

BIM in Facilities Management

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Using Forge and BIM 360 to visualize models and combine
with FM information

FORGE DEVCON





Photo: Kristoffer Marchi

Sweco

- Europe's leading engineering and architecture consultancy
- 16,000 employees

Goals

BIM in FM
Real Life User-
Case

Integration
Maximo - Forge

Inspire!

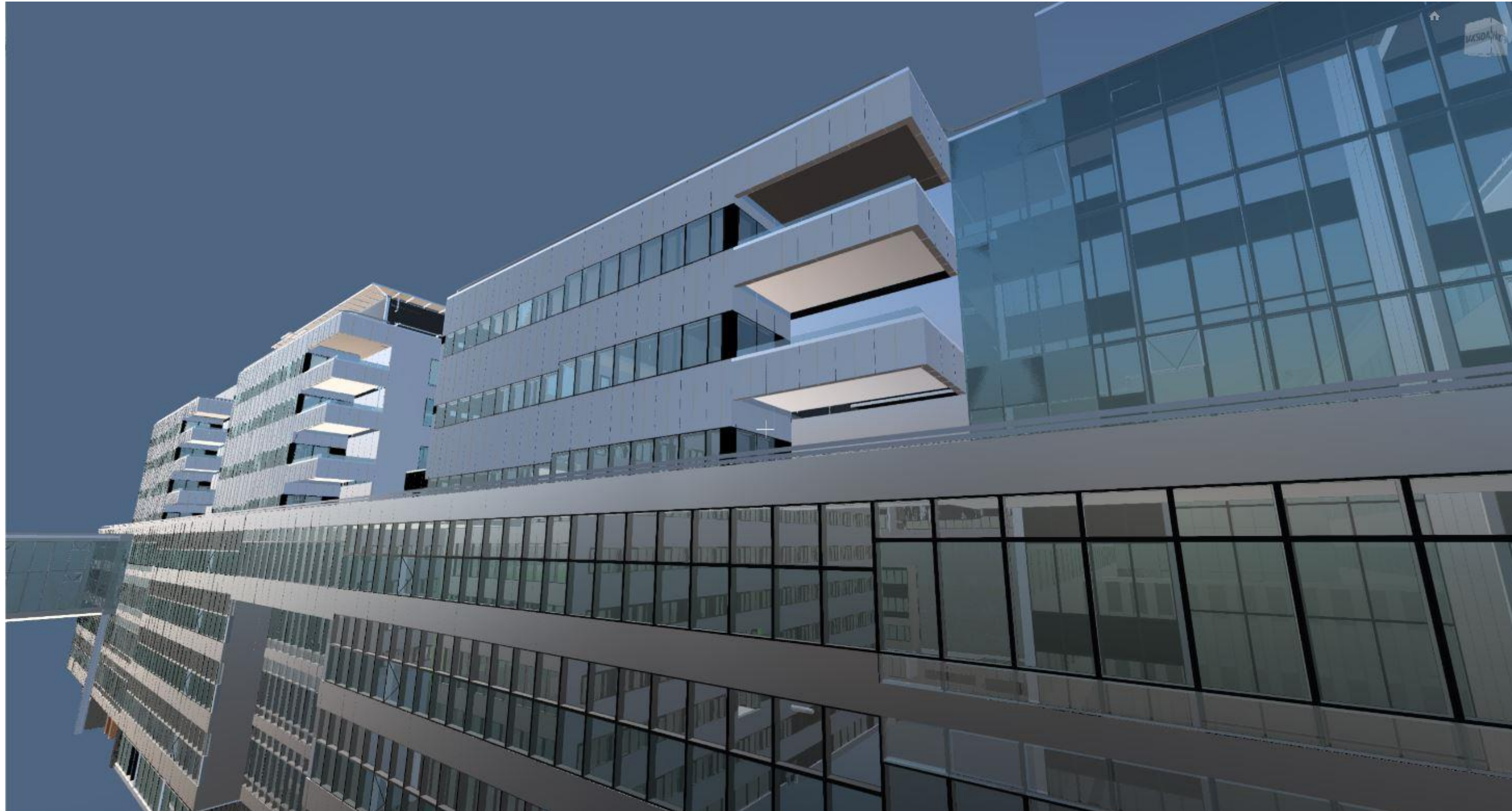
Agenda

- The viewer
- Background
 - The construction project, project delivery
 - Why Forge?
- Technical details
 - IT-Infrastructure
 - Viewer, Step-by-step
 - Integration with Maximo
- Processes for updating data
- Lessons learned
 - User feedback
 - Advices and ideas

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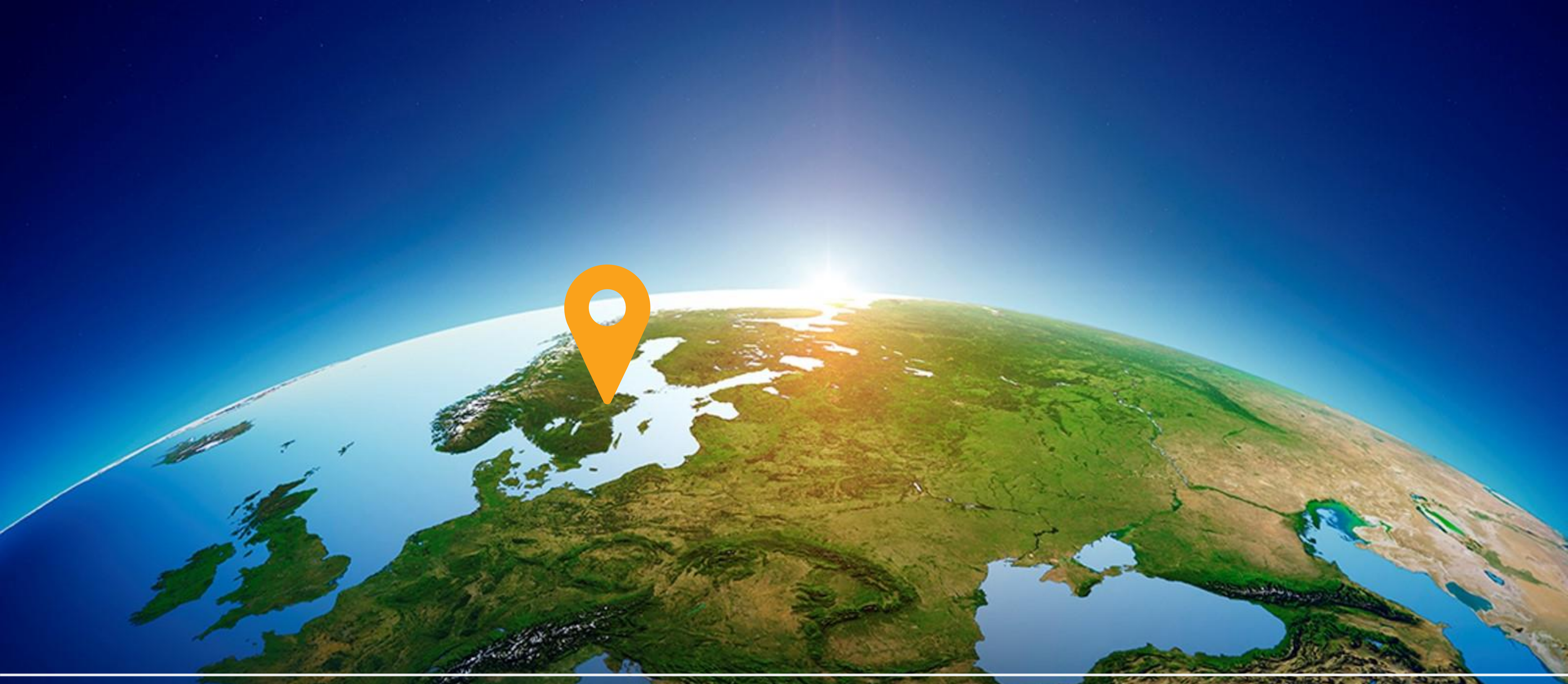
The viewer



Presentation will be updated with link to video!

