

24TH ANNUAL



24TH LCI CONGRESS
OCTOBER 18-21

Healthcare Construction Faceoff: Volumetric Modular VS Manufactured Kit-of-Parts

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Romano Nickerson, Boulder Associates

Paul Tate, The Boldt Company

LEAN GUMBO: THE RIGHT INGREDIENTS FOR PROJECT SUCCESS

October 19, 2022

INTRODUCTION



Dan Carlton
President
Mark III Construction / M3C



Romano Nickerson
Principal
Boulder Associates



Makayla Oei
Director of Preconstruction
Mark III Construction / M3C



Paul Tate
Area Superintendent
The Boldt Company

Mark III Construction & M3C



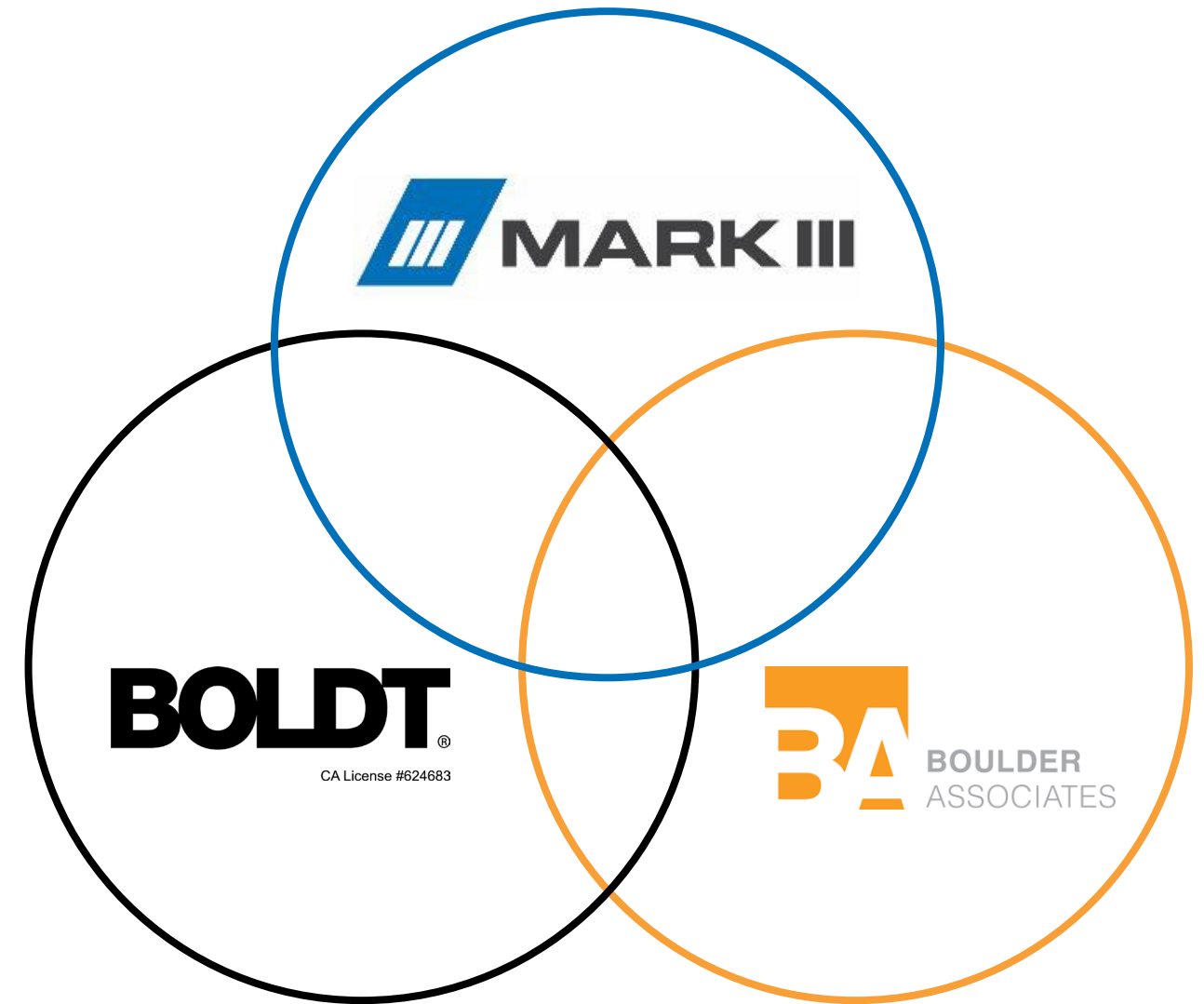
Strategic Partnership

- **Boulder Associates**

- Leading (bleeding) edge opportunity
- It's what our clients deserve
- Sounded like a cool thing to be a part of!

