

Improving ROI: “Using BIM for Long-Term Facilities Access Management”

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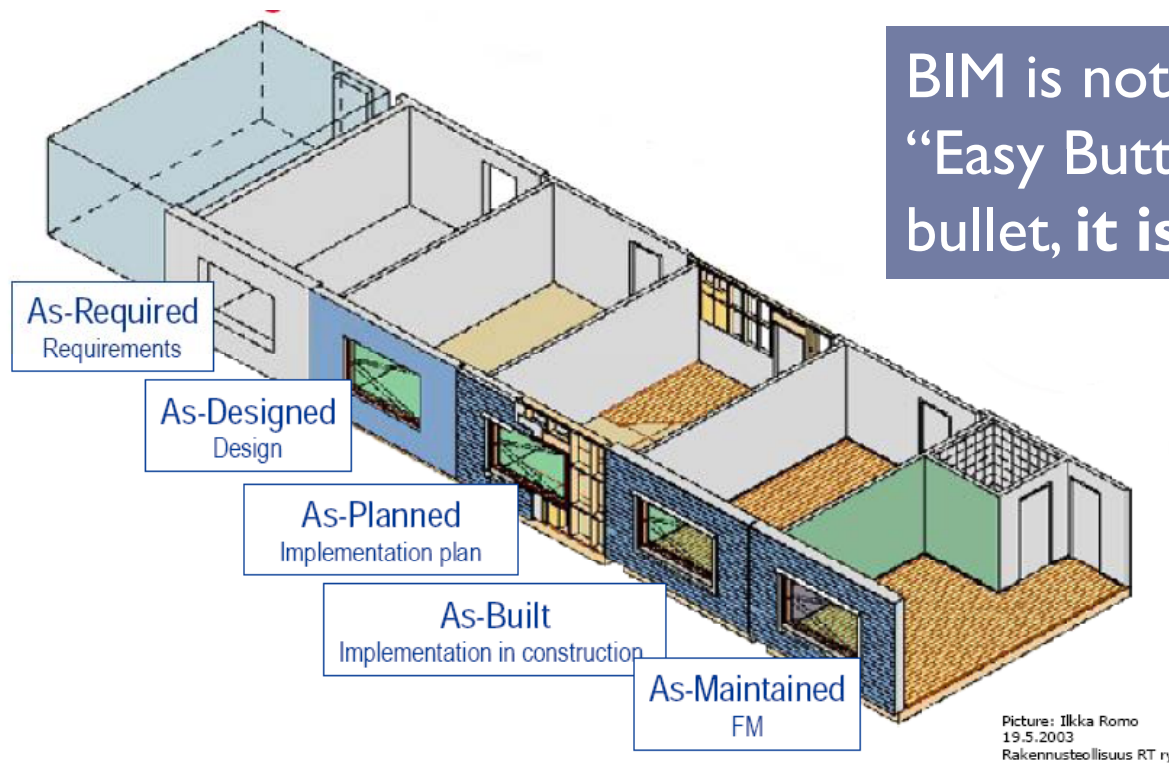


Learning Objectives

- ▶ Setting realistic expectations of BIM from the FMO Director's Perspective
- ▶ Communicating those expectations to the Design-Build team
- ▶ Applying BIM to Long-term “Serviceability” and lower Operational costs



BIM: Life Cycle Model



BIM is not the “Easy Button” or a silver bullet, it is simply a tool

BIM used for Cradle-to-Cradle Life Span of a Building, **from the Facilities perspective**, has real potential for cost savings

► LACCD BIM Standards

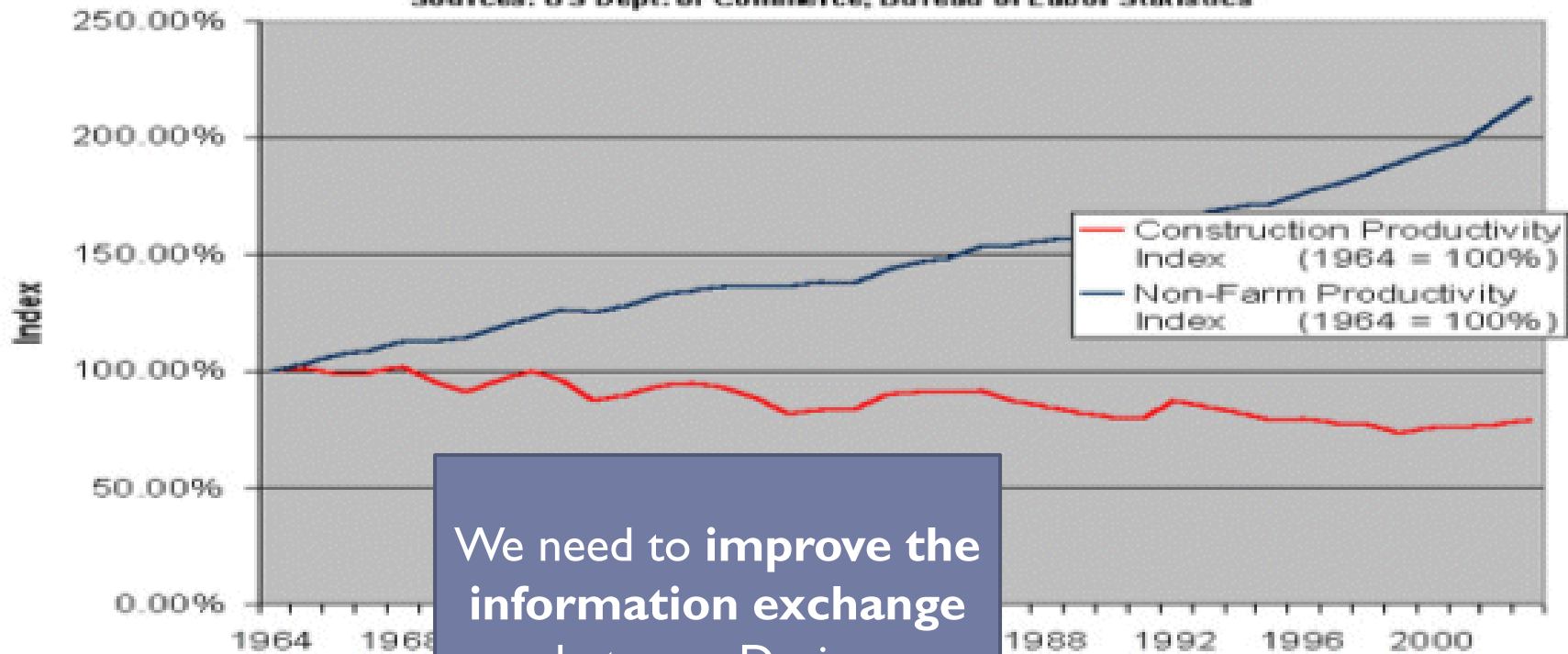
Why BIM? Why Now?