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Stockholm, Sweden

The construction project

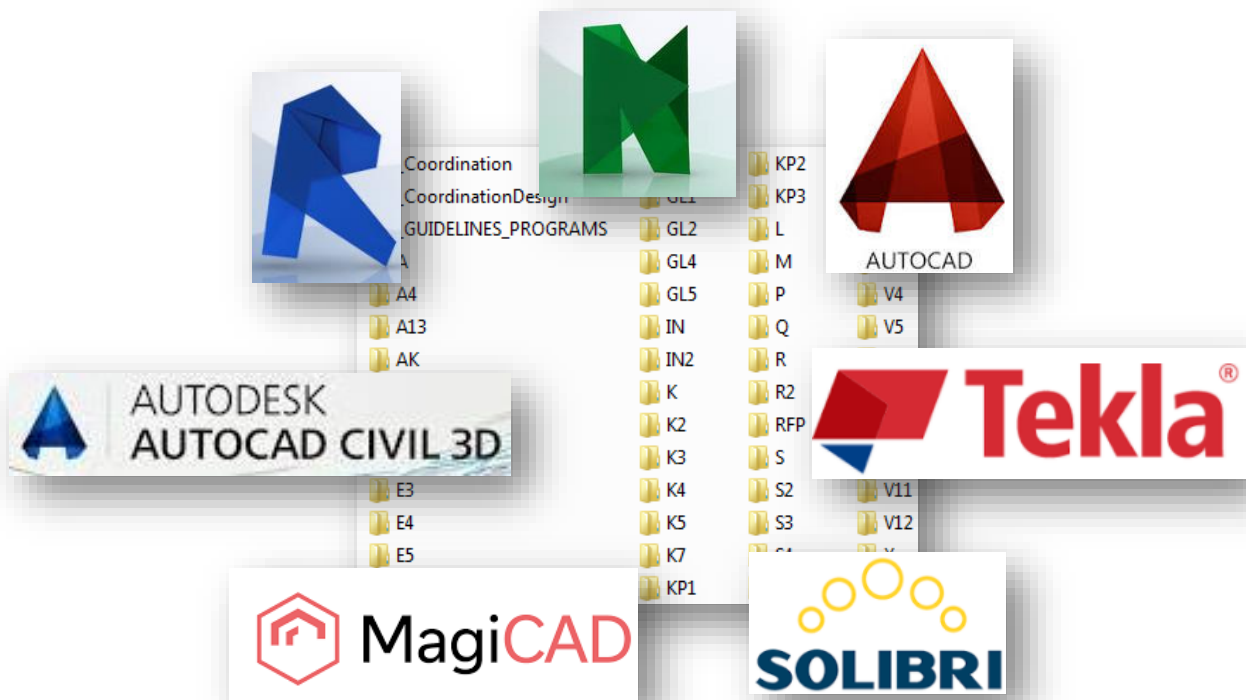
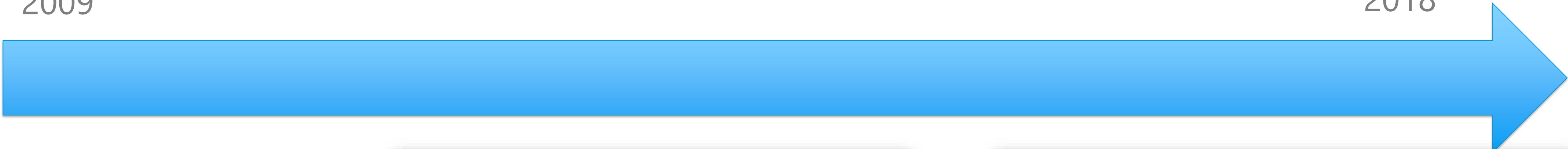
- Contractor: Skanska
- Private Public Partnership contract
- 320 000 m² ≈ 3 500 000 ft²
- 11 000 rooms
- 600 000 assets
- Architectural design: White-Tengbom
- MEP design: Sweco-ÅF



