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Smarter MEP Coordination and MEP Design Verification by Dynamo

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Hydraulic Engineer | @Powell Fenwick - Building Services Consultants

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Speaker profile

- Hydraulic Engineer.
- B.E in Water supply and drainage & water environment.
- 5 years experience in building services industry (Hydraulic).
- Currently, full time working at Powell Fenwick Consultant (PFC).
- PFC provides multi-disciplinary services including mechanical, hydraulic, fire, acoustic, civil, structure, swimming pool disciplines.

Q&A Moderator

- Phuc Le (Ken).
- Digital Consultant, Technologist, BIM expert & Application Developer.
- He currently serves as a Technical Specialist at Autodesk.
- Supporting firms and organizations in the AEC industry to successfully implement BIM, Cloud platform, Automation, and Digital Twin.

Why do we have this class here today?

- We have a lot of interferences within various disciplines.
- We have numerous engineering rules.

Class Summary

This class will illustrate two Dynamo tool examples to:

- Automatically detect clashes to coordinate with floor penetration locations.
- Automatically validate the MEP designs in compliance with building codes & standards (namely distances verification).

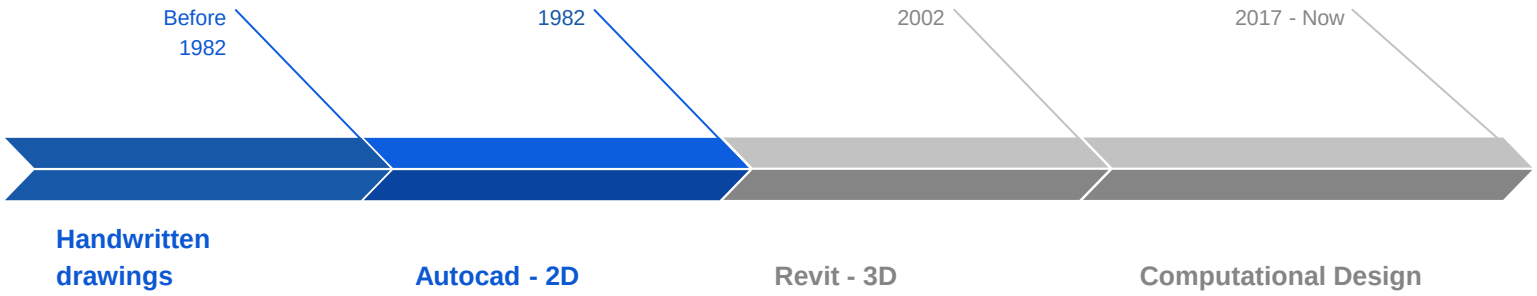
Learning Objectives

At the end of this class, you will be able to:

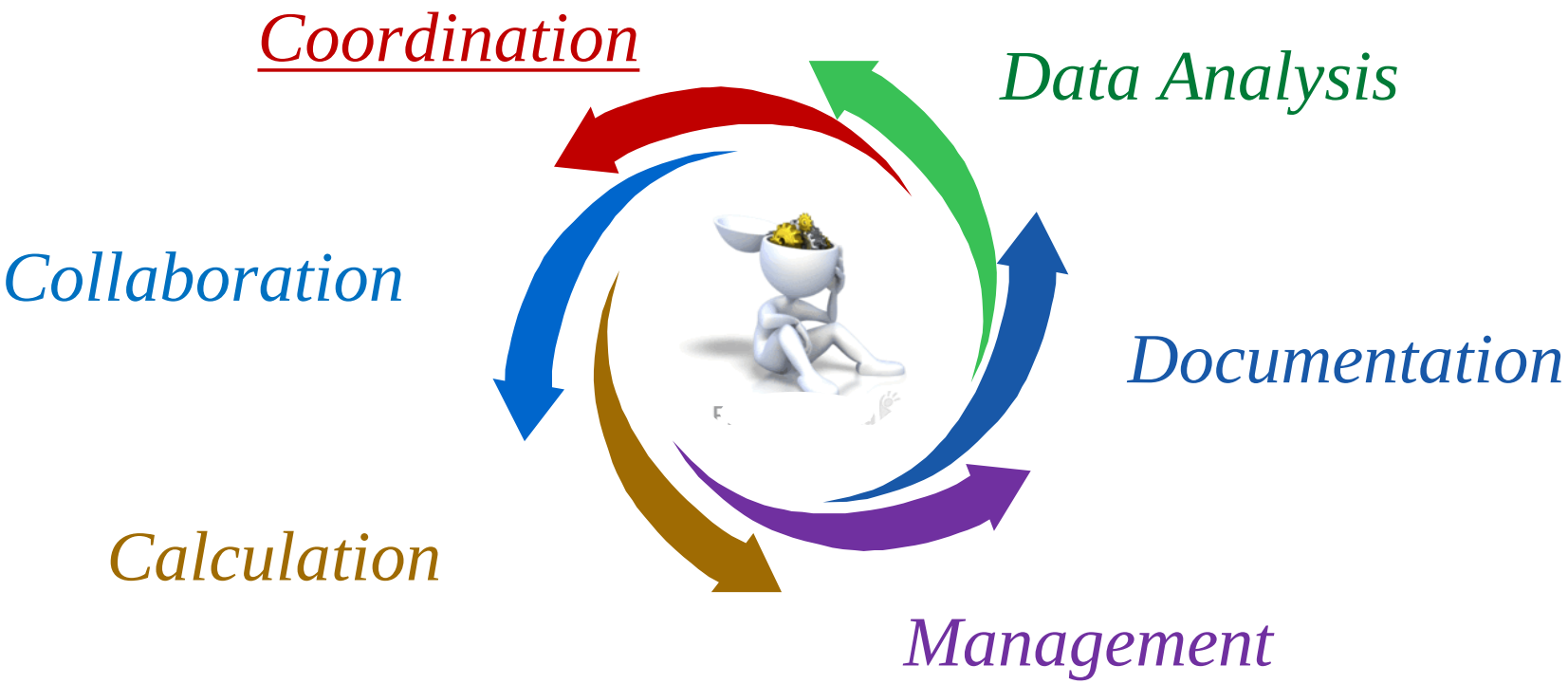
- Understand how Dynamo work fundamentally.
- Understand how to analyze BIM data to enhance interfaces between disciplines.
- Come up with your own ideas to generate your own automation tools.

The summary of history - digitization process

What will happen in the next 10 years???



What BIM data can provide?



How we can analyze BIM data?

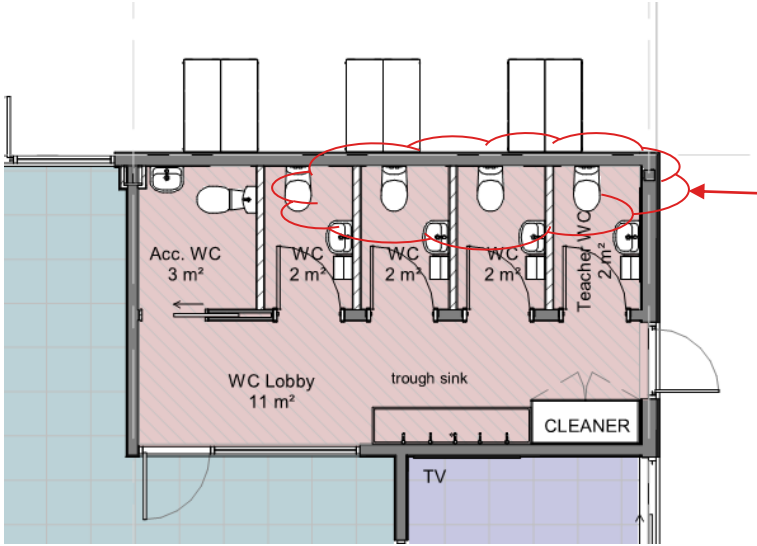
REVIT
API

Dynamo

Idea 1:

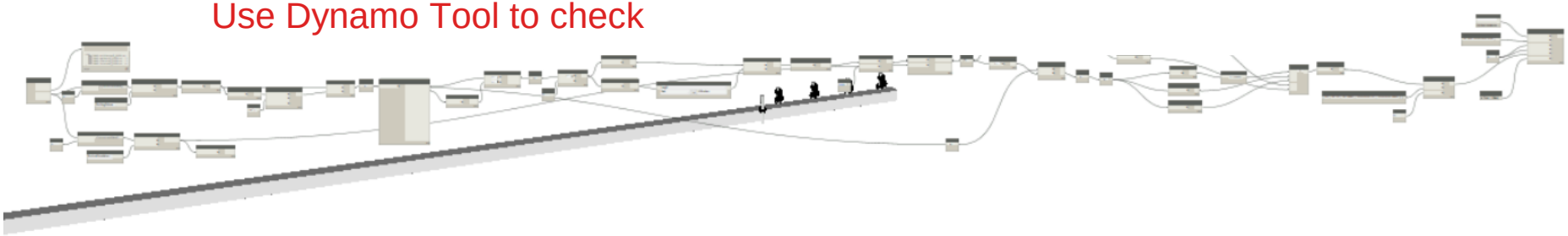
Slab Penetration Coordination

Idea one - Floor penetration coordination



WCs on beam???