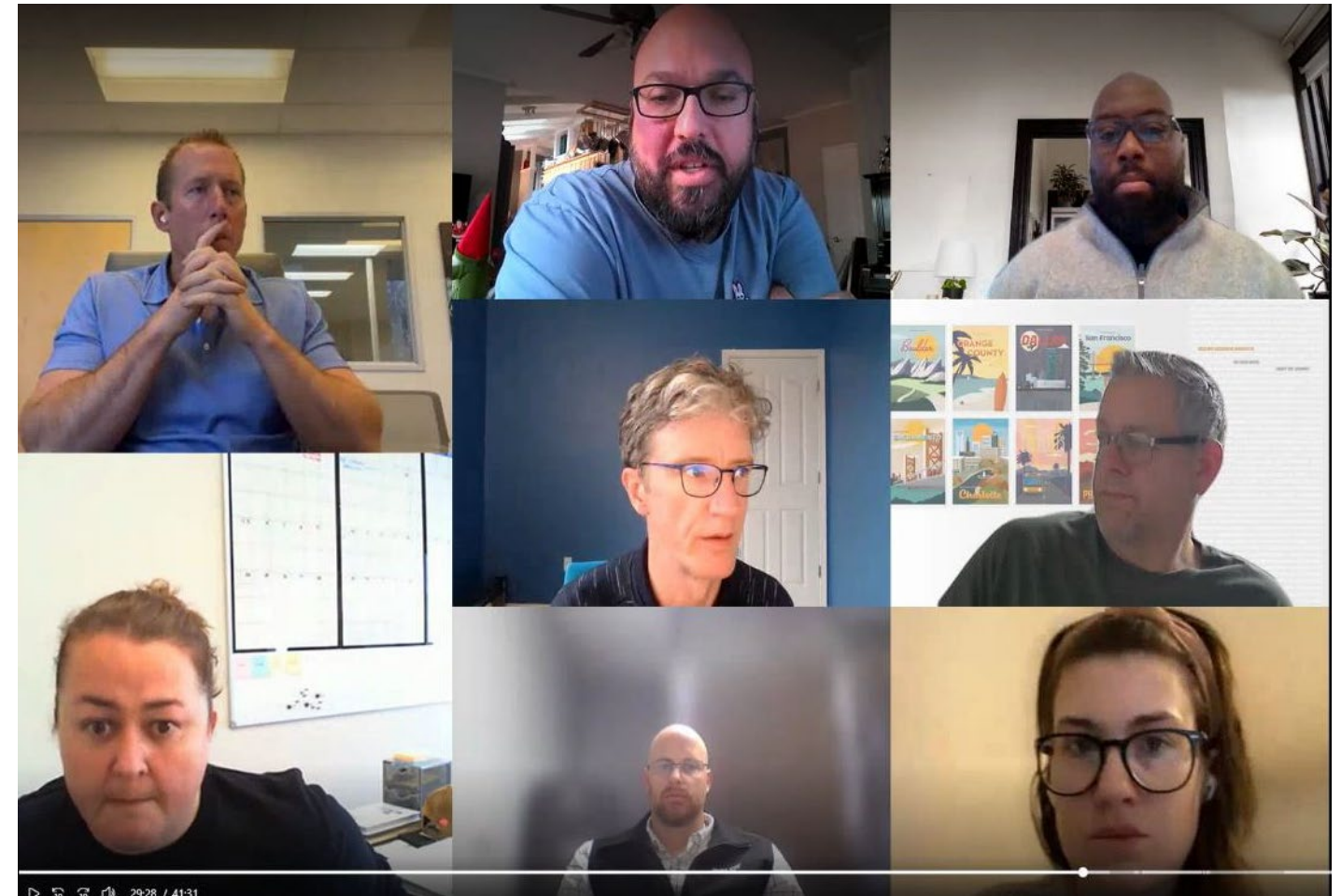
- **The Boldt Company**

- The innovation aspect of this initiative
- The challenge
- The future of construction



Early Planning Meetings

- **Mission** – Strategically collaborate across multi-disciplinary team to develop standardized room templates and manufacturing process to successfully delivery healthcare units better, faster, and cheaper
- **Long Term Goal** –
 - 25% cost savings by 2025
 - 50% time savings from Program approval and 1st patient date
- **Definitions**
- **Conditions of Satisfaction**
 - Process Improvement
 - Create Kit-of-Parts & Pods
- **Determine Metrics**
- **Expectations for all parties**

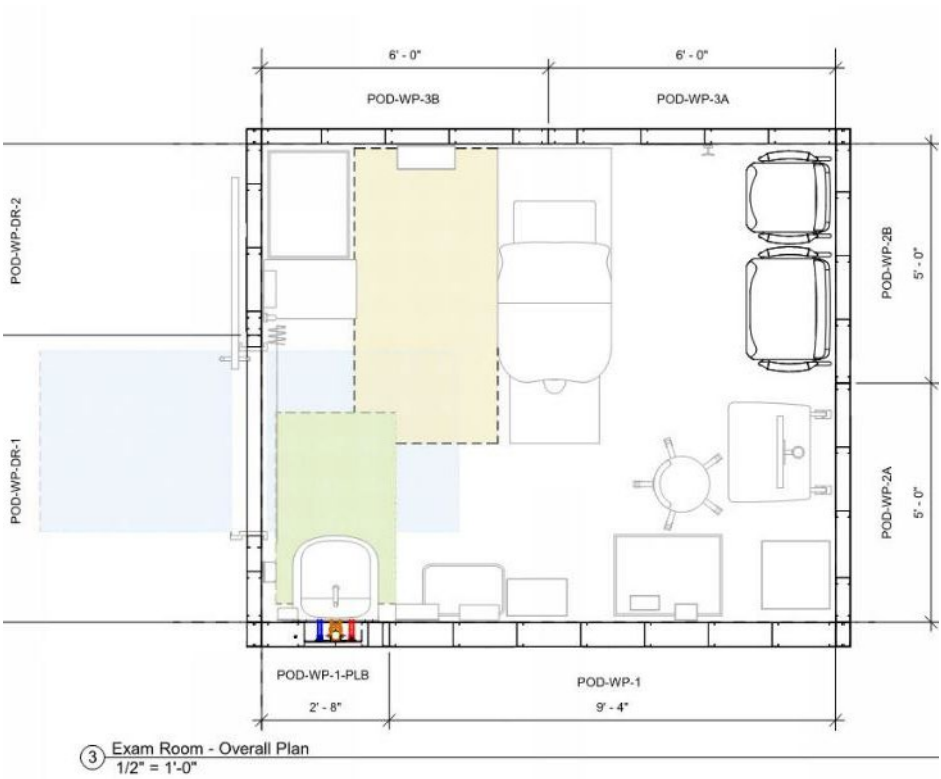
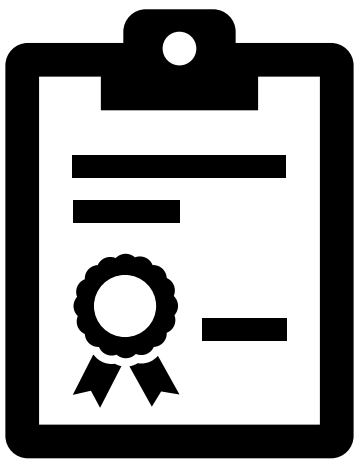
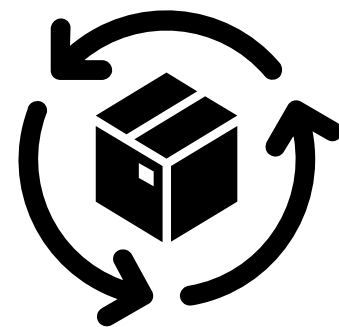
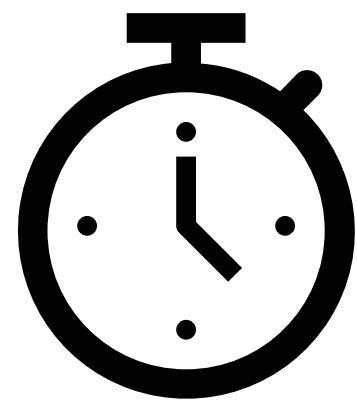


Approach – what are we doing?