- ▶ 20/80 Rule: Up to 80% of building costs absorbed by M&O

Construction & Non-Farm Labor Productivity Index (1964-2003)

Constant \$ of contracts / workhours of hourly workers

Sources: US Dept. of Commerce, Bureau of Labor Statistics



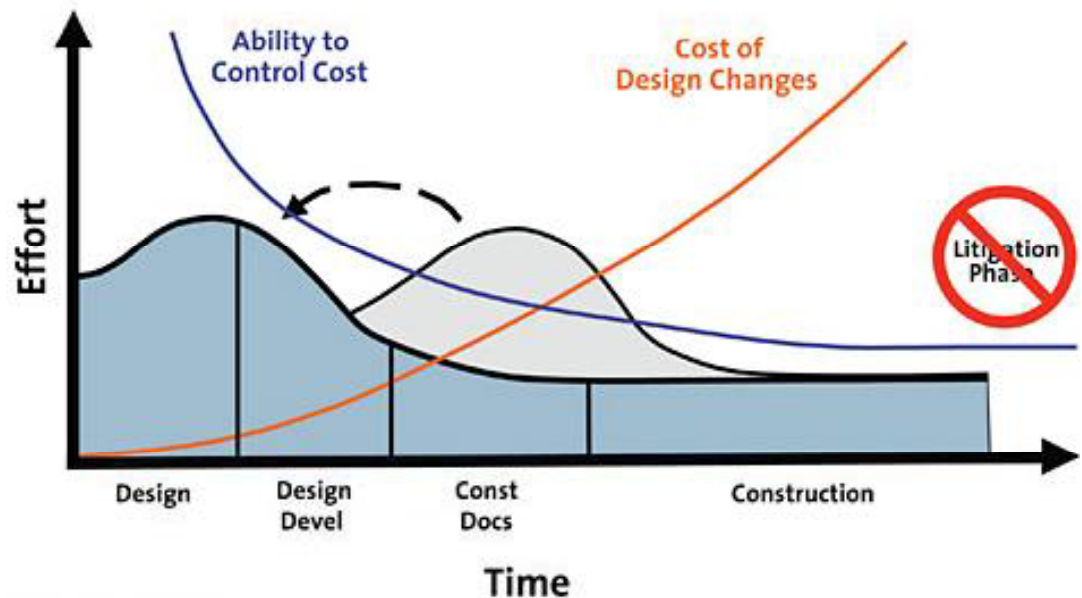
We need to improve the information exchange between Design, Construction & Facilities

Potential Impact of BIM on Architect/Engineer/Operators

- ▶ Shifting the project design/engineering time earlier in the process, does not increase building cost
- ▶ Early involvement by F.M.O. significantly improves the end result
- ▶ F.M.O. finally gets more of what they need

Integrated Project Process

- Documenting as the model is built
- Involving Construction/Suppliers
- Eliminating clashes



Early FMO Involvement

1. Know what is needed from the model – **Owner Project Requirements (OPR)**
2. Ensure OPRs are understood by the CM team
3. Develop the RFQ and the standards to the needs: **Think 5 to 15 year goal for F.M.O.**

Early FMO Involvement

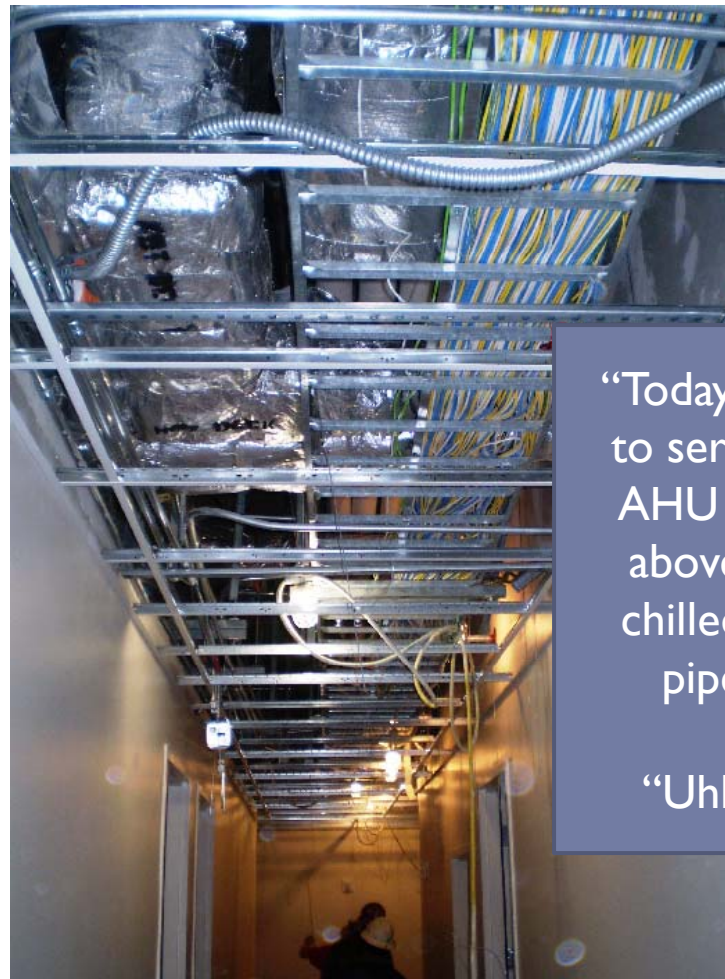
4. Verify your needs (OPR) are being met at the 100% DD; then 25% - 50% CD phase
5. If not, stop the project and the payments
6. Do a virtual walk-through...this is YOUR building, ask yourself:

“Can I maintain this?”



Getting the Job Done - **Safely**

- ▶ Employees go home in the same physical condition as they came to work



“Today’s task is to service the AHU located above those chilled water pipes...”

“Uhh?.....”

Claims Data

	Claimant		Loss Date	Total Reserves	Source of Injury	Job Code	Campus	Total
240	SMITH	Aaron	4/15/08	\$0	FALL; INTO OPENINGS	Maintenance/Classified	Bayside	
241	JOHNSON	Alec	6/17/08	\$0	FALL; ON SAME LEVEL	Maintenance/Classified	Bayside	
52	WILLIAMS	Abdel	1/30/08	\$0	FALL, SLIP OR TRIP, NOC	Custodians/Classified	Bayside	
53	JONES	Alejandro	4/1/08	\$0	FALL; ON SAME LEVEL	Custodians/Classified	Bayside	
62	BROWN	Ari	1/13/09	\$0	FALL, SLIP OR TRIP, NOC	Custodians/Classified	Bayside	
68	DAVIS	Abdullah	9/2/09	\$0	FALL; FROM LIQUID OR GREASE SPILLS	Custodians/Classified	Bayside	\$0
2	MILLER	Abe	10/20/09	\$0	FALL, SLIP OR TRIP, NOC	Certificated	Bridges	
23	WILSON	Alex	12/19/08	\$0	FALL, SLIP OR TRIP, NOC	Classified	Bridges	
32	MOORE	Abel	12/30/09	\$52,201	FALL, SLIP OR TRIP, NOC	Classified	Bridges	
117	TAYLOR	Aristotle	3/15/07	\$7,780	FALL, SLIP OR TRIP, NOC	Custodians/Classified	Bridges	
118	ANDERSON	Alfonso	3/8/07	\$0	FALL, SLIP OR TRIP, NOC	Custodians/Classified	Bridges	
123	THOMAS	Ali	5/20/07	\$0	FALL, SLIP OR TRIP, NOC	Custodians/Classified	Bridges	
124	JACKSON	Armand	7/18/07	\$0	FALL; ON SAME LEVEL	Custodians/Classified	Bridges	
125	WHITE	Alistair	8/25/07	\$0	FALL, SLIP OR TRIP, NOC	Custodians/Classified	Bridges	
130	HARRIS	Armando	8/22/08	\$0	FALL; FROM DIFFERENT LEVEL/ELEVATION	Custodians/Classified	Bridges	
131	MARTIN	Allan	9/3/08	\$0	FALL, SLIP OR TRIP, NOC	Custodians/Classified	Bridges	
134	THOMPSON	Abraham	8/26/09	\$10,426	FALL, SLIP OR TRIP, NOC	Custodians/Classified	Bridges	
198	GARCIA	Ace	2/27/08	\$0	FALL, SLIP OR TRIP, NOC	Food Service/Classified	Bridges	
199	MARTINEZ	Alston	8/15/08	\$0	FALL, SLIP OR TRIP, NOC	Food Service/Classified	Bridges	\$70,406
313	ROBINSON	Altair	4/12/09	\$0	FALL; FROM DIFFERENT LEVEL/ELEVATION	Maintenance/Classified	Foothill	
314	CLARK	Art	8/18/09	\$0	FALL, SLIP OR TRIP, NOC	Maintenance/Classified	Foothill	
326	RODRIGUEZ	Alvin	8/22/09	\$0	FALL; FROM LADDER OR SCAFFOLDING	Mechanic/Classified	Foothill	
40	LEWIS	Adam	9/5/09	\$0	FALL, SLIP OR TRIP, NOC	Classified	Foothill	
175	LEE	Amado	4/7/07	\$0	FALL, SLIP OR TRIP, NOC	Custodians/Classified	Foothill	
187	WALKER	Asher	7/31/09	\$17,784	FALL, SLIP OR TRIP, NOC	Custodians/Classified	Foothill	\$17,784

