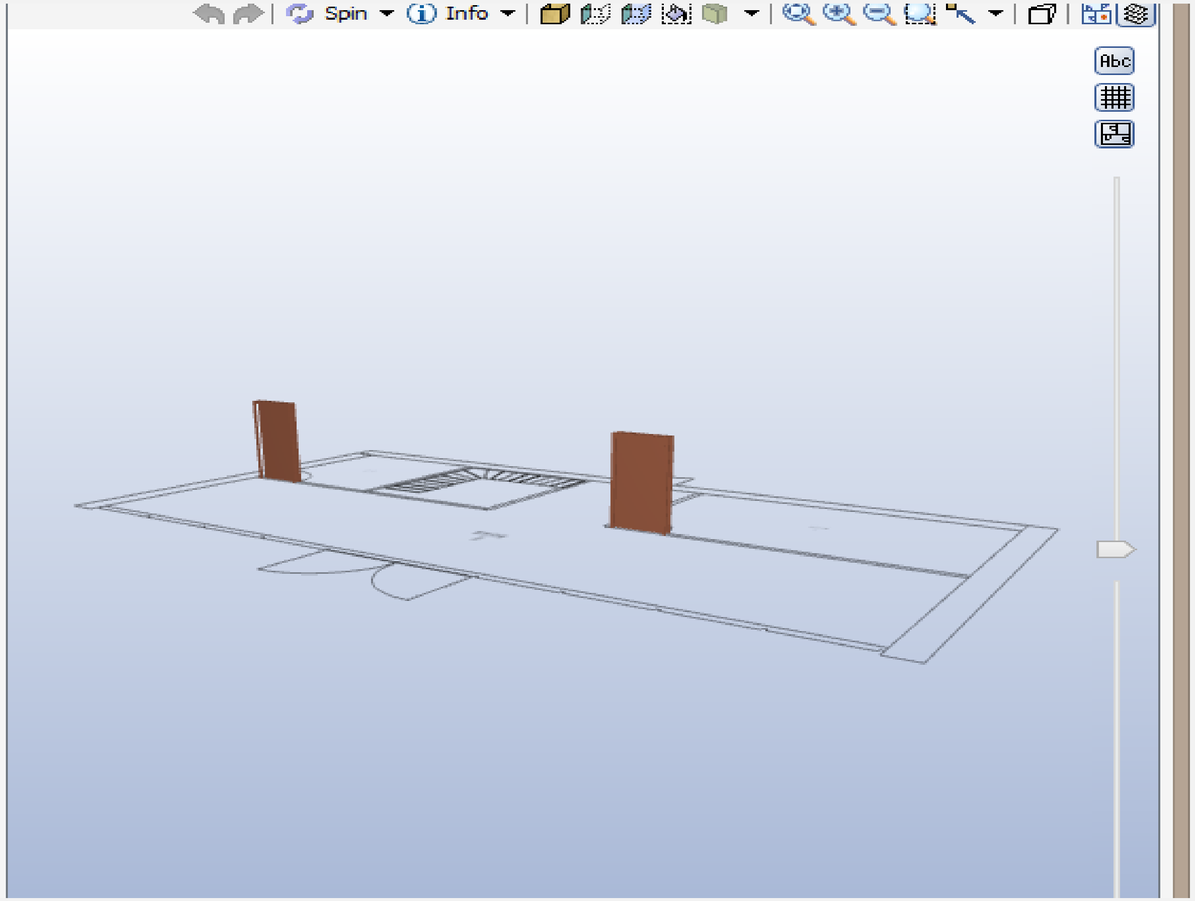
Code Compliance: ADA



Code Compliance: Mirror Heights

LOD
Measuring Compliance – No Fire Rating





Area and Space Calculations Customized for the Owner or Project

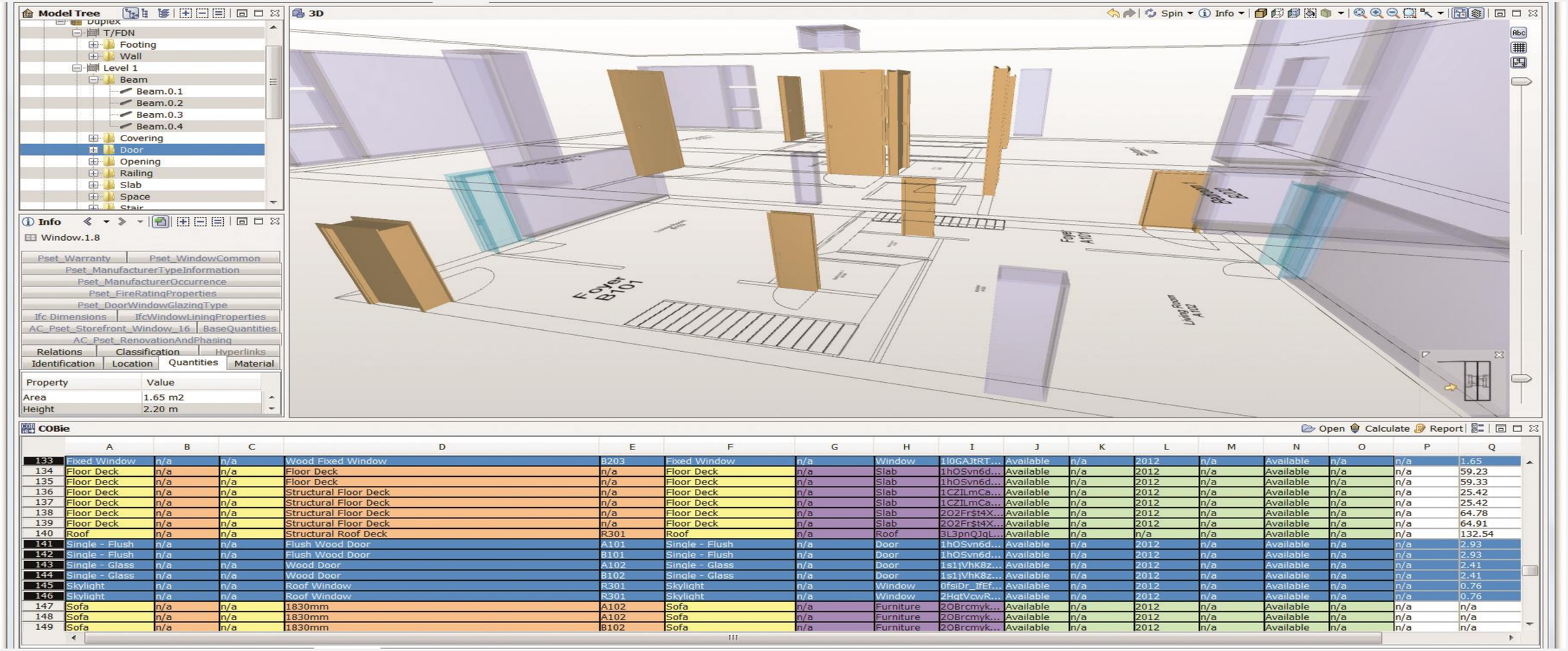
Note: The perimeter of the *Usable Area* is defined according to the '*Standard Method for Measuring Floor Area in Office Buildings, ANSI/BOMA Z65.1-1996*'.

There are two main properties associated with the *Usable Area Visualization* tool:

1) A set of three numbers: the first is the room number, the second is the *GSA BIM Area* in black, and the third is the *Usable Area* in red.

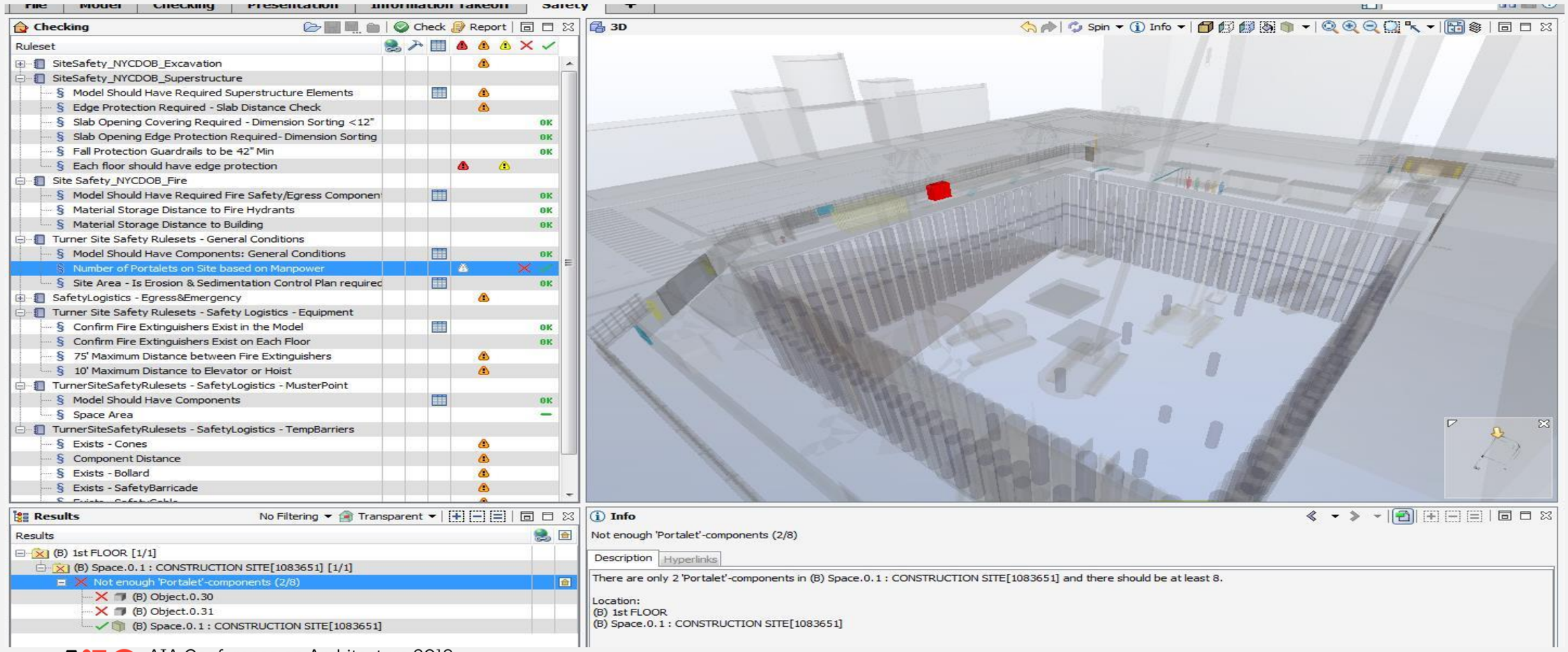
2) A dashed red line that shows the perimeter of the *Usable Area*. There is no dashed line to represent the *GSA BIM Area*.