Use Dynamo Tool to check



Summary of the Dynamo Graph

Step 1: Identify data

Architectural model

Plumbing fixtures (WC)

Identify WC connectors

Draw a cylinder 120 diameter

Structural model

Structural foundation / framing

Step 2: Analyze data

Location A

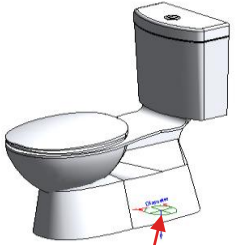
Intersect

Location B

Clashes

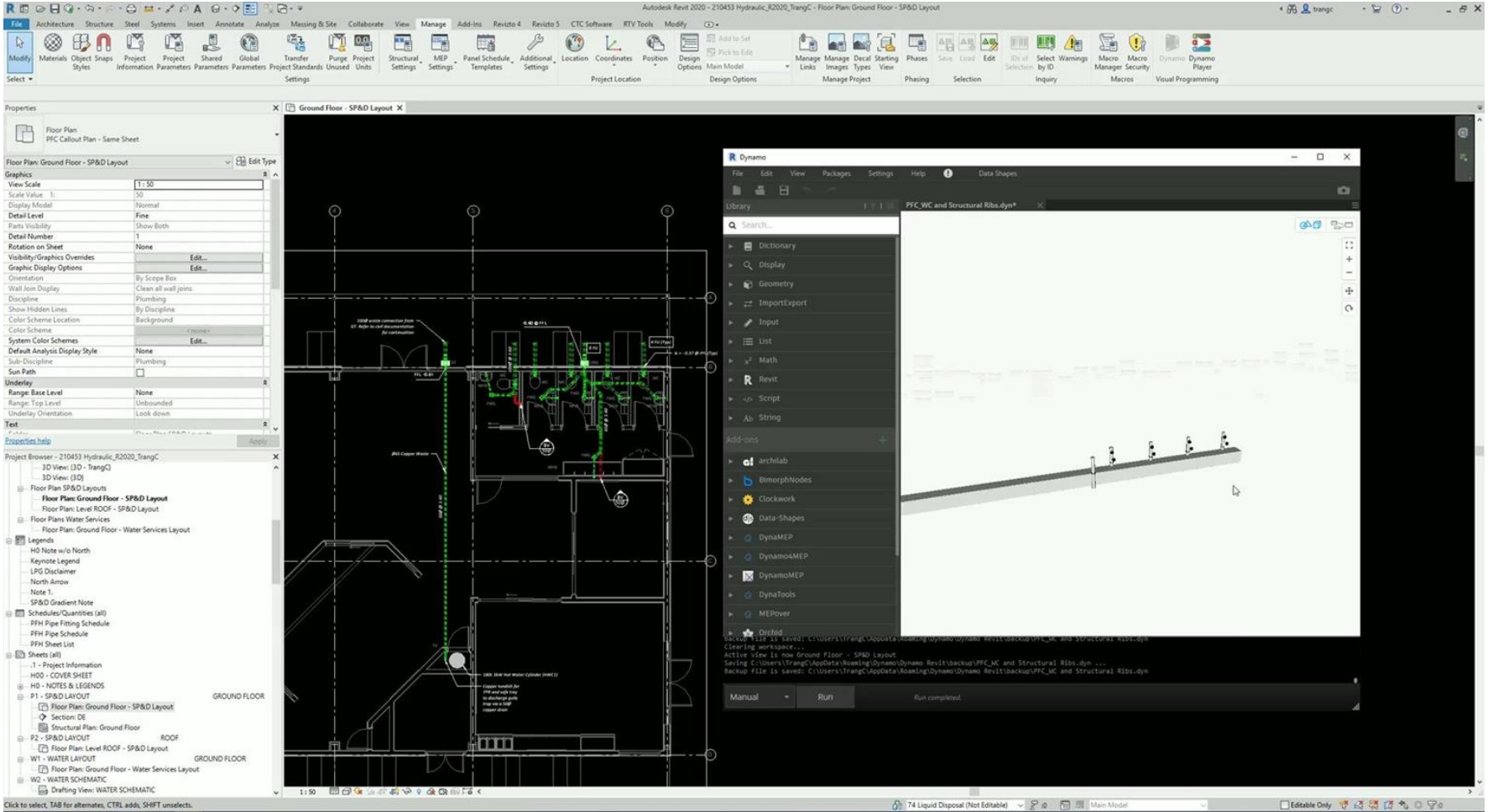
Step 3: Export information

Export elements information (ID, names, locations, etc)