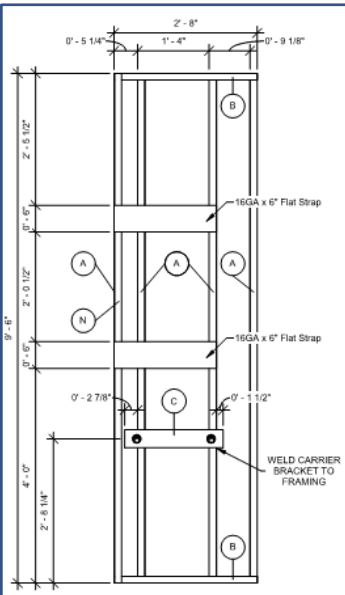
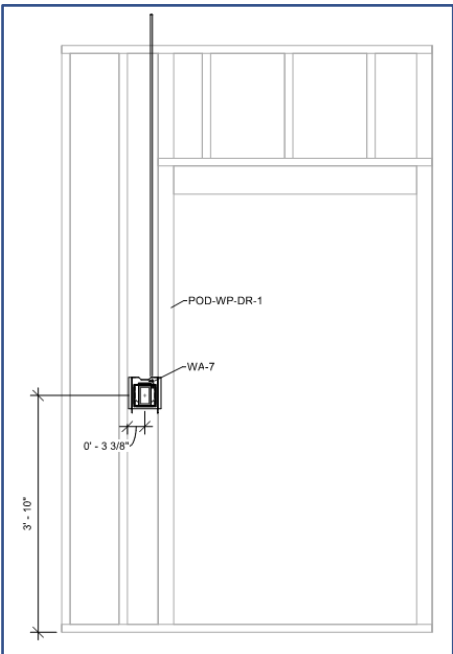
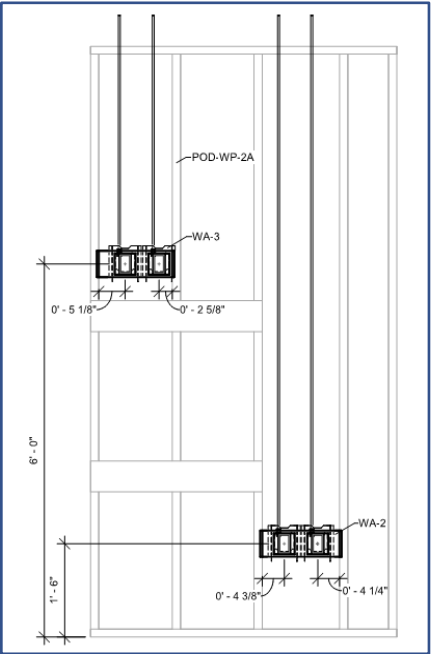
- Room Selection
 - Repetition – Exam & Staff toilet
 - Complexity – MEP heavy
- Delivery Method:
 - Kit-of-parts vs. Volumetric Modular
 - Concerns around Pods
 - TI's may not accommodate Pods
 - Shipping cost – expensive air



Metrics



Templates to Catalogued Components



CONNECTION TYPE

STUD TO SILL / TOP TRACK
DBL STUD INTERSCREW
TRACK NESTED OI STUD INTERSCREW
BACKING PLATE FOR GRAB BAR

MIN. HANGINGWARE

(1) #10SMS EA FLANGE EA MEMBER
(E.G. 4 SCREWS TOTAL FOR BACK TO BACK STUDS)
(2) #10SMS @ 12" O.C.
(1) #10SMS @ 12" O.C. EA FLANGE,
I.e. (2) #10SMS @ 12" O.C. TOTAL
MIN. (3) #10SMS @ EA. END OF BACKING TRACK @ EA. STUD

NOTE:
ALL SMS SCREWS SHALL BE PAN-HEAD WITH SELF-DRILLING TIPS AND HAVE LENGTH SUCH THAT MIN. 3 THREADS PROTRUDE ON OPPOSITE SIDE OF CONNECTED MATERIAL.

Mark	Model	Section Shape	Count	Length
A	600S162-33	C Profile with Lips	4	9' - 5 7/8"
N	600T150-43(33)	C Profile	1	9' - 5 7/8"
Grand total: 5				

Mark	Model	Section Shape	Count	Length
B	600T150-33	C Profile	2	2' - 8"
Grand total: 2				