COBie
Huge Amounts of Object Data

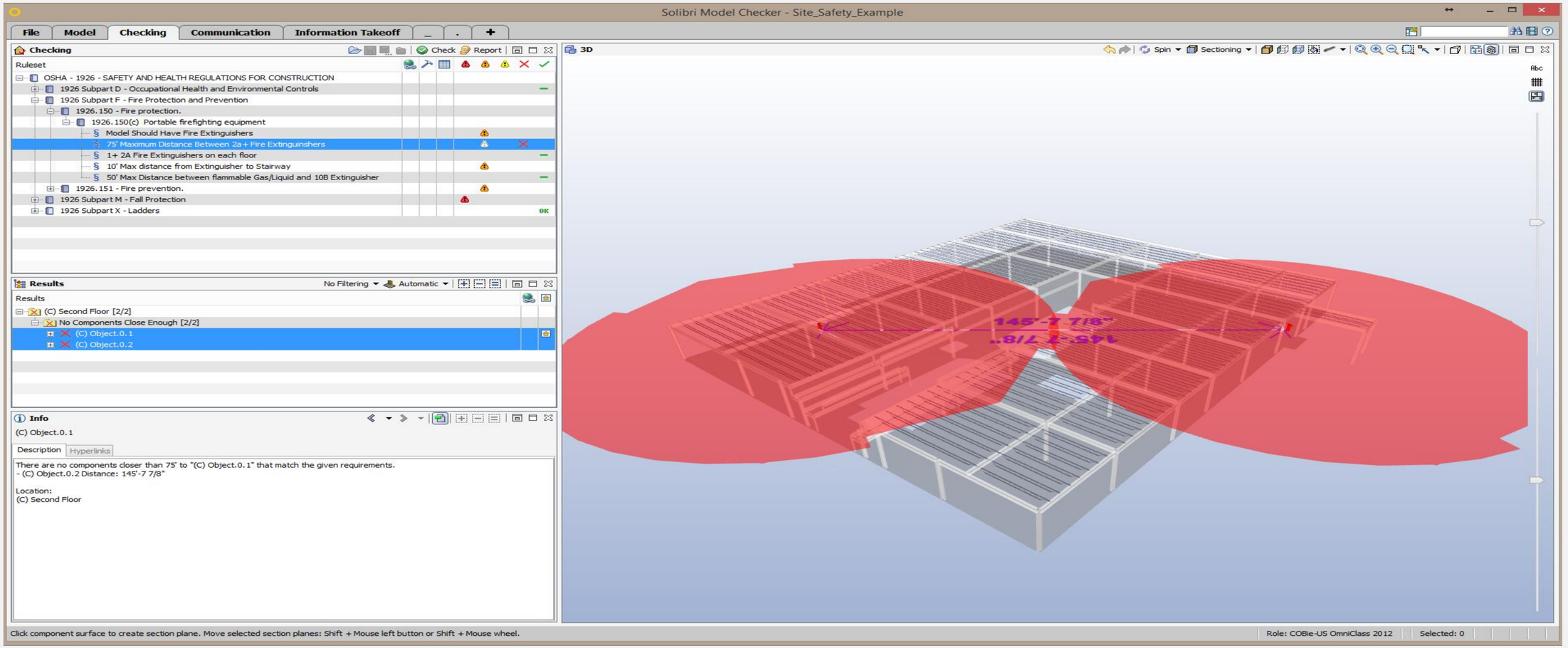


	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
133	Fixed Window	n/a	n/a	Wood Fixed Window	B203	Fixed Window	n/a	Window	1l0GAJtRT...	Available	n/a	2012	n/a	Available	n/a	n/a	1.65
134	Floor Deck	n/a	n/a	Floor Deck	n/a	Floor Deck	n/a	Slab	1hOSvn6d...	Available	n/a	2012	n/a	Available	n/a	n/a	59.23
135	Floor Deck	n/a	n/a	Floor Deck	n/a	Floor Deck	n/a	Slab	1hOSvn6d...	Available	n/a	2012	n/a	Available	n/a	n/a	59.33
136	Floor Deck	n/a	n/a	Structural Floor Deck	n/a	Floor Deck	n/a	Slab	1CZILmCa...	Available	n/a	2012	n/a	Available	n/a	n/a	25.42
137	Floor Deck	n/a	n/a	Structural Floor Deck	n/a	Floor Deck	n/a	Slab	1CZILmCa...	Available	n/a	2012	n/a	Available	n/a	n/a	25.42
138	Floor Deck	n/a	n/a	Structural Floor Deck	n/a	Floor Deck	n/a	Slab	2O2Fr$t4X...	Available	n/a	2012	n/a	Available	n/a	n/a	64.78
139	Floor Deck	n/a	n/a	Structural Floor Deck	n/a	Floor Deck	n/a	Slab	2O2Fr$t4X...	Available	n/a	2012	n/a	Available	n/a	n/a	64.91
140	Roof	n/a	n/a	Structural Roof Deck	R301	Roof	n/a	Roof	3L3pnQJqL...	Available	n/a	n/a	n/a	Available	n/a	n/a	132.54
141	Single - Flush	n/a	n/a	Flush Wood Door	A101	Single - Flush	n/a	Door	1hOSvn6d...	Available	n/a	2012	n/a	Available	n/a	n/a	2.93
142	Single - Flush	n/a	n/a	Flush Wood Door	B101	Single - Flush	n/a	Door	1hOSvn6d...	Available	n/a	2012	n/a	Available	n/a	n/a	2.93
143	Single - Glass	n/a	n/a	Wood Door	A102	Single - Glass	n/a	Door	1s1jVhK8z...	Available	n/a	2012	n/a	Available	n/a	n/a	2.41
144	Single - Glass	n/a	n/a	Wood Door	B102	Single - Glass	n/a	Door	1s1jVhK8z...	Available	n/a	2012	n/a	Available	n/a	n/a	2.41
145	Skylight	n/a	n/a	Roof Window	R301	Skylight	n/a	Window	0fslDr_IfEf...	Available	n/a	2012	n/a	Available	n/a	n/a	0.76
146	Skylight	n/a	n/a	Roof Window	R301	Skylight	n/a	Window	2HqtVcwR...	Available	n/a	2012	n/a	Available	n/a	n/a	0.76
147	Sofa	n/a	n/a	1830mm	A102	Sofa	n/a	Furniture	2OBrcmyk...	Available	n/a	2012	n/a	Available	n/a	n/a	n/a
148	Sofa	n/a	n/a	1830mm	A102	Sofa	n/a	Furniture	2OBrcmyk...	Available	n/a	2012	n/a	Available	n/a	n/a	n/a
149	Sofa	n/a	n/a	1830mm	B102	Sofa	n/a	Furniture	2OBrcmyk...	Available	n/a	2012	n/a	Available	n/a	n/a	n/a

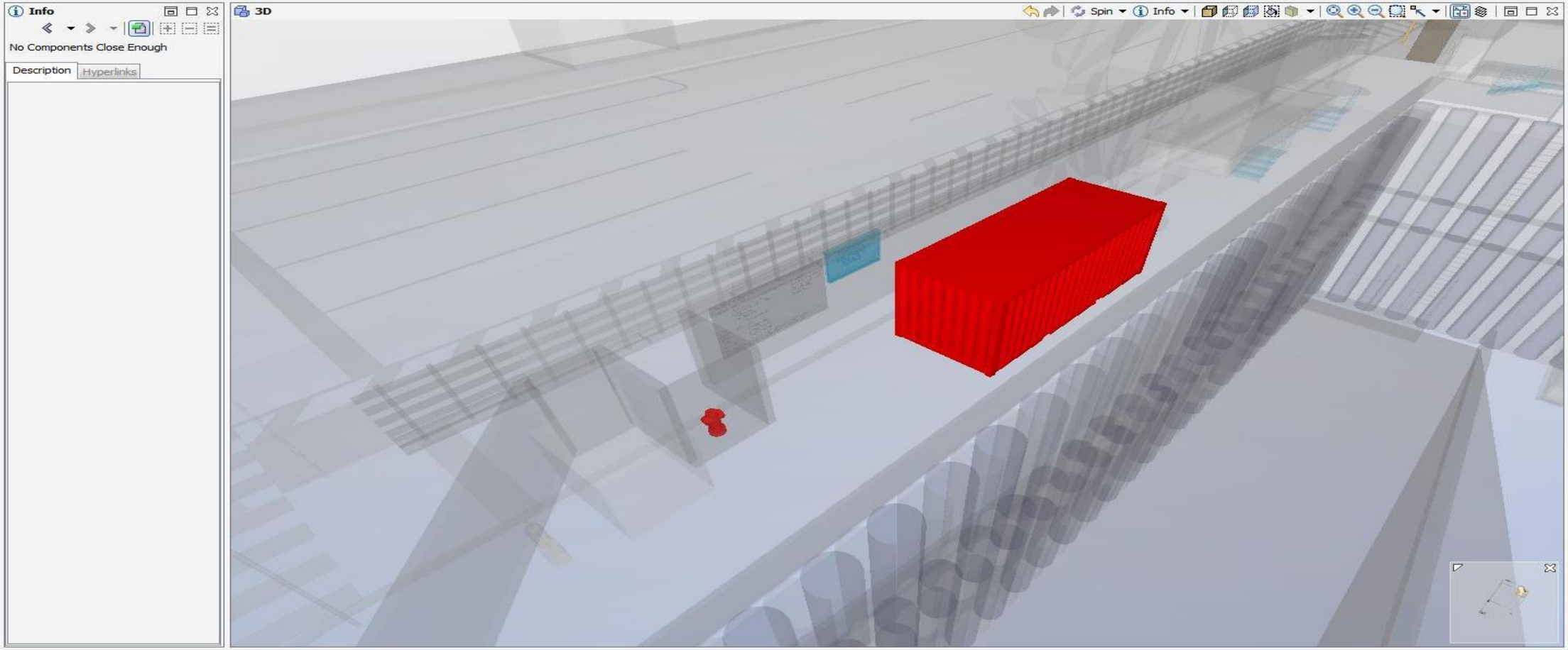
Safety
How Many Portalets are Enough?



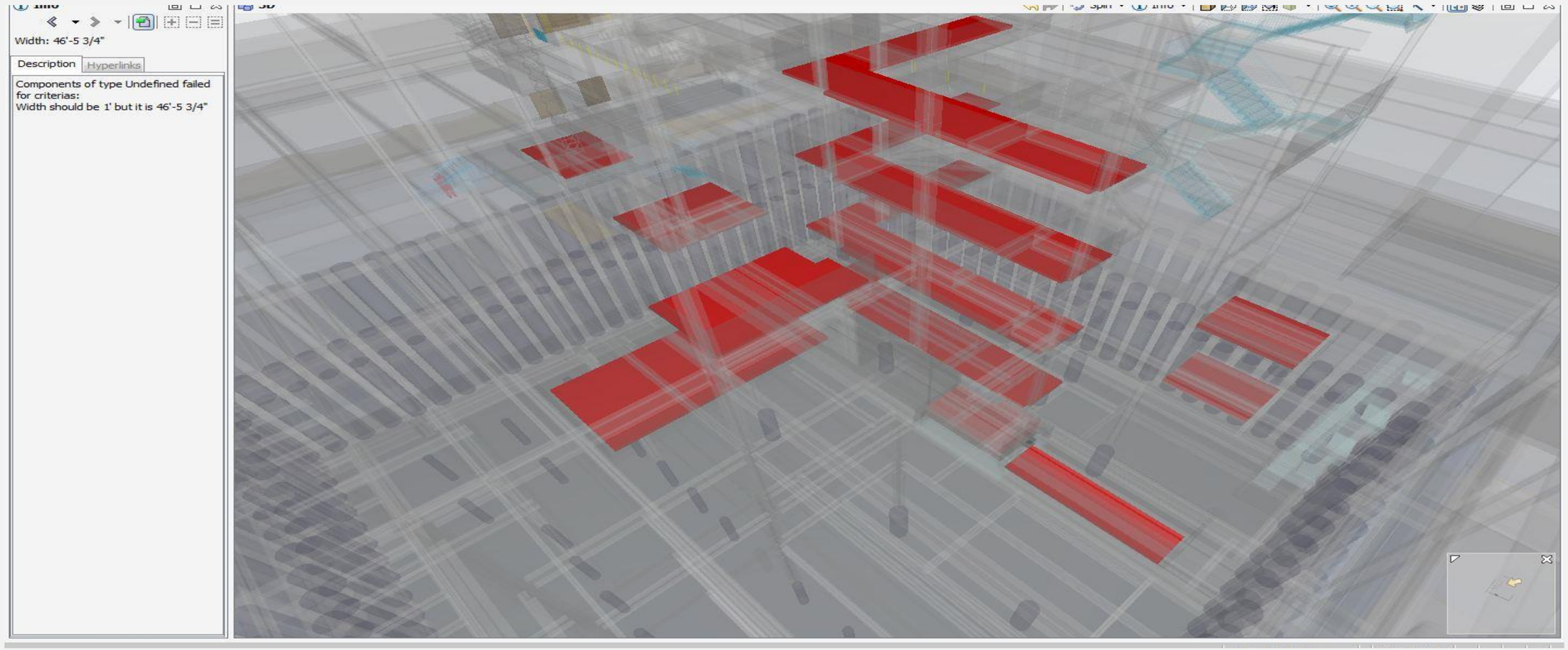
Safety
Ensuring Fire Extinguishers are Present



Safety
Material Storage Proximity to Hydrant



Safety
Modeled Slab Edge Protection



Summary

- What are we waiting for?
- Innovation requires US to embrace change
- Evolution requires US to advance our Industry
- Better Model Consistency = Better ROI

- If we ask for it…they will develop it

Steve Jones

Stephen Hagan FAIA
- President | CEO, Hagan Technologies
- Principal, Construction Data Ventures

Kimon Onuma FAIA
- President, Onuma, Inc.

Jonathan Widney
- Principal, Construction Data Ventures

Steve Jones
- Senior Director, Dodge Data & Analytics

Dodge Data & Analytics Research on Trends

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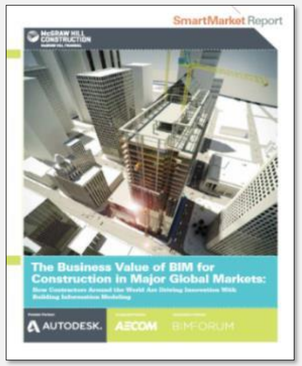
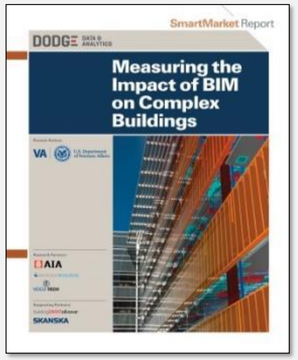
TECHNOLOGY/INNOVATION

Information Mobility

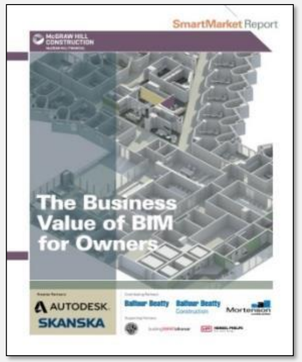
BIM for Contractors



Measuring BIM



BIM for Owners

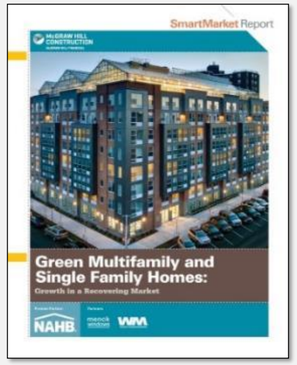


SUSTAINABILITY

World Green Trends

Design for Health

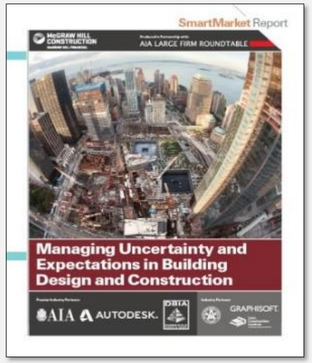
Green Homes



Green Schools

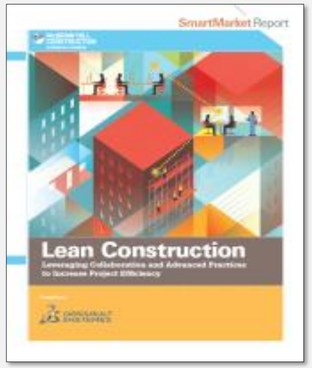
PRACTICES/PROCESSES

Managing Uncertainty



Project Delivery Systems

Lean



Safety (3x)

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Dodge Data & Analytics Research on Trends

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construction.com/toolkit

- What are people doing that generates value*, improves outcomes**
  - **Meaningful, Reliable, Repeatable, Scalable*
  - ***How much better is it than previous methods?*
- What's keeping people from doing it (or doing more of it)?
- What do people believe will:
  - *Drive more use*
  - *Add more value*

What can/should people do to move forward?