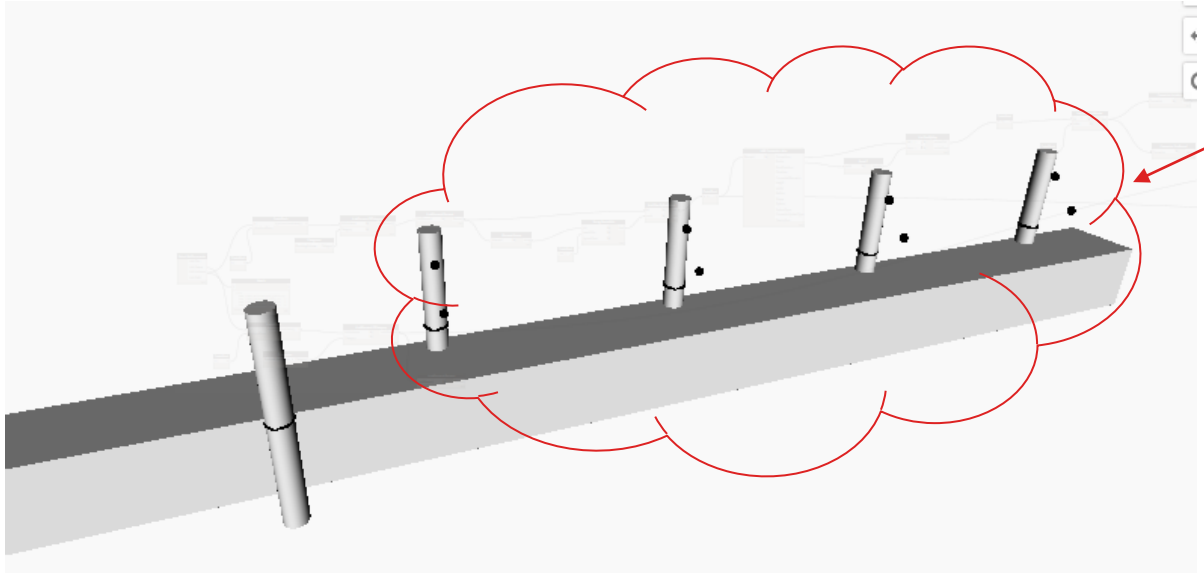


Add Waste Connector to WC

Video simulation



Slab Penetration - Result

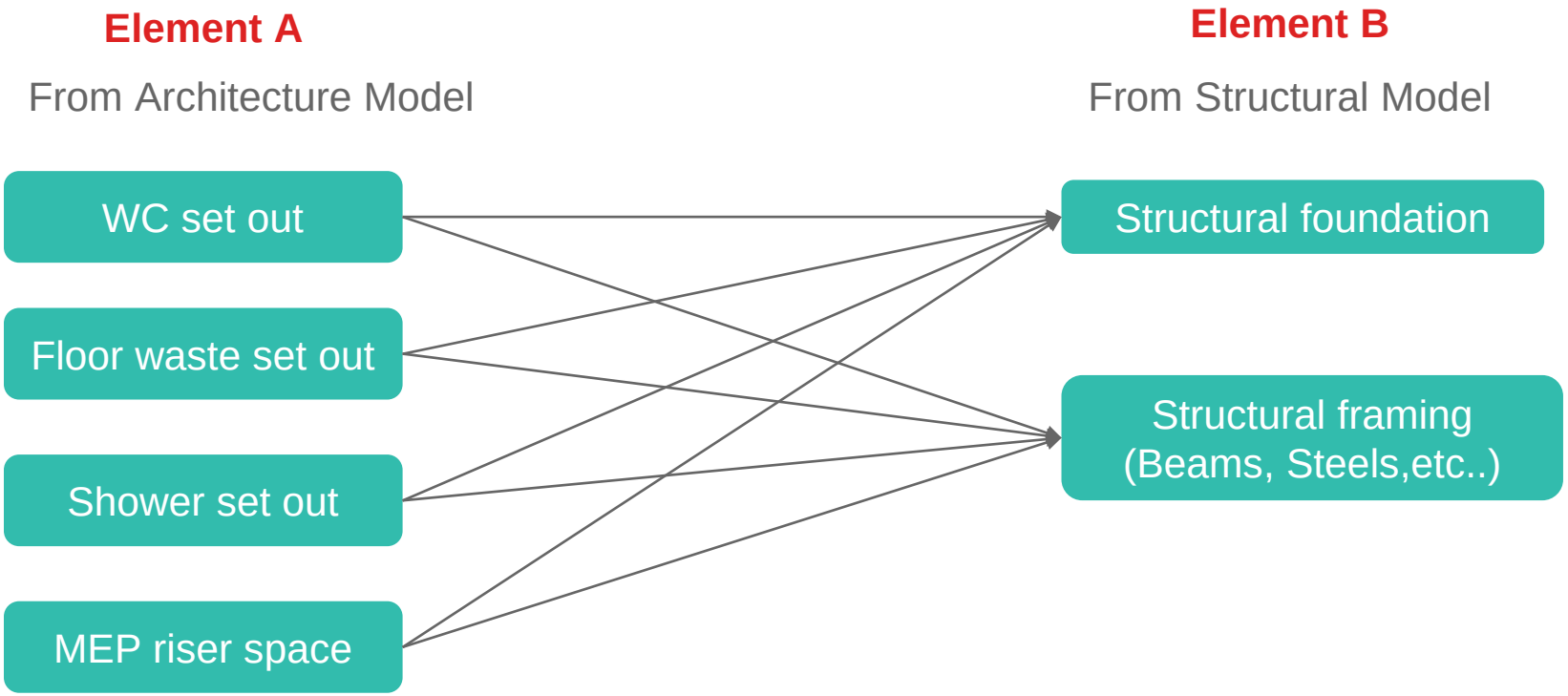


automatically identify clashes

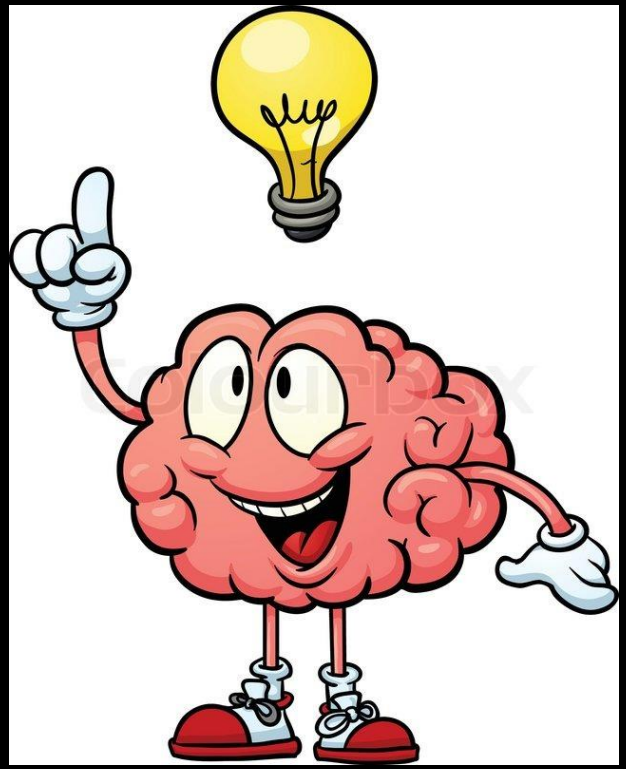
No	WC ID	WC Name	Structure ID	Structure Name
1	3843435	Plumbing Fixtures	2918241	Foundation
2	3843526	Plumbing Fixtures	2918241	Foundation
3	3843649	Plumbing Fixtures	2918241	Foundation
4	3843706	Plumbing Fixtures	2918241	Foundation

automatically export element information

What else can apply ?