Use BIM to **Engineer Out the Risk**

Service Scenario

▶ Assignment

- ▶ Facilities Engineer is assigned to service HVAC for LACCD Campus Building
- ▶ 70 VAV, 8 pumps, 14 fan motors, 2 centrifugal
- ▶ **Equaling = 18 tickets per day per trade**



Pre-BIM Scenario #1: **Best Case**

	Cost Type	Duration (hours)	Total Hourly Rate	Total Cost
Locate appropriate As-Builts and O&M Manuals	Facility Operation	0.75	\$54.00	\$41
Gather eqpt/tools and go to service building	Facility Operation	0.25	\$54.00	\$14
HVAC perfectly located per As-Builts*	Facility Operation	6.0	\$54.00	\$324
Return eqpt/tools	Facility Operation	0.25	\$54.00	\$14
Total this Assignment	Facility Operation	7.25		\$392
	Design/Construction	0	0	0
Total Cost				\$392

* Able to respond to the service call in 20 minutes/ticket

Pre-BIM Scenario #2: **Real Case**

	Cost Type	Duration (hours)	Total Hourly Rate	Total Cost
Locate appropriate As-Builts and O&M Manuals	Facility Operation	0.75	\$54.00	\$41
Gather eqpt/tools and go to service building	Facility Operation	0.25	\$54.00	\$14
Only 75% of HVAC perfectly located per As-Builts	Facility Operation	6.83	\$54.00	\$369
Return eqpt/tools – since it takes more time, goes to second day*	Facility Operation	1.00	\$54.00	\$54
Total this Assignment	Facility Operation	8.83		\$477
	Design/Construction	0	0	0
Total Cost				\$477

*** Able to respond to the service call in 20 minutes/ticket with the balance at 30 minutes/ticket**


Pre-BIM Scenario #3: **Nightmare Case**

	Cost Type	Duration (hours)	Total Hourly Rate	Total Cost
Locate appropriate As-Builts and O&M Manuals	Facility Operation	0.75	\$54.00	\$41
Gather eqpt/tools and go to service building	Facility Operation	0.25	\$54.00	\$14
Only 30-40% of HVAC perfectly located per As-Builts	Facility Operation	8.17	\$54.00	\$441
Unforeseen conditions encountered	<p>During equipment maintenance, Facilities Engineer encounters a “web” of conduits located below the unit, requiring FE to brace of off while replacing the filter. While doing this, one of the conduits couldn’t support his weight and deflected at the conduit joint which caused wires within to pinch and tripped the circuit. An on-site electrician was called in to repair the conduit, re-pull the wires and reset the circuit.</p>			
Return eqpt/tools – since takes more time, goes to second day*				
Total this Assign				
	Design/Construction	0	0	0
Total Cost				\$864

* **Able to respond to the service call for 5 units at 20 minutes/ticket with the balance at 30 minutes/ticket**

With **BIM**

	Cost Type	Duration (hours)	Total Hourly Rate	Total Cost
BIM Coordinator places 20 Serviceability Zones	Design/ Construction	1.0	\$76.00	\$76
Facilities Mgr/Engineer review Record Model for As-Builts & O&M	Facility Operation	0.5	\$54.00	\$27
Gather eqpt/tools and goes to Level 2	Facility Operation	0.25	\$54.00	\$14
Finds all VAVs perfectly located per As-Builts*	Facility Operation	6.0	\$54.00	\$324
Return eqpt/tools	Facility Operation	0.25	\$54.00	\$14
Total this Assignment	Facility Operation	7.0		\$378
Total for Design & Construction	Design/ Construction	1.0		\$76
Total Cost				\$454