Harnessing the Technology Innovation Revolution

The ***NOW***

The ***NEW***

The ***NEXT***

Harnessing:

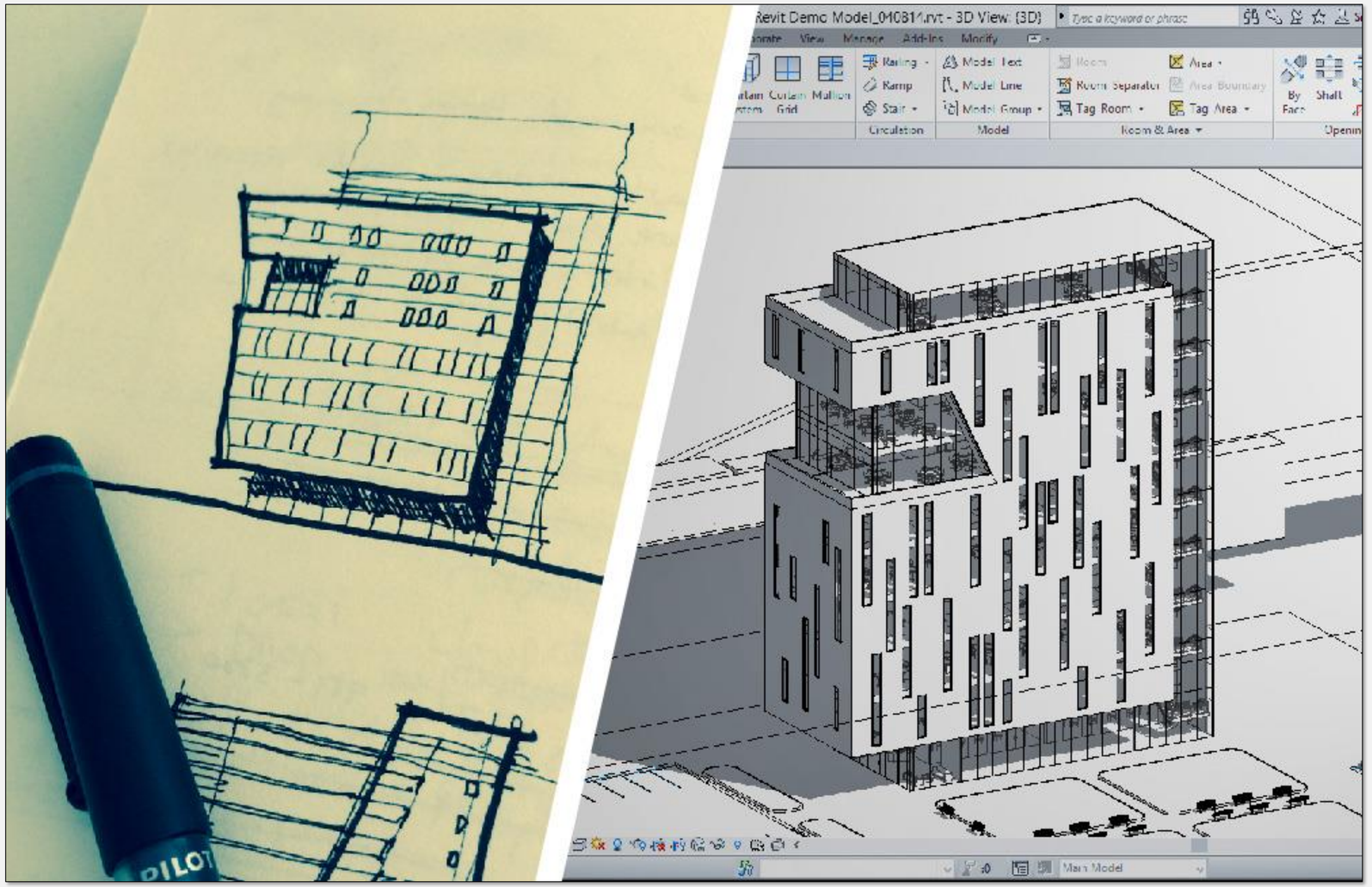
Taking control of something powerful
and driving for results

Harnessing the Technology Innovation Revolution

The ***NOW***

The *NEW*

The *NEXT*



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Harnessing the Technology Innovation Revolution

The ***NOW***

The *NEW*

The *NEXT*

1. Get more out of BIM

How many of you are currently using BIM?

Harnessing the Technology Innovation Revolution

The ***NOW***

The *NEW*

The *NEXT*

1. Get ~~more out of~~ BIM!!!

free at:

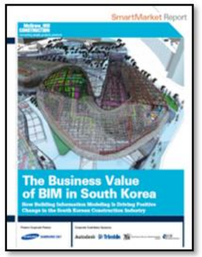
construction.com/toolkit

REGIONAL STUDIES

BIM in North America (3X)

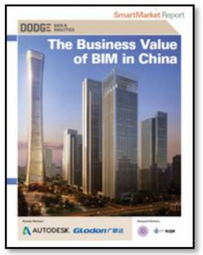
BIM in Europe

BIM in Korea

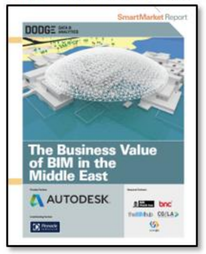


BIM in Australia/NZ

BIM in China



BIM in The Middle East



VERTICAL STUDIES

BIM for Infrastructure (2X)

Green BIM

BIM for Owners

BIM for Contractors

BIM Metrics

BIM for Water

2018

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Harnessing the Technology Innovation Revolution

The ***NOW***

The ***NEW***

The ***NEXT***

1. Get more out of BIM

- *Stop* thinking of BIM as something used IN YOUR FIRM
- *Start* thinking of BIM as something used ON YOUR PROJECTS

Harnessing the Technology Innovation Revolution

The ***NOW***

The *NEW*

The *NEXT*

1. Get more out of BIM

"Silos of Excellence" do not help

Multiple Analyses from Single Model

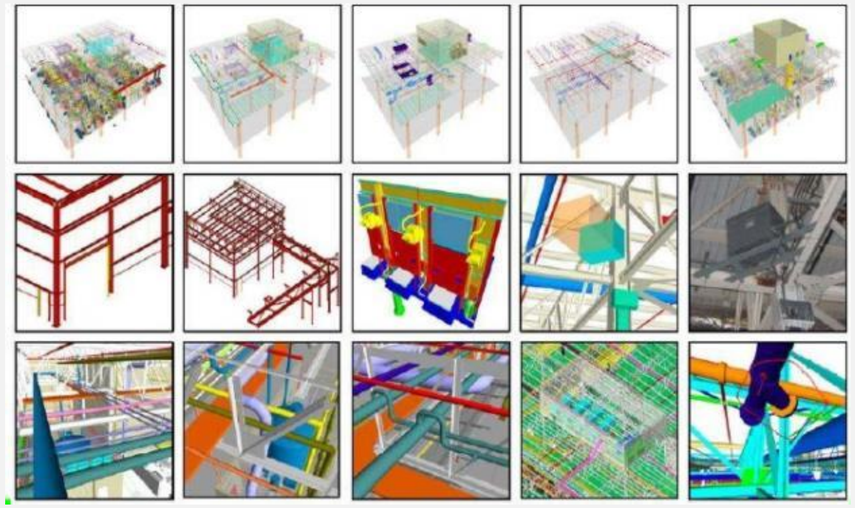


Image Source: eQ NOVA

Harnessing the Technology Innovation Revolution

The ***NOW***

The ***NEW***

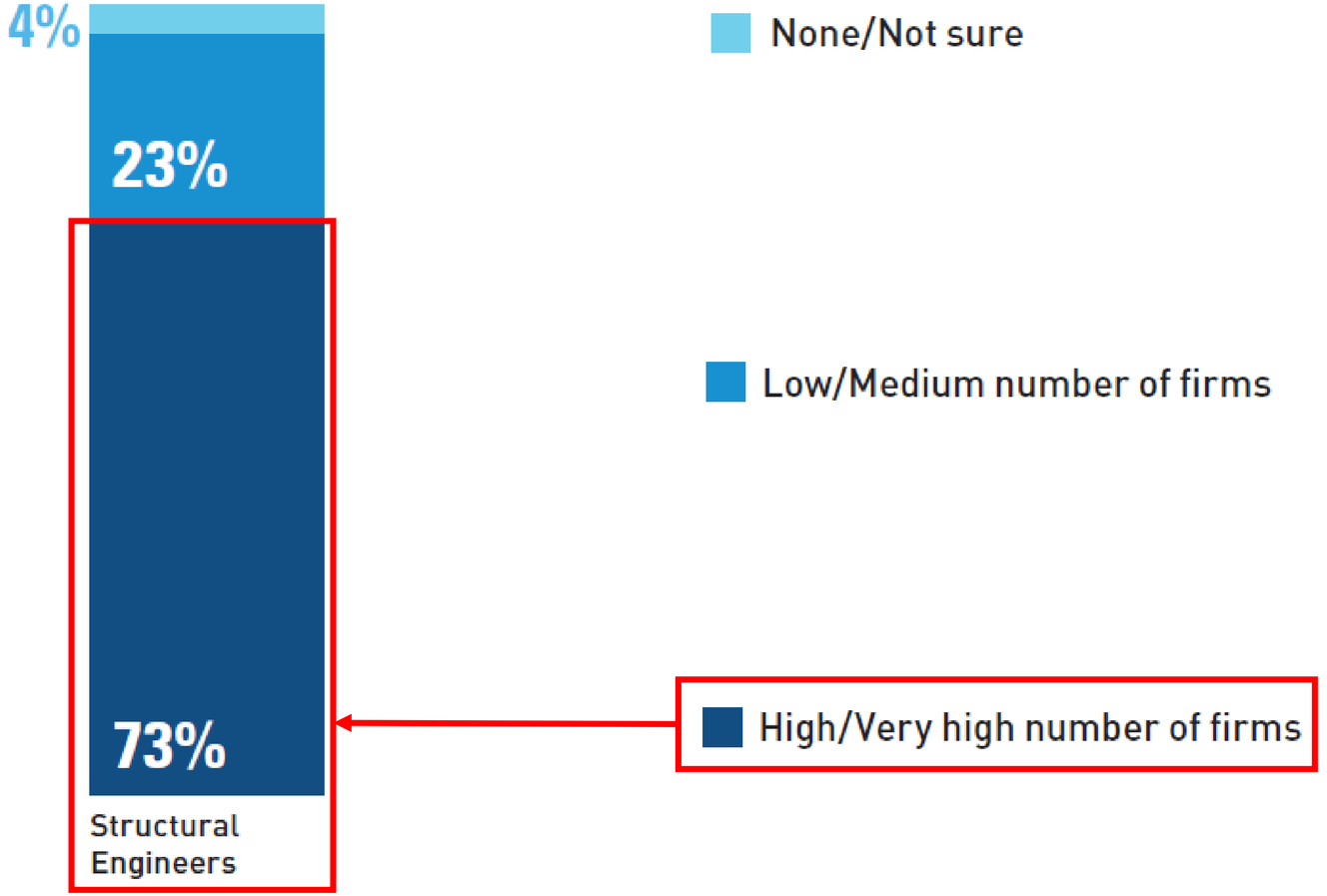
The ***NEXT***

1. Get more out of BIM

- Drive more adoption and use among your project team members
- Where are we now re: engineers BIM adoption?