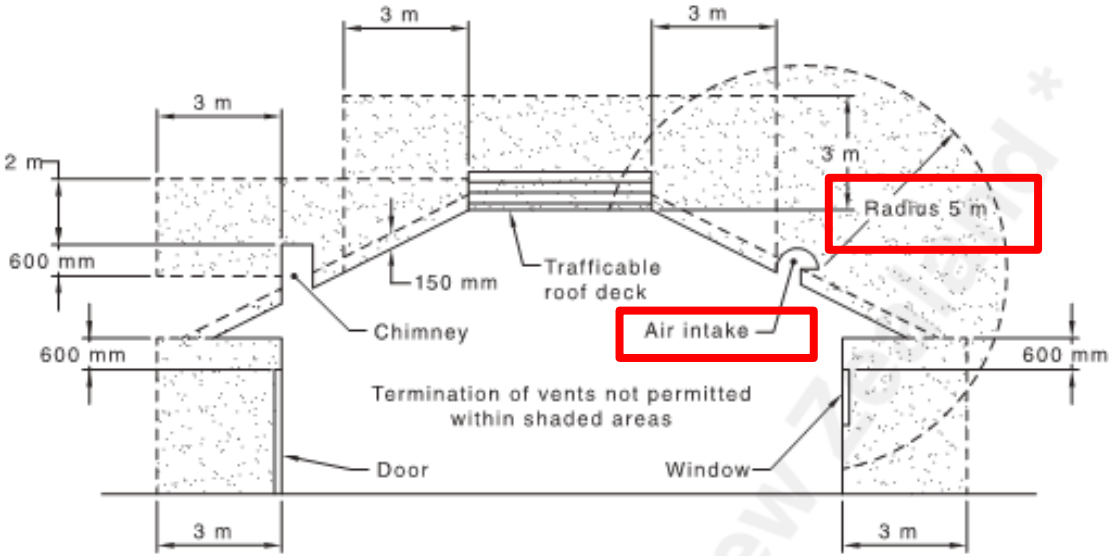
Idea 2:



Validate distances within MEP models

MEP Standards & Rules

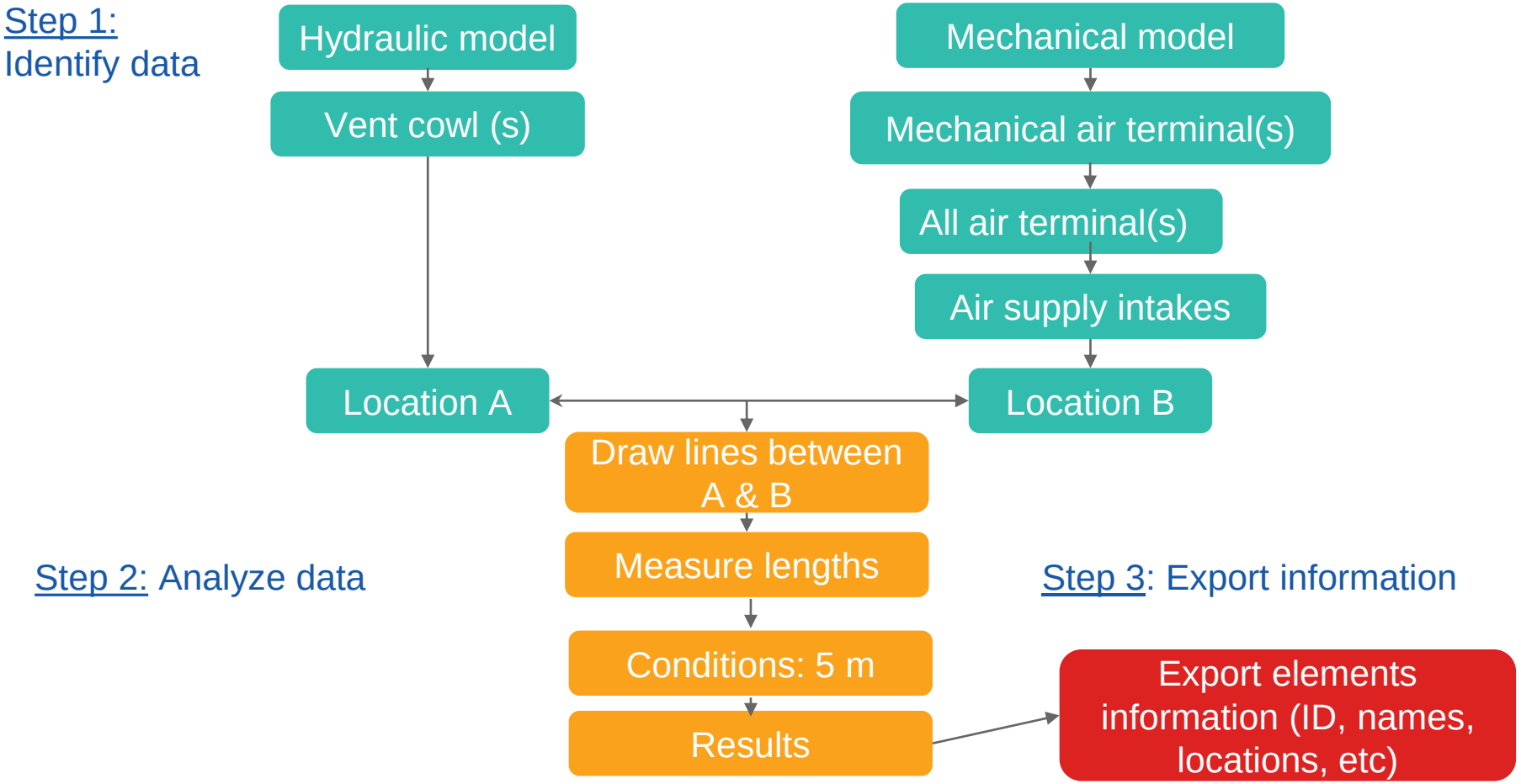
Example 2: Vent Cowls vs Mechanical Air Intake



