

Dig Deeper into Data With Forge and Digital Twins

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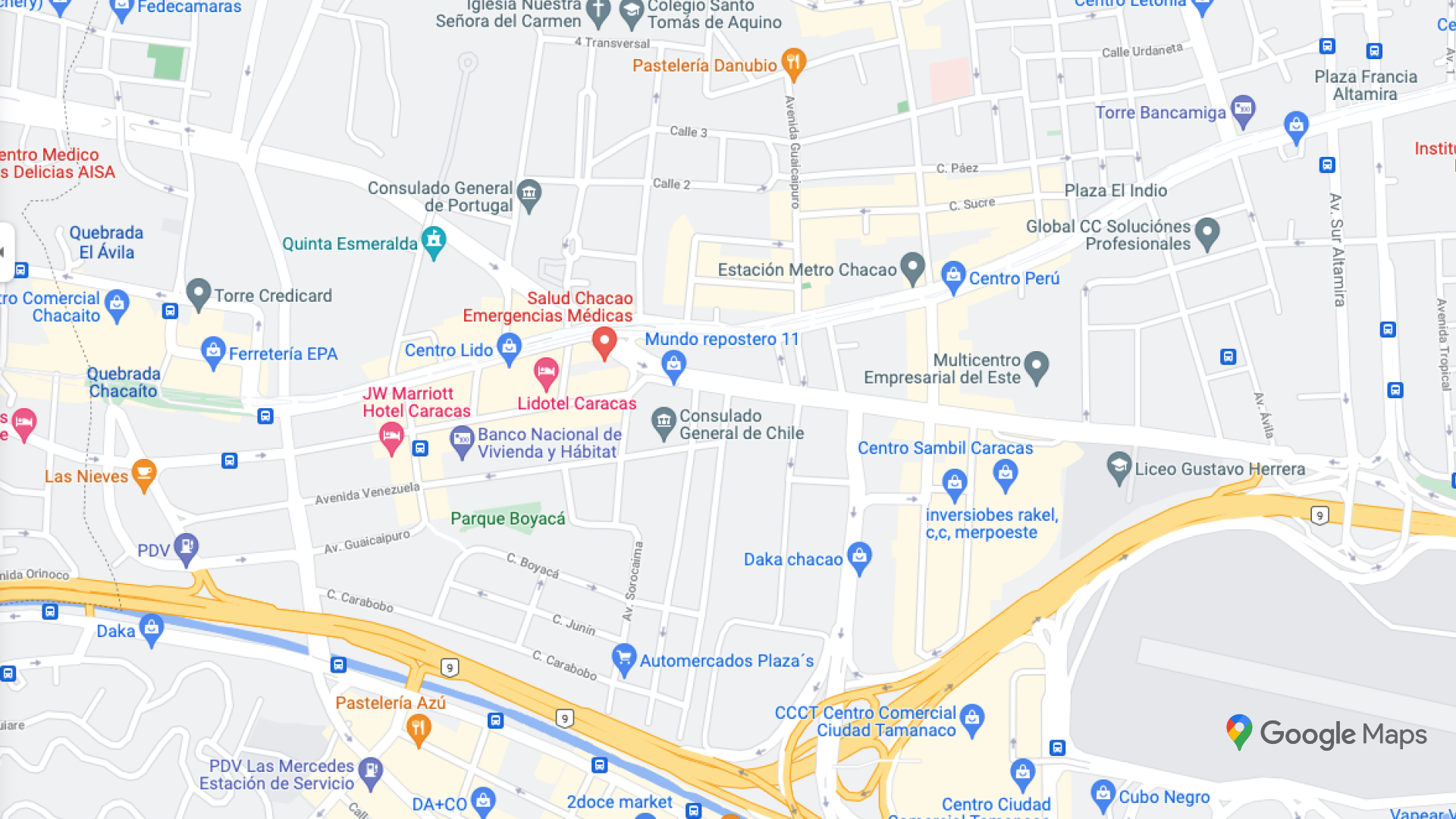
Accenture | DataVisualization Lead

Cindy Baldwin

VDCO Tech | President

Shawn Weekly

Southern Company | Principal
Architect



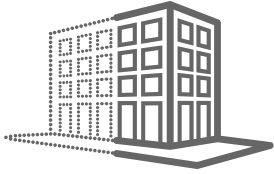




Life before Google Maps



Agenda



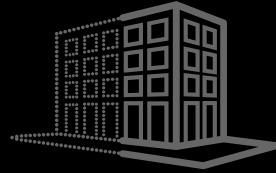
Digital Twin



Customer Stories

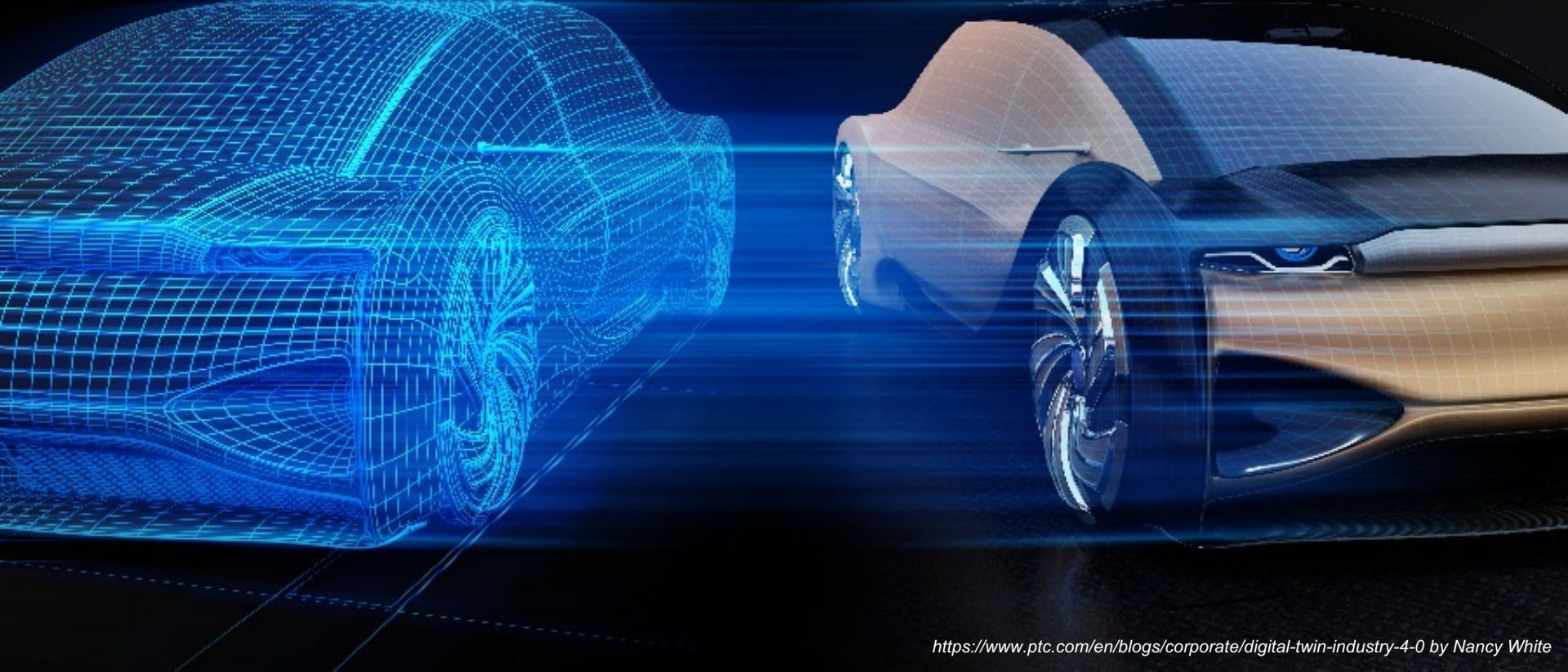


How to get started



Digital Twins

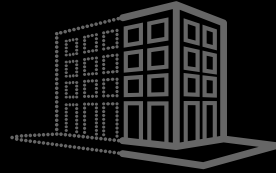
Why are they so popular?



<https://www.ptc.com/en/blogs/corporate/digital-twin-industry-4-0> by Nancy White

Digital Twins are...

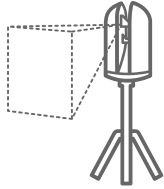
A digital representation of a physical entity



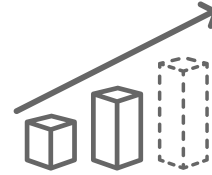
Digital Twins

Use Cases & Example

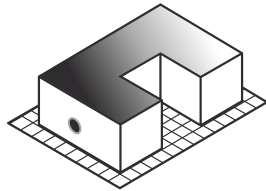
Use Cases



Scan



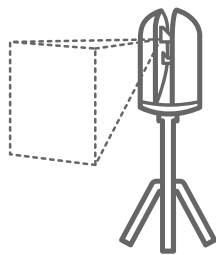
Prediction &
Simulation



Activity Tracking

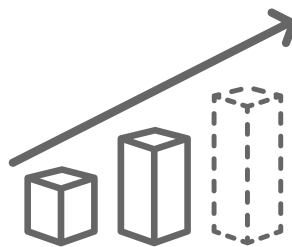


Maintenance



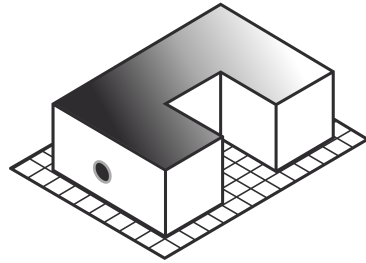
Scan





Prediction & Simulation





Activity Tracking

1041

- B) Unassigned
- B) Critical
- C) Danish
- D) Temporary

Reality

[Image](#)