Mark	Model	Description	Count
C	MC-54	Lavatory Carrier	1

Manufacturing

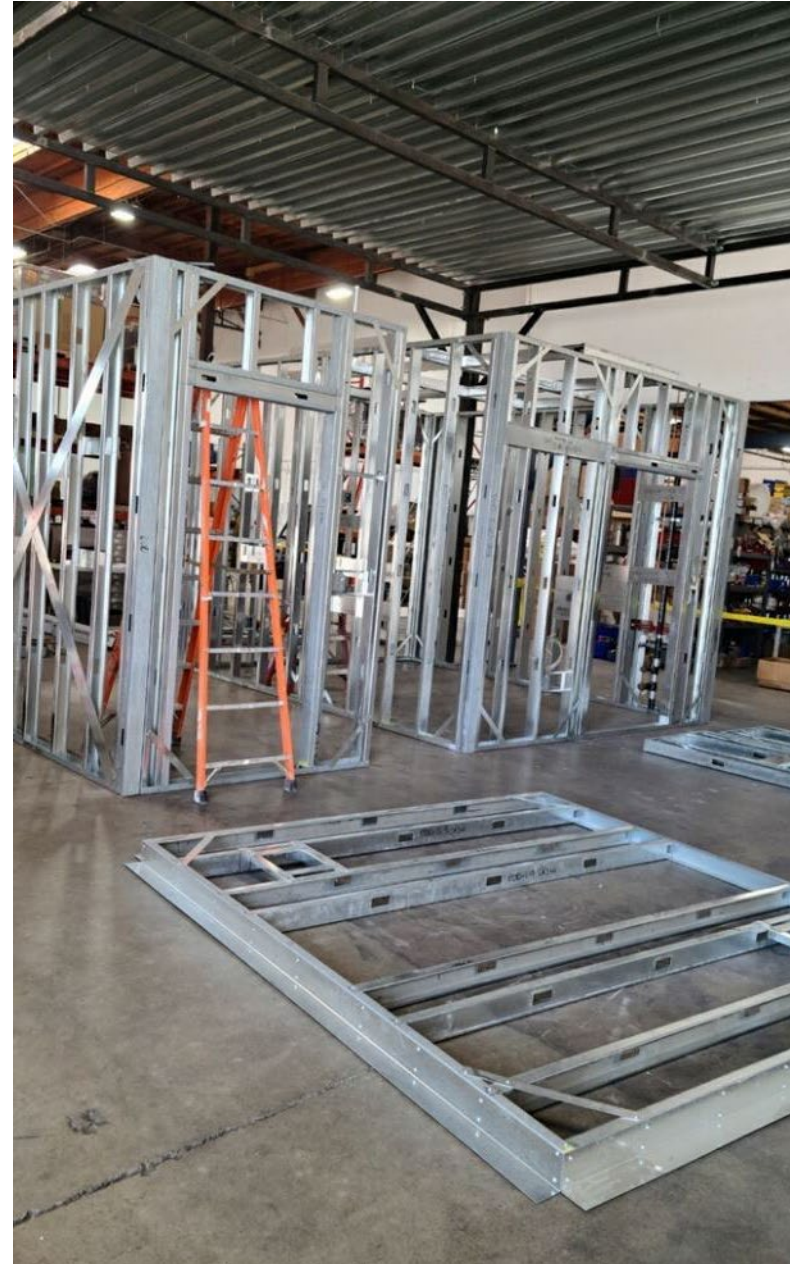
- All 4 rooms comprised from same product
- Kit-of-Parts
 - Manufactured panels with in-wall
 - 3 Deliveries
 - Issues & Ops Log provide for continuous improvement efforts
- Pods
 - Turnkey room, minus flooring, floor fixture, ceiling tiles
 - Track left in doorway
 - Ceiling box grid



Installation – Kit-of-Parts

Kit-of-Parts (KOP):

- Each KOP included wall panel assemblies, wall finish, fixtures, and trim.
- Units were flat-packed and organized into three deliveries.
- The Boldt Company received the KOPs for final on-site installation with our self-perform crew.



Installation – Pods

- Turn-key rooms
 - Test quality and simulate real life scenario
- Set
 - Proprietary roller system
- Site Work
 - Flooring
 - Floor mounted toilet
 - Ceiling tiles
- Punch
- Final Team Review – all hands



Data & Analytics – Speed to Market

<u>KOP</u> DELIVERY METHOD MANUFACTURING & INSTALLATION DURATIONS		
	EXAM ROOM	PATIENT/ STAFF TOILET
MANUFACTURING TIME	2.9 days	1.9 days
INSTALL/ASSEMBLY TIME	8.3 days	7.9 days
TOTAL MAN DAYS	11.2 days	9.8 days

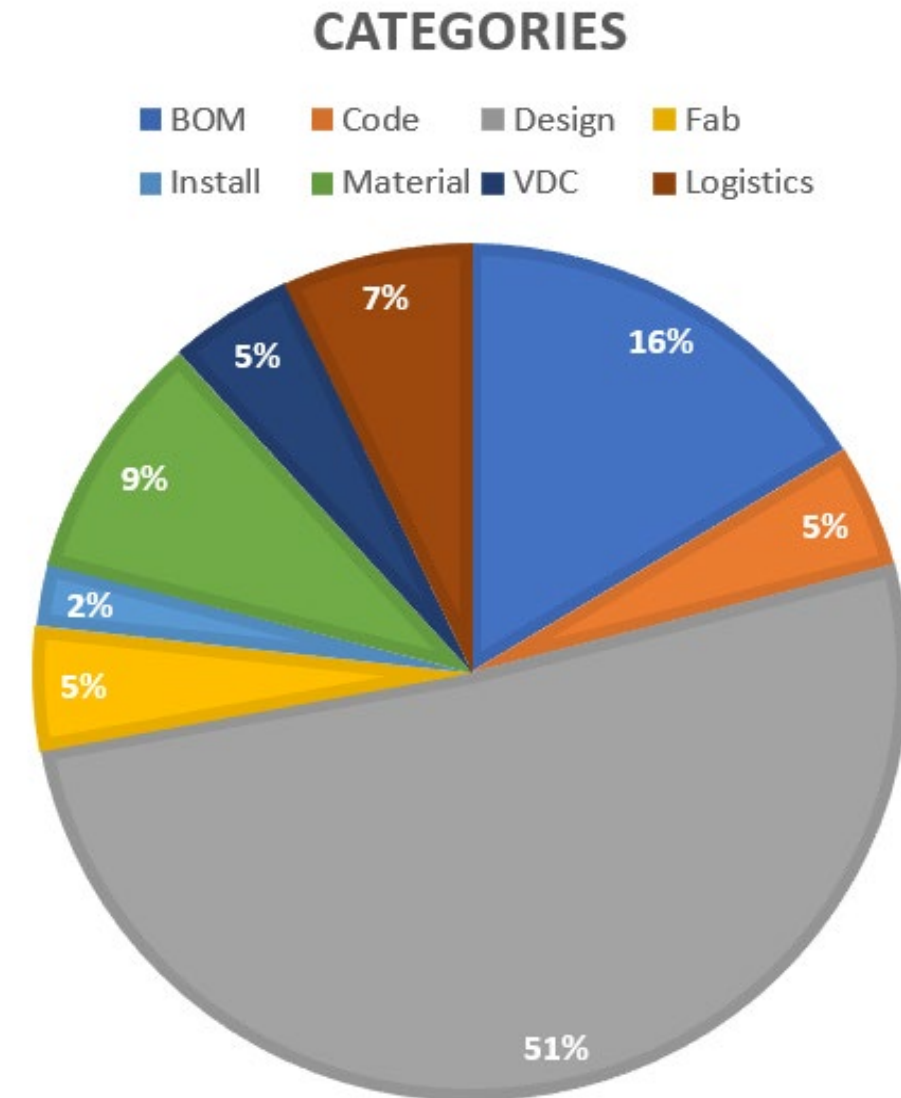
<u>VOLUMETRIC POD</u> DELIVERY METHOD MANUFACTURING & INSTALLATION DURATIONS		
	EXAM ROOM	PATIENT/ STAFF TOILET
MANUFACTURING TIME	8.9 days	7.4 days
INSTALL/ASSEMBLY TIME	.6 days	.6 days
TOTAL MAN DAYS	9.5 days	8 days