The construction project

2009

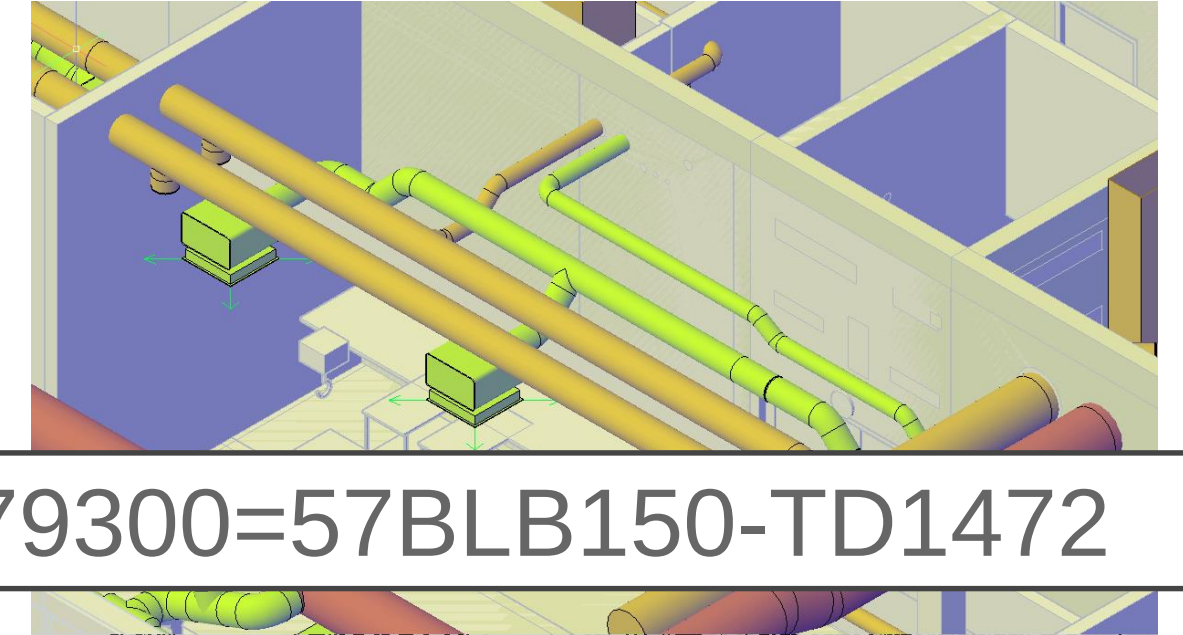
2018



Project delivery



- 3 000 models
- 30 000 documents
- 600 000 unique assets

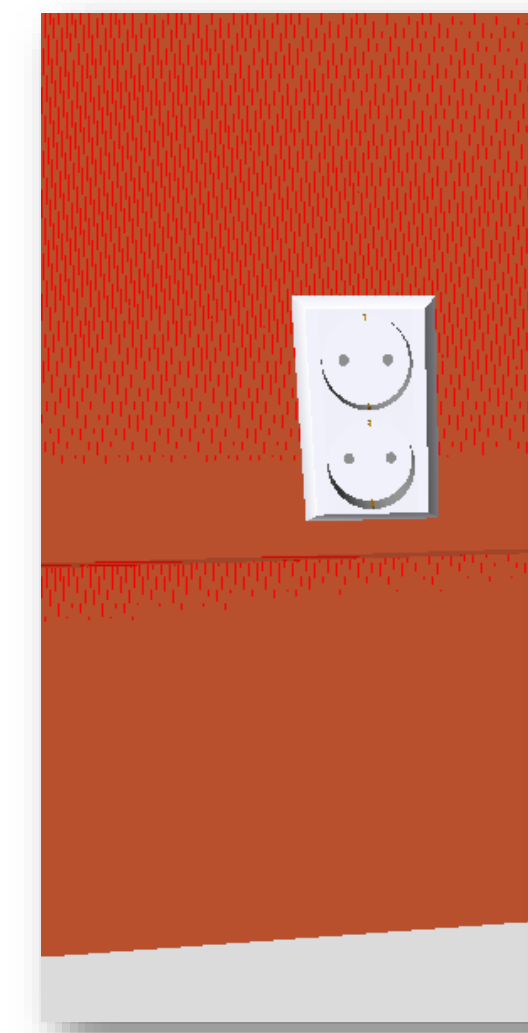


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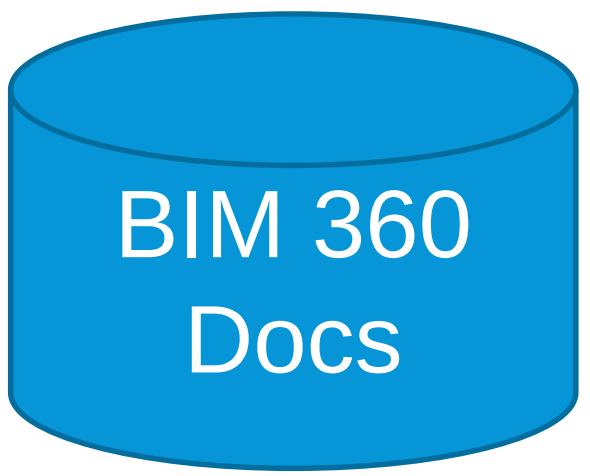
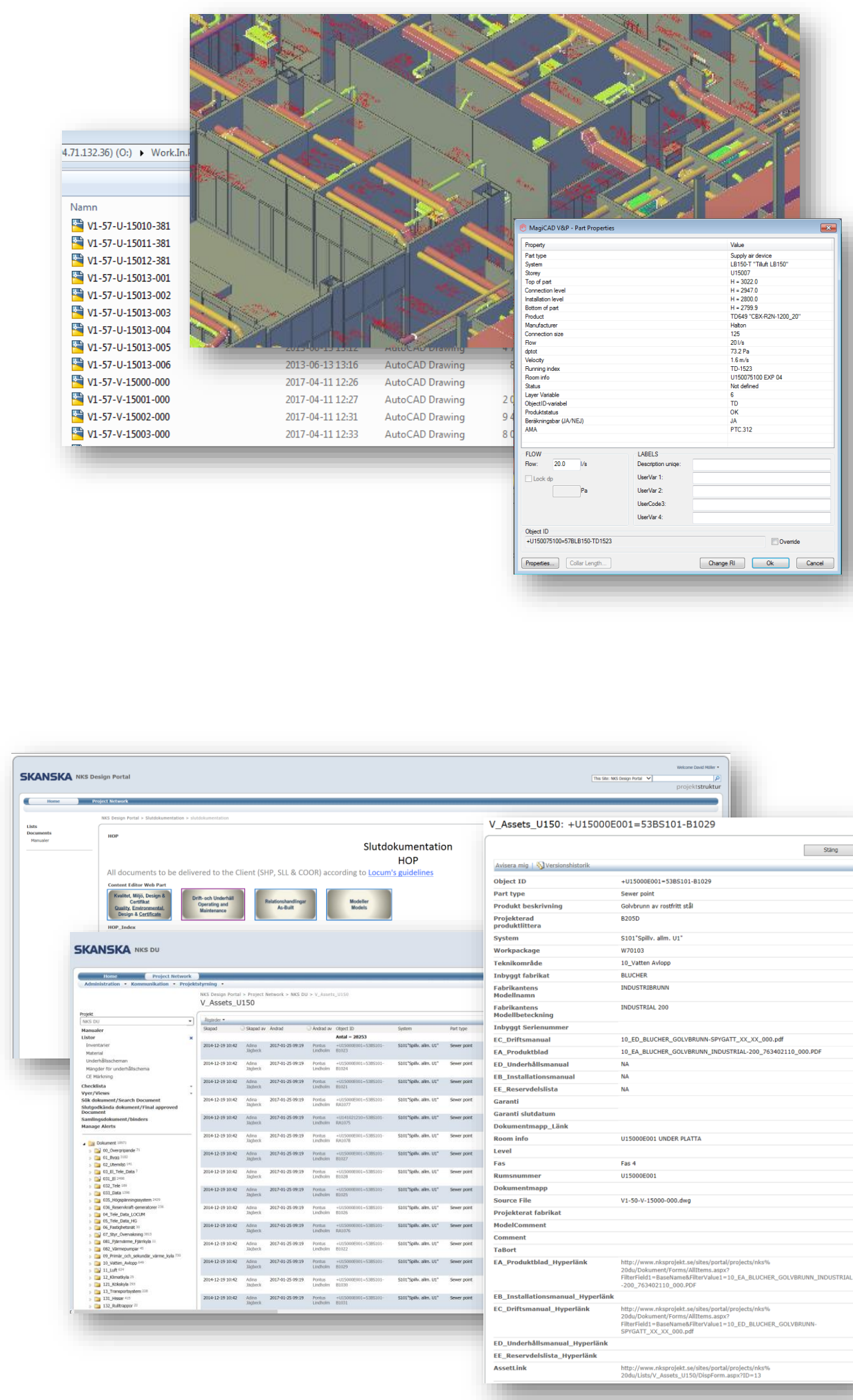


Project delivery - assets

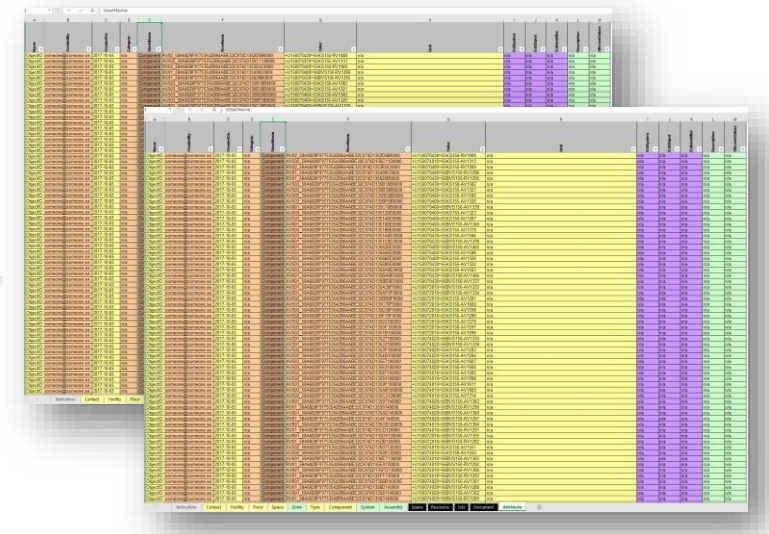


Properties	
Item MagiCAD Timeliner Entity Handle	
Property	Value
EntityTransparency	ByLayer
Material	ByLayer
Part type	Sockets/E
System type	Electric
Storey	15 "03"
Room info	U300033010 ENTRE
O1	=63B-NB42N09N02F054:06
O2	+U300033010=63B-NB42N09N02F054:06
Status	N Nytt
Running index	-
User code	2
Product description	2-vägsuttag utv
P1	2
P3	2 6_P004_1A
P5	ESOC074
P14	1200
System (electrical)	63B "Elkraftsystem"
System UserCode	63B
Position of part	157960, 88050, 300
Circuit number	F054
Switchboard code	NB42N09N02
Installation code	5 På vägg
Voltage [V]	230,00