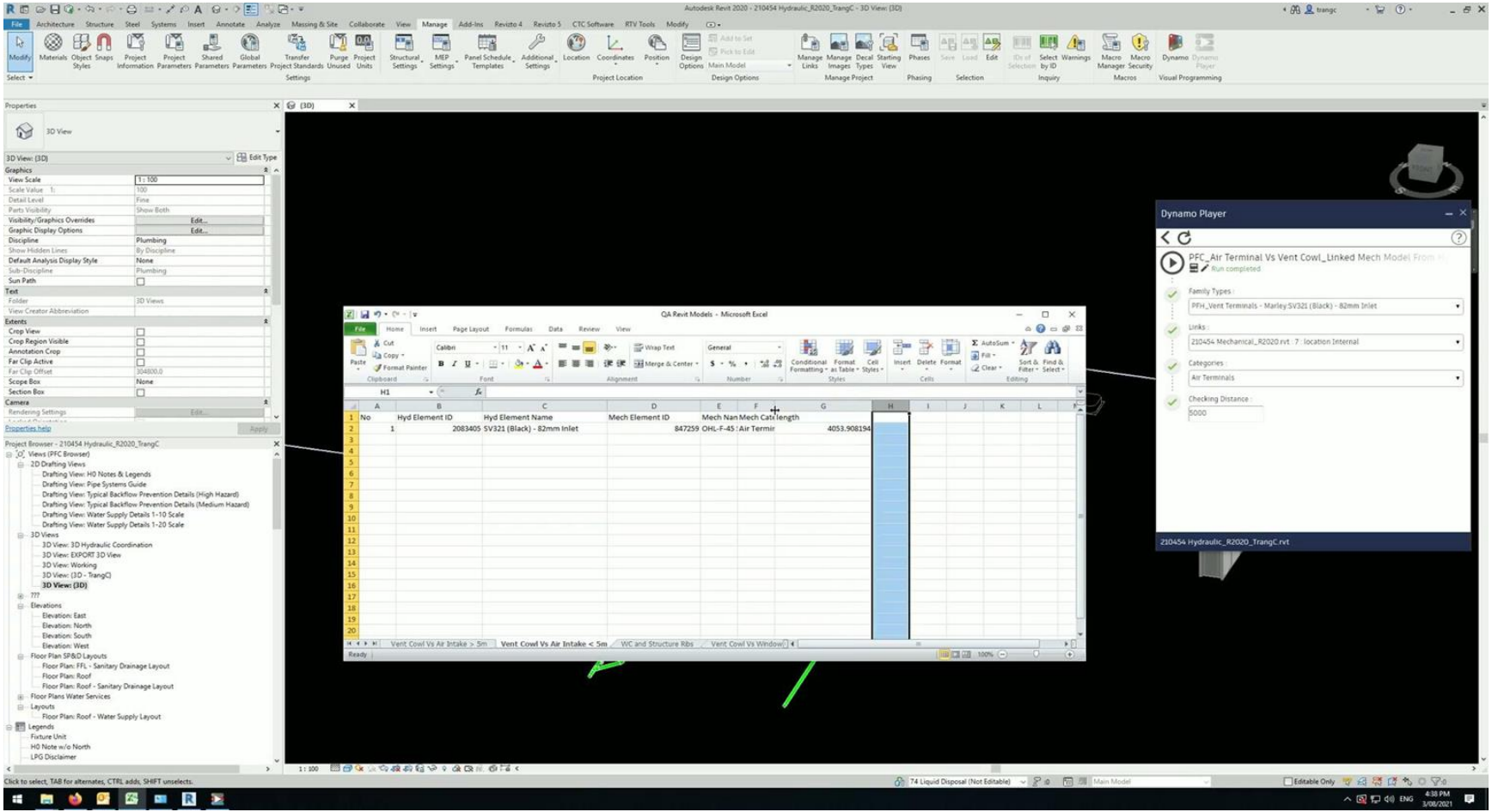
NOTE: Trafficable decks exclude access workways and work platforms.