Pods Avg. 16% faster

Data & Analytics - Quality

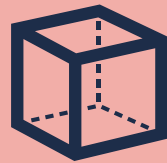
- **Issues & Opportunities Log**
 - Continuous improvement tool
- **43** total entries
- **88%** of entries had no negative time impacts on production/install
- Highest Trade Entries
 - Framing/Backing **30%** (qty 13)
- Highest Category Entries
 - Design **51%** (qty 22)
- Countermeasures evaluated and will be implemented into product file



Notable Areas of Improvement



Contribution to the I&O Log – majority of entries by Mark III



Point cloud issues



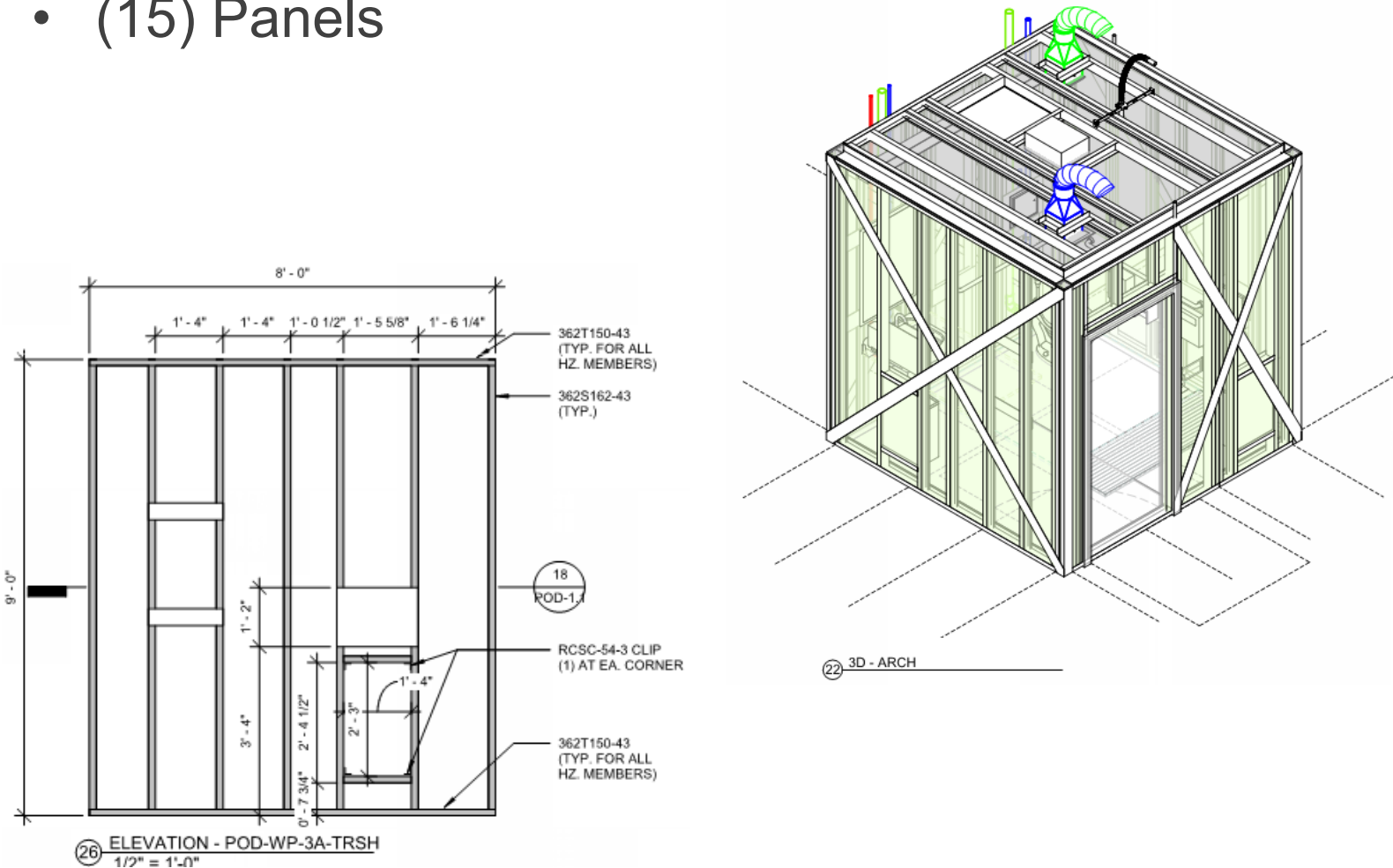
Improved QA/QC at hand-offs

- Bill of materials
- Spool sheets
- Before walls are closed
- Shipping
- Delivery acceptance

Data & Analytics

Quantity of Products developed:

- (2) Pods
- (15) Panels



PRODUCT ID	LINEAR FT. / SQUARE FT.	PLUMB ASSEMBLIES	ELECTRICAL ASSEMBLIES	QUANTITY OF BACKING / OPENINGS
Exam-POD-WP-1-PLB	2'-8"	1	-	2
Exam-POD-WP-3B	6'-0"	-	-	3
Exam-POD-WP-3A	6'-0"	-	1	2
Exam-POD-WP-2B	5'-0"	-	1	-
Exam-POD-WP-2A	5'-0"	-	2	2
Exam-POD-WP-1	9'-4"	-	1	4
Exam-POD-WP-DR-2	4'-0"	-	2	2
Exam-POD-WP-DR-1	6'-0"	-	1	1
Toilet-POD-WP-1AM-PLB	2'-8"	1	-	1
Toilet-POD-WP-1A	2'-8"	-	-	1
Toilet-POD-WP-3A	8'-0"	-	-	2
Toilet-POD-WP-3A-TRSH	8'-0"	-	-	-
Toilet-POD-WP-2A	2'-8"	-	1	3
Toilet-POD-WP-36	5'-4"	-	-	4
Toilet-POD-CLG-PNL	8'-0"	-	-	2
TOILET POD		2	2	14
EXAM POD		1	8	16