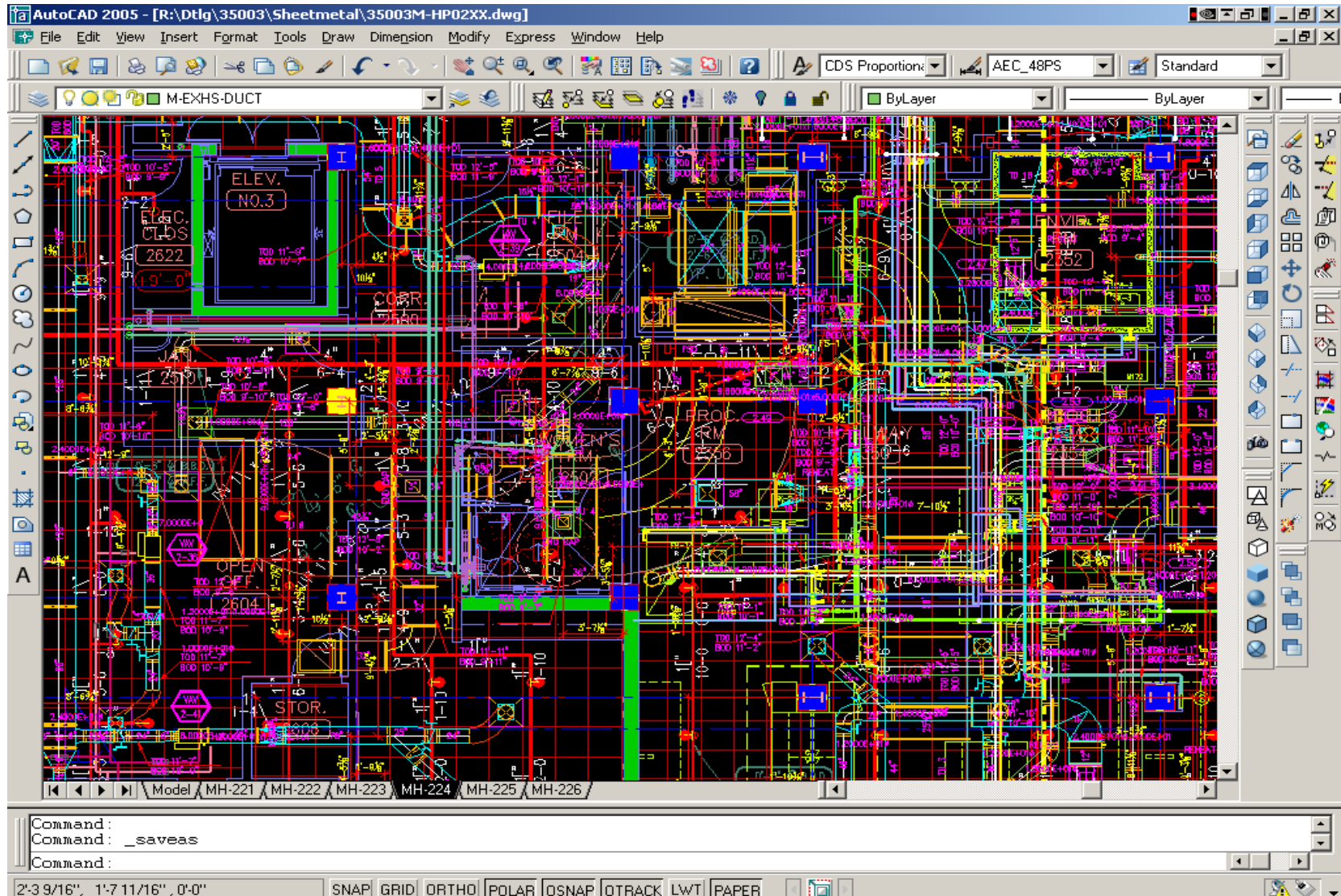
 **Able to respond to the service call for 20 units in 20 minutes/ticket**

Service Scenario: **In Summary**

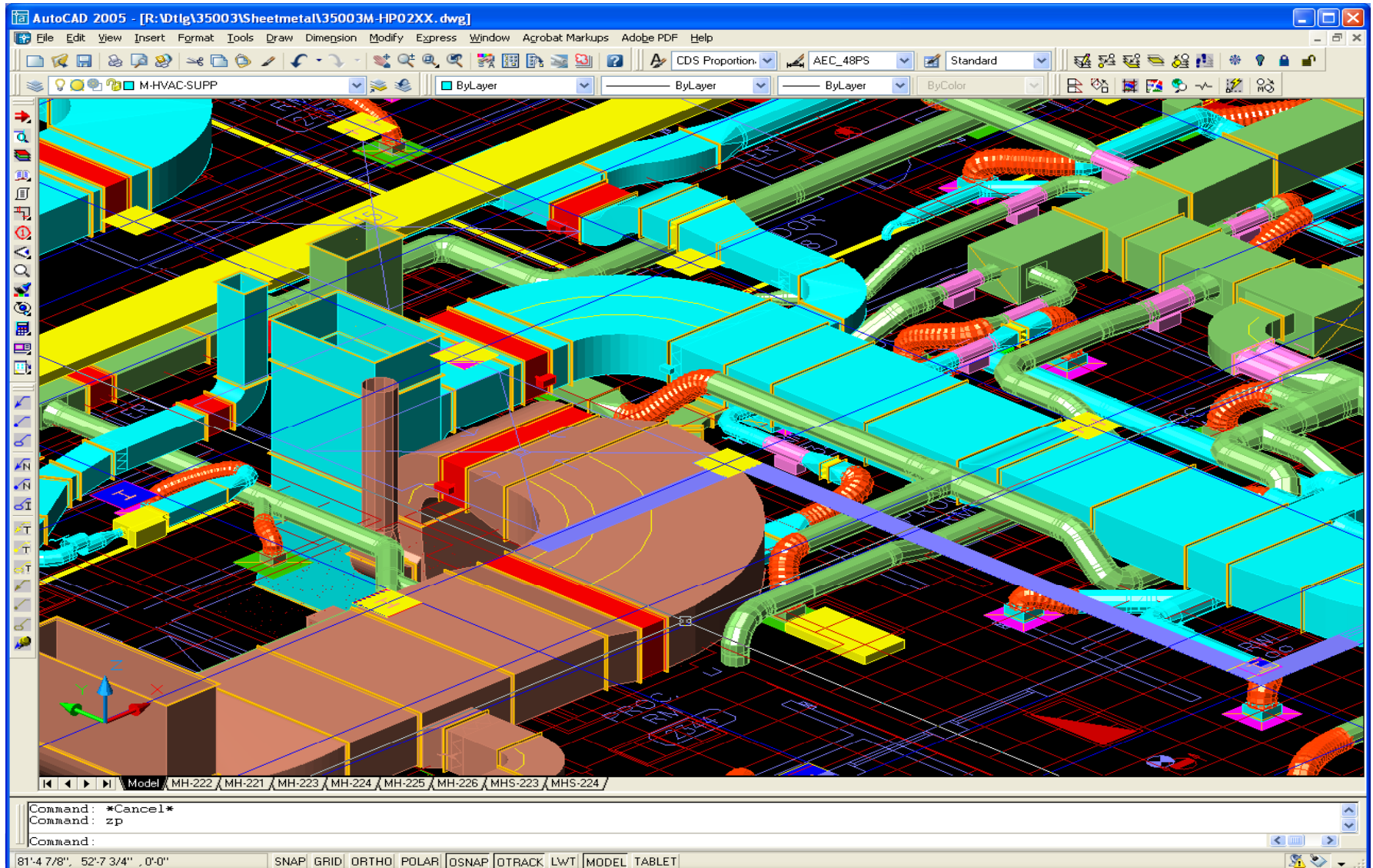
	With BIM	Pre-BIM “Best Case”	Pre-BIM “Real Case”	Pre-BIM “Nightmare”
Total Cost per Facilities Engineer Assignment	\$378	\$392	\$477	\$864
Total Annual Cost per Facilities Engineer (approx. 208 assignments/year)	\$78,624	\$81,432	\$99,216	\$179,712
Average # of Facilities Engineering Staff	3	3	3	3
Total Annual Cost per Facilities Engineering Department	\$235,872	\$244,296	\$297,648	\$539,136
Additional Annual Cost incurred w/o BIM		(\$8,424)	(\$61,776)	(\$303,264)

A Better **Communication** Tool...

