



<u>Advancing Technology into the</u> <u>Built Environment</u>

Dave Little, Gallegos Corp.





Presented by: AGC Specialty Contractors Council

Moderator Ryan Howsam – FMI





Where Are We Today?





Almost two-thirds of respondents expect more change in how construction is put in place over the next 5 years than in the last 50 years combined.



Neither agree or disagree

Disagree

Source: 2018 AGC/FMI Industry Risk Survey



One of the few remaining Industries to Digitize





\$4.34B Total funding in ConTech since 2009

478 Funding dea

Funding deals in ConTech since 2009

Construction startup and venture capital activity







A year ago we mapped the construction technology landscape uncovering 3 clusters of innovation ...





1.62







Source: McKinsey





Our Presenters:

Richard Lopez – Hensel Phelps Peter Busciglio – Hensel Phelps Chris Porter – Trimble Site Services Nick Lauer – MTech Mechanical Mike Bishop – Intermountain Electric





To Earn CEUs for this Session

Participants must:

- 1. Check in with attendance proctor at thedoor.
- 2. Attend atleast 95% of the session.
- 3. Complete the post-program evaluation.
- 4. Complete a brief assessment with a score of 75% or greater.



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Learning Objectives

By the end of this session, participants will be able to:

- 1. Identify technologies that specialty contractors are using.
- 2. Discuss how to increase productivity.
- Describe how innovative changes can be adopted within your own organizations.
- 4. Analyze how technological changes improve the overall jobsite.





Using theAGC Mobile App

Click "Session Evaluation" atthe top right within the session description, then click "Evaluate This Session."

We welcome your feedback!









Augmented & Virtual Reality Design Review

What's the Vision?



Peter Busciglio





How to review the vision of the Project Design with the Owner and/or Team Partners through Augmented Reality/Virtual Reality

- 1. Collaborate with the authoring teams and their models to add materials to the various models
- Utilize those models with various Software to add realism Enscape / HoloLive
- 3. View those models in an Augmented/Virtual Reality environment Oculus Rift / HoloLens



Collaborate with the Team to plan the Design







Add Materials to the Revit Model

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View the model in Enscape with VR







View the model in HoloLens with AR







Into the Future...









Unmanned Aerial Vehicle

How Can UAV's Assist in Design, Production and Safety?



Richard Lopez















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Where do I register my Unmanned Aircraft?

Register your aircraft using this website if it weighs more than 0.55 lbs. (250 grams) and less than 55 lbs. (25 kg).



























OPERATIONS MASTER CHECK LIST

- SITE SURVEY
- **RISK ASSESSMENT**
- OPERATIONS BRIEF
- AIRSPACE ASSESSMENT
- ATC COORDINATION
- WEATHER FORECAST
- FLIGHT AUTHORIZATION





Flight Planning & Logging

•Using the digital logbook, pilots can store essential records and easily generate reports to improve business operations and meet regulatory requirements.

Flights

ID+

- Planning a flight with an intuitive map and toolkit. Call attention to specific areas for pilots by adding hazard notifications or points of interest.
- •Analyze airspace and identify airport contact zones, restricted areas, and temporary flight restrictions.

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Plan, Capture, and Process

Store Imagery and Data in Dashboard

UAS Deliverables






















































Outdoor High Accuracy Augmented Reality

Why Should I Consider Augmenting My Reality?



Chris Porter





Trimble UAV/Drones



🕸 Trimble





Trimble Stratus - UAV Cloud Processing



Strimble.





Stratus UAV - Cut / Fill Mapping



Trimble





Stratus UAV - Cross Section



Se Trimble





Stratus UAV - Aerial Survey







Trimble Connect



🙊 Trimble





Trimble Connect













Hardware

- Trimble Catalyst Antenna
- ARCore capable phone
- **Custom Bracket**

Software

- ARCore Technology
- Trimble Connect Cloud
- SiteVision Application
- VRSNow and RTX







YEARS













Site Vision









































Data Services

- Convert 2D drawings to 3D model
- Optimize 3D model for visualization
- Supplemental Content
 - Equipment
 - Site Logistics
 - Site Context







YEARS











How Does BIM Support Fabrication in a Successful Project?



Nick Lauer



BIM and Prefab



- BIM is the framework for our coordinated model and key to effective prefabrication.
- Prefabrication and BIM to support it is the reality of current construction, but it carries costs and risks to participants.
- We need to recognize the difference between a coordinated model and drawings to build our trade sub-systems.
- Rework ruins budgets and rushing guarantees rework.





Who are the BIM clients?

External

- Owner
- Architect / Int Design
- Engineer of Record
- General Contractor
- Subcontractors

Internal

- Preconstruction
- Engineering
- Project managers
- Trade field managers 3x
- Trade fab shops 3x



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The false promise of a coordinated model

- Many projects require a coordinated model as the end product of the BIM process.
- Design firms are driven by document releases and their software model as the sole platform.