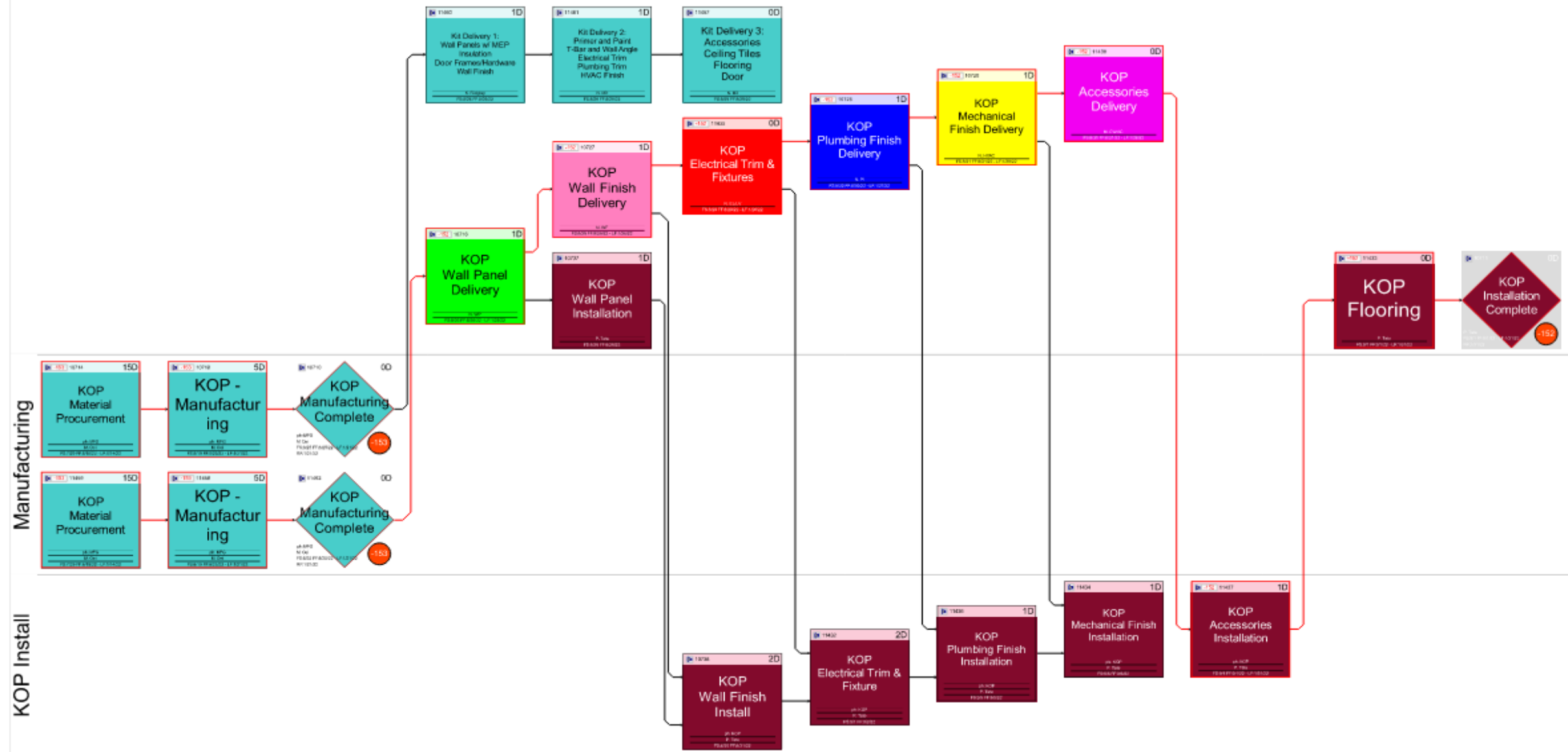
Why this is important to Architects?

- Architects doing more with less
- Ability to focus on aesthetics, lighting, sustainability, design, etc. In areas that need it
- Increased speed of delivery
- Improved quality aligning with standards
- Opportunity to take to other owners
- This is the way we need to go as an industry!