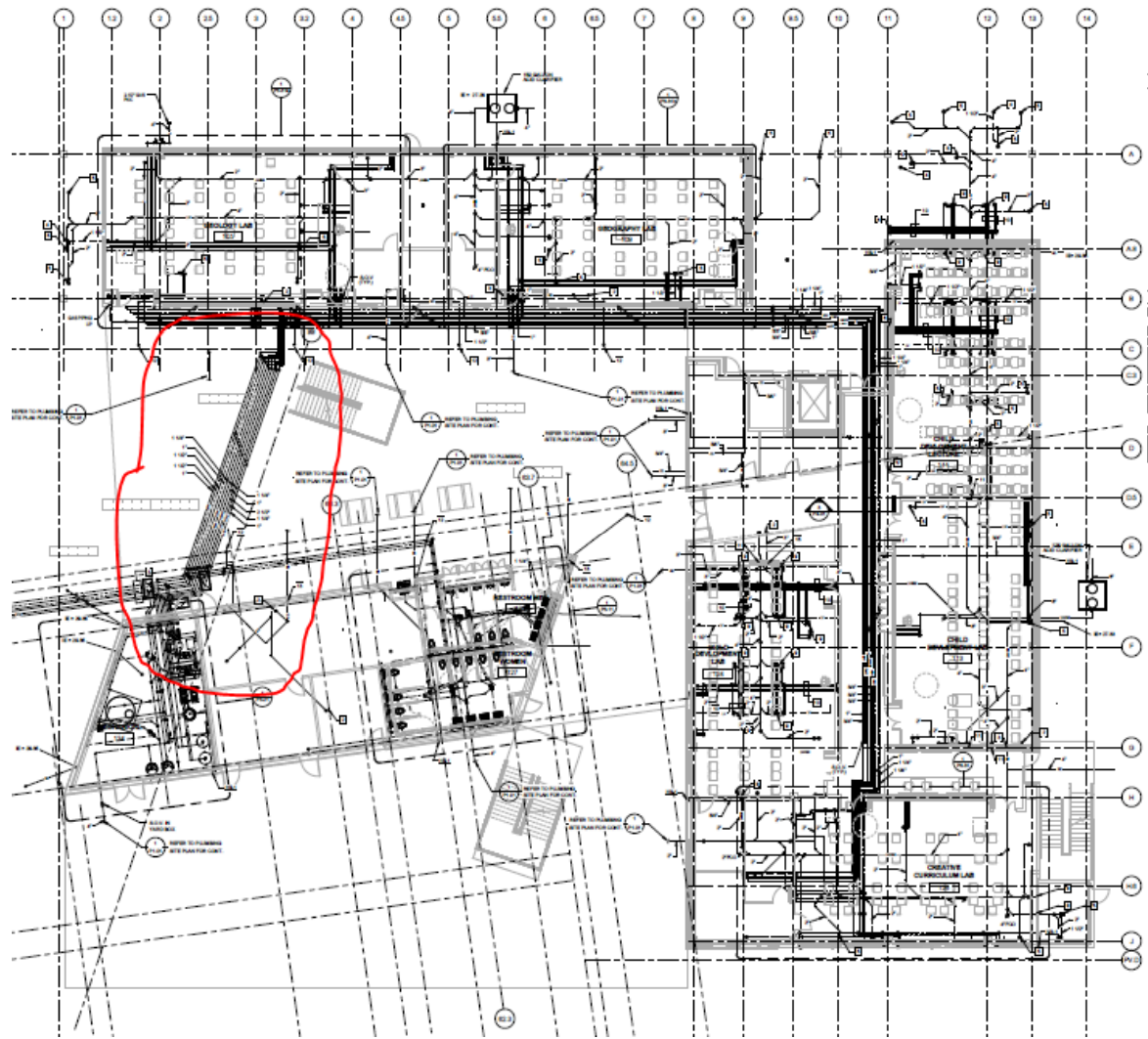
Traditional Systems: **2D Web of Confusion**