VOLUME 1

☐ Shop Gold every day

SIM

Plan

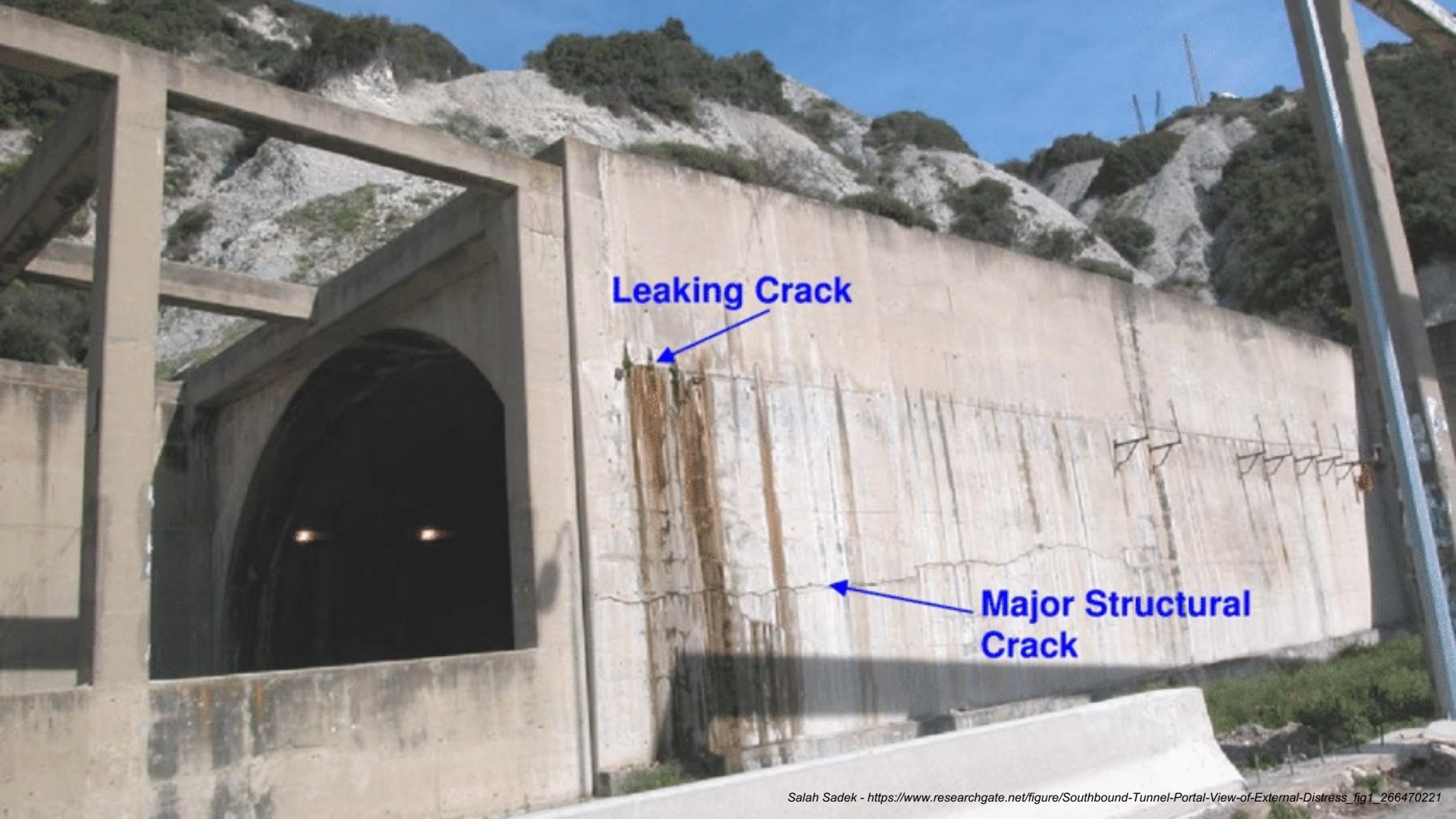
Validity

May 2005

Business & Society

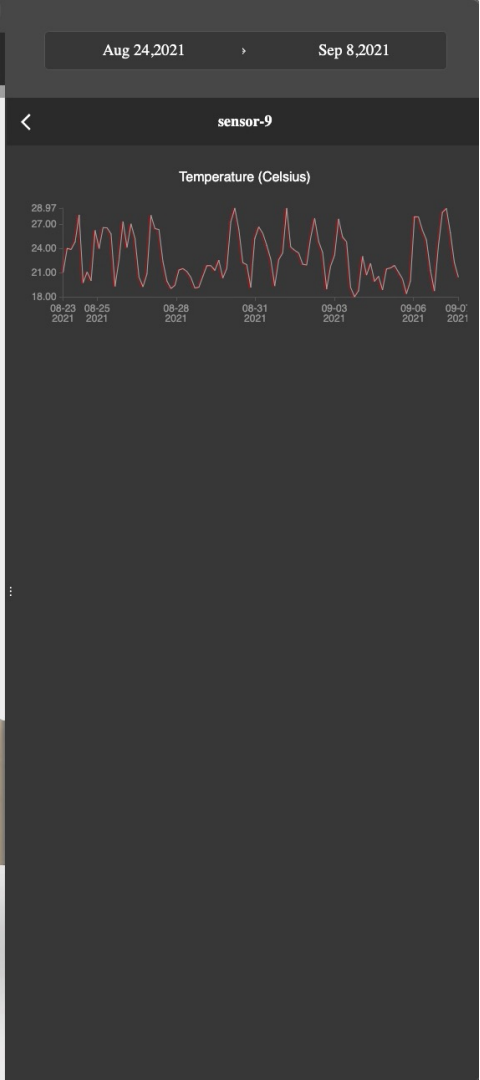
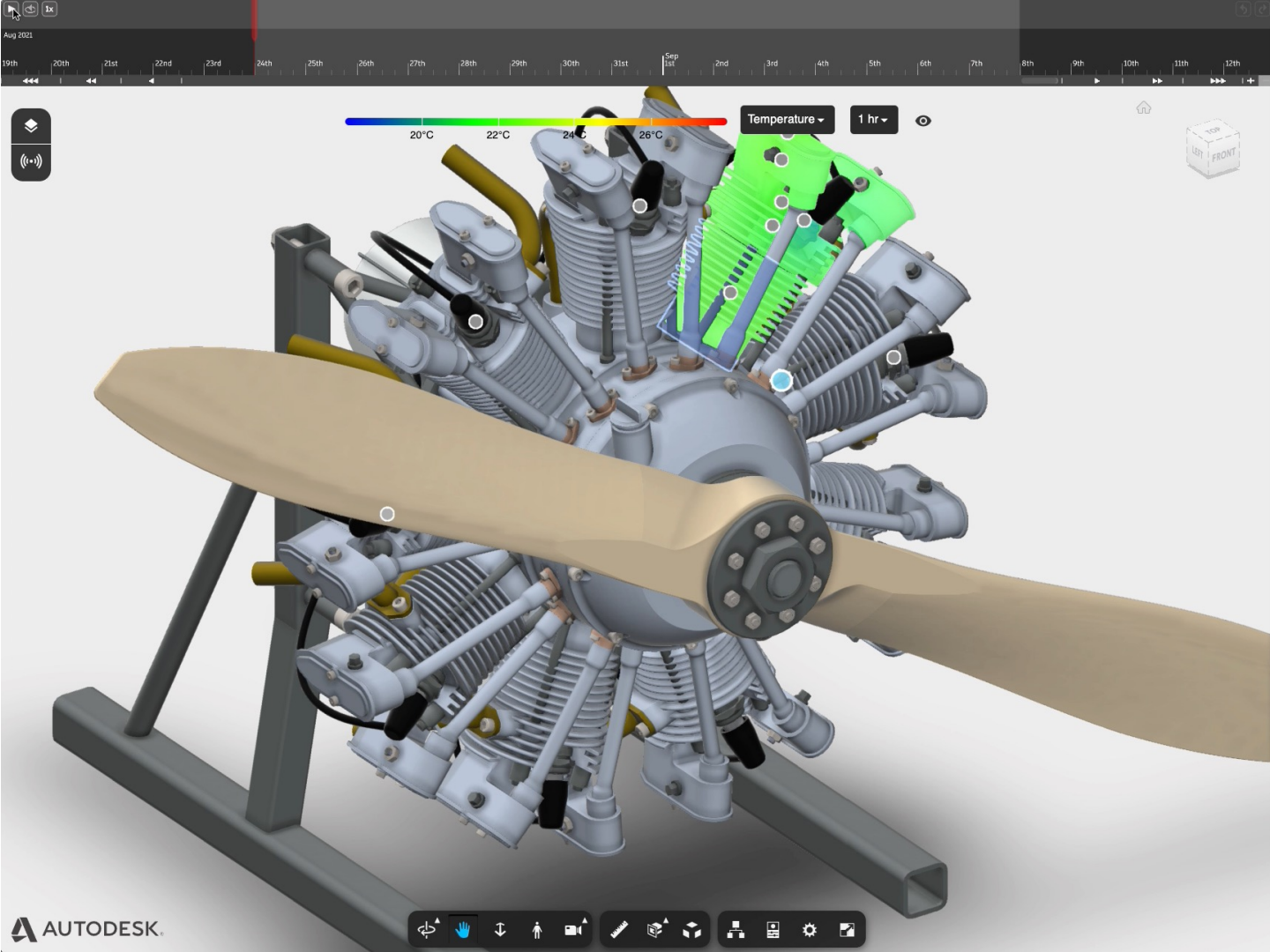


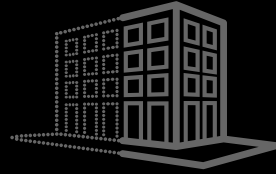
Maintenance



Leaking Crack

Major Structural Crack



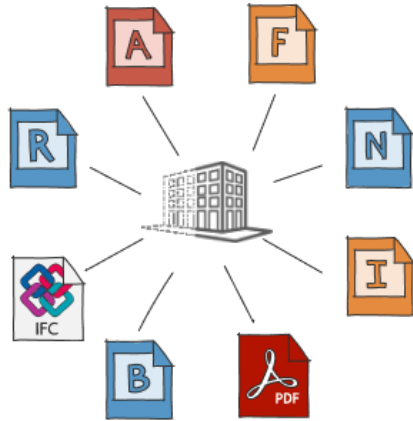


Digital Twins

Benefits

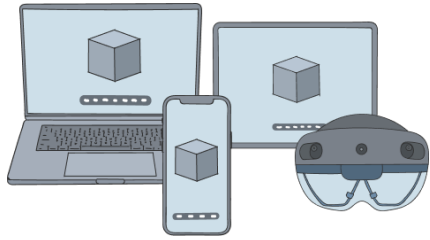
Benefits

Organize



Benefits

Access





Customer Stories





Customer Stories



Reconstruct Inc. and a Great Construction Story

Broward County Convention Center, Greater Fort Lauderdale



Mani Golparvar, Ph.D.
CTO and co-founder, Reconstruct



Cindy Baldwin
President, VDCO Tech

info@reconstructinc.com

Three Topics...

1. The Problem?
2. What is “Reconstruct” Visual Command Center?
3. The Results!

Broward County Convention Center



- \$1 billion project with 1.2 million Sq. ft. of space

Broward County Convention Center

But... Phase one to open in 2021 with full completion in 2024!

The needs and the how...



Owners and Owner Reps

Proactively manage risk for delay, coordinate OAC activities, and expedite payment applications



GC and CMs

Reliable short-term and long-term planning, coordinate work activities, quality control, and progress monitoring

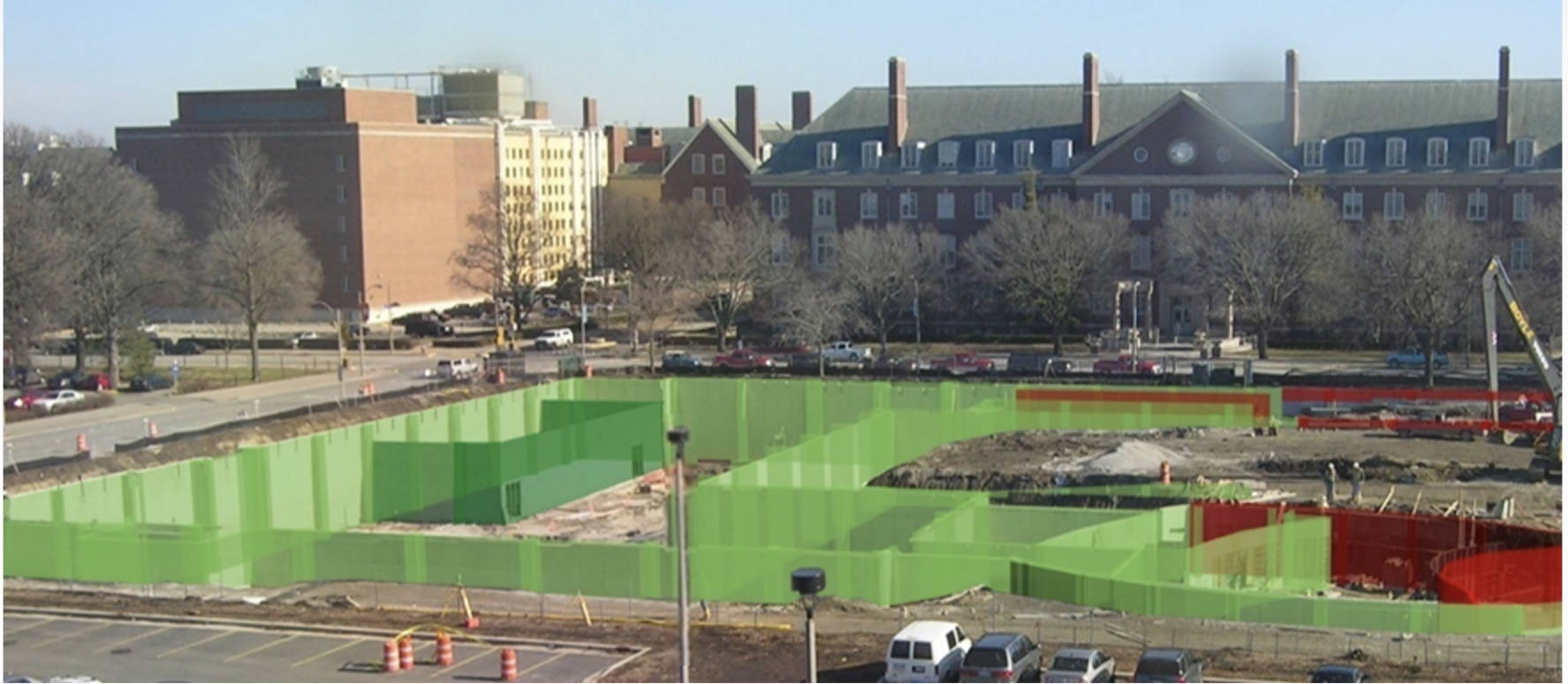


Trade Contractors

Real-time knowledge of “who does what work in each location”, quality control, and enhanced work coordination

Transparency through Digital Twins + AI-Driven Analytics

Reconstruct: 4D BIM vs. Measurable Reality Models



What is there (Picture) vs. What should be there (BIM + Schedule)

What is Reconstruct Visual Command Center?

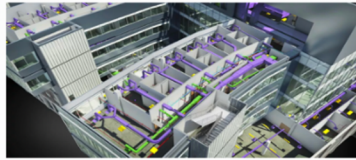
1. Historical Record *(Past)*
2. Quality and Progress Tracking *(Present)*
3. Planning and Risk Management *(Future)*

Reconstruct- Remote Monitoring Solution

#1 Historical Record

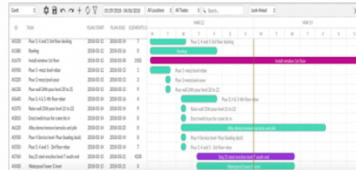


#2 Quality Control

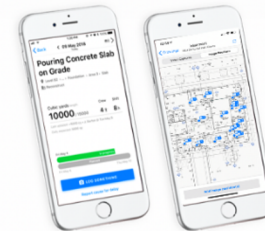
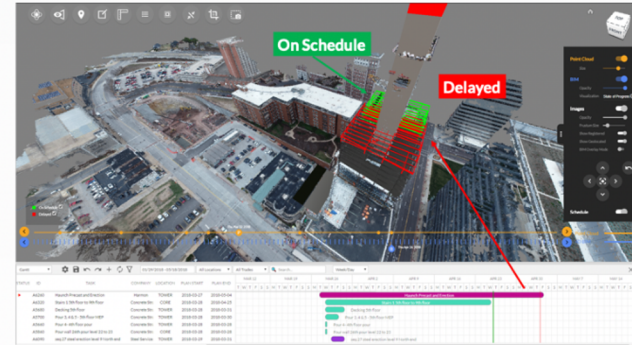