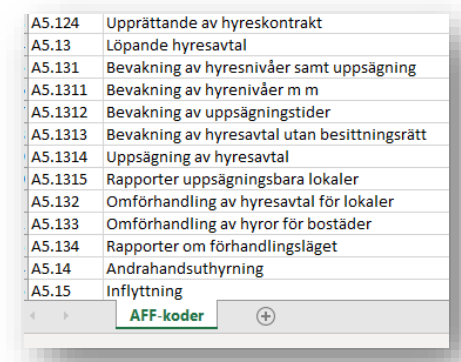
Project delivery – data to FM



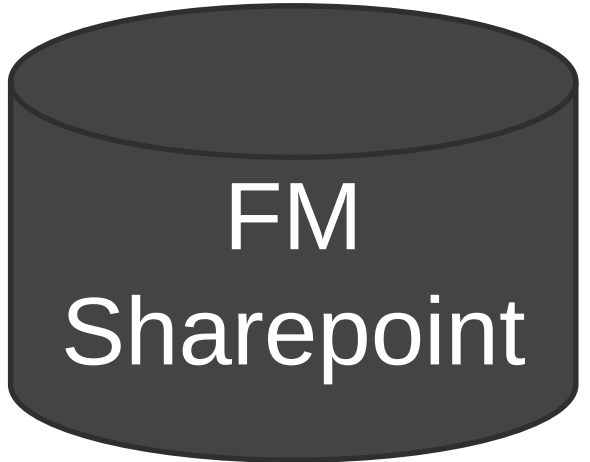
COBie



~30 attributes/asset



FM information



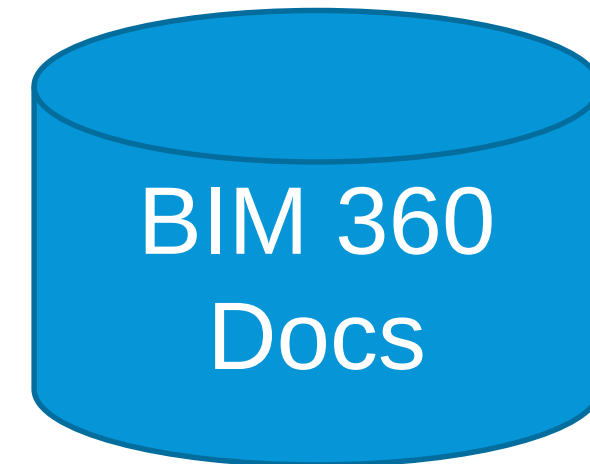
Data quality

Scneider	
Schneider Electric	
Schneider, Electric	
Schneider Electric AB	
Schneider Electric AB	
Schieder Electric	

How to do better project
delivery?

Consistent data!

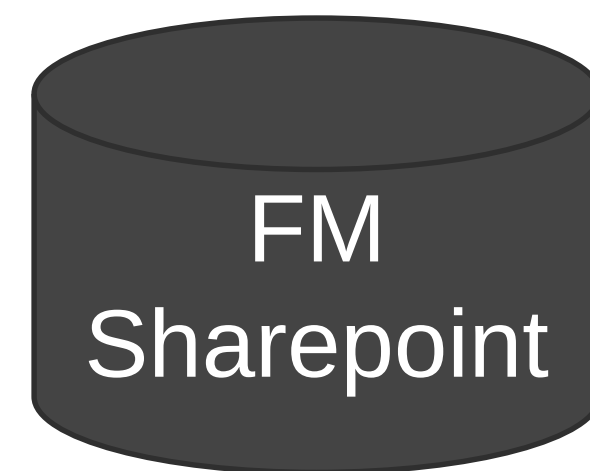
Project delivery – end result



Models – for the viewer (NWC)



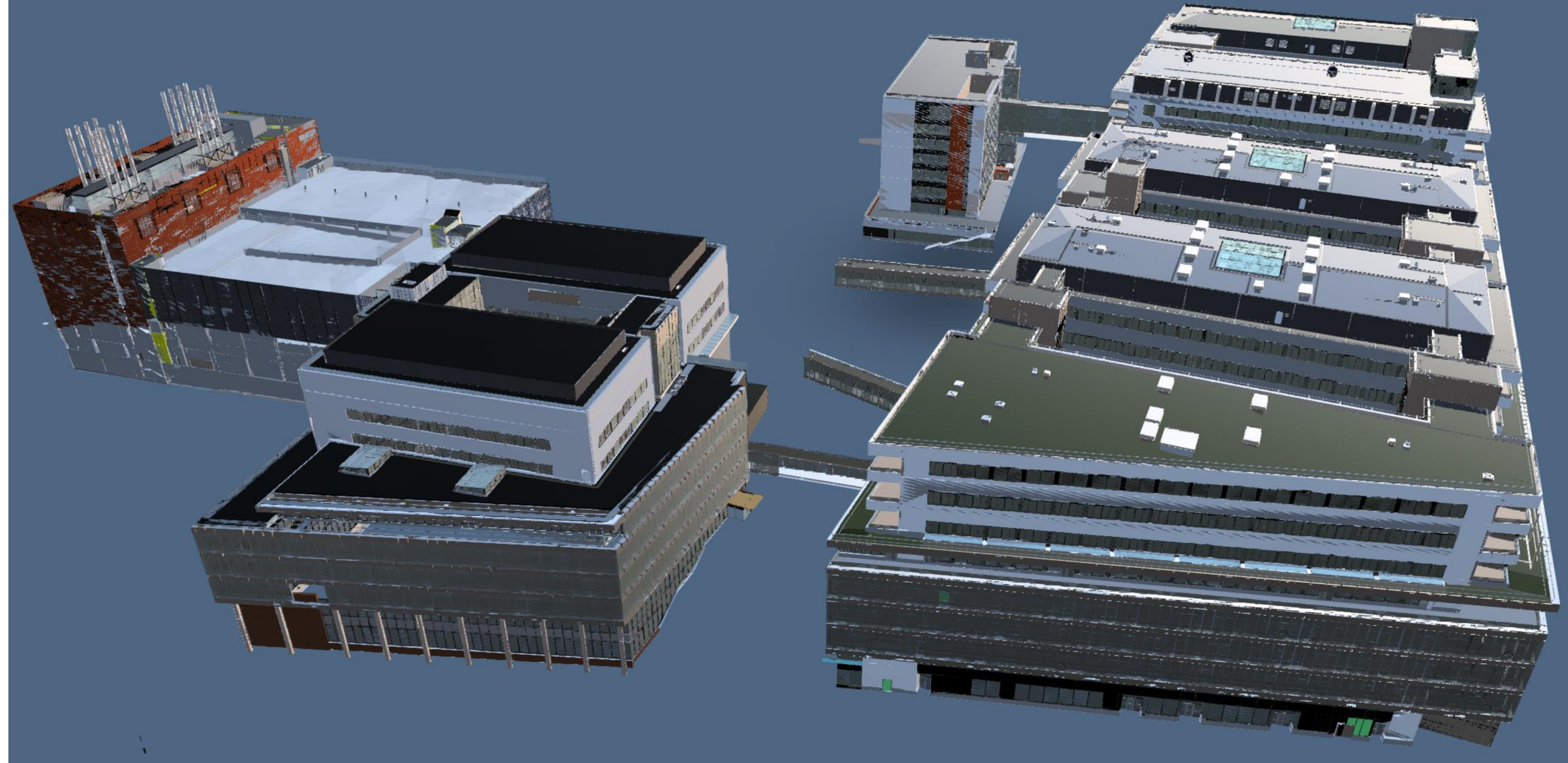
Asset information
Planning, work orders



Documents
Models – for projects (Native)

Why Forge?