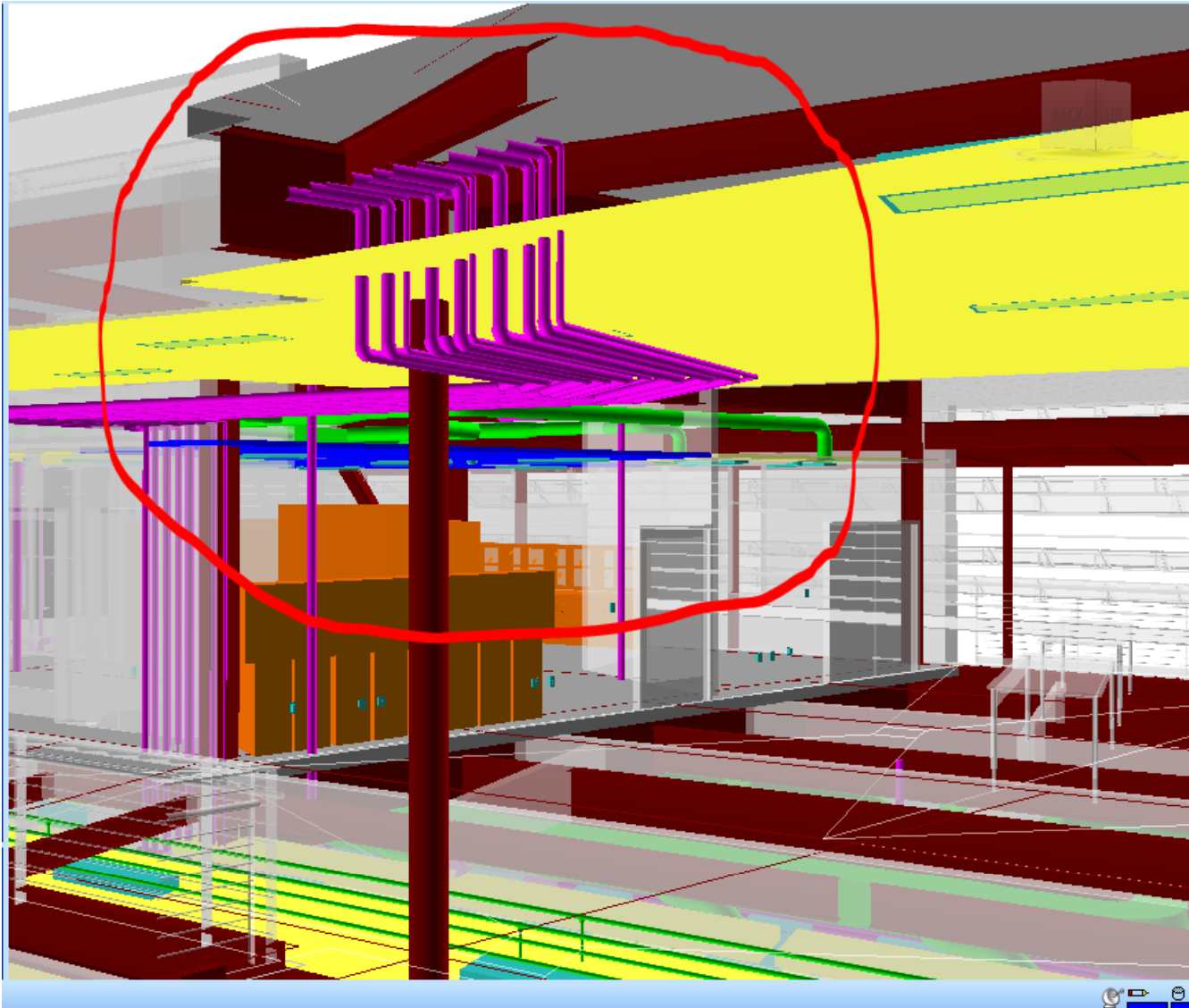
BIM: **Simpler, Intuitive, Efficient**



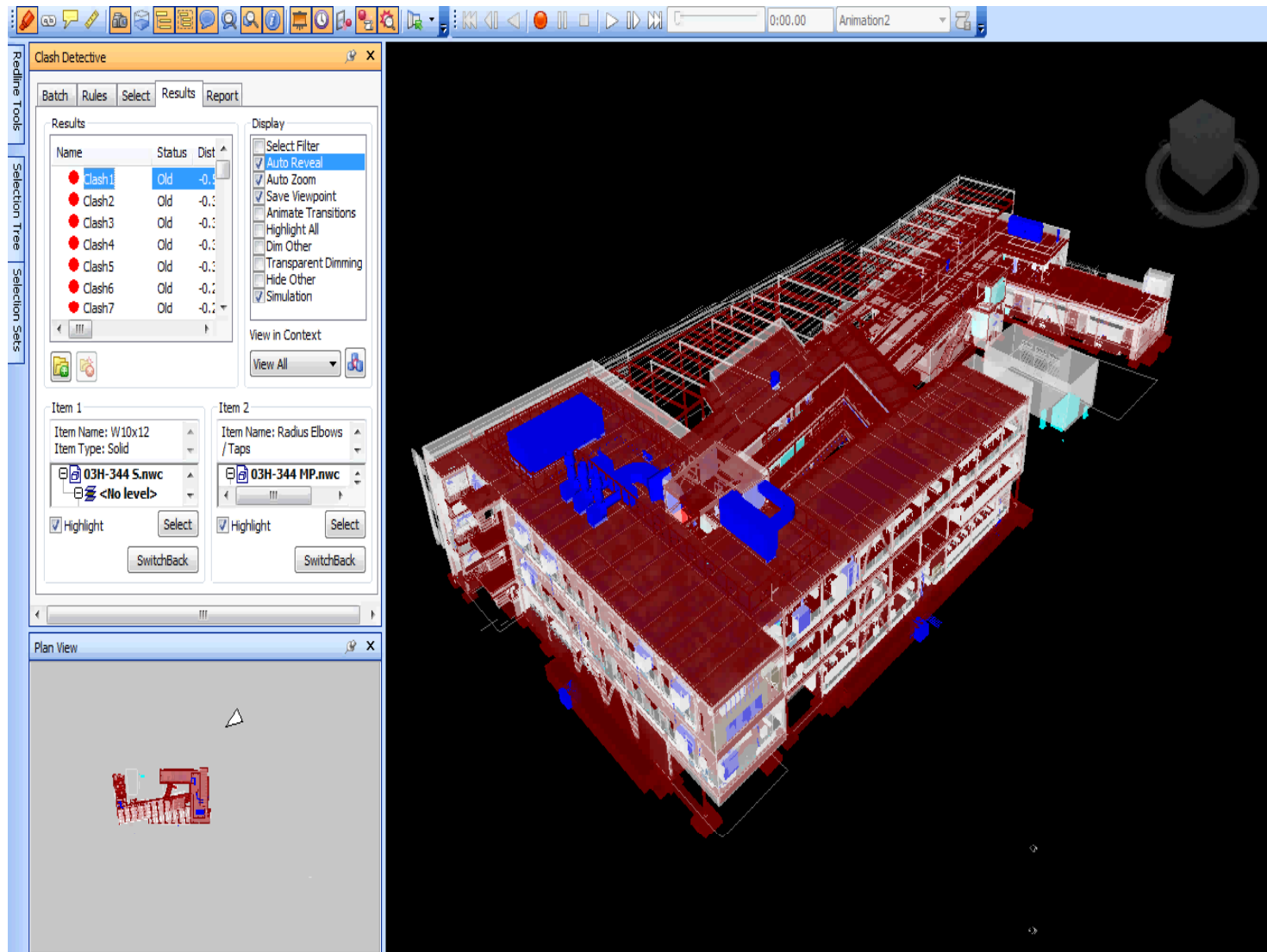
This type of review...



...is now done this way.



Clashing: **From a F.M.O Perspective**



Any **questions** about
the **Why**?

Now, **How** do we get
there?

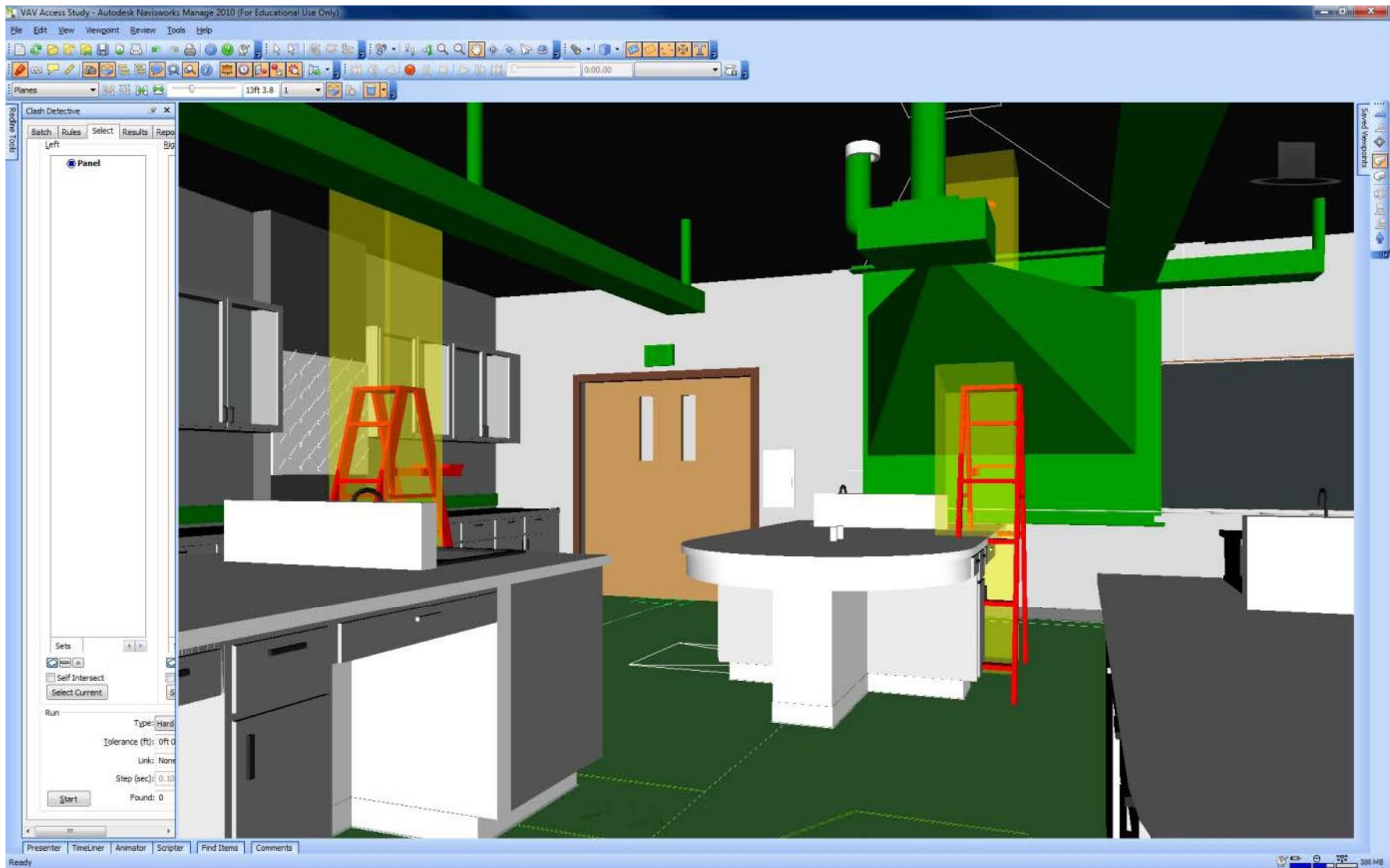
Screening Steps: Ensure You Get **the Right Modeler**