+ Drawings and Models

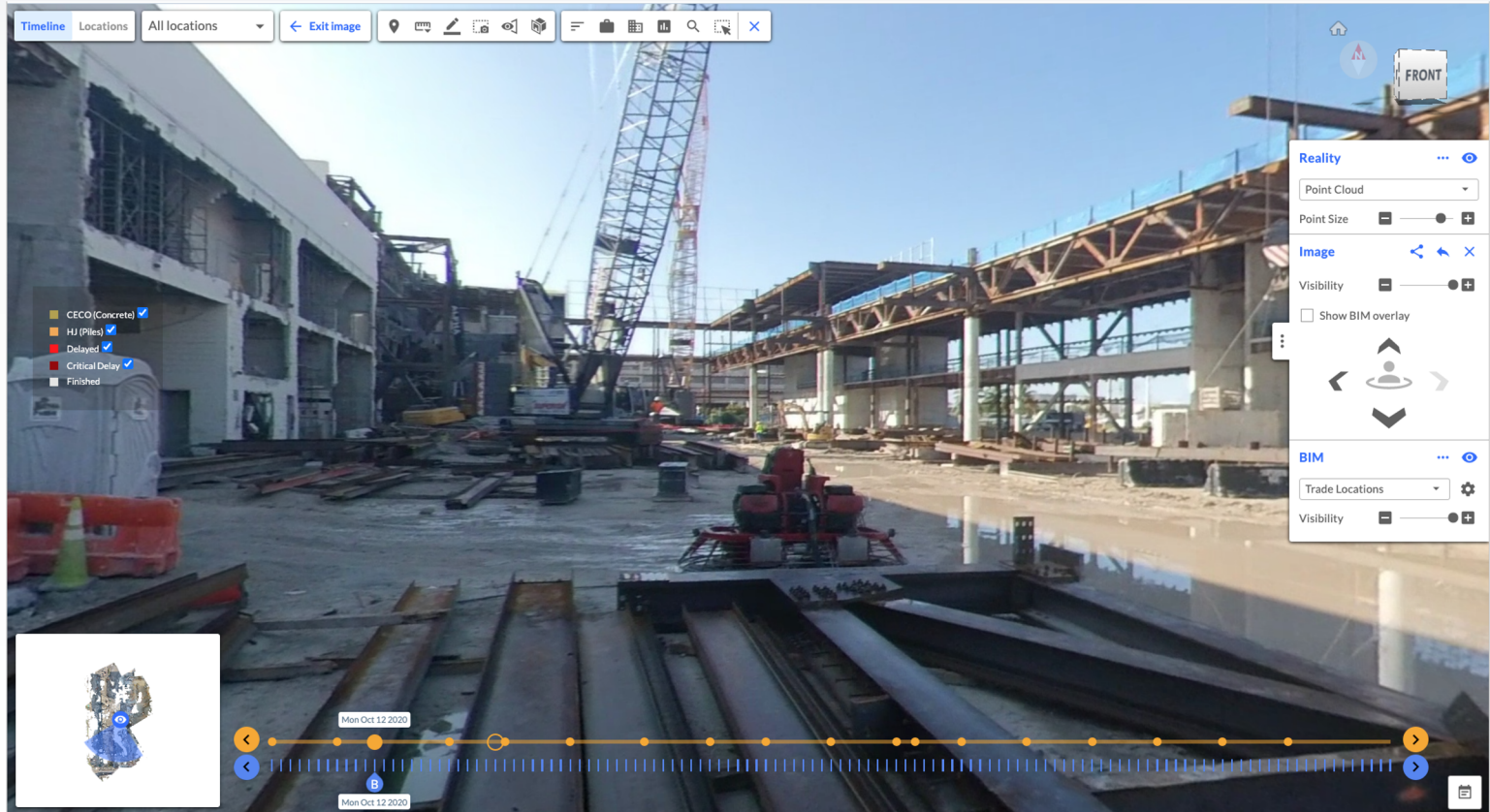
#3 Production Tracking



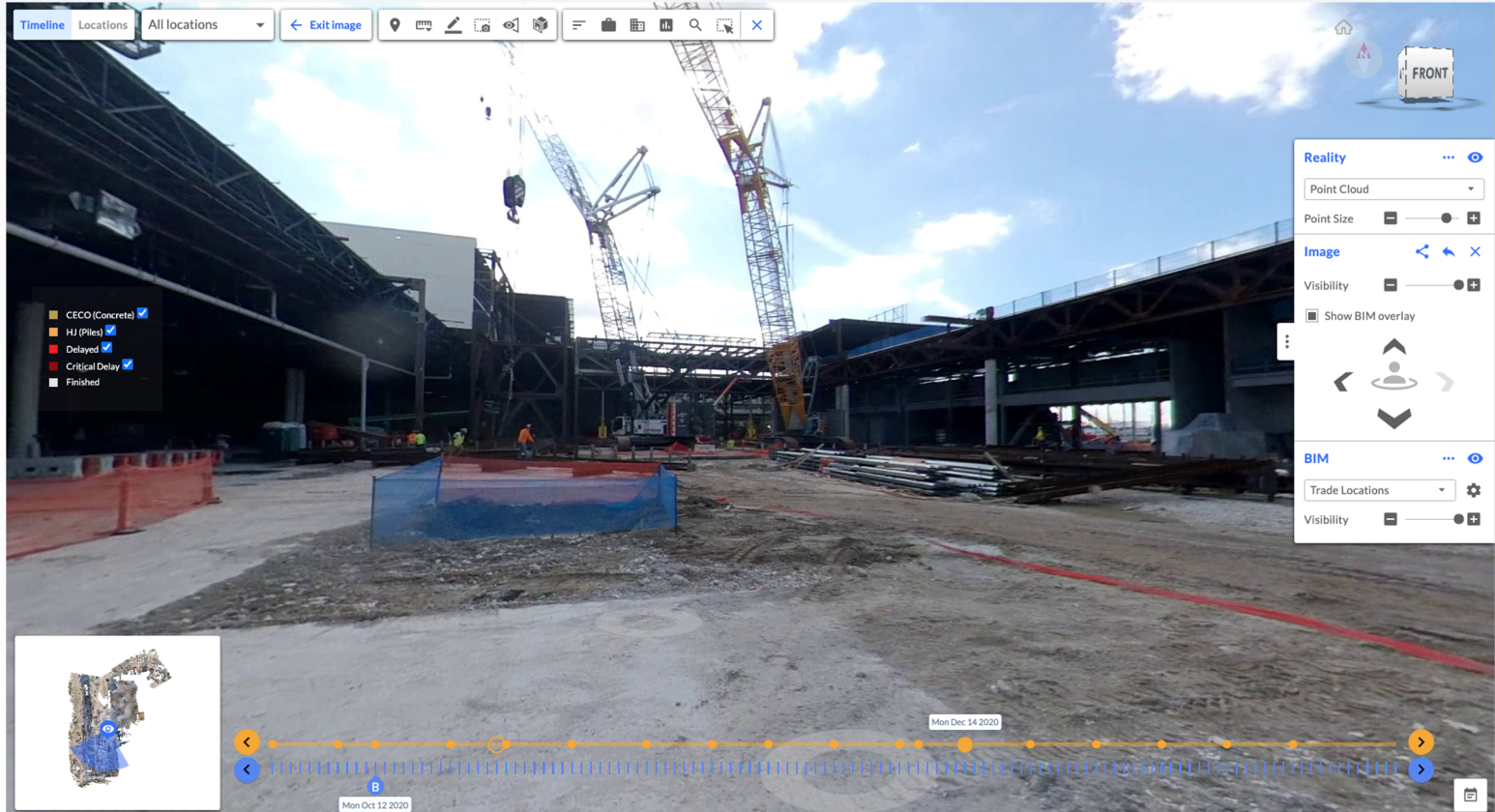
+ Schedule



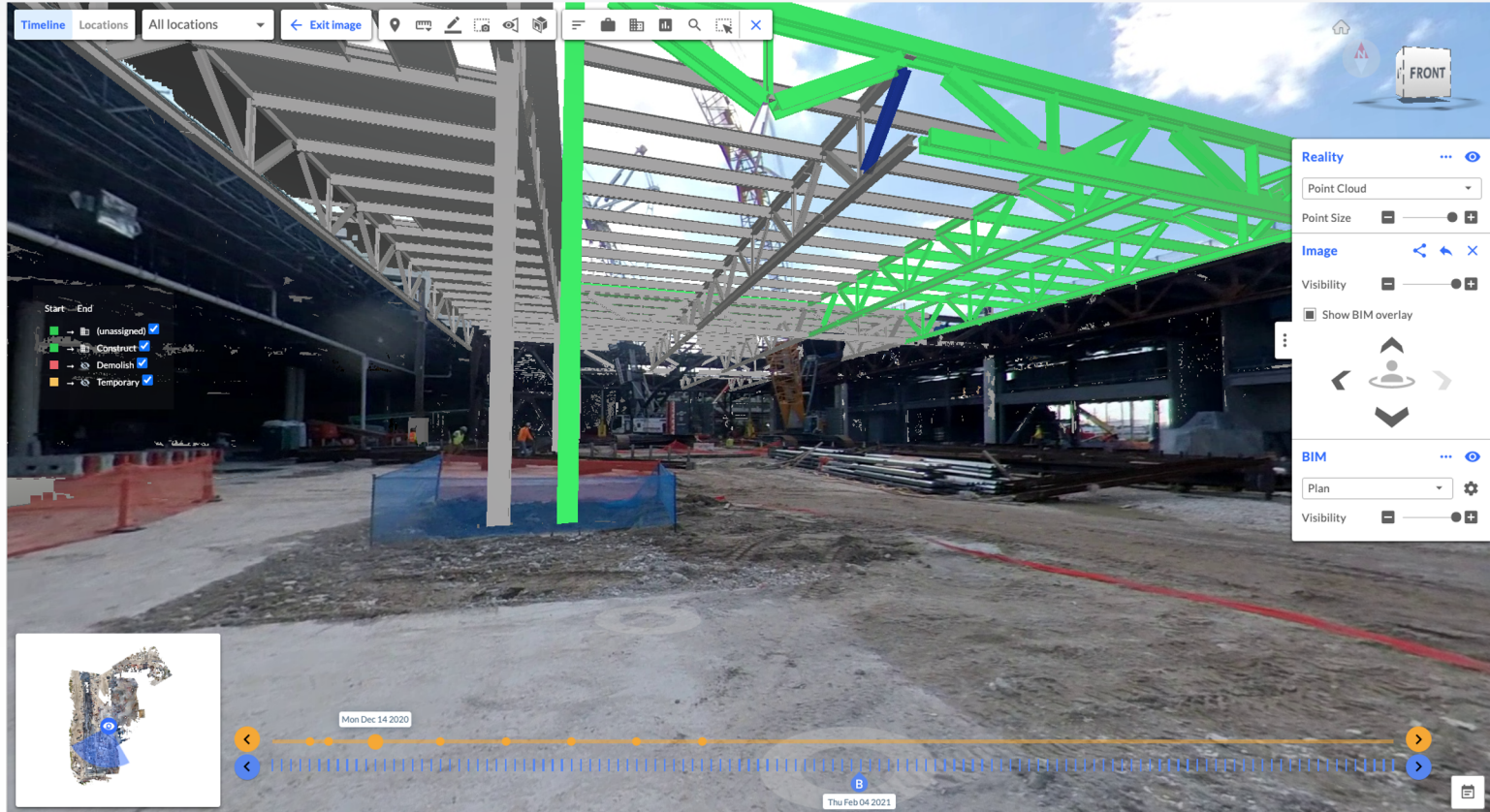
Time Machine for Construction (Past)



Time Machine for Construction (Present)



Time Machine for Construction (Future; 4D BIM)