- "3000 model challenge"
- High performance viewer
- Adaptable
- Price



Design choice: Stand alone web solution



- Easier updates
- Less coordination



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Technical details - Project delivery

Fileserver

C# /Lisp

- detach xref
- clean models
- export nwc

Navisworks Automation API C#

Navisworks Plugin API C#

- Find assets & rooms
- Export to database

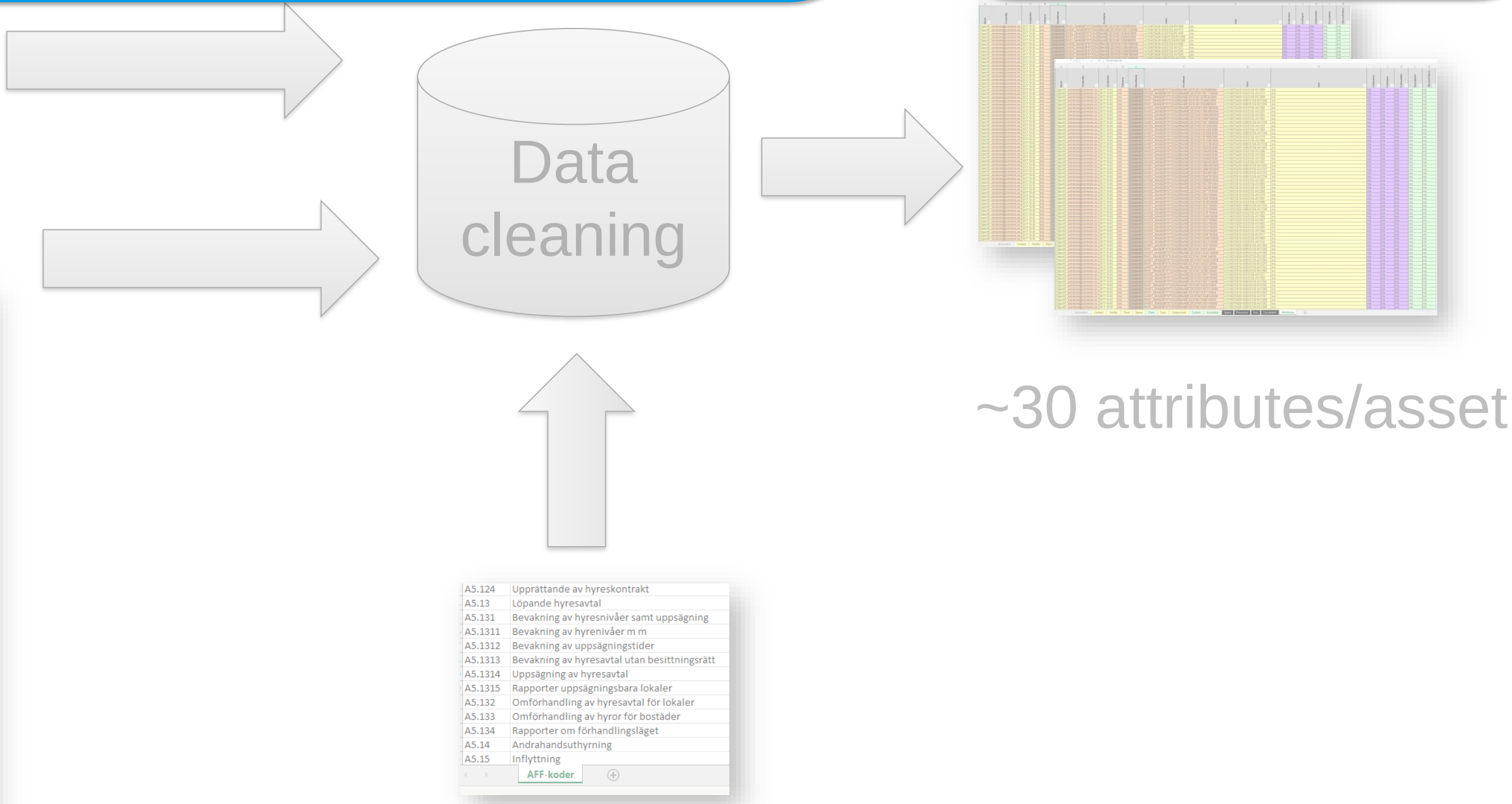
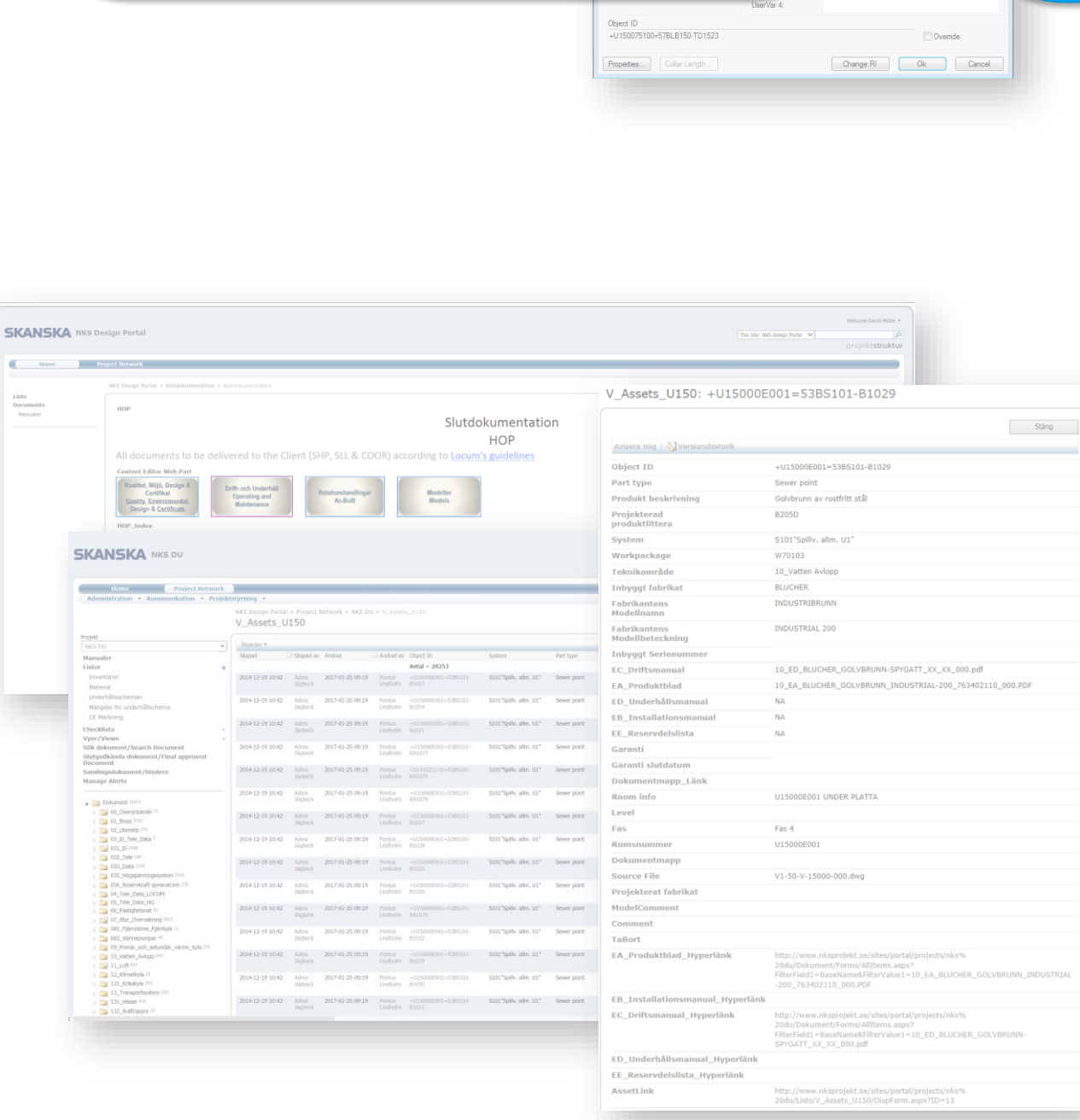
C#