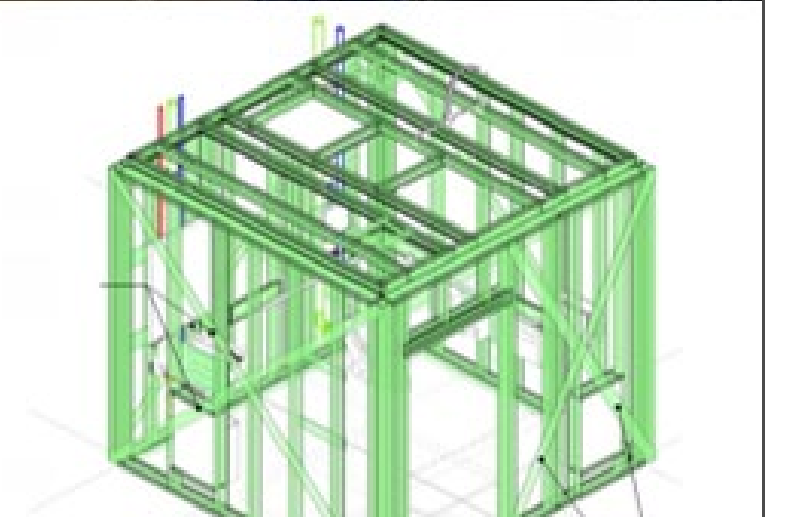
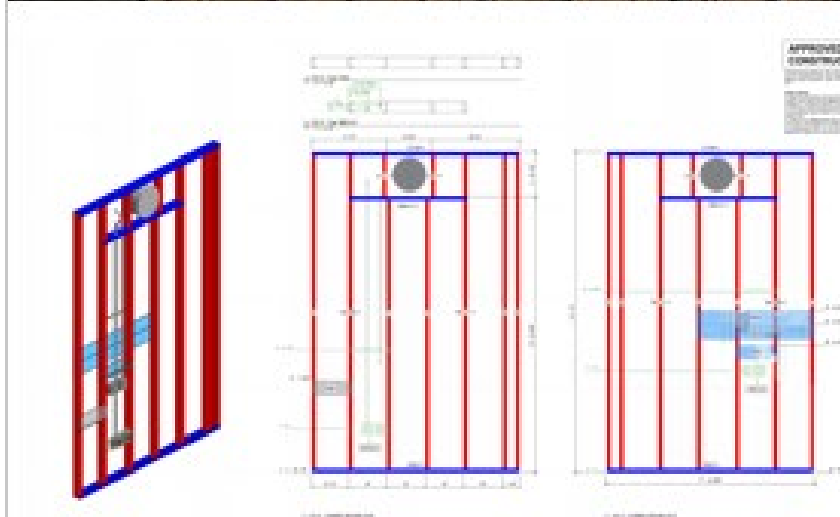
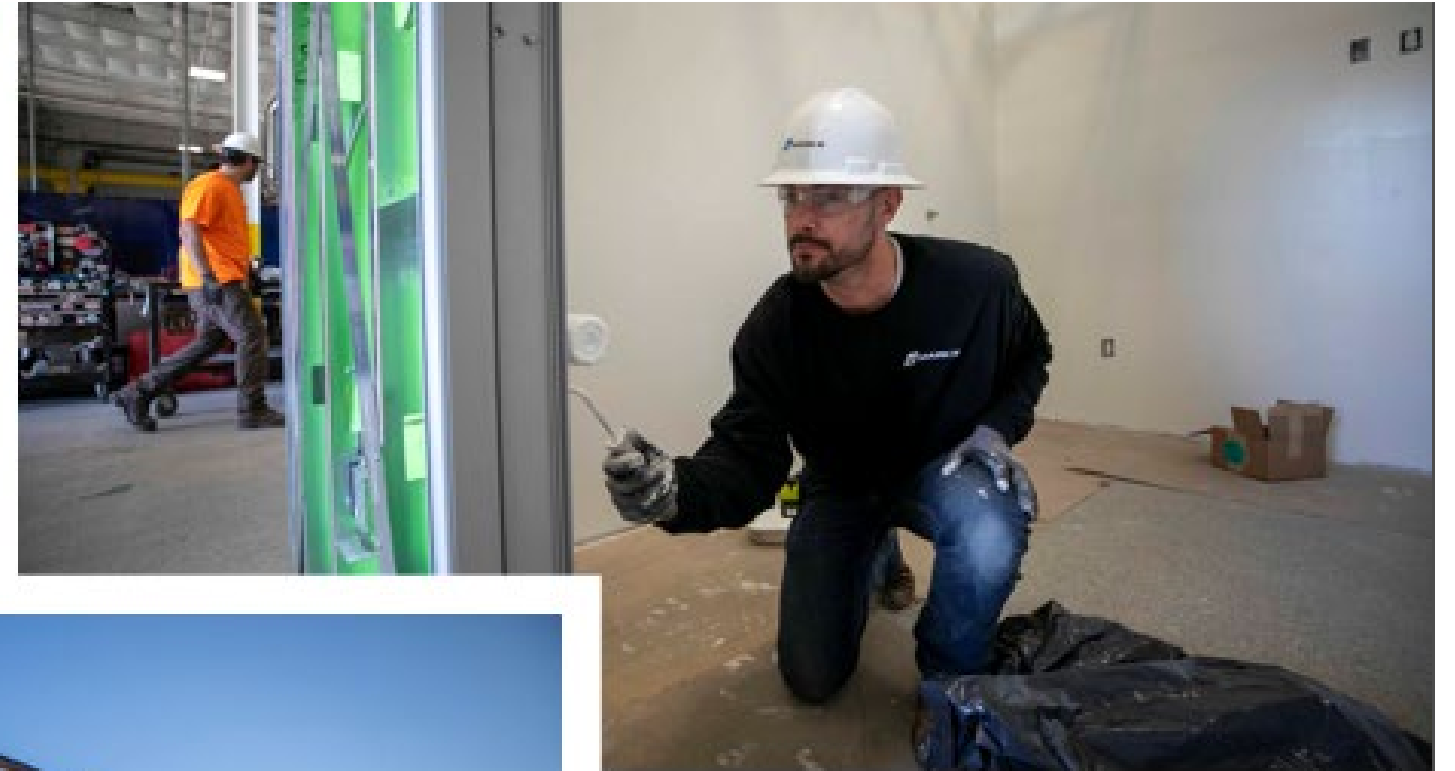


Why this is important to Contractors?

- How does this affect schedule
- Scalability



The Evolution of Construction



More information

Download our case study here →



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Key Takeaways, Questions & Answers