Architects' Perception of BIM Adoption by Engineers

Percentage of architects who perceive each of three levels of BIM adoption in their market among five types of engineering firms



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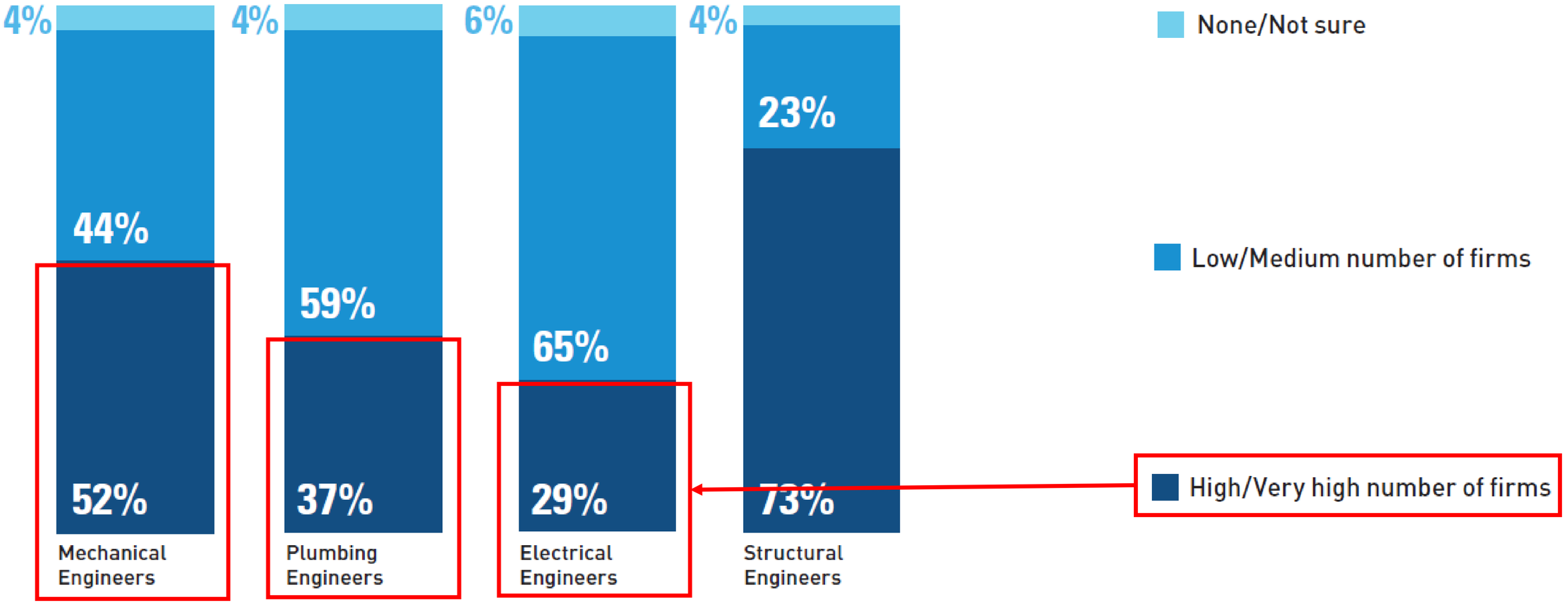

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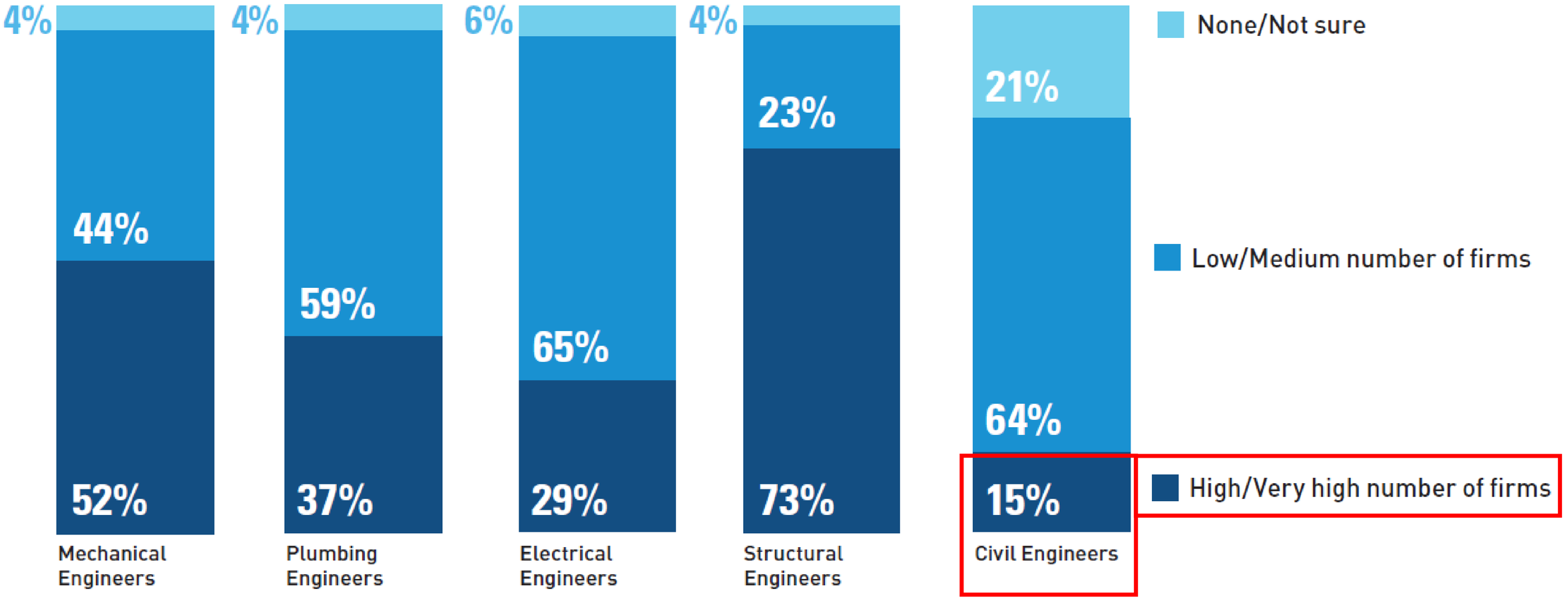
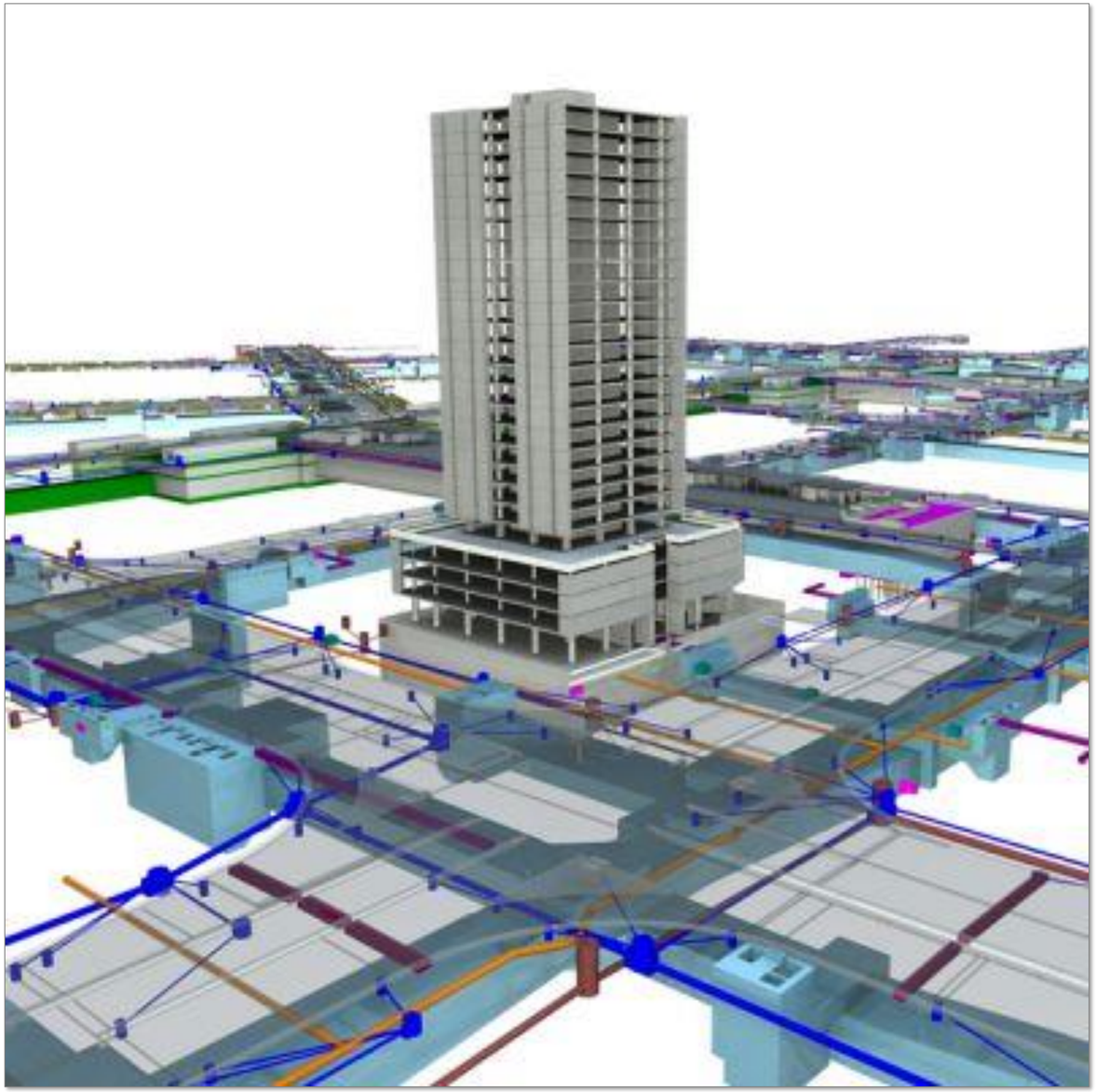
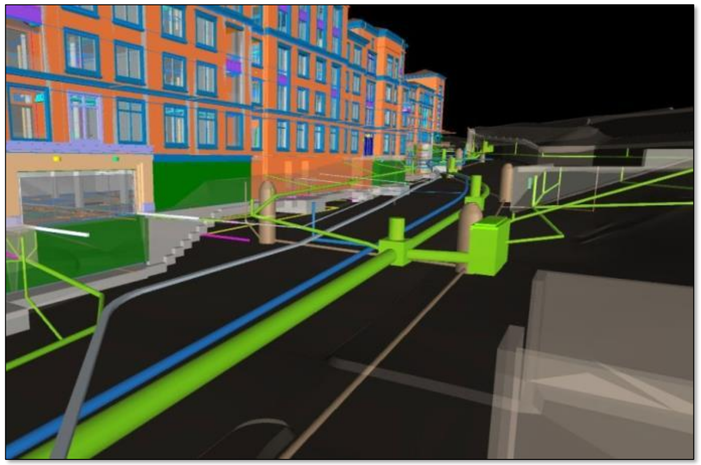
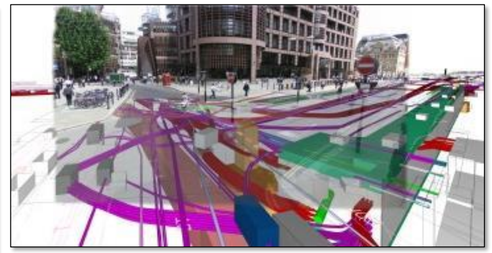
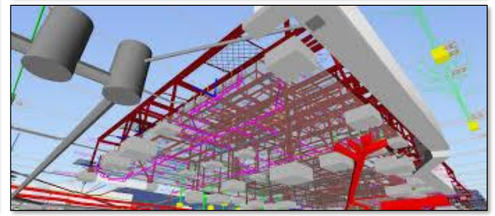





NORTH
Architectural Bridge and Pool Point
Mail Kiosk and Community Gathering with Trellis
Visitor Parking
Bosque of Ornamental Trees
water
grass
grass
CAISONS CREEK DRIVE
Main Signage and Landscape Feature at Entry Point to Project
Fountain Feature and Gathering Area with Special Pavement
Plantings of Live Oaks Along Main Drive
Main Signage and Landscape Feature at Entry Point to Project
Planting of Specimen Live Oak and Dedication
Open Air Pavilion and Barbeque
Typical Architectural Building Unit








Reality-informed design

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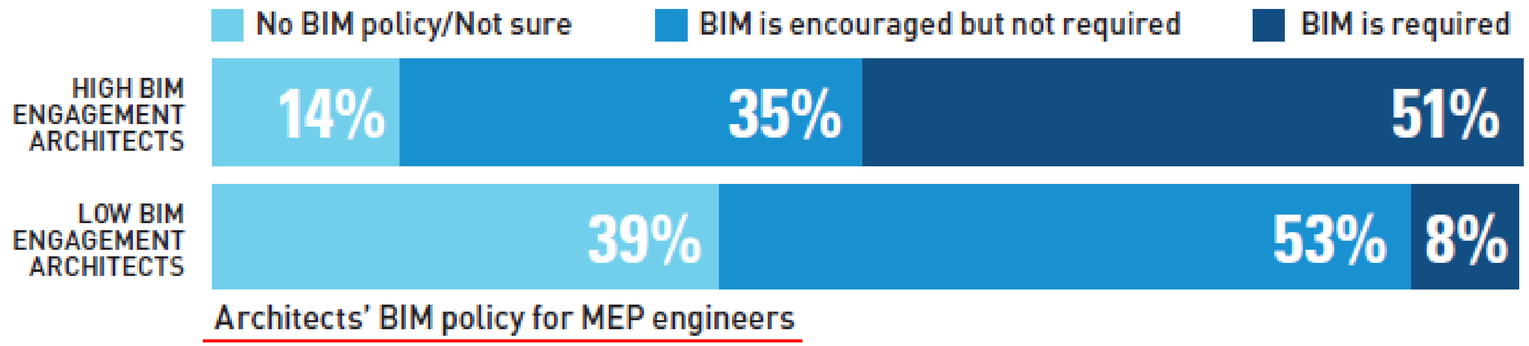
1. Get more out of BIM

- Drive more adoption and use among your project team members
- **HOW?** BIM Requirements