FIGURE 6.9.4 TERMINATION OF VENTS

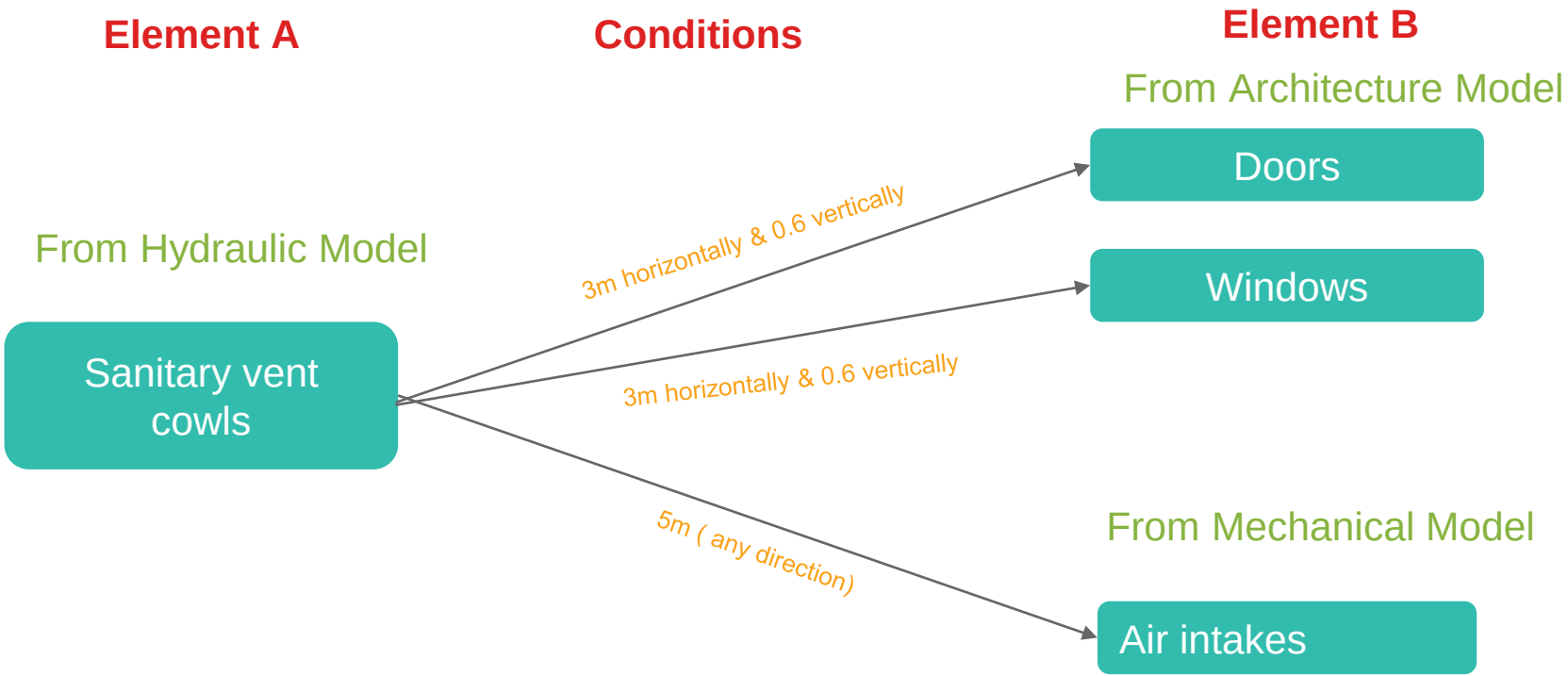
Idea 2: Summary of the Dynamo Graph



Video Simulation



What else can apply?



Advantages

- No need to model simple elements from Revit (e.g idea 1).
- Identify clashes at the beginning of the project (e.g. idea 1).
- Quickly update when input data or conditions change.
- Especially suitable for large-scale projects with numerous elements.
- Can apply to many similar projects when the script is written.
- Export results to spreadsheets and record documents automatically.

BIM projects contain a <u>huge database</u> of various information

How can we develop these automation tools?

- Your ideas are important. Start from your own disciplines.
- Divide ideas into smaller ideas, start with baby steps first.
- Start with common ideas first, then specific ones.
- Look beyond traditional ideas and workflows.
- Work closely with the digital team to optimize your ideas.
- Your involvement and commitment to implementing ideas is important.

Conclusion

Lessons learned

- How Dynamo works fundamentally.
- How to analyze BIM data to enhance coordination between disciplines.
- How to evaluate and implement new automation tools.

Thank You

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