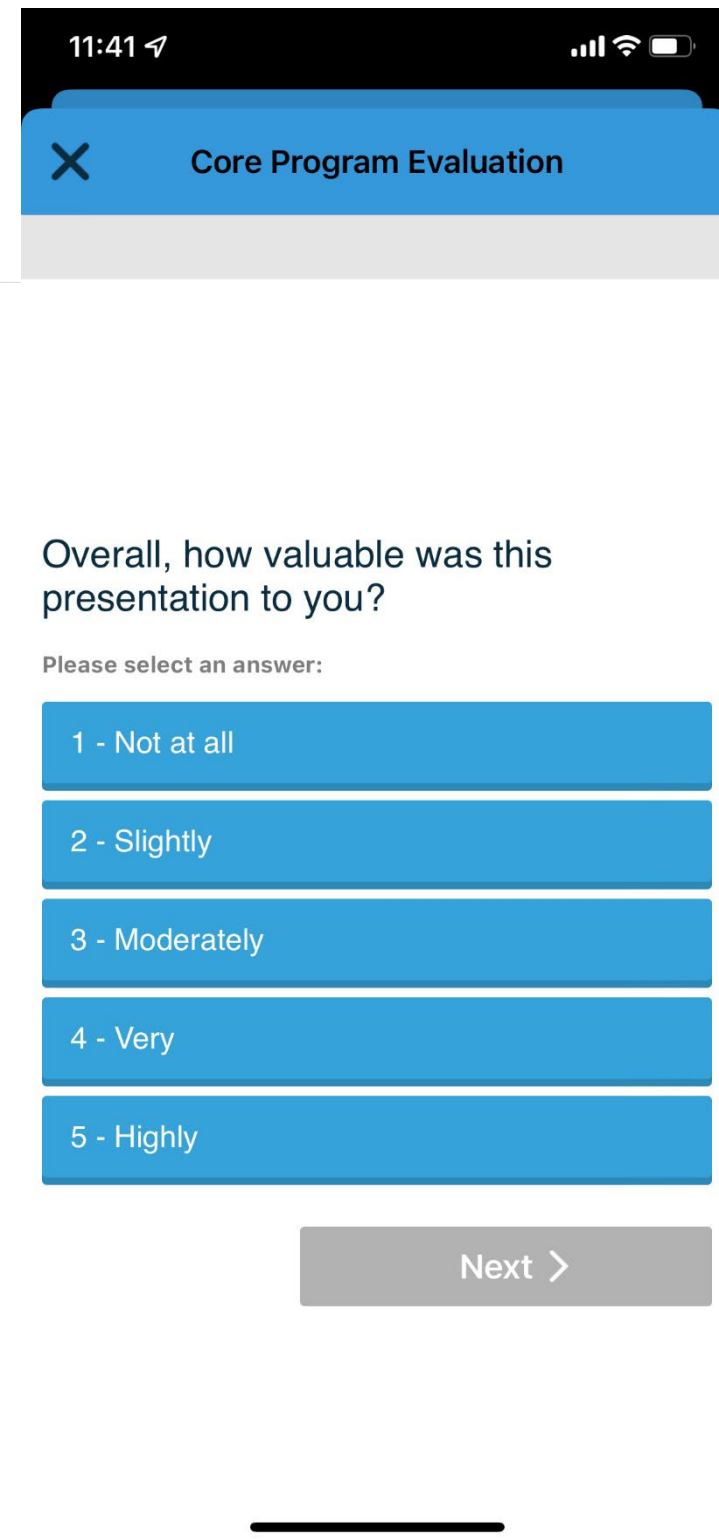
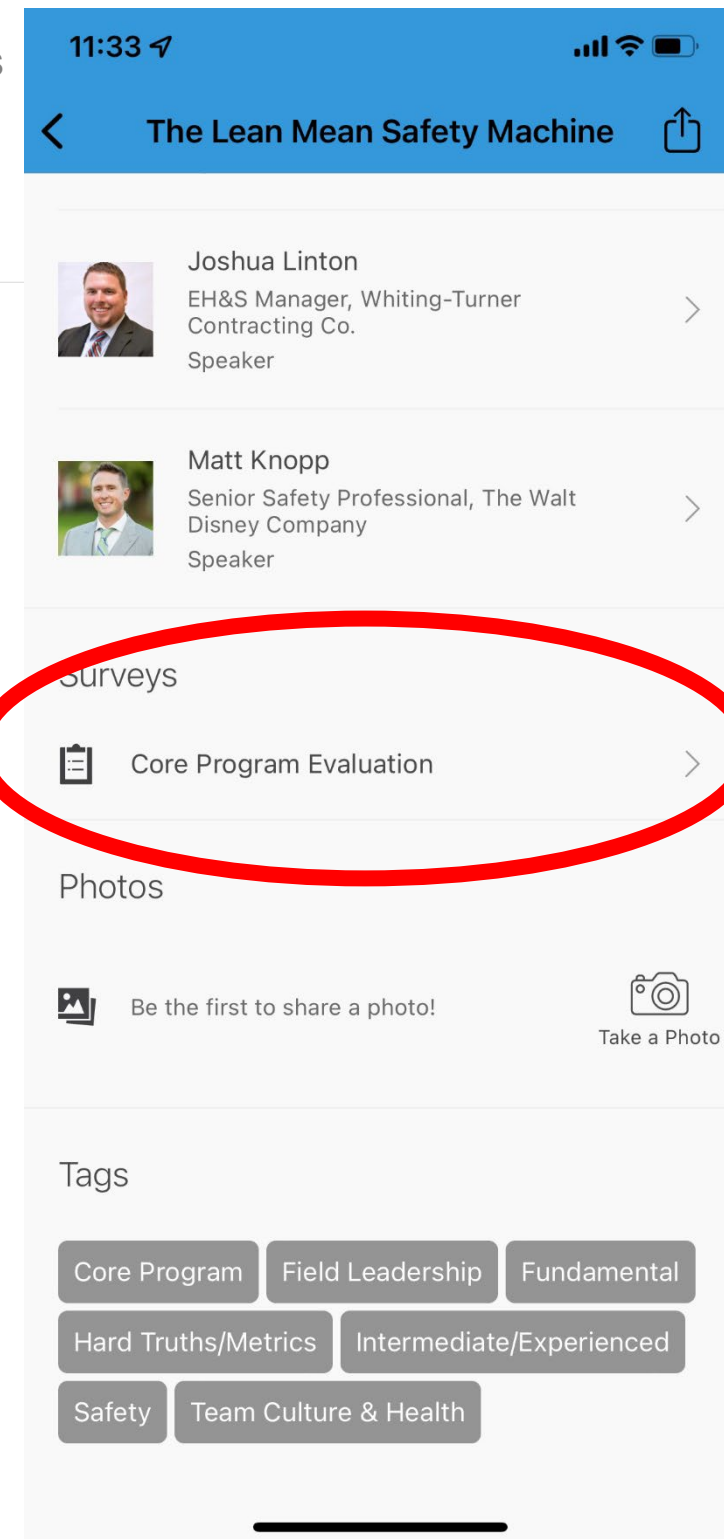


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1. Find the session under “schedule”
2. Click on it then scroll down
3. Click “core program evaluation”
4. Complete the 5-question evaluation

This information will determine the top 5 presentation teams and the top Live Lab





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In the spirit of continuous improvement, we would like to remind you to complete this session's survey! We look forward to receiving your feedback.



Contact Us

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Thank you for attending this presentation. Enjoy the rest of the 24th Annual LCI Congress!