- ▶ In the interview, heavy Q&A with the modeler, in their actual model
 - Request a **Live Demo**
 - The BIM modeler should be present
 - With past and current project and current project schedule: **Eliminate the bait and switch**
 - Ask lots of “how and why” questions... soon you will KNOW if they are qualified

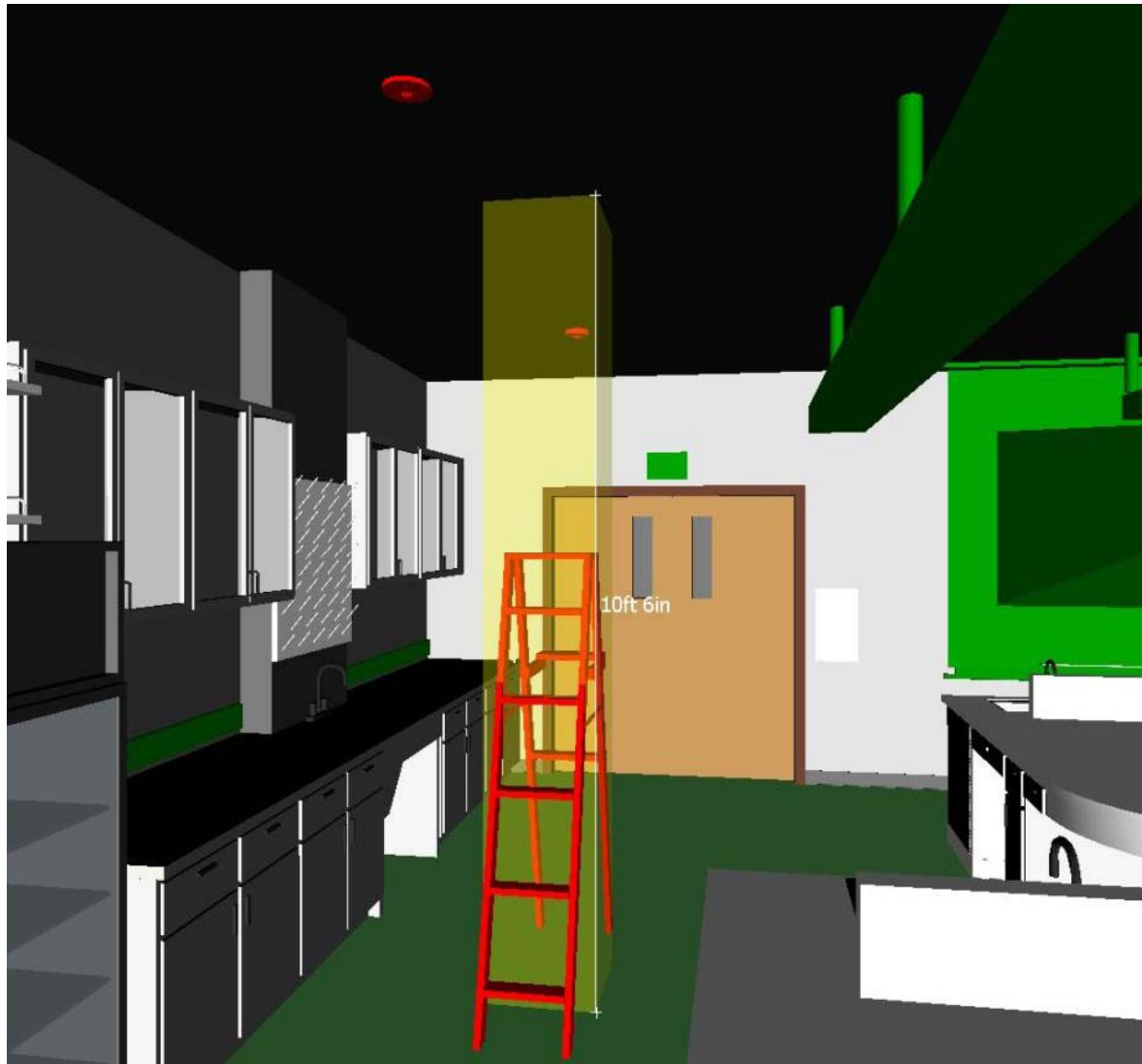
Screening Steps: Ensure You Get **the Right Modeler**

- ▶ Final Presentation for Project: **Live Demo by Modeler**
 - ▶ Ask “how & why” questions regarding working with owners and staff at your experience level
 - ▶ Ask “what if” questions
 - ▶ Follow up with the **references** (ask more how & why questions)
 - ▶ Does the modeler have Animations that show you how he has **helped** owners?