Export COBie from database

BIM 360 Docs

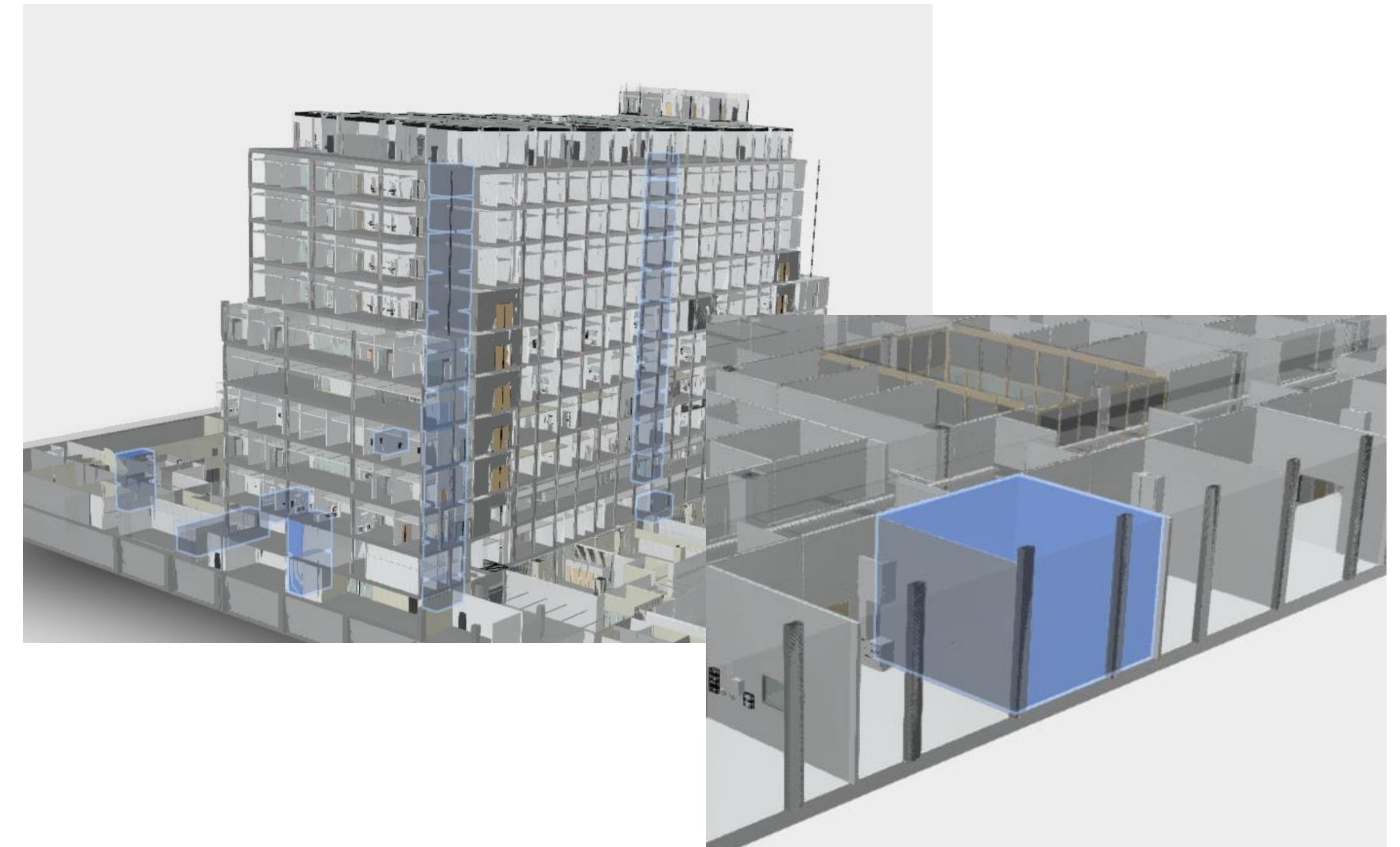
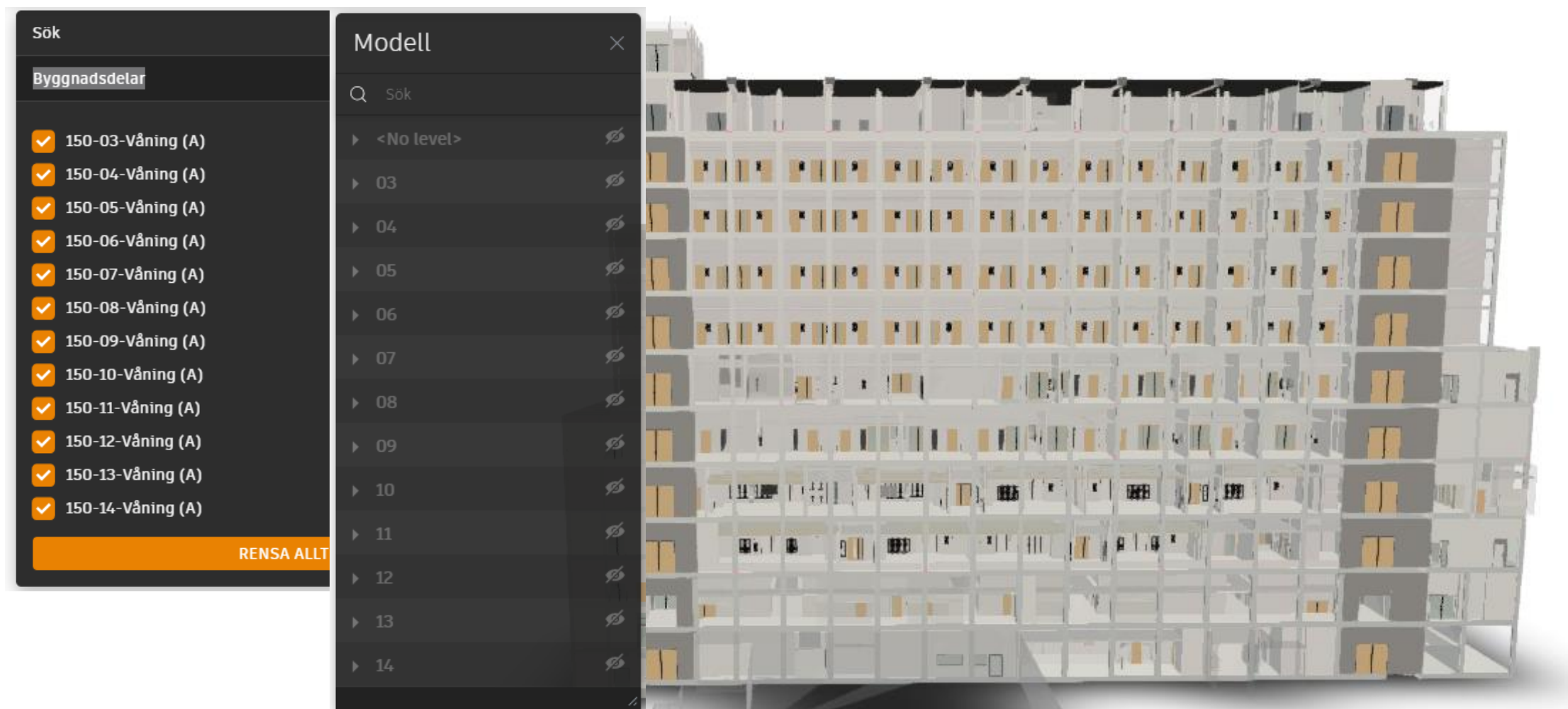
Maximo