#1 Proactive Risk Management

Street-view walkthrough, indoors and outdoors

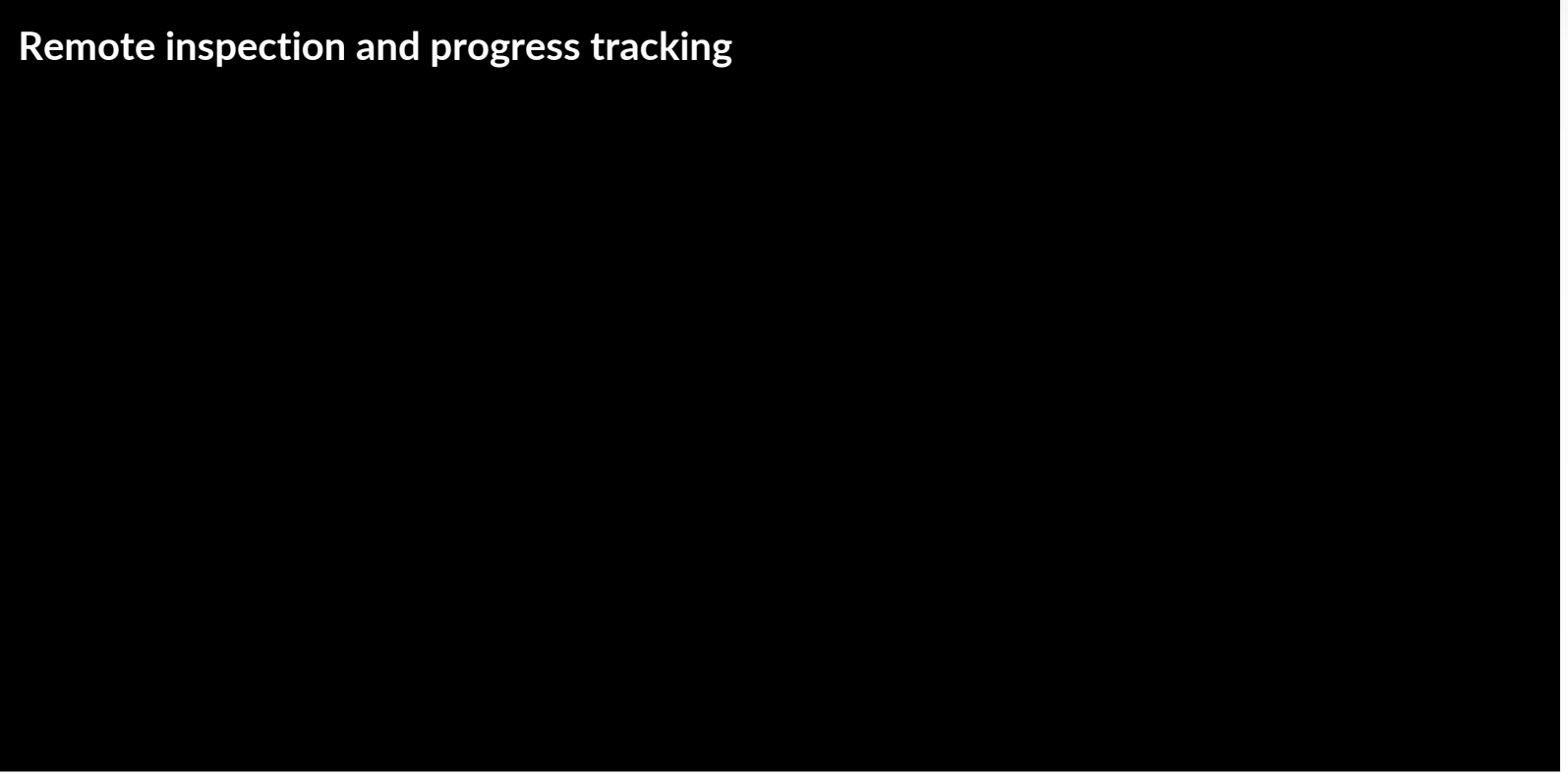


#1 Proactive Risk Management

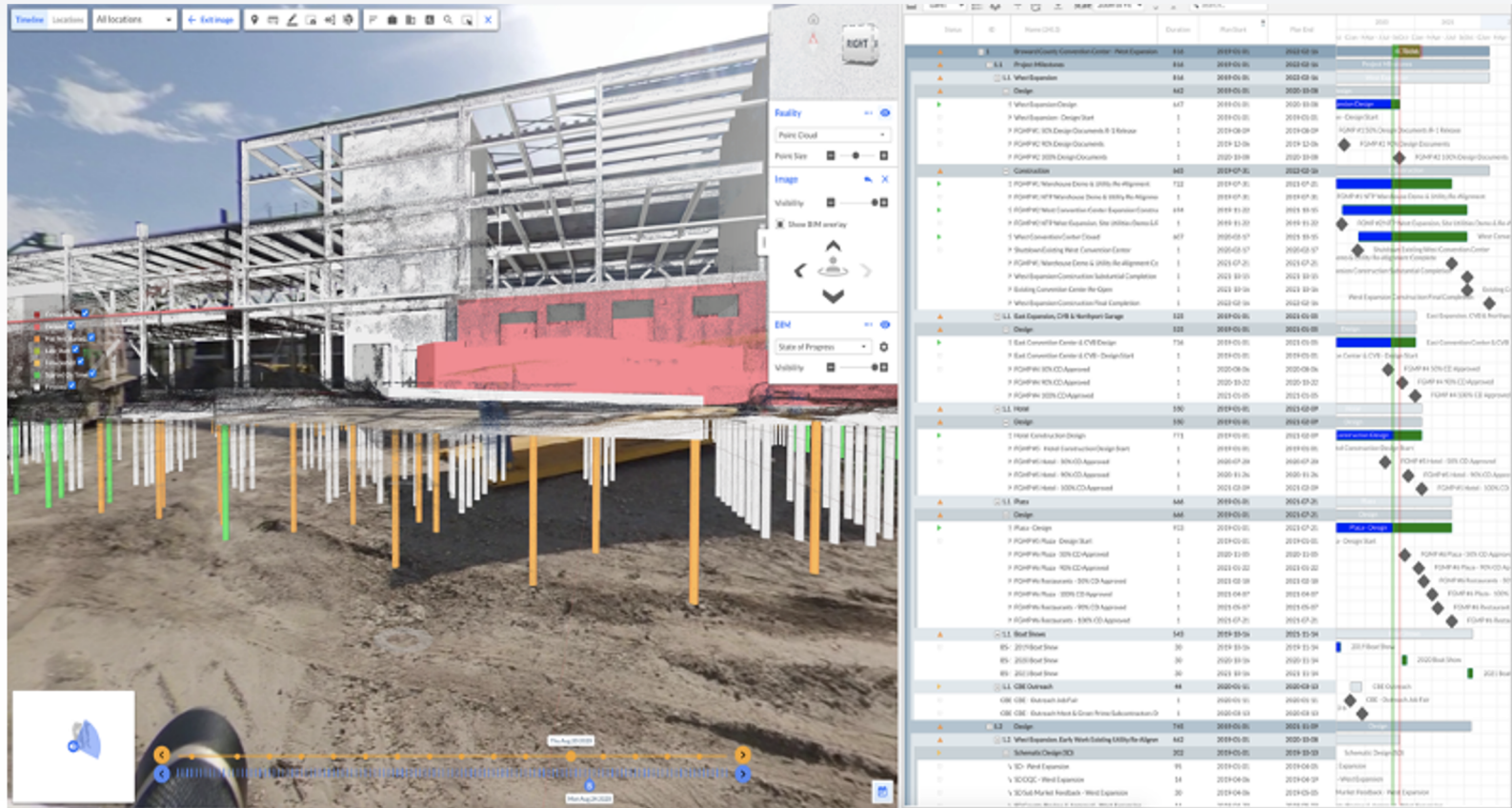


#1 Proactive Risk Management

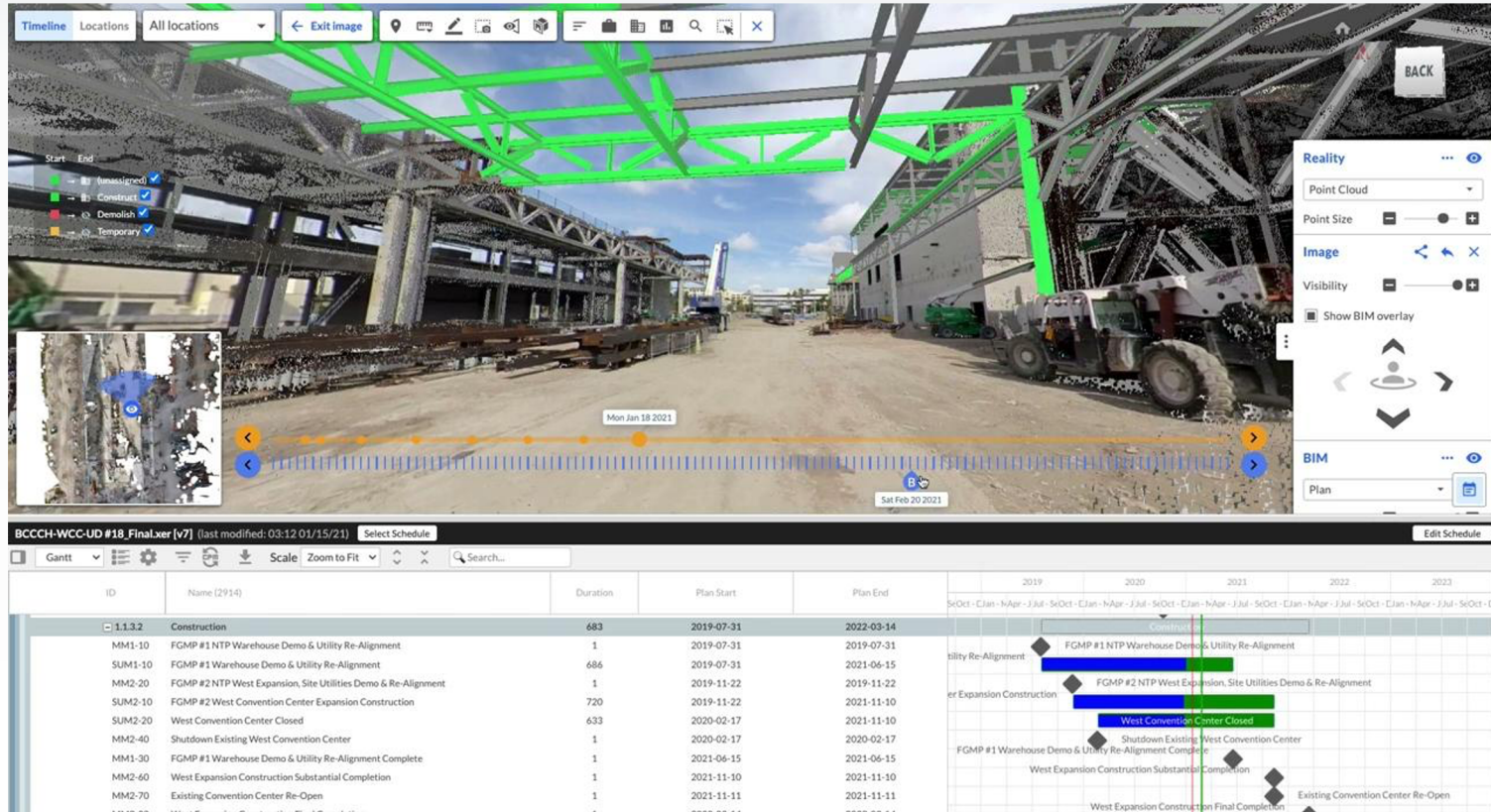
Remote inspection and progress tracking