Architects' BIM Policies for Engineers

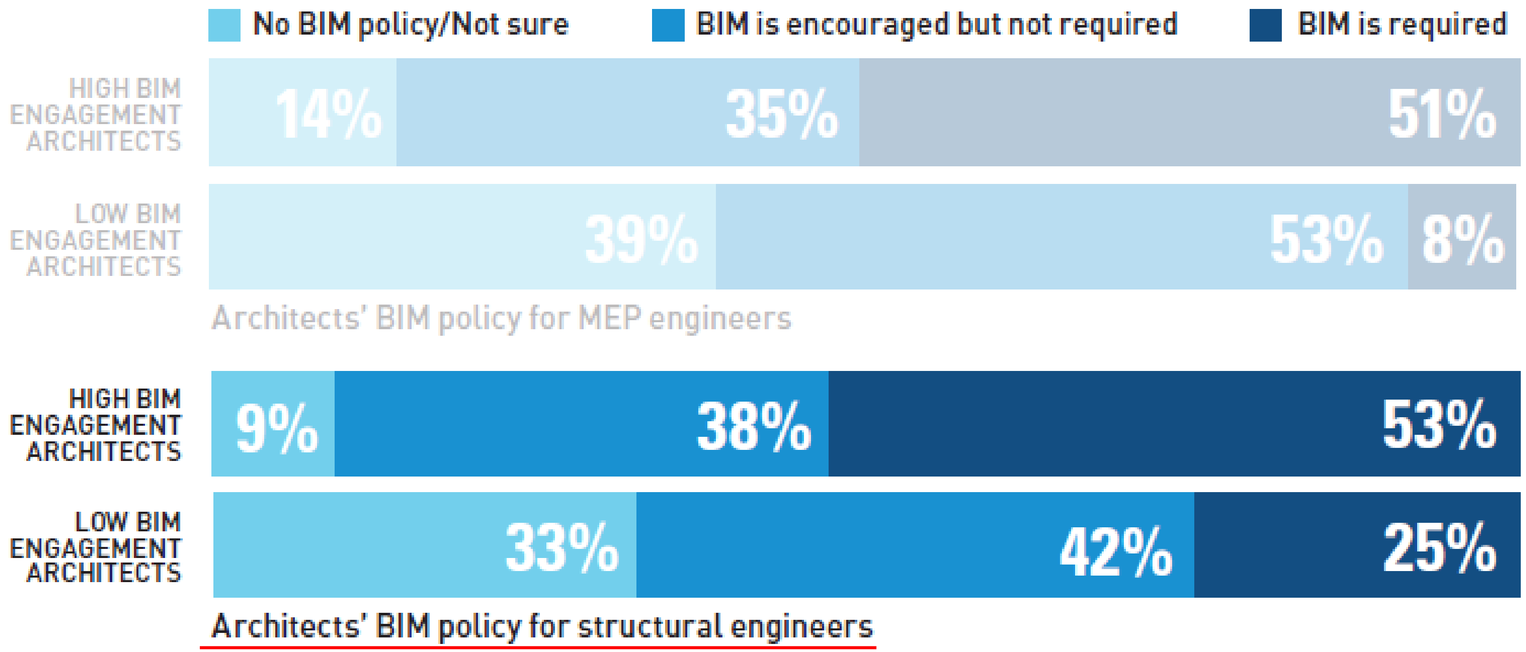
Percentages of architects reporting each of three levels of BIM requirements policy for engineering firms on their project teams



Dramatic differences between High and Low Engagement BIM users.

Architects' BIM Policies for Engineers

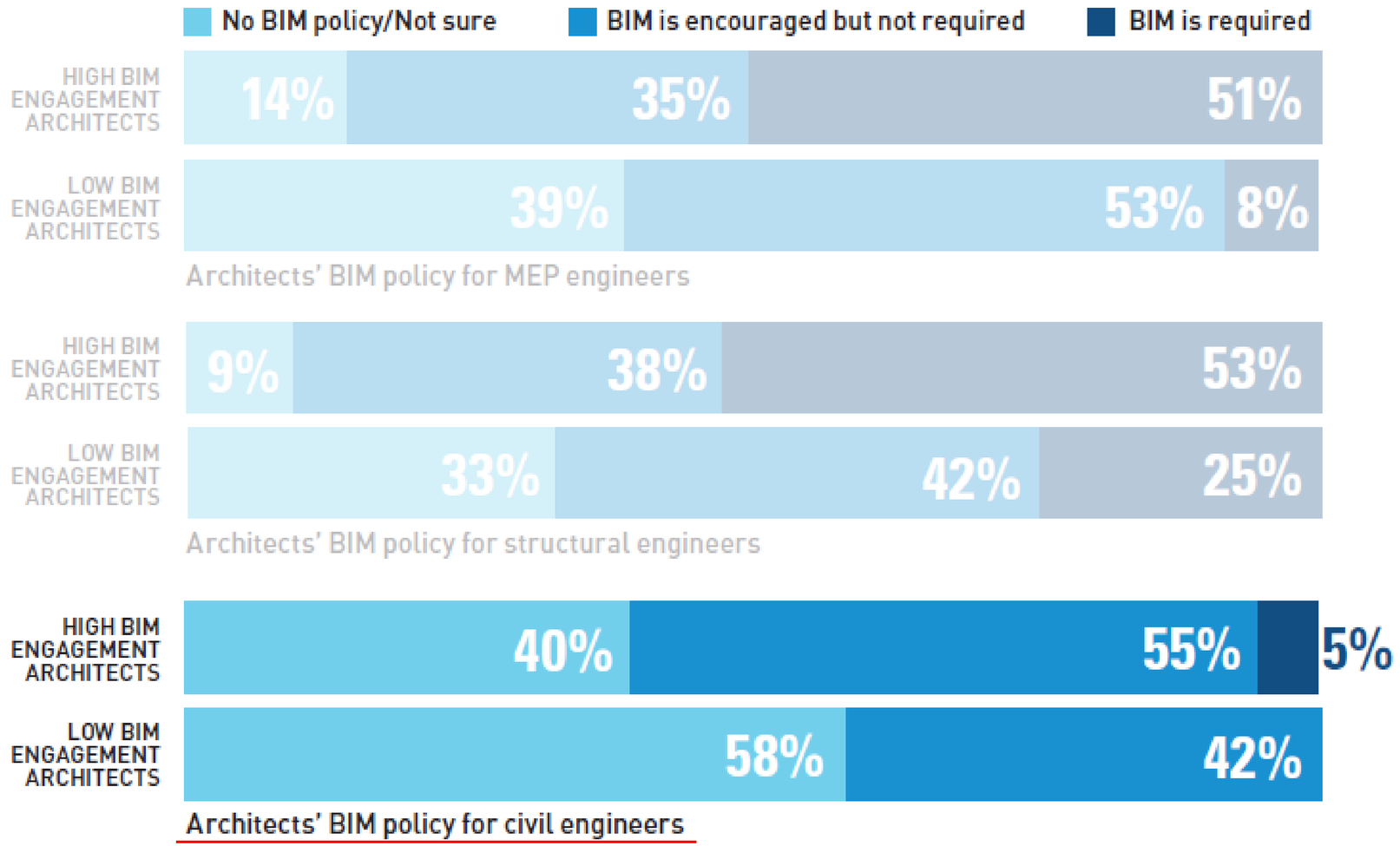
Percentages of architects reporting each of three levels of BIM requirements policy for engineering firms on their project teams



More of the Low Engagement users report having BIM requirements for structural engineers.

Architects' BIM Policies for Engineers

Percentages of architects reporting each of three levels of BIM requirements policy for engineering firms on their project teams



BIM requirements for civil engineers is still developing among all users.

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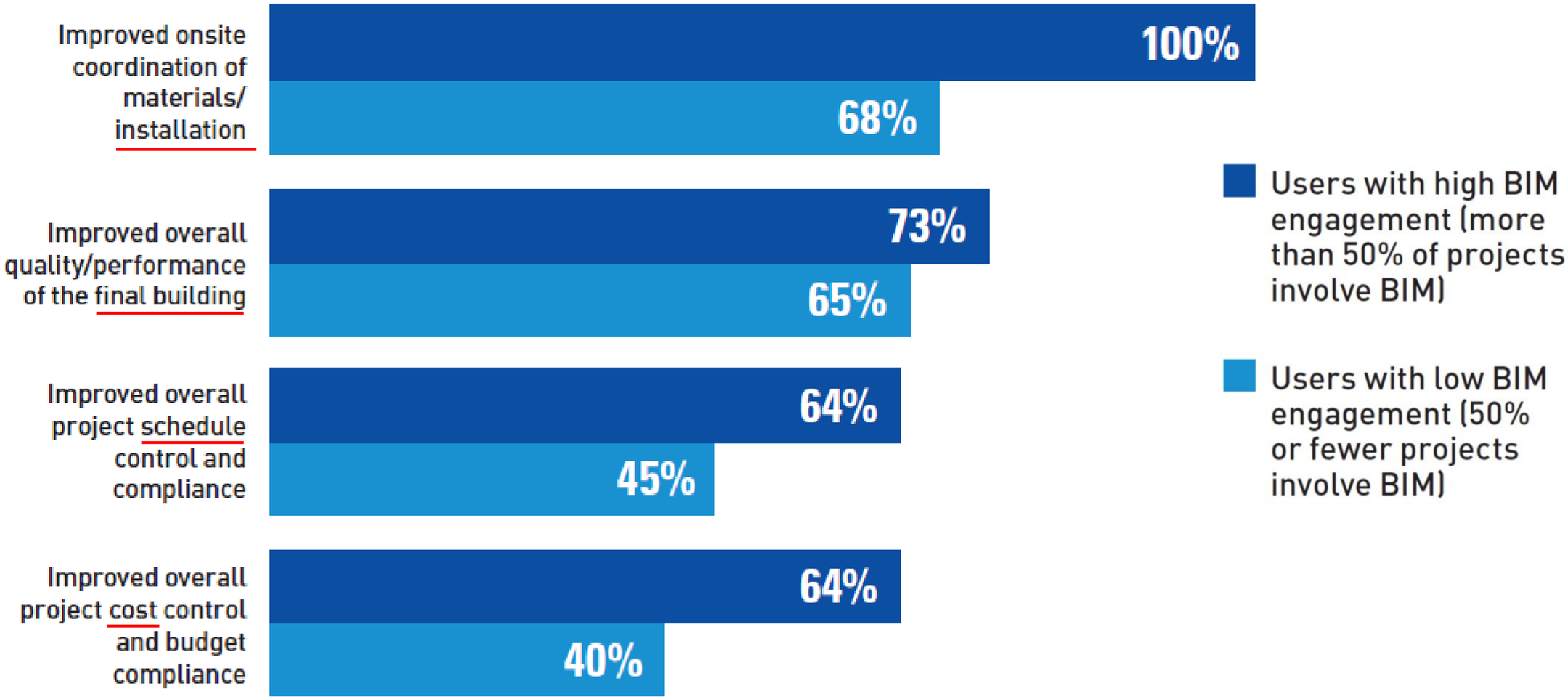
1. Get more out of BIM

- Drive more adoption and use among your project team members
- **WHY?** Better Outcomes

Improved Project Outcomes When BIM is Used by Engineers and Trades

Percentage of BIM users who cite each of four benefits generated by having key team members engaged with BIM



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The *NOW*

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The *NEXT*

2. Drive integrated digital workflows

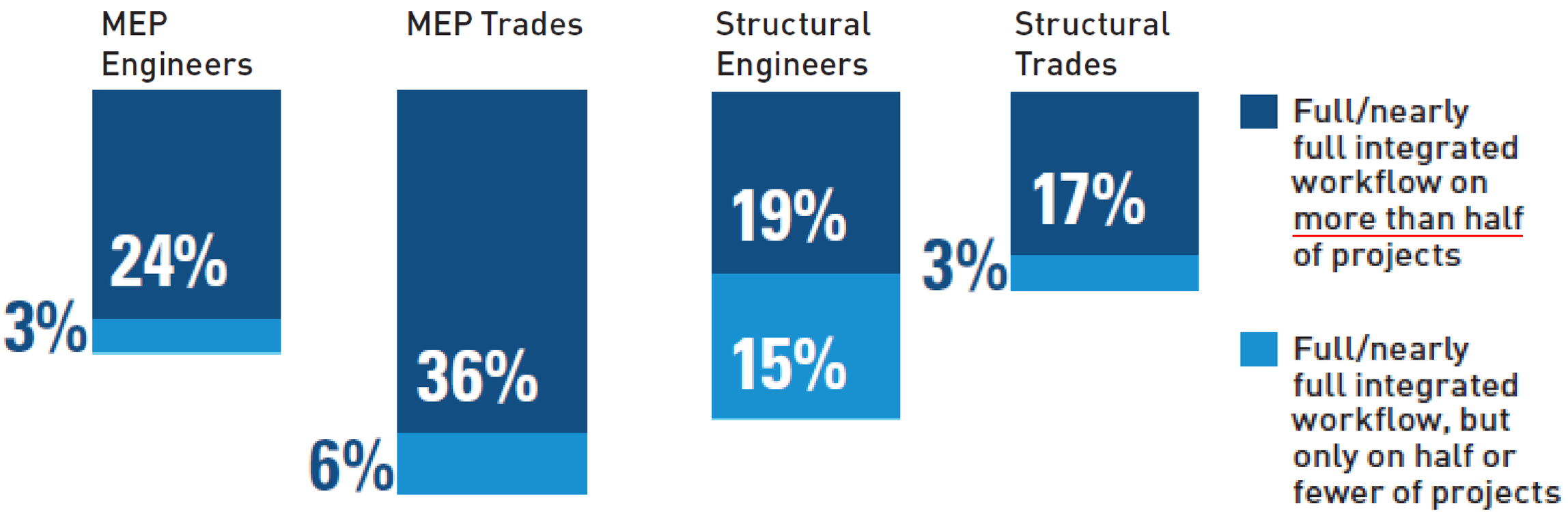
Continuous multi-party flow of digital data