FM Sharepoint



FM information

A5.124	Upprättande av hyreskontrakt
A5.13	Löpande hyresavtal
A5.131	Bevakning av hyresnivåer samt uppsägning
A5.1311	Bevakning av hyresnivåer m m
A5.1312	Bevakning av uppsägningstider
A5.1313	Bevakning av hyresavtal utan besittningsrätt
A5.1314	Uppsägning av hyresavtal
A5.1315	Rapporter uppsägningsbara lokaler
A5.132	Omförhandling av hyresavtal för lokaler
A5.133	Omförhandling av hyror för bostäder
A5.134	Rapporter om förhandlingsläget
A5.14	Andrahandsuthyrning
A5.15	Inflyttning

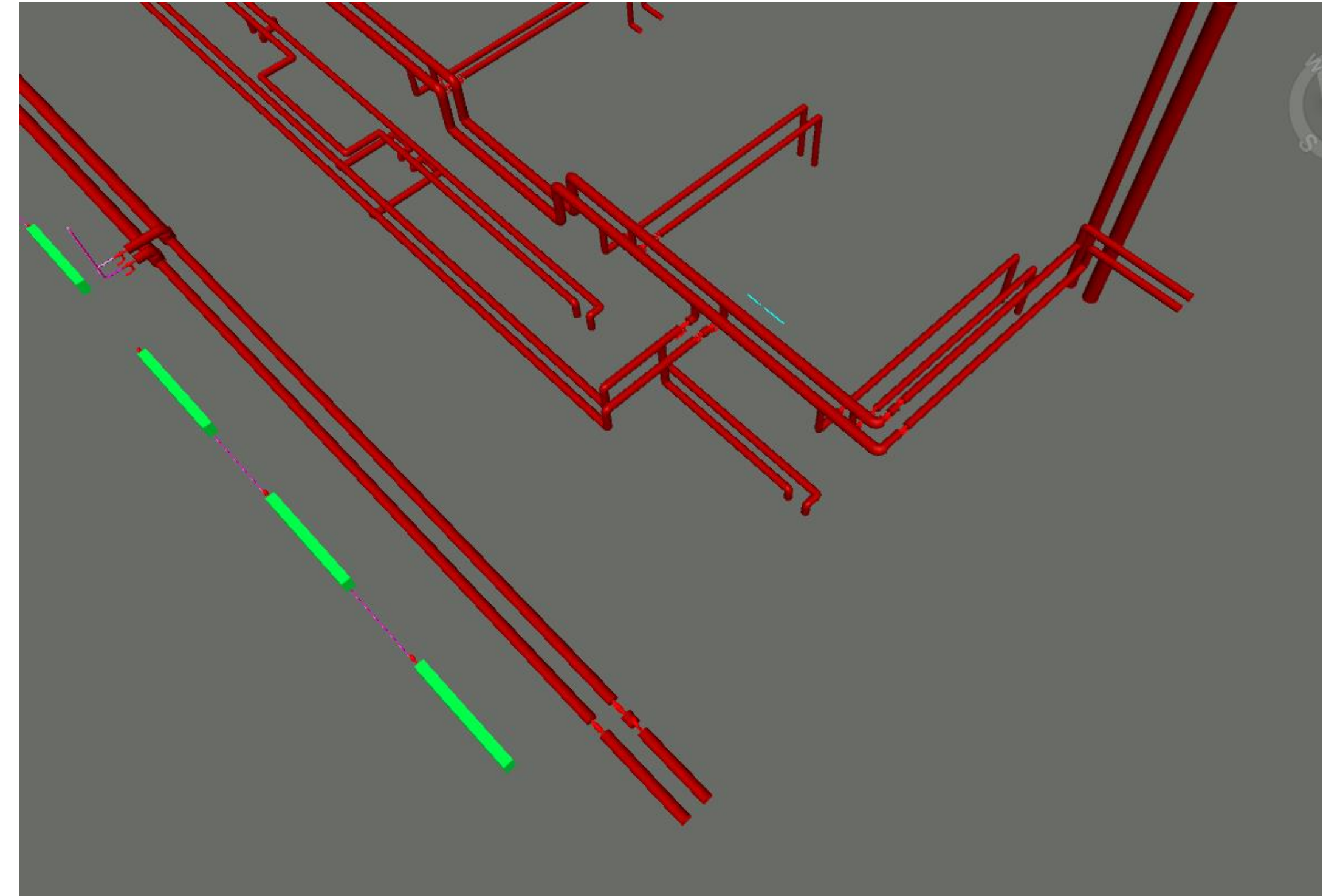
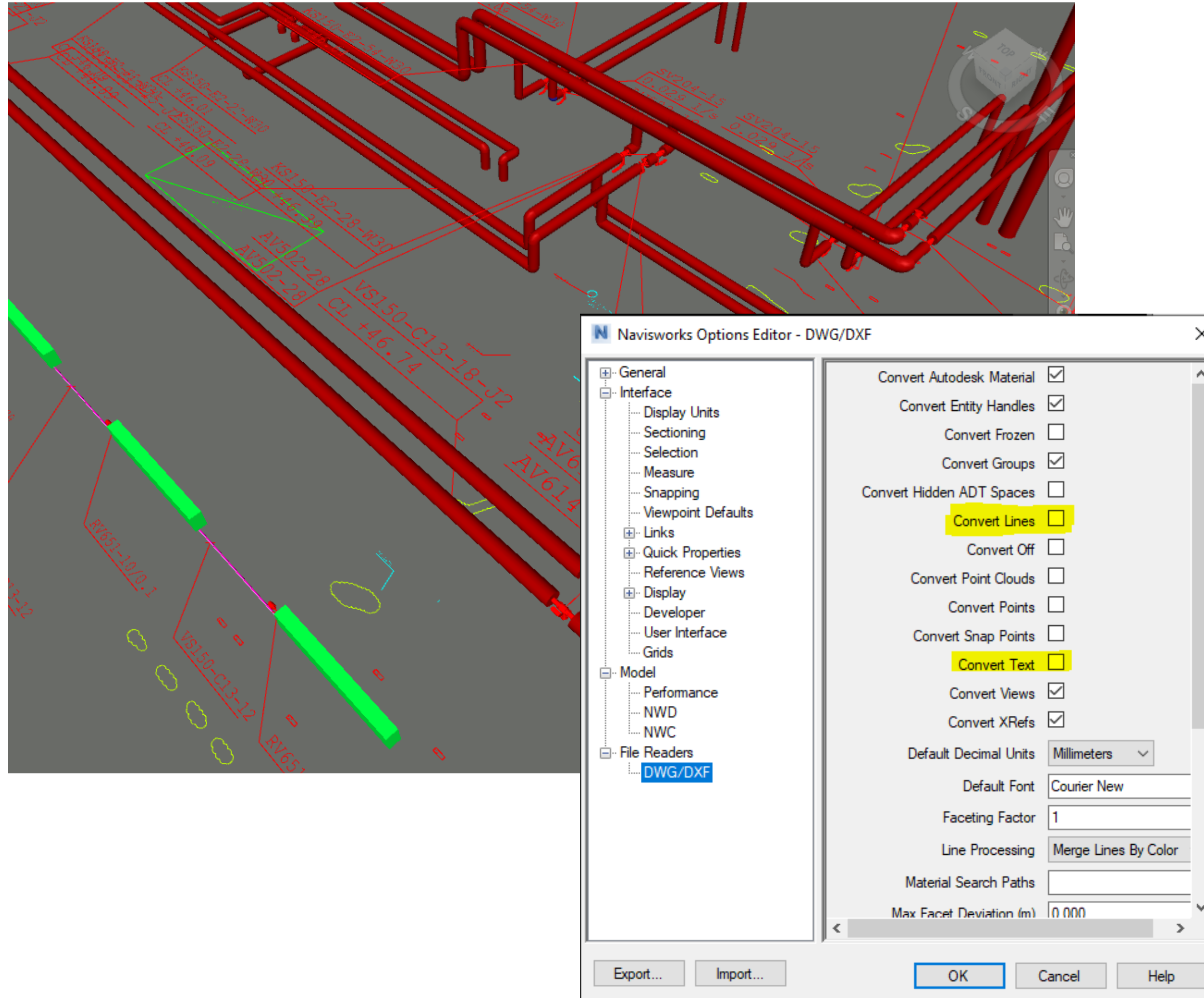


```
viewer.impl.visibilityManager.setNodeOff(node, true);
```