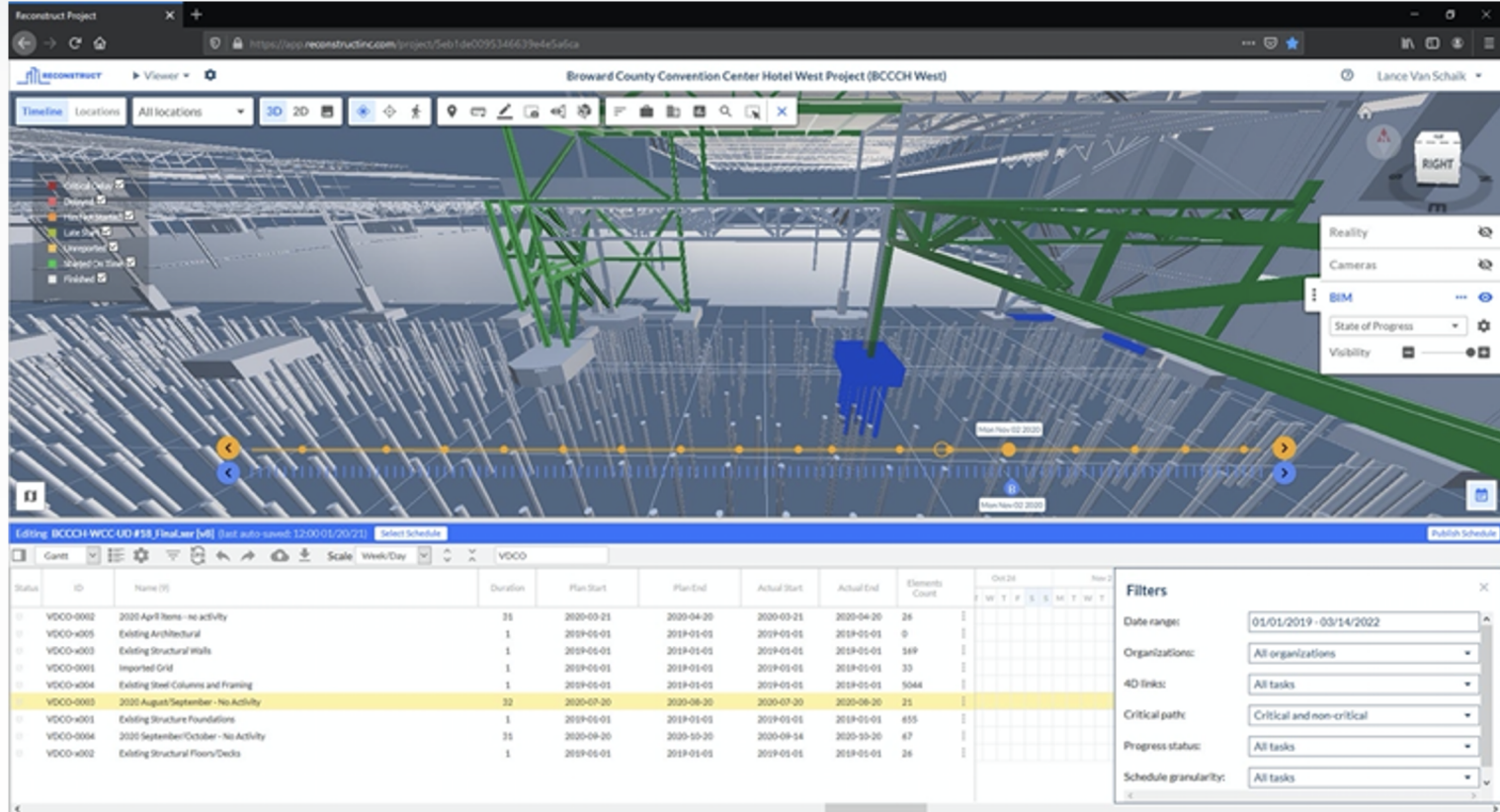
#1 Proactive Risk Management



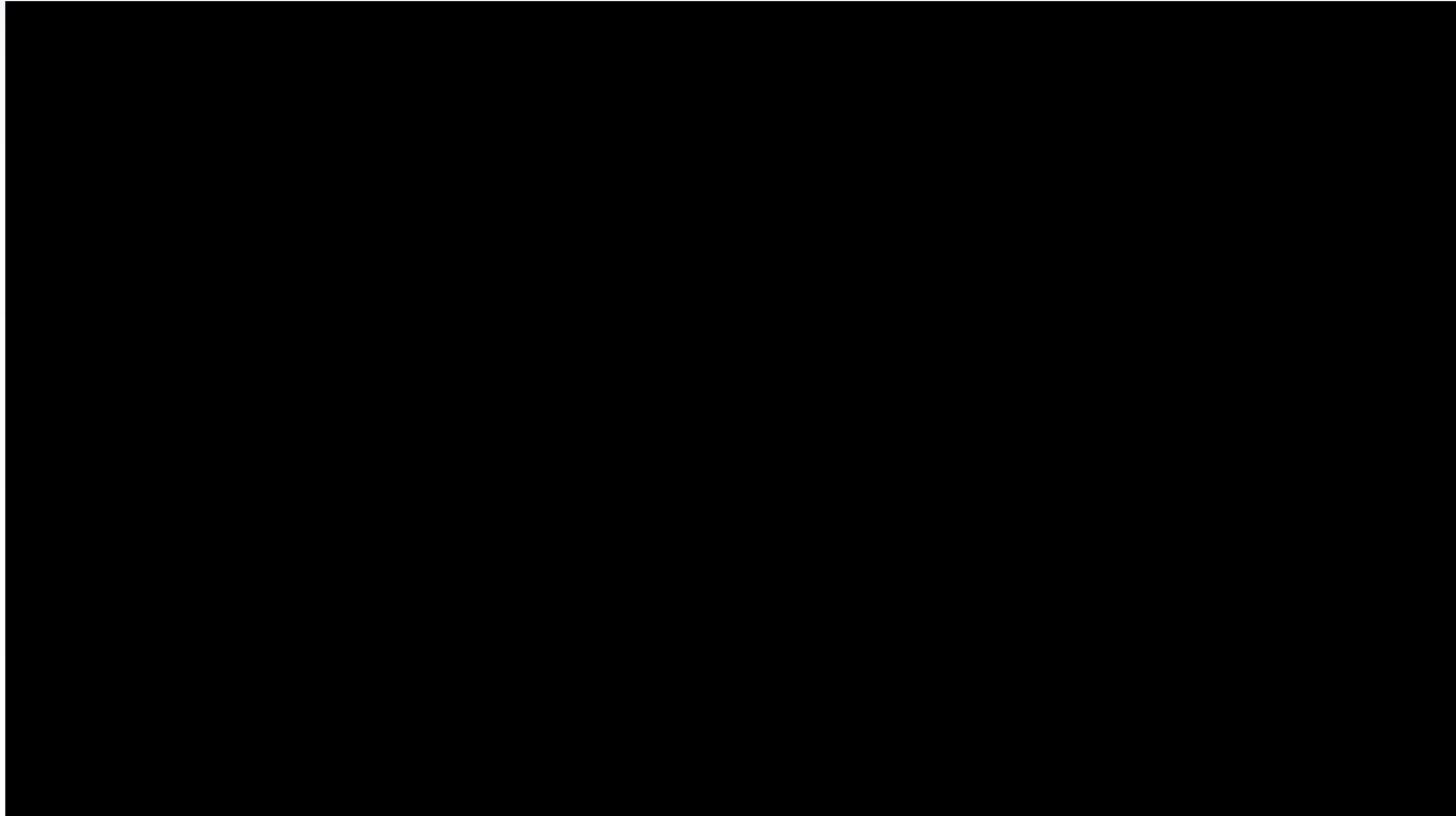
#2 Resiliency in Project Execution



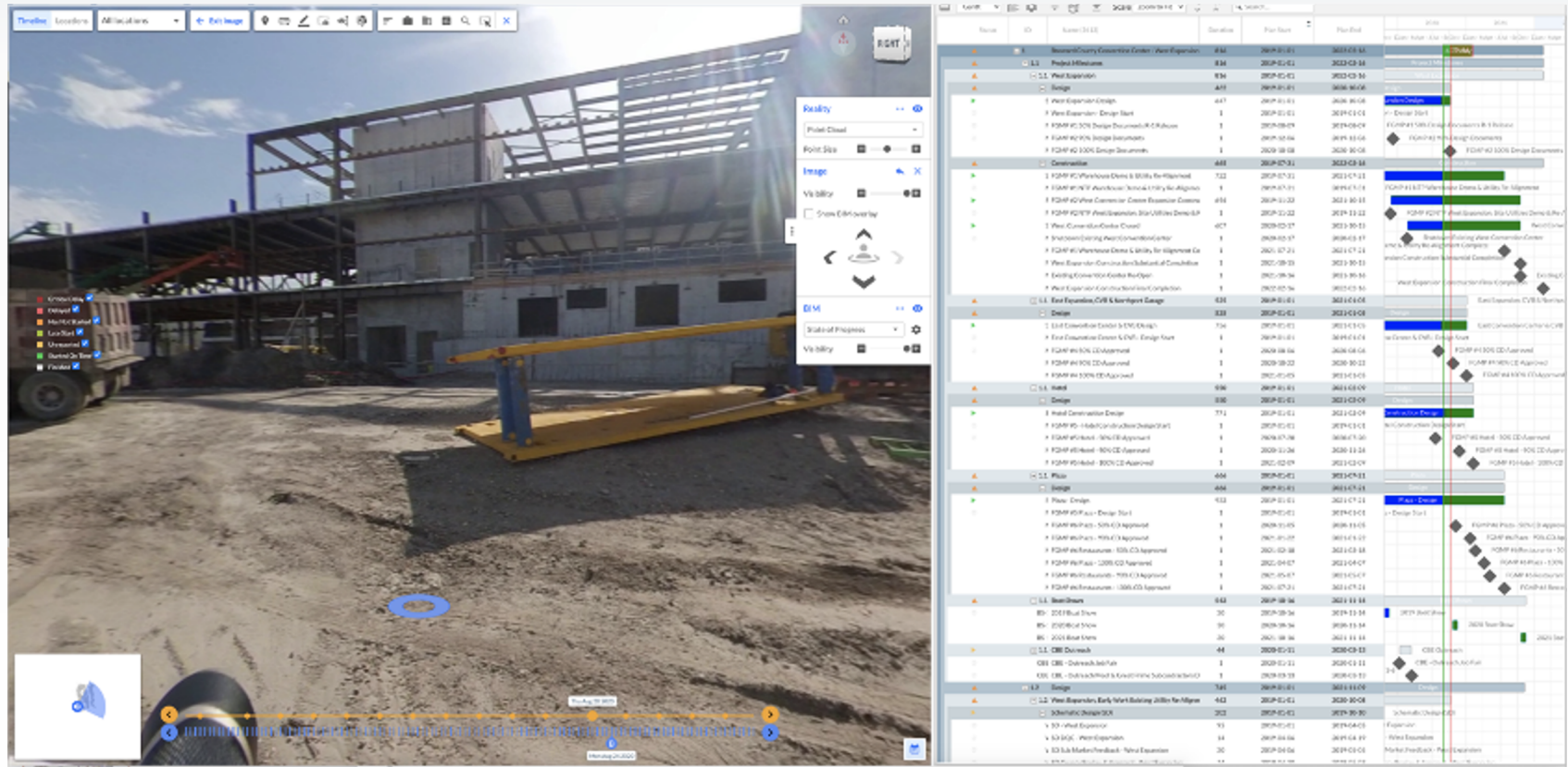
#2 Resiliency in Project Execution



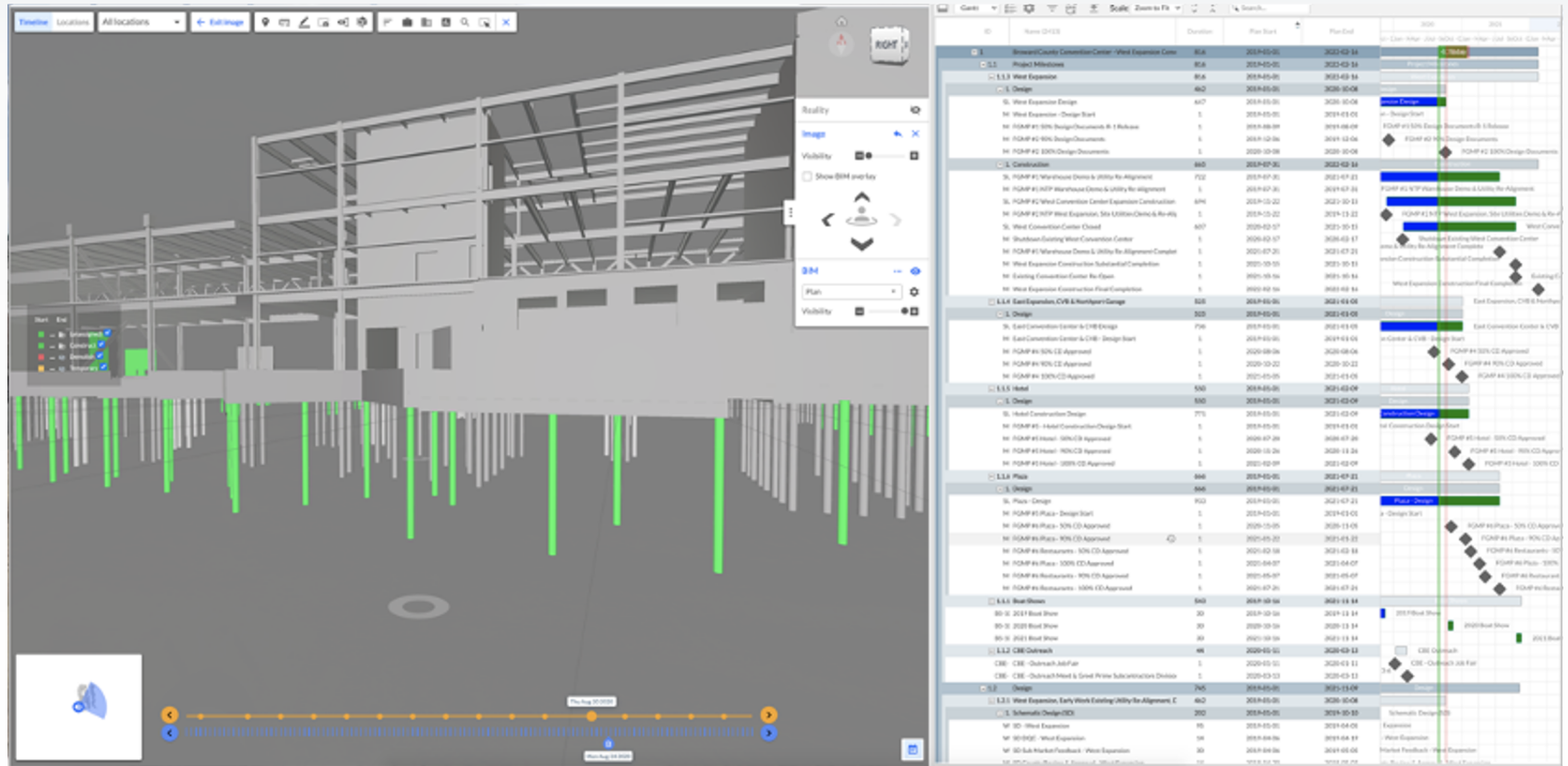
#3 Rebalancing and Continuous Improvements