- **Designers** – create model, code check, analyze/optimize
- **Detailers** – shop drawings, install/erection plans
- **Fabricators** – bring model data into fabrication systems
- **Installers** – Transfer data back into design model to validate accuracy and confirm installation in the field

Connecting design+fabrication+installation

Frequency of Integrated Workflow

Percentage of structural and MEP engineers and trades who report participating in an integrated digital workflow on current and recent projects



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The *NOW*

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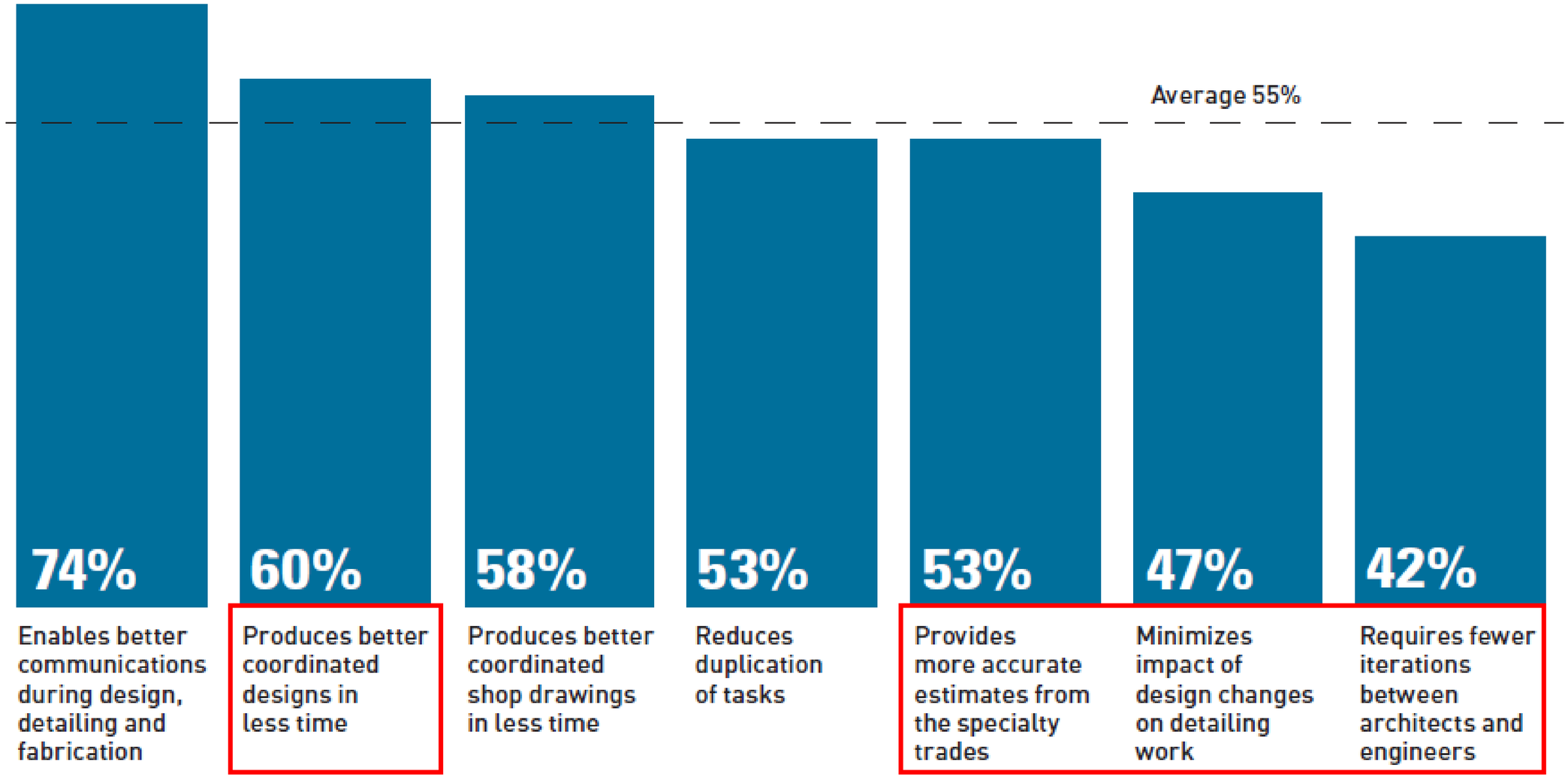
The *NEXT*

2. Drive integrated digital workflows
   - **WHY?** Better Outcomes

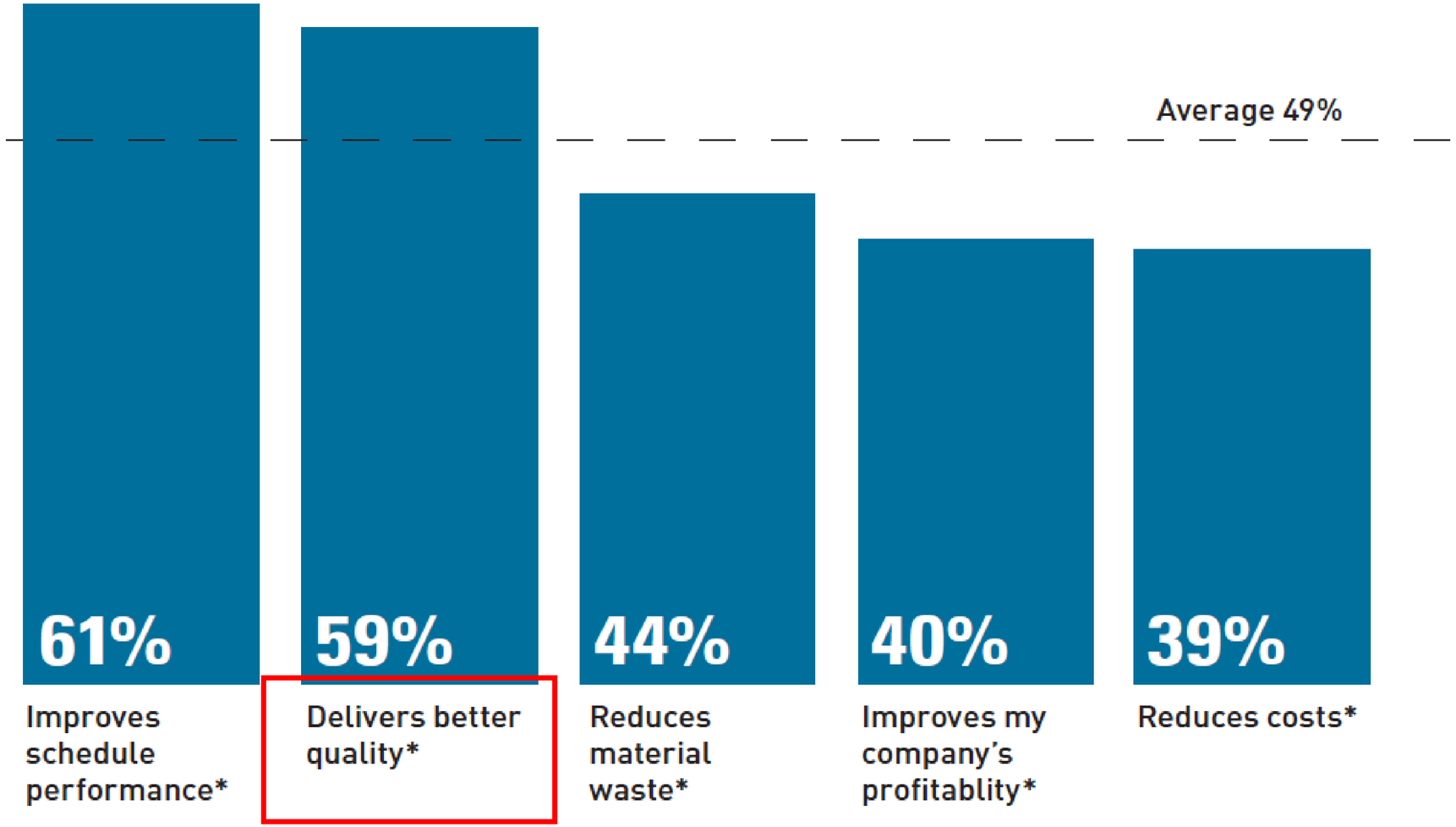
Impact on Design, Detailing and Fabrication

Percentage of high or very high impact ratings for seven positive impacts of the integrated workflow on design, detailing and fabrication



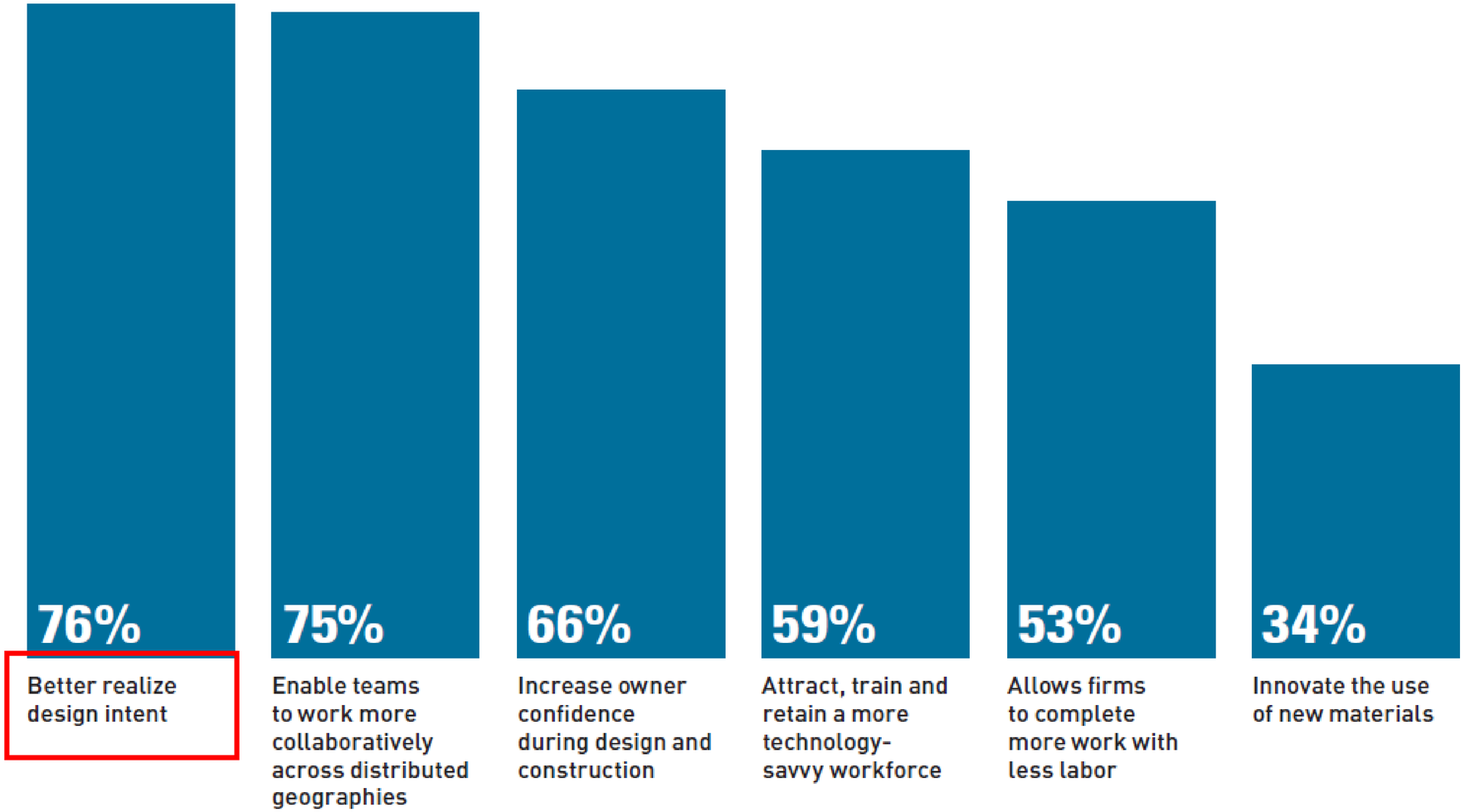
Impact on Project Outcomes

Percentage of high or very high impact ratings for 5 positive impacts of the integrated workflow on project outcomes



Predicted Future Benefits of Integrated Workflow

Percentage of respondents who predict high or very high impact in the future for each of 6 positive impacts of the integrated workflow



Harnessing the Technology Innovation Revolution

The *NOW*

The *NEW*

The ***NEXT***

Most Impactful BIM Trends and Capabilities in the Next 5 Years

Percentages of each discipline that predict high or very high positive impact for emerging BIM trends or capabilities over the next five years