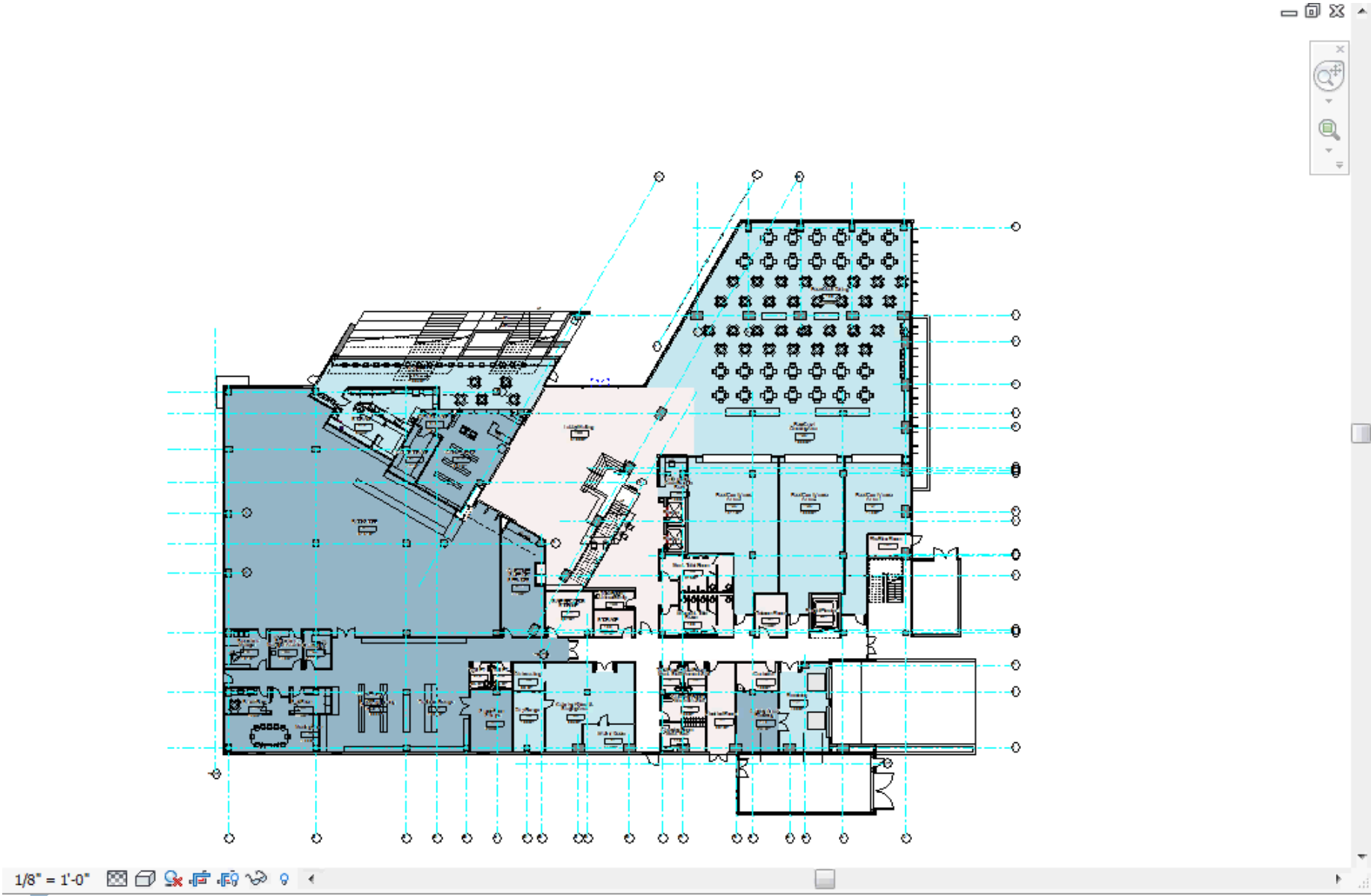
Clashes at the **Service** Level



A Safer History = **Lower Insurance Costs**

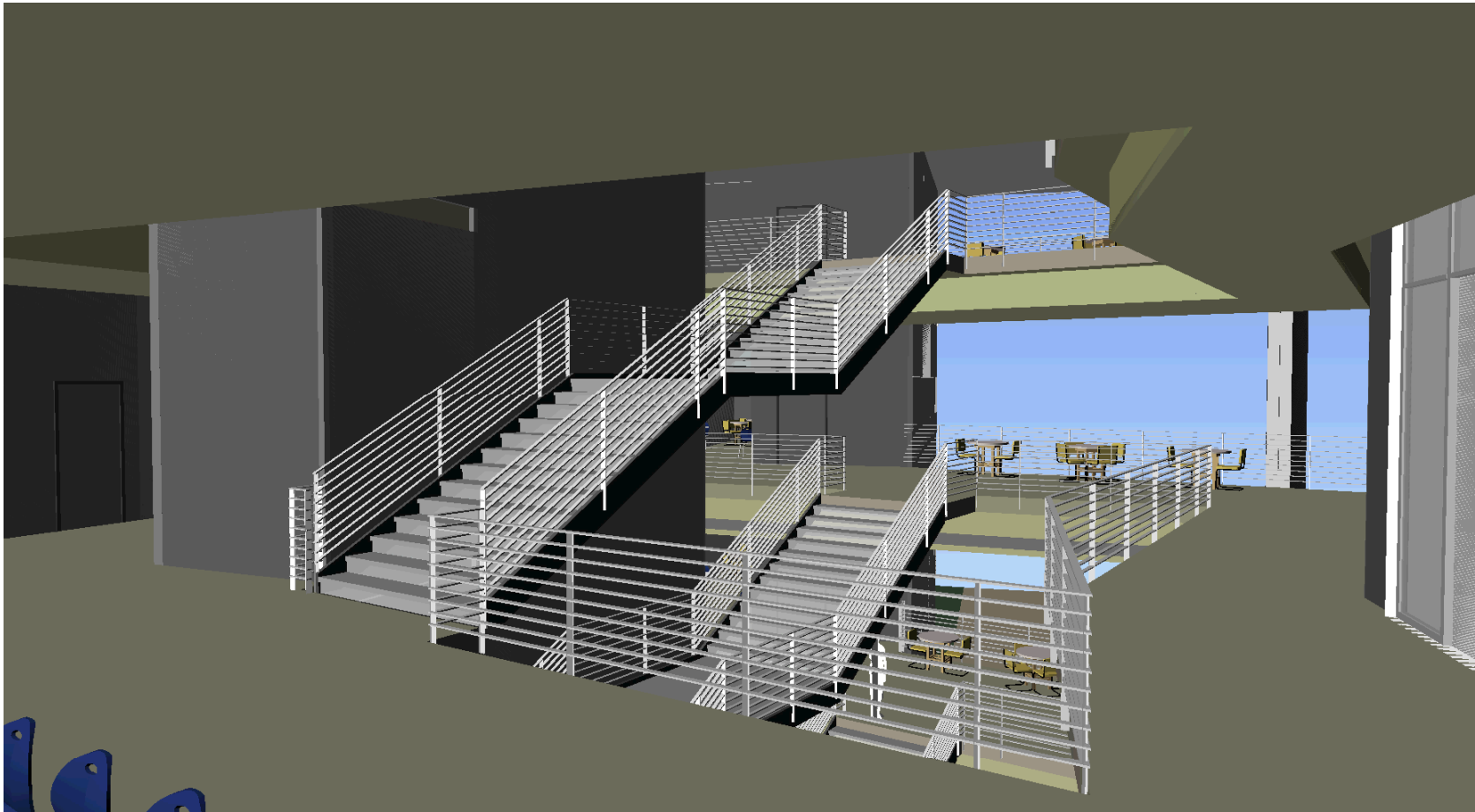


Design Visualization



Seeing **Maintainability**

▶ User Group Interaction



East Los Angeles College Student Success and Retention Center

What Can You do **Today**?

- ▶ **Get involved early** in the Project Development process
- ▶ **Define M&O requirements** that need to be addressed within the design/construction process
- ▶ REQUIRE your Project Team to **incorporate M&O needs** within the project BIM
 - ▶ Technology has advanced such that the question isn't: "If it can be done?" It is: "When can this be done?"
- ▶ Meet periodically with your Project Team to **verify your expectations are being met**
- ▶ Enjoy a **more efficient, lower Operational cost facility!**

Questions?

Resources

- ▶ Build LACCD - www.Build-LACCD.org
- ▶ SDCCD - http://public.sdccdprops-n.com/Design/SDCCD_BIM_Standards.pdf
- ▶ Charles Pankow Foundation - <http://www.pankowfoundation.org>
- ▶ Building Smart Alliance - <http://idm.buildingsmart.no/confluence/display/IDM/home>
- ▶ Penn State BIM Execution Planning Guide Research - www.engr.psu.edu/bim/download
- ▶ Army Corp of Engineers
- ▶ AIA 202 Responsibilities from a Design Perspective - <http://aectechnology.wordpress.com/2010/03/11/bim-standards-with-the-aia%C2%AE-e202>
- ▶ Associated General Contractors of America Responsibilities from a Build Perspective - http://www.aecbytes.com/buildingthefuture/2006/AGC_BIM_pr.html

Contact Info

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Thank You.