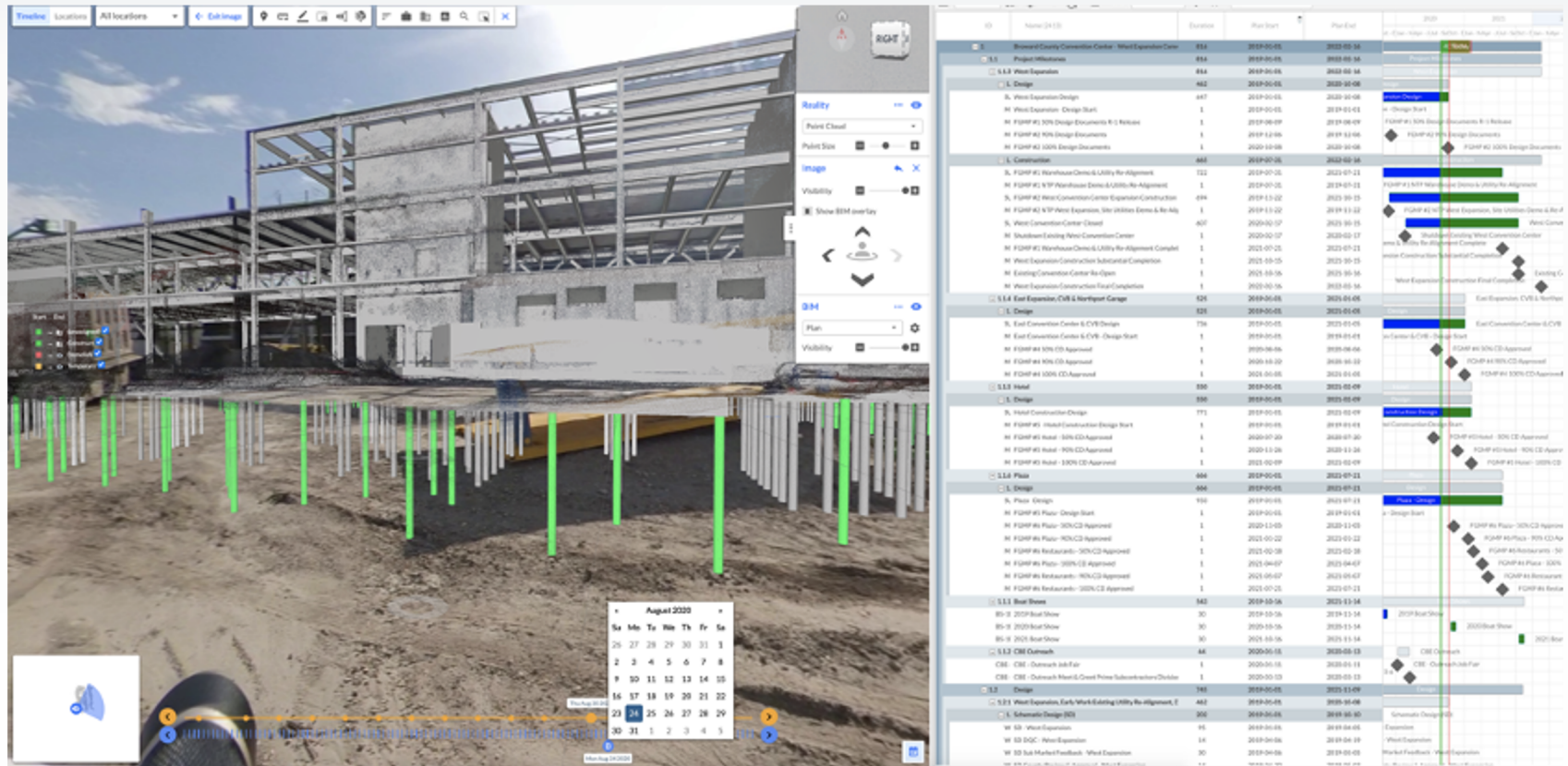
42



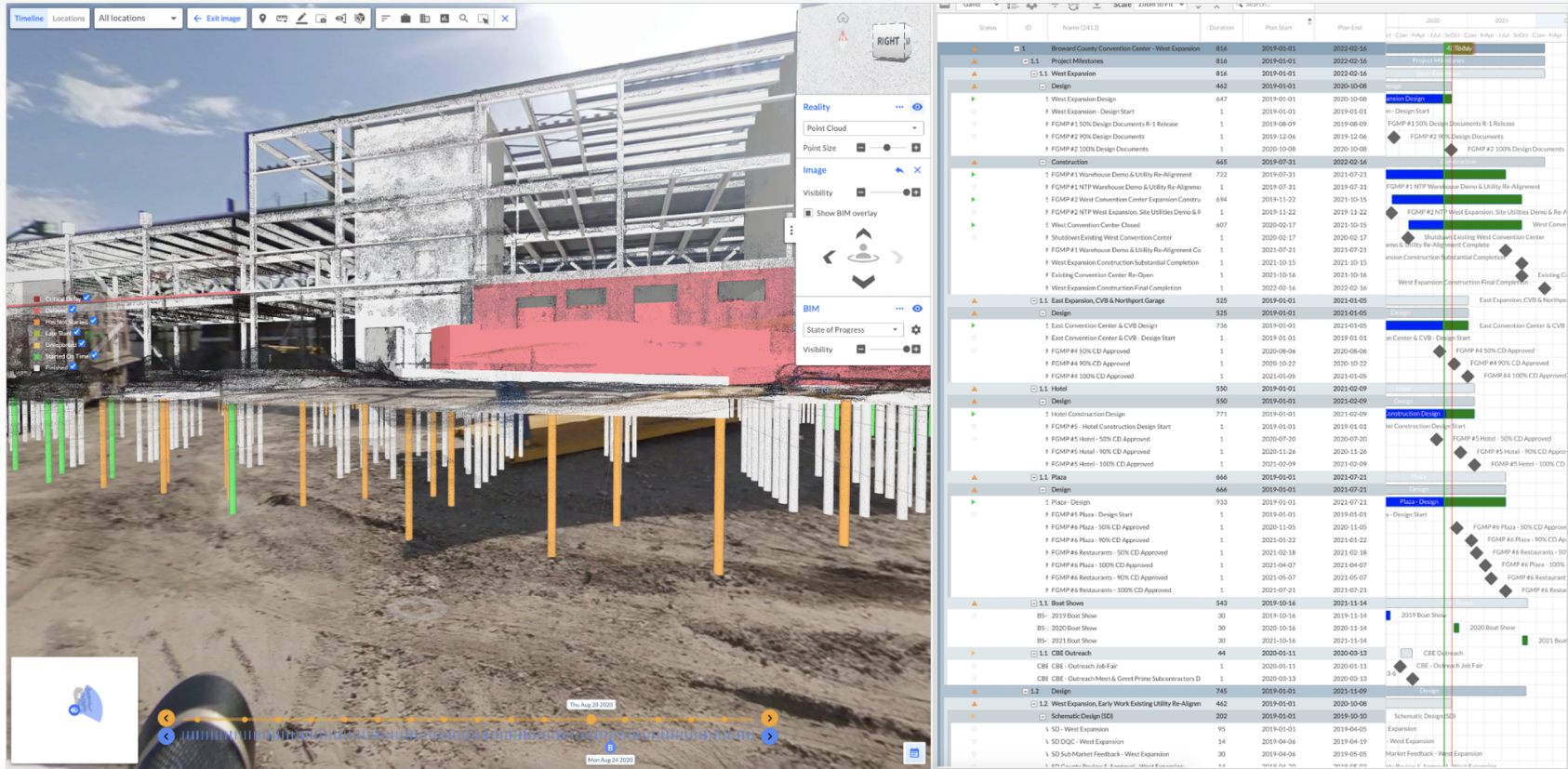
#3 Rebalancing and Continuous Improvements



44



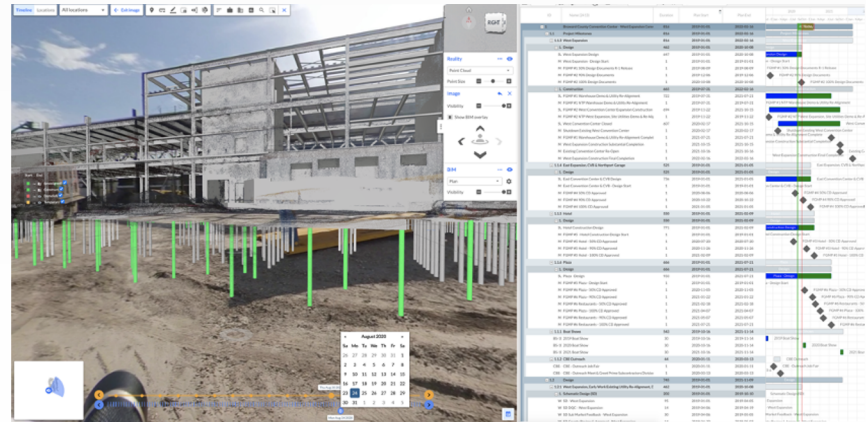
#3 Rebalancing and Continuous Improvements



Takeaways: FORGE, Enabler of Reconstruct & Broward County Convention Center Project

- Spatial and Temporal 2D/3D Alignment and Rendering
 - Large Federated Models vs. Reality Models
- Construction Workflow Integration

```
125         if index >= 0:  
126             self.window.open_file(snippets[index][1])  
127         else:  
128             view = self.window.active_view()  
129             if self.window.get_view_index(view)[1] == -1:  
130                 view.close()  
131  
132         def on_highlight(index):  
133             if index >= 0:  
134                 self.window.open_file(snippets[index][1], sublime.  
135  
136             self.window.show_quick_panel(  
137                 [_[0] for _ in snippets],  
138                 on_done,  
139                 0,  
140                 -1,  
141                 on_highlight  
142             )  
143
```



Project Takeaways: Transparency drives ROI

- **What is there vs. what should be there**
 - Instant access to project status
 - Proactive risk assessment
- **Resiliency in Project Execution**
 - Schedule coordination and communication
 - Photogrammetry truth for QA/QC and change orders
- **Schedule Adherence and Continuous Improvements**
 - Proactive progress tracking
 - Informed schedule revisions

End Result ...

Happy Project Stakeholders!



Owners and Owner Reps

Proactively manage risk for delay, coordinate OAC activities, and expedite payment applications



GC and CMs

Reliable short-term and long-term planning, coordinate work activities, quality control, and progress monitoring



Trade Contractors

Real-time knowledge of “who does what work in each location”, quality control, and enhanced work coordination

Transparency through Digital Twins + AI-Driven Analytics



Customer Stories





INDUSTRY X

Connected Construction

Speakers



ANAND DESAI

CONNECTED CONSTRUCTION
PRODUCT OWNER



ADEEL ALI

CONNECTED CONSTRUCTION
DATA VISUALIZATION LEAD



CONNECTED CONSTRUCTION AT MAJOR O/G OWNER

Connected Construction is a **platform** that helps organizations realize the **full potential from their People, Equipment and Materials**, by connecting them in real time, to improve Safety, Efficiency and Predictive Delivery.

CLIENT SITUATION

- **Static** and **inconsistent** information
- **Multiple** source of truth
- **Delayed** project reporting
- Lack of **accurate timeline sequencing** of work packages



- **Inaccurate demand planning** and resource allocation
- Reactive teams – **lagging indicators**
- **Changes, rework & wastage**
- Negative impact on **Productivity and Progress**
- **Unsafe** work environment



CONNECTED CONSTRUCTION

A solution for Oil and Gas customer

OUR SOLUTION



AUTODESK
FORGE[®]



CONNECTED CONSTRUCTION



CONNECTED CONSTRUCTION

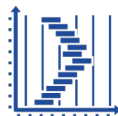
A solution for Oil and Gas customer

KEY FEATURES

To demonstrate **home office and field usability**, we developed 4 features by integrating **Autodesk Forge platform** within Connected Construction.



Model
Visualization



Construction
Progress



Path of
Construction



System
Completion



CONNECTED CONSTRUCTION

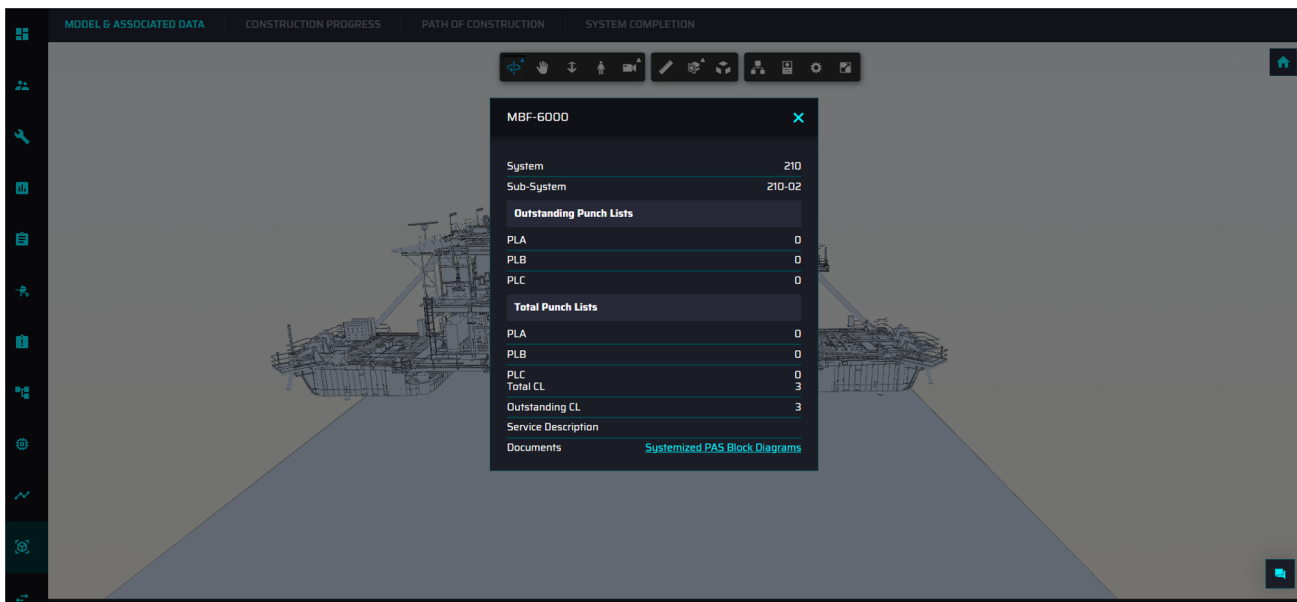
A solution for Oil and Gas customer

Model & Associated Data

- Online viewing of Navisworks model



Model
Visualization





CONNECTED CONSTRUCTION

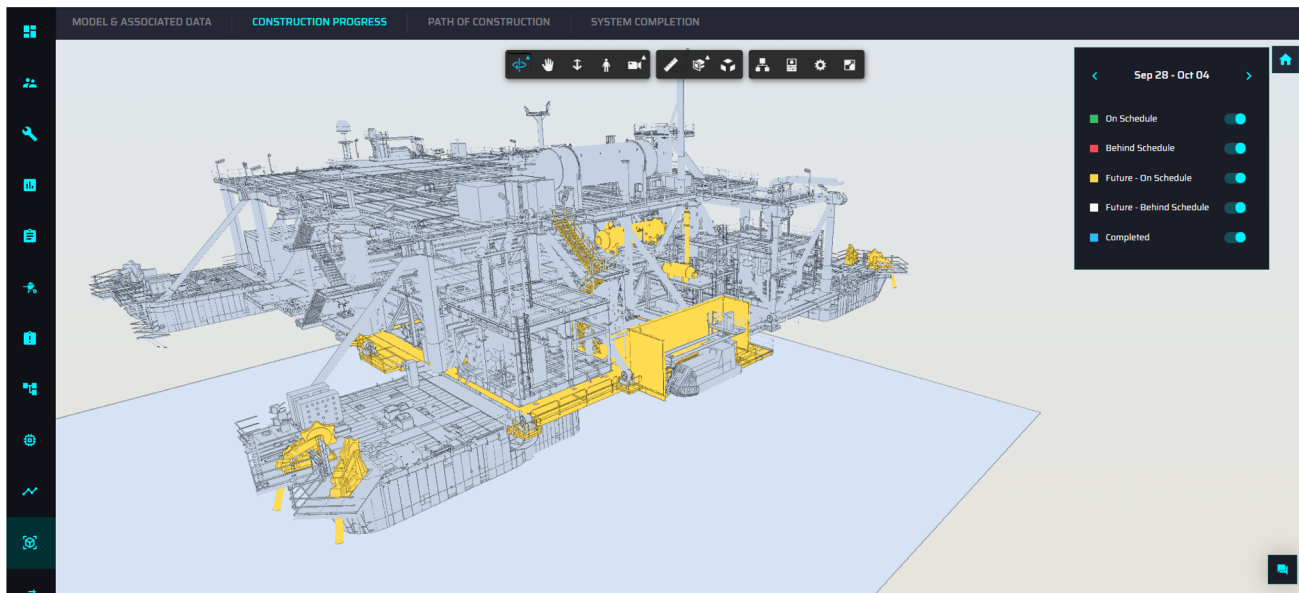
A solution for Oil and Gas customer

Construction Progress

- “Status twin” – what is my project status with latest schedule data?



Construction
Progress





CONNECTED CONSTRUCTION

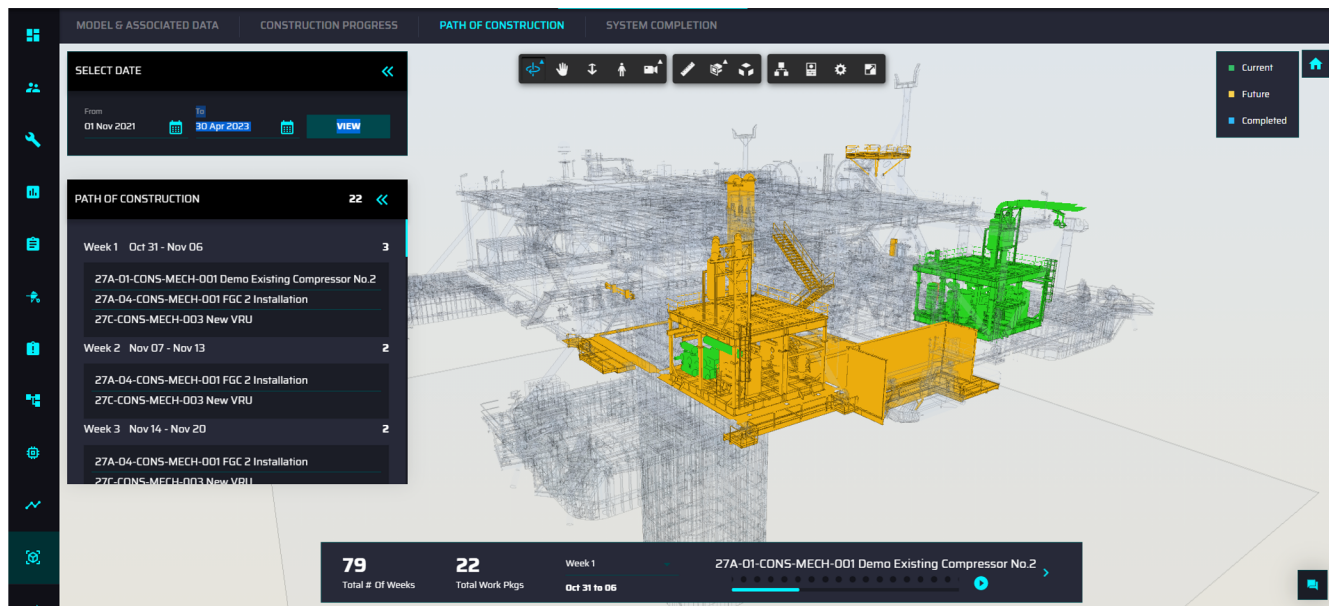
A solution for Oil and Gas customer

Path of Construction

- “Simulation twin” – how can I visualize sequence and constructability of work package installation?