	Architects	Structural Engineers	MEP Engineers	GC/CMs	Structural Trades	MEP Trades
Tools that allow visual and creative insight to produce better design alternatives in less time	83%	78%	45%	70%	70%	76%
Intelligent models that lead to more consistent and coordinated contract deliverables	77%	72%	52%	67%	67%	73%
BIM-based processes that produce better coordinated shop deliverables in less time	77%	72%	48%	73%	70%	67%
Single source of truth of project data, accessible anytime, anywhere in the office, shop or field	73%	66%	55%	53%	73%	70%
Integration of analysis and code-based design with 3D models*	63%	66%	48%	47%	53%	61%
Ability to visually simulate project delivery timelines for estimation and coordination	52%	63%	39%	53%	57%	61%

Harnessing the Technology Innovation Revolution

The *NOW*

The *NEW*

The ***NEXT***

3. Embrace generative and computational design

Harnessing the Technology Innovation Revolution

Commonly used in product design

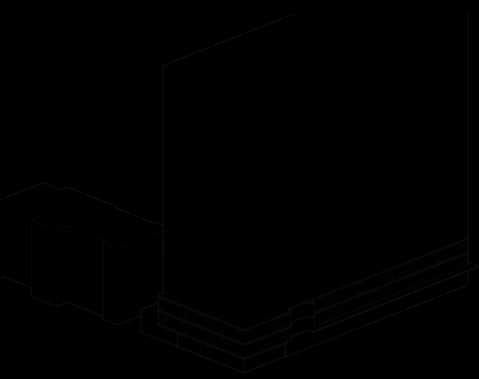
- *set parameters and constraints*
- *the computer analyzes 1000's of feasible options*

Optimize the solution within parameters and constraints

Insight Capabilities for Generating Design Options

1	Early-stage sketching that connects conceptual design to BIM with smart objects that flow into later stages of design
2	Early-stage sketching that uses constructability constraints and building-code requirements to drive geometry and behavior of design models
3	Creating visual logic to explore parametric conceptual designs and automate tasks
4	Using generative design to cycle through thousands of design choices, testing configurations and developing more sophisticated solutions through multiple iterations
5	Incorporating reality capture to document existing conditions more accurately
6	Integrating design options with GIS data to more fully represent the contextual environment


FormIt 360 - C:/Users/P40/Box Sync/FormItContent/JDG/2016 03-01 FMS opt 2_TH.axm
File
Edit
View
Create
Design Tools
Settings
Energy Analysis
Share
Window
Info
Dynamo
Filter
Creased Tower + Plinth
a week ago
Grid of Panels
a week ago
Helix Parking Structure
Thu Nov 26 21:32:56 2015
Twisting Denver Tower
Wed Nov 25 12:27:39 2015
Rotated Twister
Tue Nov 24 22:01:47 2015
Circle Wall Arc
Sat Nov 21 10:40:05 2015
Search the web and Windows
8:43 PM
3/1/2016