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- Do the documents support constructability or are they "diagrammatic in nature"?
- Competitive pricing creates a trade-off when poor background models risk cost overruns down the road.



Politics of competitive pricing vs. design-assist/design-build



Preconstruction is the first line of defense when setting up for success.

- How do designers and GC's ensure that documents are ready? Are they open to feedback?
- Are subcontractors able to evaluate model status and price accordingly?
- How are we compensated for BIM rework in design-assist projects?
- What constitutes change?





Preliminary Design to Coordination

- Steel or Concrete Model is fleshed out.
- MEP partners are brought on board and provide input.
- Backgrounds are locked down.
- Civil documents are complete.
- Specification Set is released.



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Preliminary Design to Coordination

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Above the surface:

- Cost History
- Customer expectations
- Arch/structural backgrounds
- Clash detection
- The "Coordinated Model"





Coordination to fabrication process



Below the waterline:

• Field reviews

Completed shop drawings and labels

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- Spool drawings
- Buildable components for our key internal client, our field staff.



Coordination to Fabrication

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- Coordinated model (timer starts)
- Submittal drawings out for approval
- Field Review (5 days)
- Field markup and spool drawings

(5 days)





Coordination to Fabrication



- Field review (5 days)
- Finalized by CAD (5 days)
- Prefabrication (5 days)
- Material to jobsite



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Our BIM product to the field



			÷	Spool-BOM		
TAG	Qty	Length	SIZE	DESCRIPTION	END-1	END-2
t.	40		-6	VIC STYLE 177N QUICKVIC FLEX T GSKT		
2	2		6	VIC #10 SO DEG ELL		
3	3		3/4 x 6	Thread-O-Let		1989 - 1997 - 1997
4	1	1'-2"	6-	Pipe-A53-CS-(A-ERW)-SCH40- BLK(GRx8V)	GRC_Tube Grooved	GRC_Tube_Bevelled
5	2		67	Cap		
6	15		6*	Weld Neck Flange RF STD		
7	7		6	Ring Non-Asbestos Gasket 150		
8	3		6*	W-910 - 125 Class Check Valve		
9	6	11	6"	SS Pump Connector (Flange)	GRC_Flange - Class 150 FF	GRC_Flange - Class 150 FF
10	6		6	F222 - Lever Lock		
11	3	6 5/8*	67	Pipe-A53-CS-(B-ERW)-SCH40- BLK(BV)	GRC_Tube_Bevelled	GRC_Tube_Bevelled
12	3		3	Ring Non-Asbestos Gasket 150		
13.	3		6"x3"	Reducer Concentric		
14	3		3,	Weld Neck Flange RF STD		
15	6		6*	Tee Equal	- 10 1 1	
16	4	2-0 1/2*	6'	Pipe-A53-CS-(B-ERW)-SCH40- BLK(BV)	GRC_Tube_Bevelled	GRC_Tube_Bevelled
17	3	2-6 5/8*	6*	Pipe-A53-CS-(B-ERW)-SCH40- BLK(BV)	GRC_Tube_Bevelled	GRC_Tube_Bevelled
18	1	3'-3 1/8"	6"	Pipe-A53-CS-(A-ERW)-SCH40- BLK(GR/BV)	GRC_Tube Grooved	GRC_Tube_Bevelled











UCHealth Steadman Hawkins Clinic – Denver Mechanical Room ISO







UCHealth Steadman Hawkins Clinic – Denver DHW, Snowmelt, and RO skids









UCHealth Steadman Hawkins Clinic – Denver DHW and HHW Pump skids in place







YEARS

Keys to Success

- Correlate Design, BIM and Construction Schedules
- Accurate information from the start
- Just-in-time installation
- Measured results basis for improvement
- Resulting in a quality product for client









Augmented and Virtual Reality

Where are we Going?



Mike Bishop











Poll

Who here is actively using AR/MR?

Who here plans to use AR/MR within the next two years?

Who here uses BIM?











AR/MR uses in Construction

- QA/QC
 A Ryelva Resign review
 Owner/GC Design visualization
 Owner/GC Design in existing space
 Bee new design in existing space
 Better of the on model in field
 Review hidden content
- for acting Mapter Gece
 - Instructional applications
 - Sales and marketing





Scaled Down Design Review







1:1 Field Alignment







Quality Control and Quality Assurance













Questions?







AGC GROUPS:

Business Development Forum

https://www.agc.org/connect/agc-groups/business-development-forum

BIMForum https://bimforum.org/

Safety & Health | Associated General Contractors https://www.agc.org/industry-priorities/safety-health

Specialty Contractors | Associated General Contractors https://www.agc.org/connect/agc-groups/specialty-contractors