Path of Construction





CONNECTED CONSTRUCTION

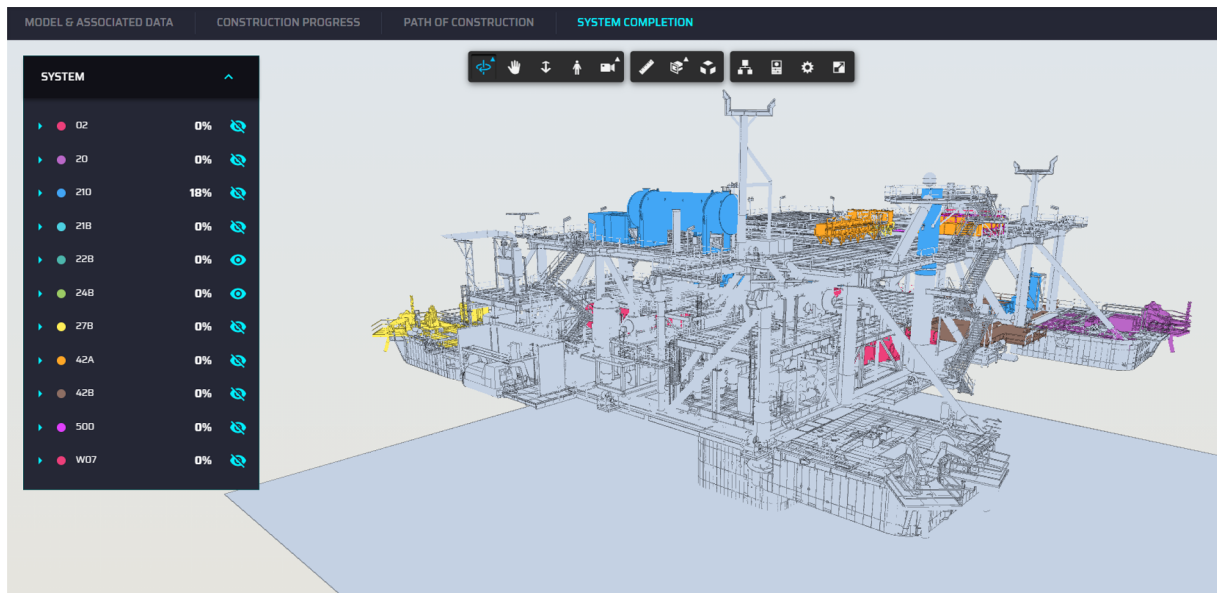
A solution for Oil and Gas customer

System Completion

- Monitor systems coming online with checklist and punch list status



System
Completion





CONNECTED CONSTRUCTION

A solution for Oil and Gas customer

OUTCOME / RESULTS

- Single source of truth
- Real time data for accurate and faster decision making
- Focus on leading indicators affecting project cost and schedule
- Improved asset planning and utilization
- Clear path of construction
- Increased confidence on project schedule



Contacts

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adeel.a.ali@accenture.com

Connected Construction References

SHOWREEL

<https://www.youtube.com/watch?v=gAQwZEInXnk>



Customer Stories





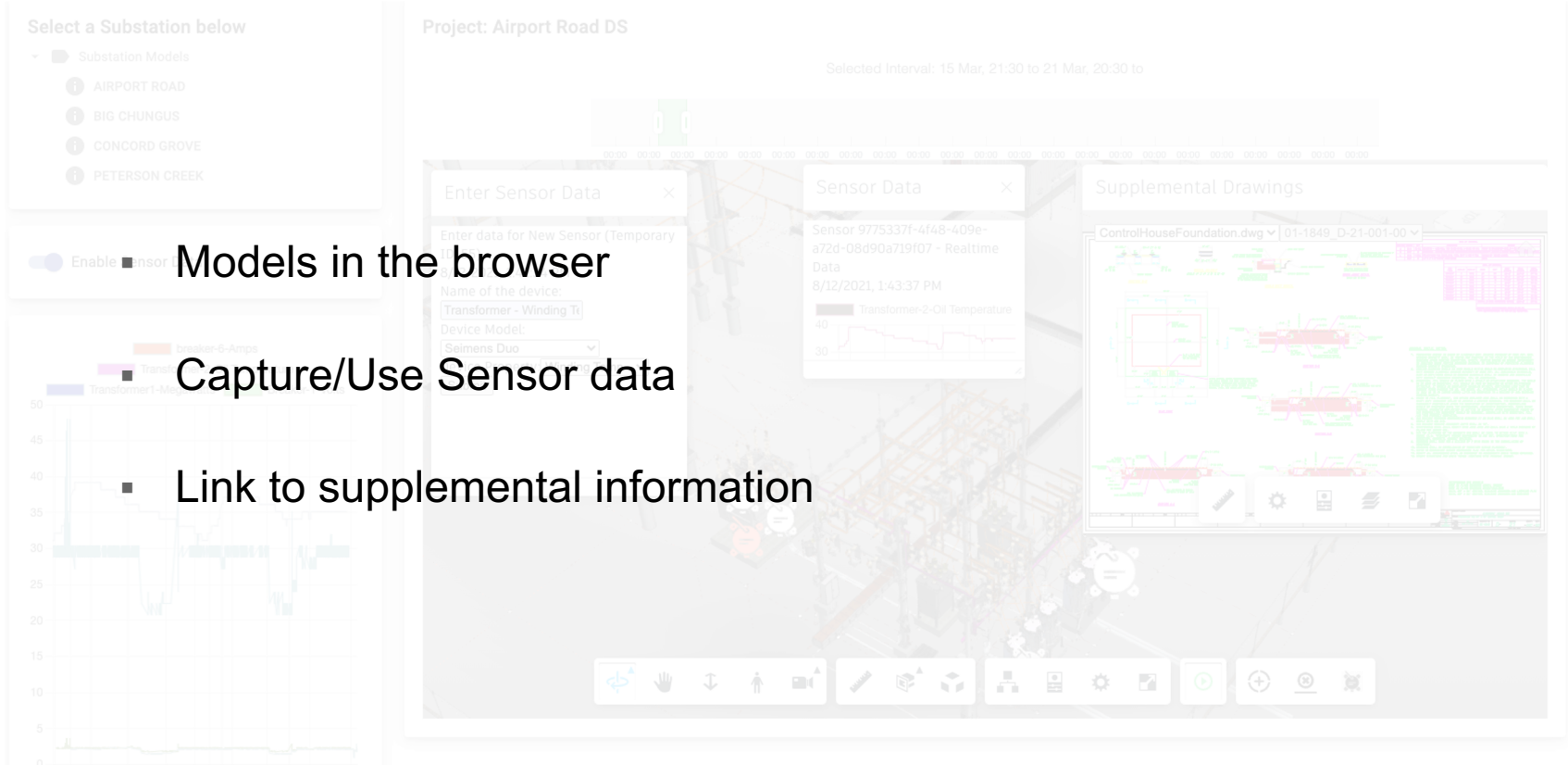
Shawn Weekly - Principal/Solution Architect

How do we...

- Predict equipment failure?
- Extend the life of equipment?
- Reduce power outages?

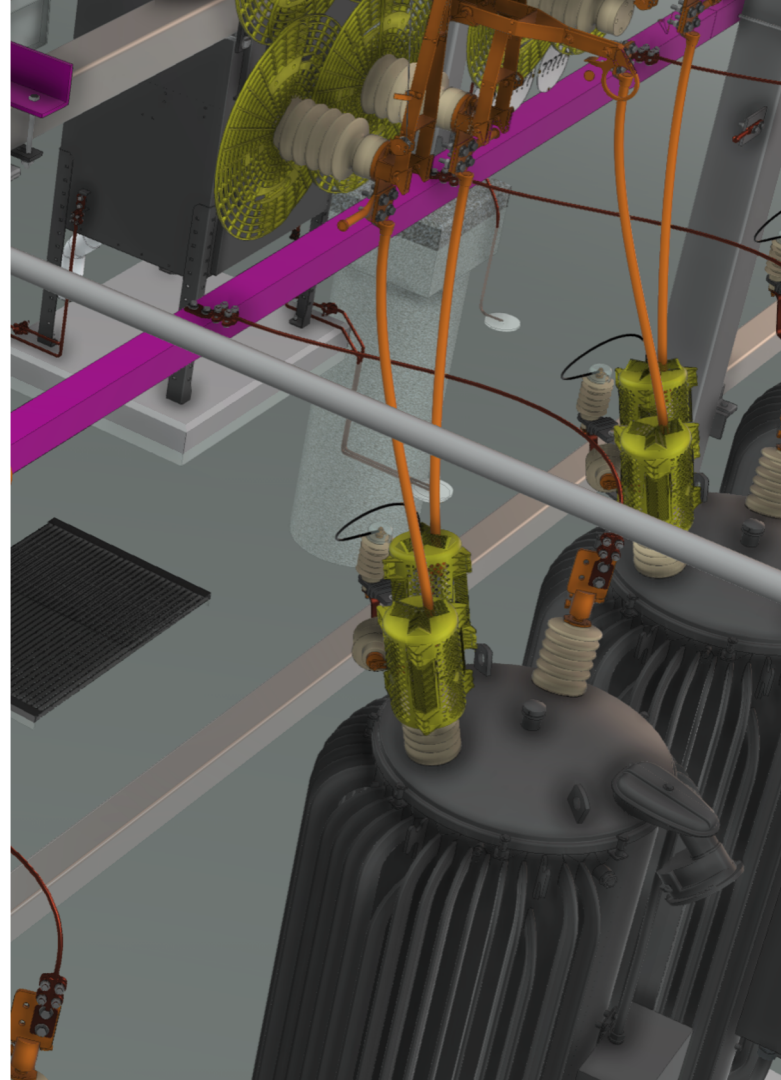


Condition Based Maintenance using Autodesk Forge



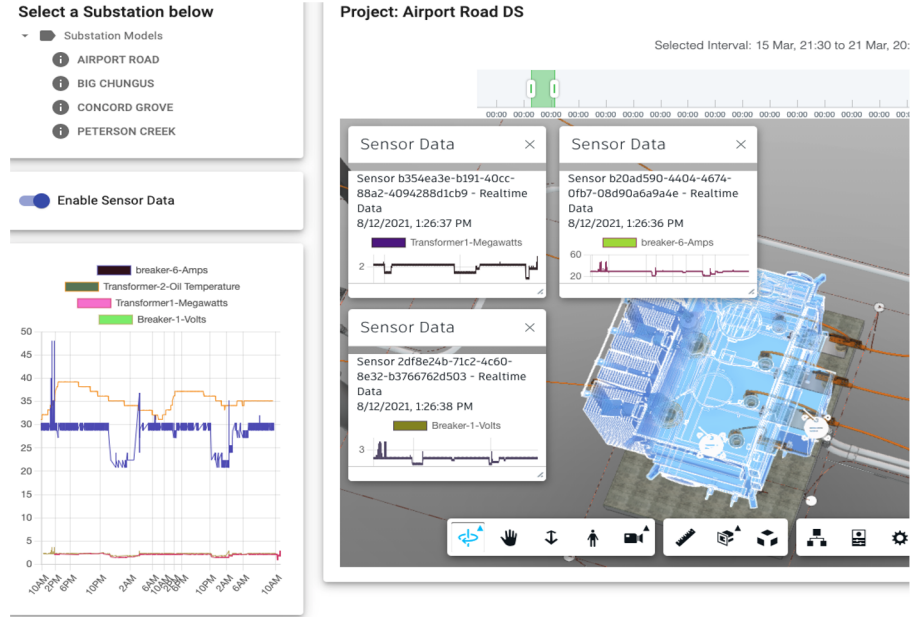
Models in the Browser

- 3D = Inventor
- Inventor = Detailed models
- Detailed models = Markup/Measure
- Collaboration= **KING**