MTHøjgaard

Computational Design & Construction

Parking Garage Configurator

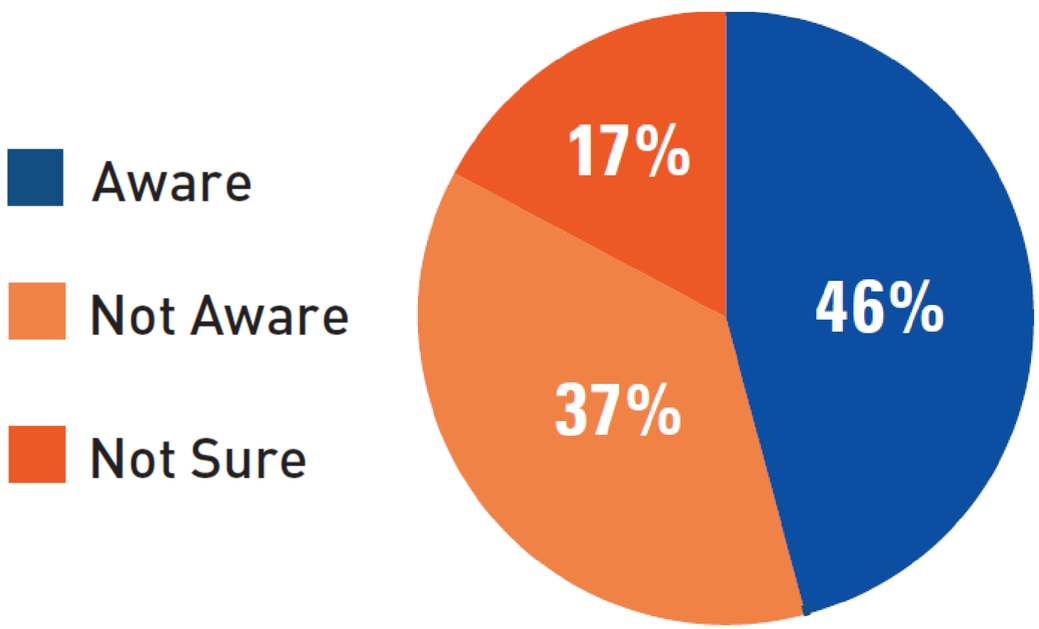
Sale | Client | Concept model

Explore | Alternatives | Optimization

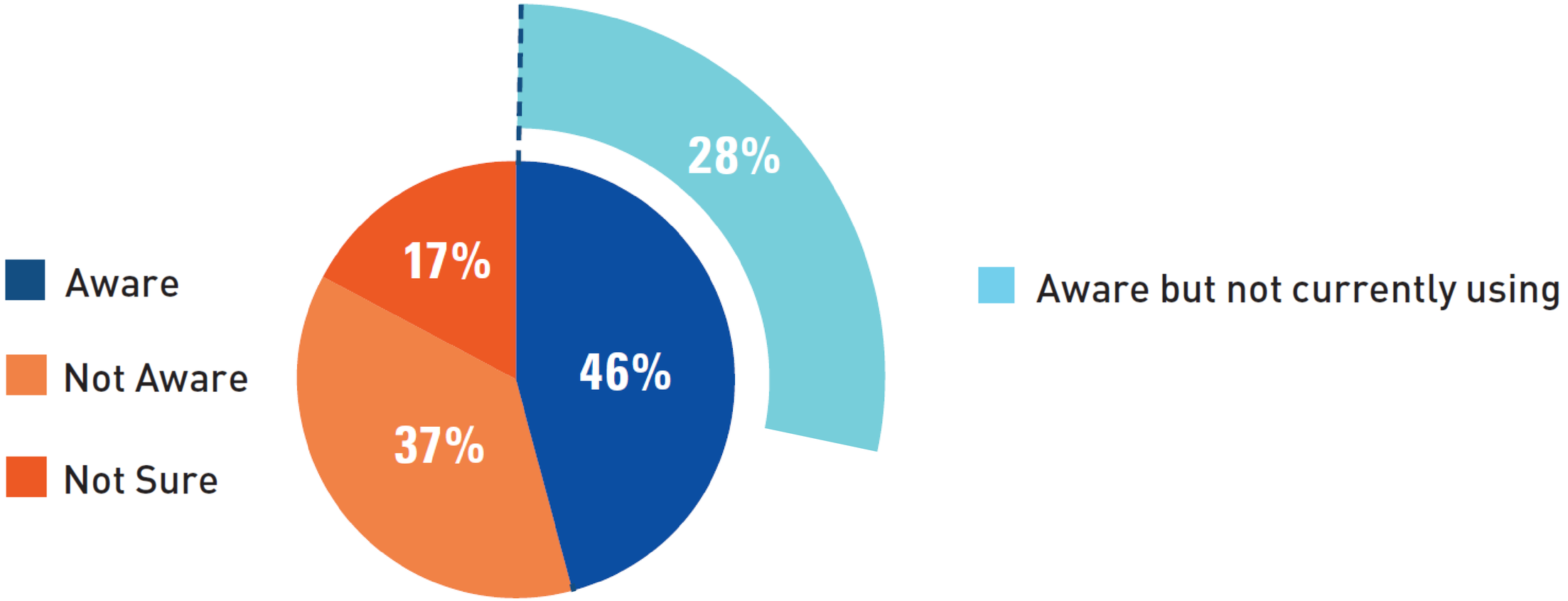
Documentation | Detail | BIM model

Construction Planning & Execution

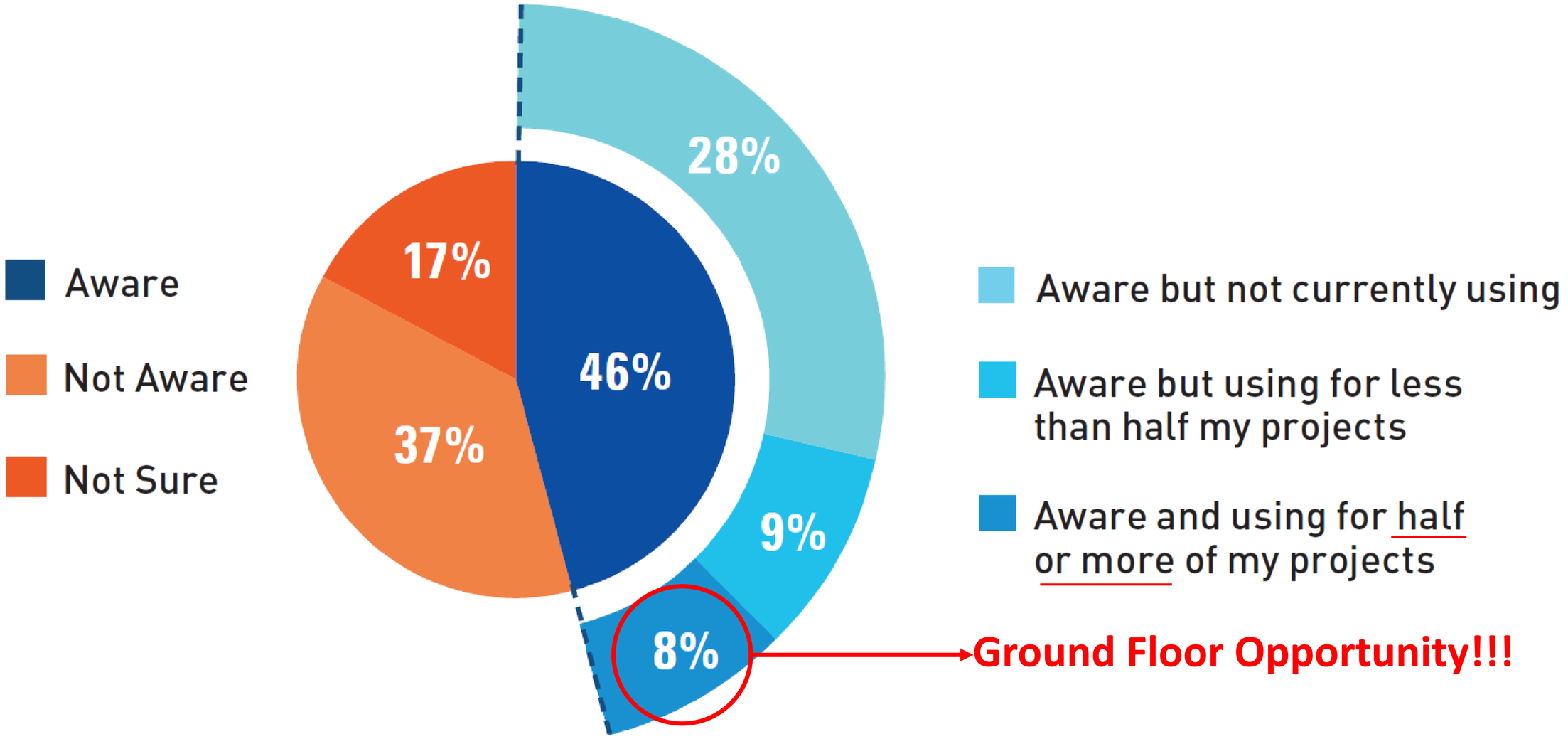
Awareness and Use of Generative Design



Awareness and Use of Generative Design



Awareness and Use of Generative Design



Harnessing the Technology Innovation Revolution

The *NOW*

The *NEW*

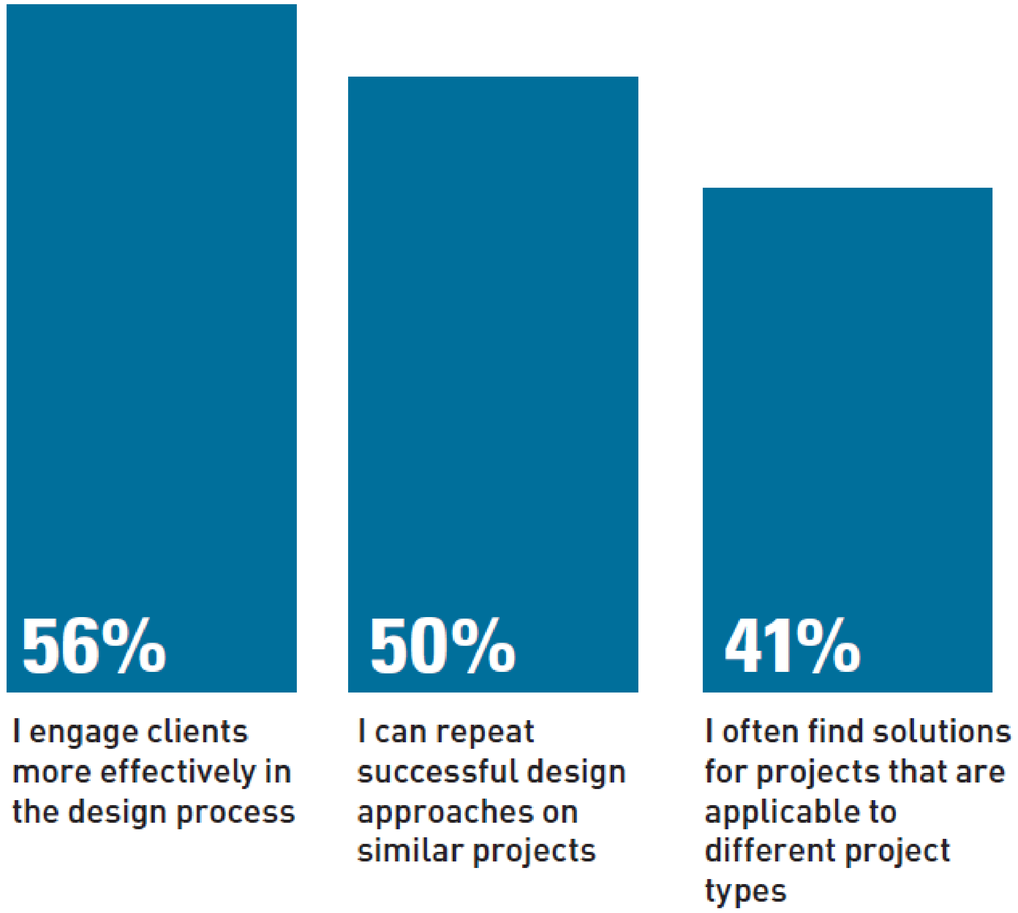
The ***NEXT***

3. Embrace generative and computational design

- **WHY?** Better Outcomes

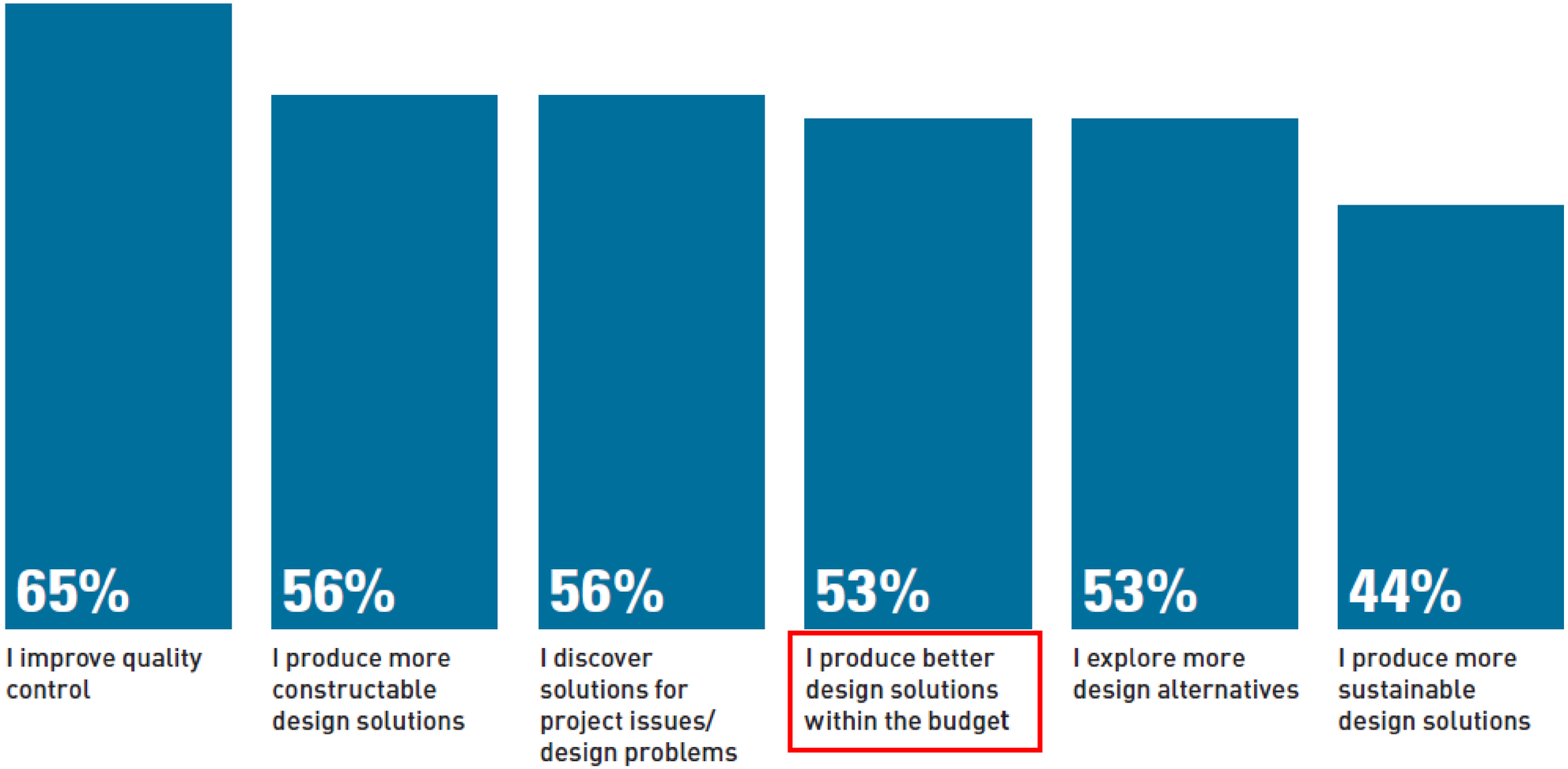
Impact on Design Process

Percentage of users reporting high or very high level of benefit



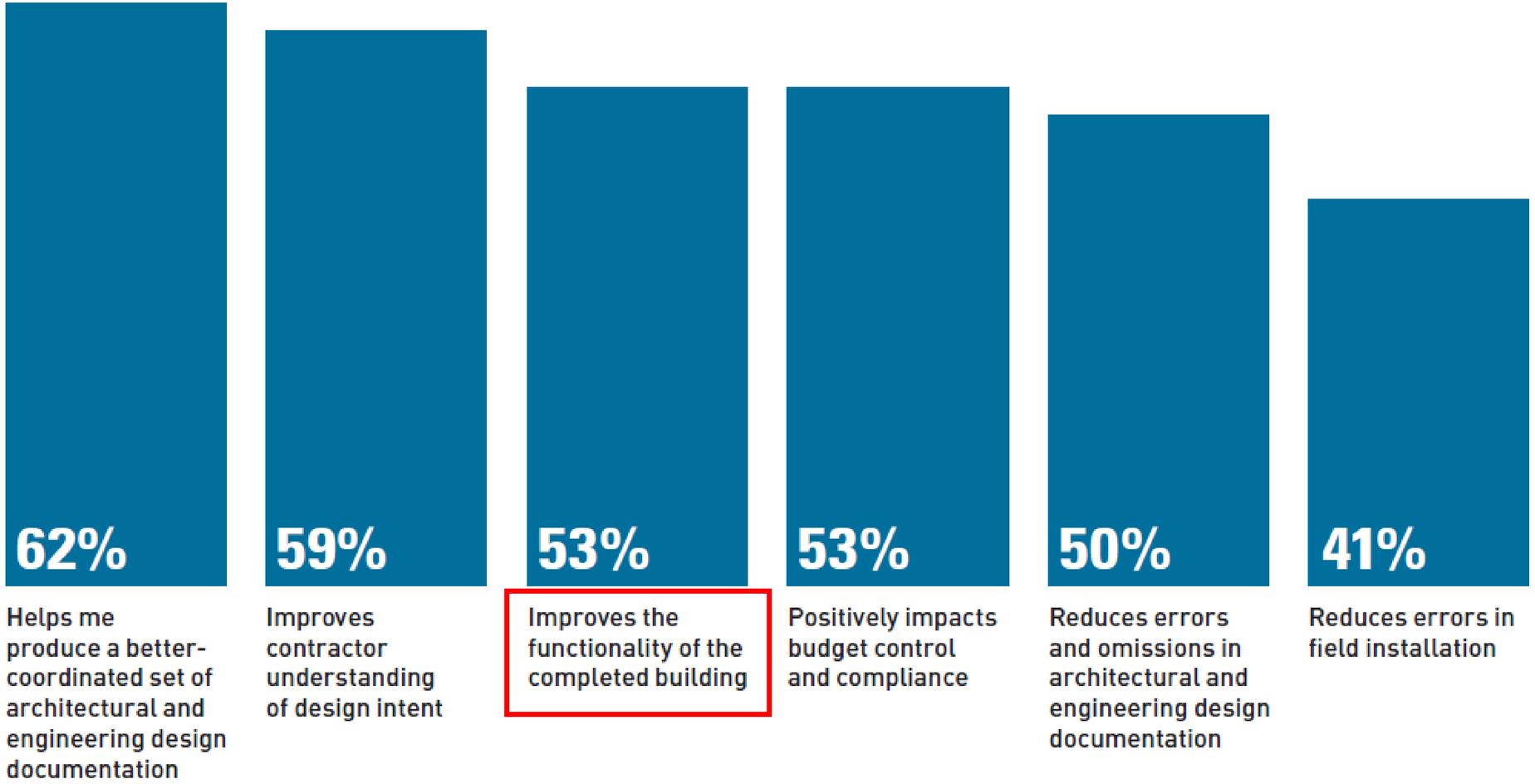
Impact on Design Solutions

Percentage of users reporting high or very high level of benefit



Impact on Production, Construction and Operation

Percentage of users reporting high or very high level of benefit



Harnessing the Technology Innovation Revolution

The ***NOW***	BIM teams & requirements	**60%**
The ***NEW***	Integrated digital workflows	**30%**
The ***NEXT***	Generative design	**10%**

Resources and Attention

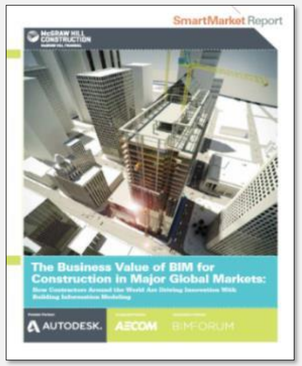
Dodge Data & Analytics Research on Trends

free at:
construction.com/toolkit

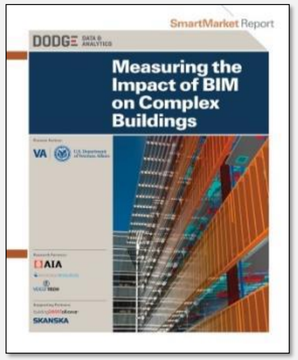
TECHNOLOGY/INNOVATION

Information Mobility

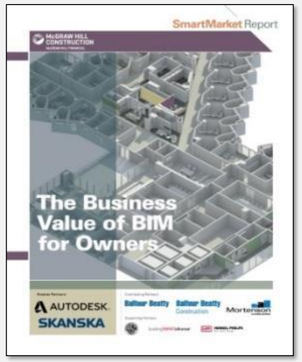
BIM for Contractors



Measuring BIM



BIM for Owners

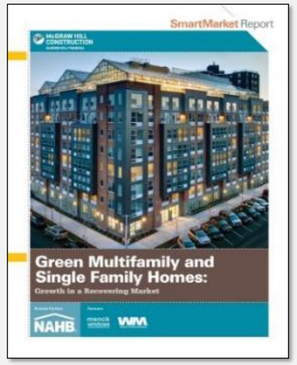


SUSTAINABILITY

World Green Trends

Design for Health

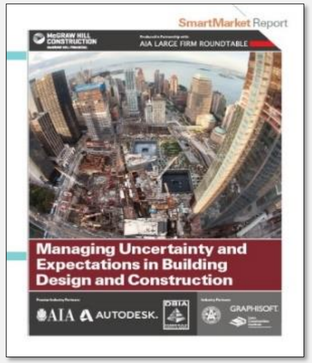
Green Homes



Green Schools

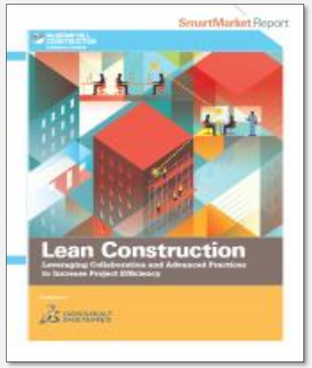
PRACTICES/PROCESSES

Managing Uncertainty



Project Delivery Systems

Lean



Safety (3x)

A'18 AIA Conference on Architecture 2018
June 21-23, New York City

Thank you!

Town Hall Discussion

Town Hall Discussion

Stephen Hagan FAIA
- President | CEO, Hagan Technologies
- Principal, Construction Data Ventures

Kimon Onuma FAIA
- President, Onuma, Inc.

Jonathan Widney
- Principal, Construction Data Ventures

Steve Jones
- Senior Director, Dodge Data & Analytics

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Architecture

as a Platform for the Urban Agenda

6/21/2018 9:45 AM - 11:15 AM

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June 21-23, New York City

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Thank you!

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Course Number TH204

Thursday, June 21, 2018, 7:30 AM – 9:00 AM

Learning Units 1.5 LU RIBA

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