Capture and use Sensor data

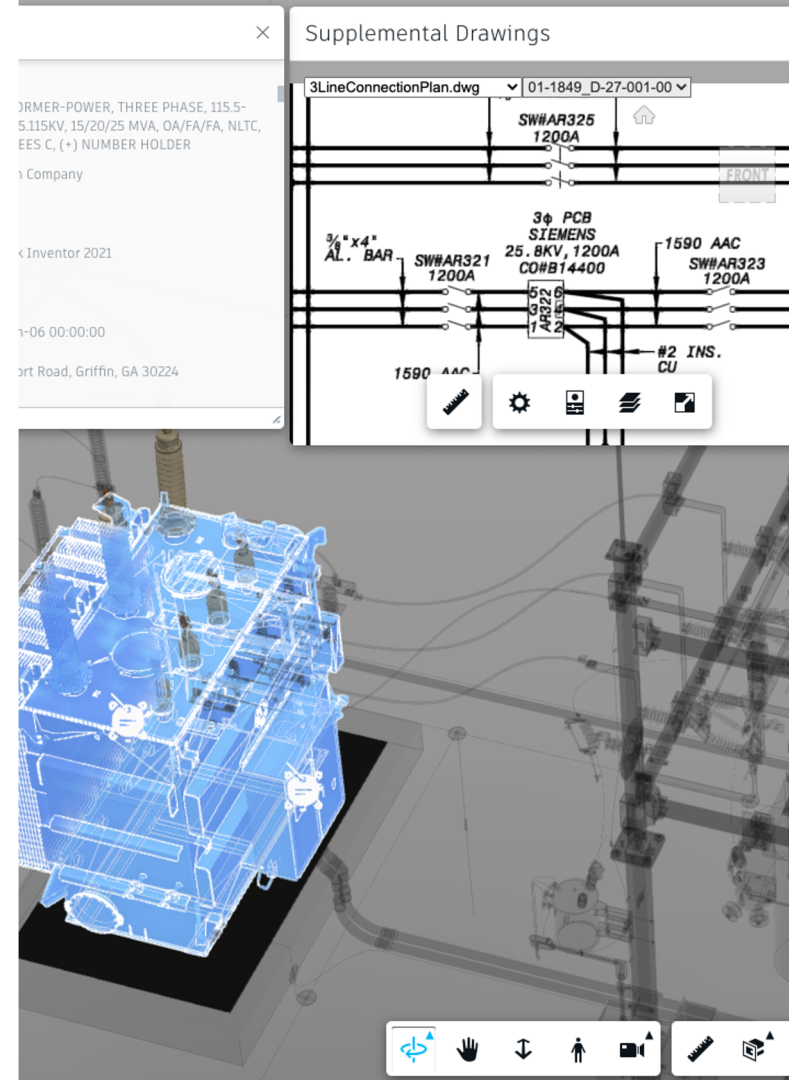
- IoT sensors reading 'vitals'
- Visualize the data
- Near real-time analysis
- Proactive maintenance



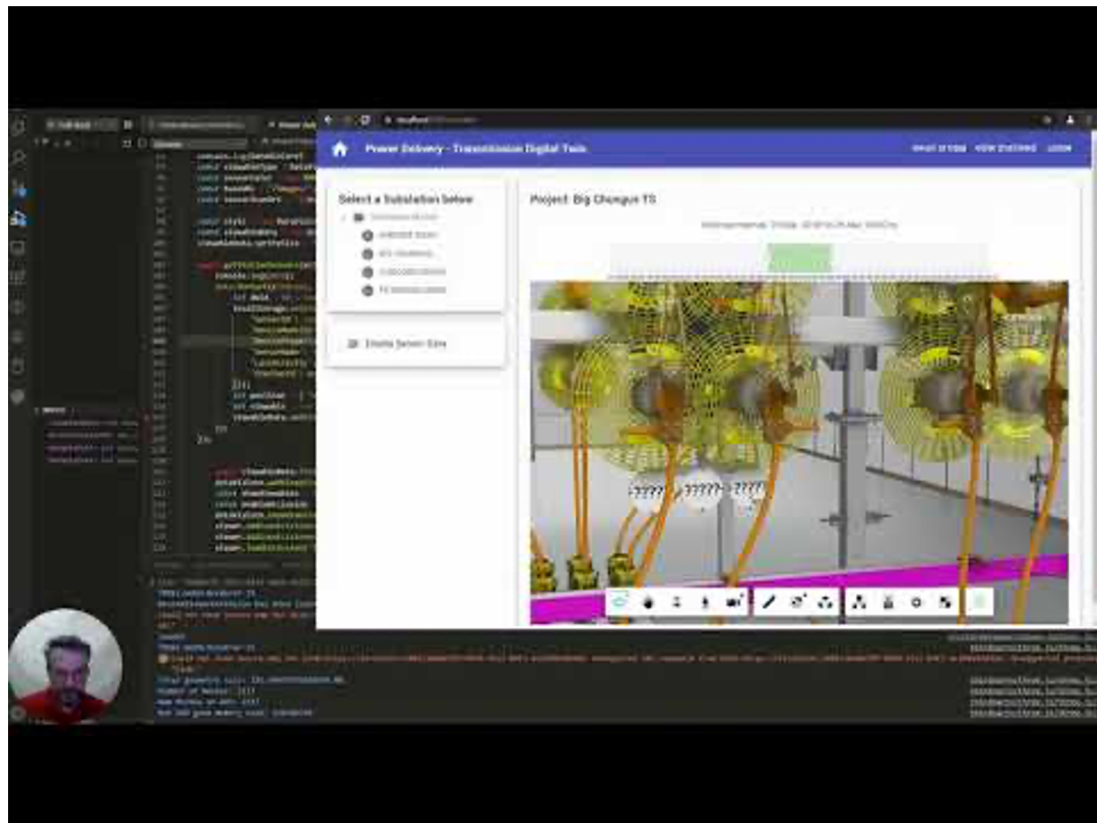
Supplemental Information

Autodesk Vault:

- 2D Cad files
- Project information
- Equipment Properties



Our Solution

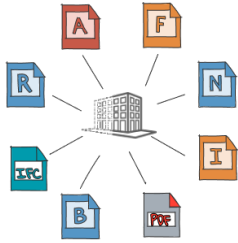




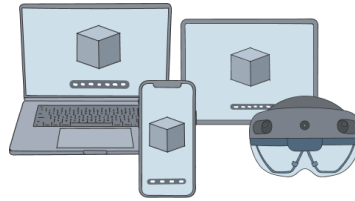
Get Started

Building your own flavor of Digital Twin

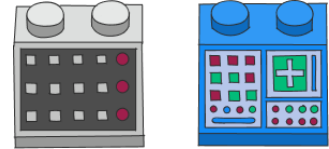
Building your own Digital Twin



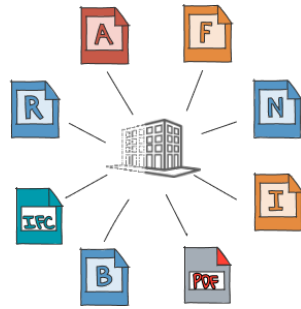
Organize it



Access it



Customize it
(Learn the basics)

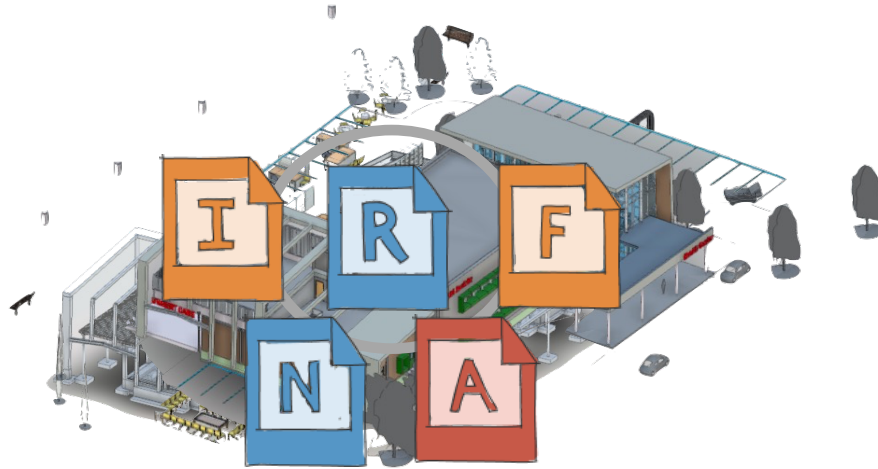


Organize it



Organize it

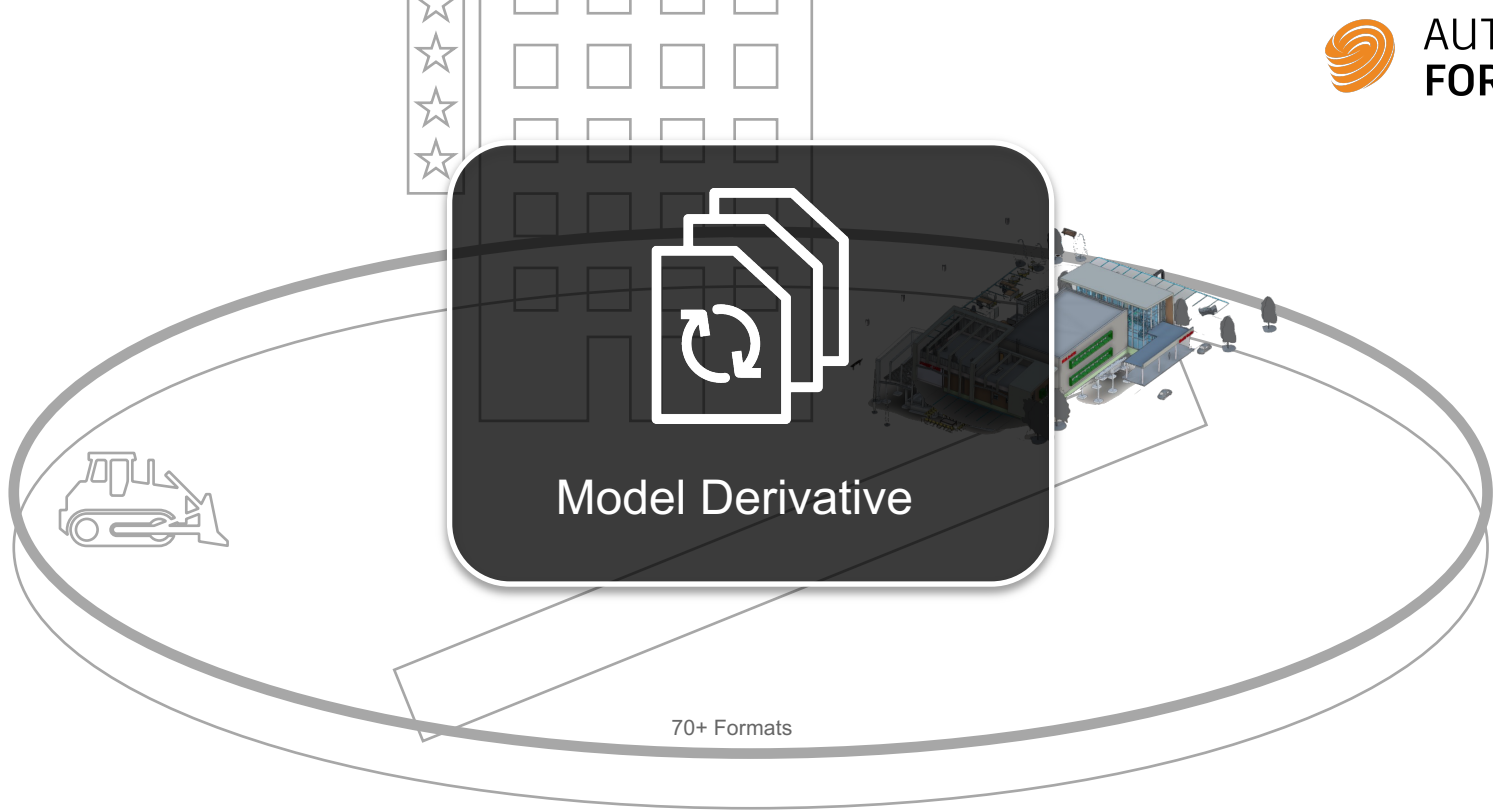
Bring all your CAD files...



70+ Formats

Organize it

Bring all your CAD files... into one place



Organize it

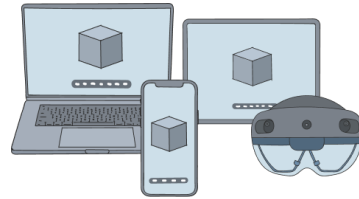
...even “Foreign” CAD and PDF files



Model Derivative

Organize it

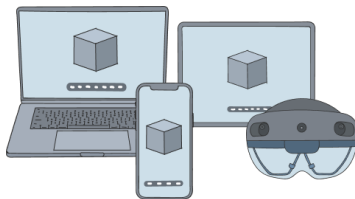
Bring “all” your CAD files, into one place.



Access it

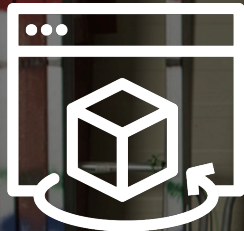
Access it

from anywhere...





AUTODESK
FORGE®

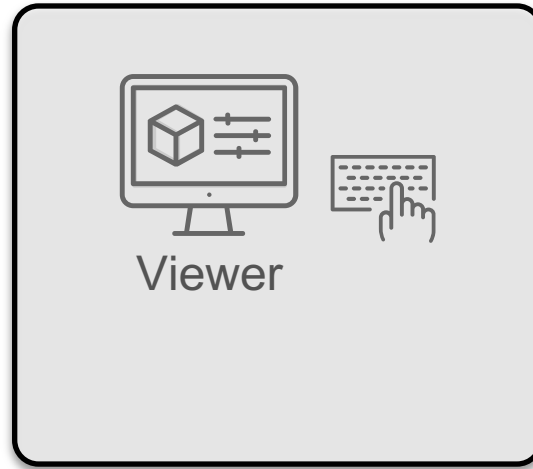


Viewer



Access it

from anywhere ...using your browser



Customize it

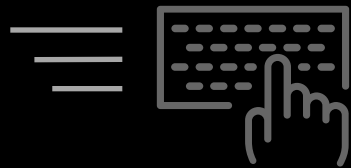
▶ LEVEL 3 (4478) ▶ LEVEL 1 (1157) ▶ LEVEL 2 (4932) ▶ LEVEL4 (2828) ▶ un-named-story_1 (0) 

Viewer

**Customize**

Let's Learn the “Viewer” Basics...

Search, highlight and color, individual pieces. Isolate Floors and layers.



“Viewer” API Demo...

Forge at Autodesk University 2021

SEE WHAT'S IN THE WORKS

Forge Roadmap Class

SHORT AND SWEET TECHNICAL OVERVIEWS

Forge Lightning Talks

A WALK THROUGH TIME

Forge Documentary

EXPLORE THE WINNING APPS

Forge Hackathon Showcase



The background of the slide features four abstract, dark, metallic-looking geometric shapes in the corners. These shapes are composed of sharp, angular planes that reflect light, creating a sense of depth and modernity. They are positioned in the top-left, top-right, bottom-left, and bottom-right corners, framing the central text.

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