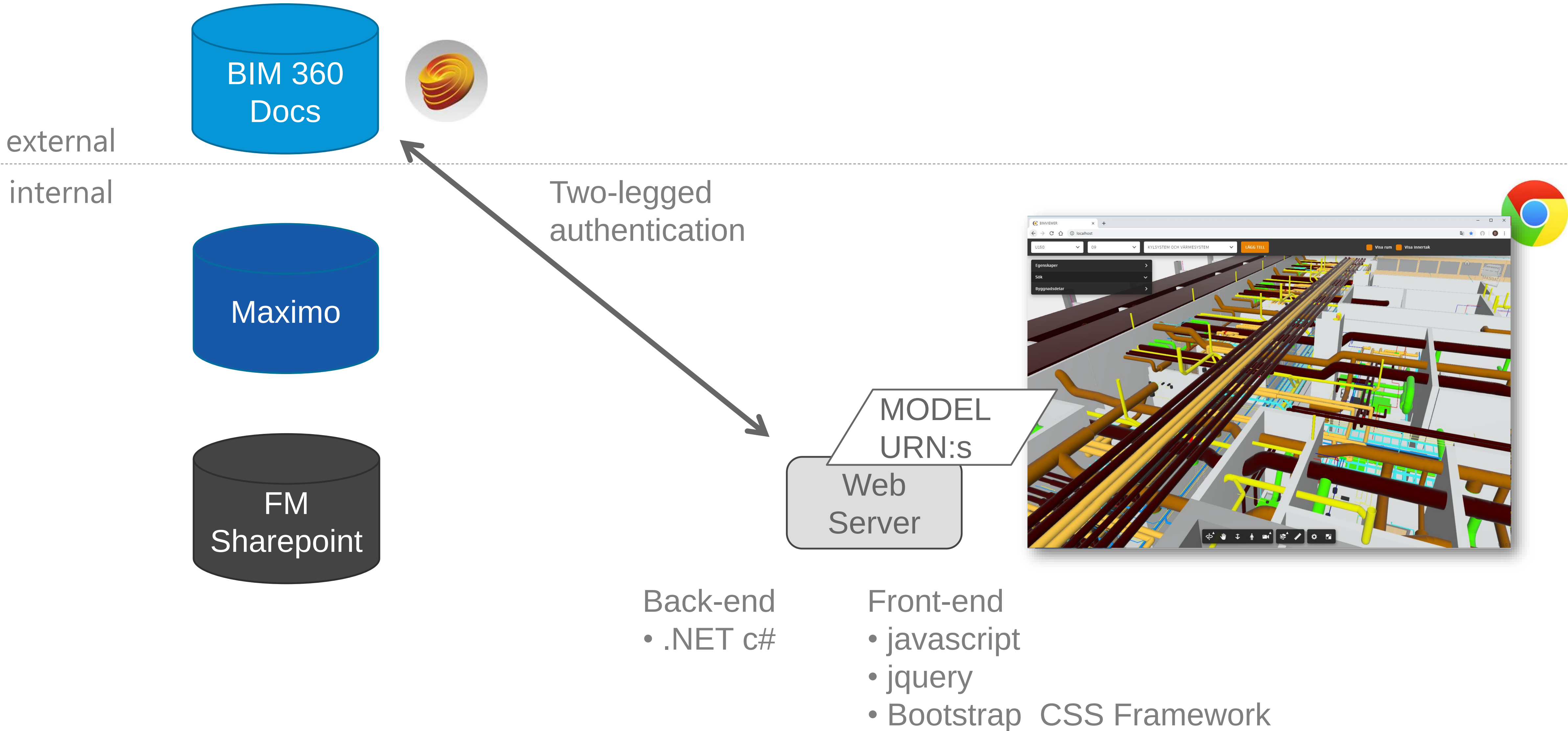
NWC-models

- Easy to export by automation
- Extract data from models
- Splits building to tree structure
- Space objects included

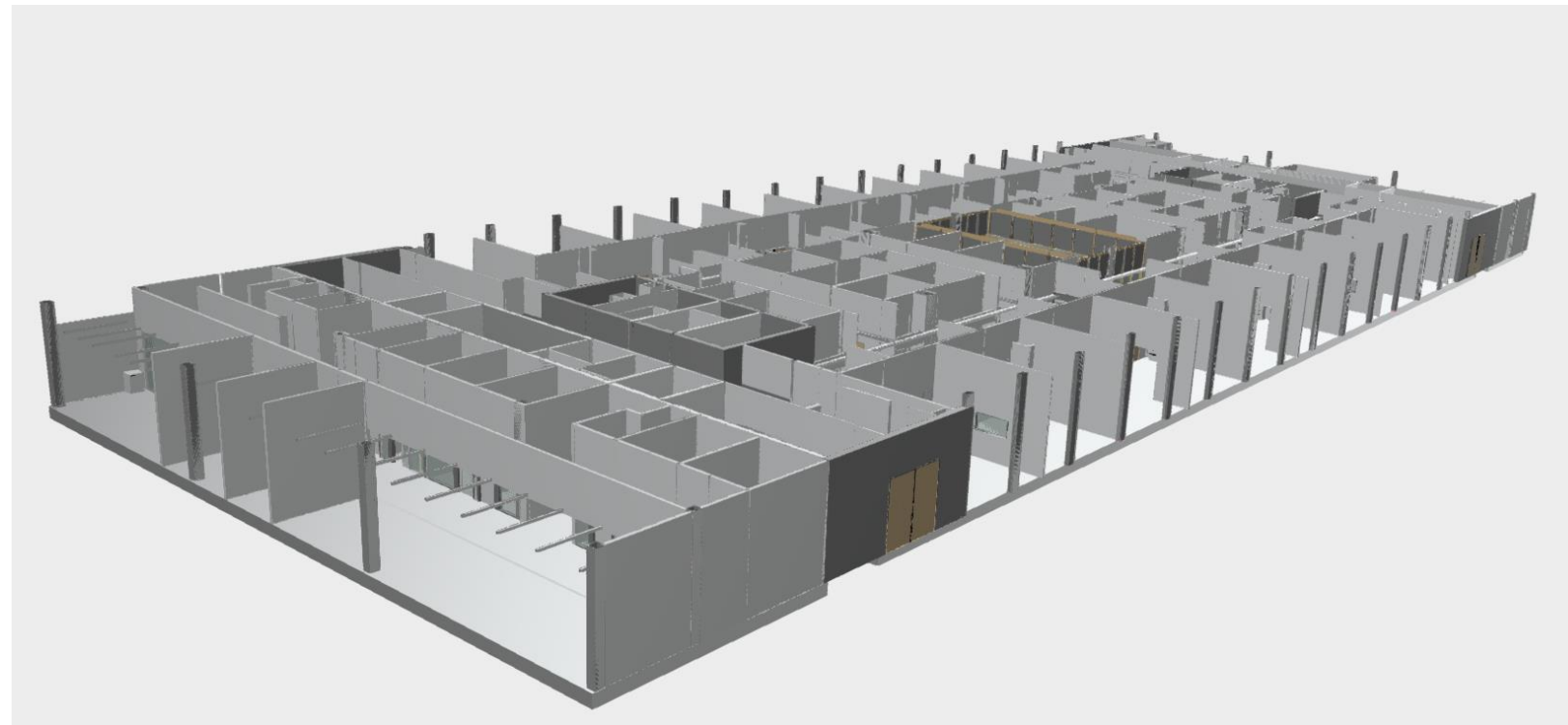
Model cleaning



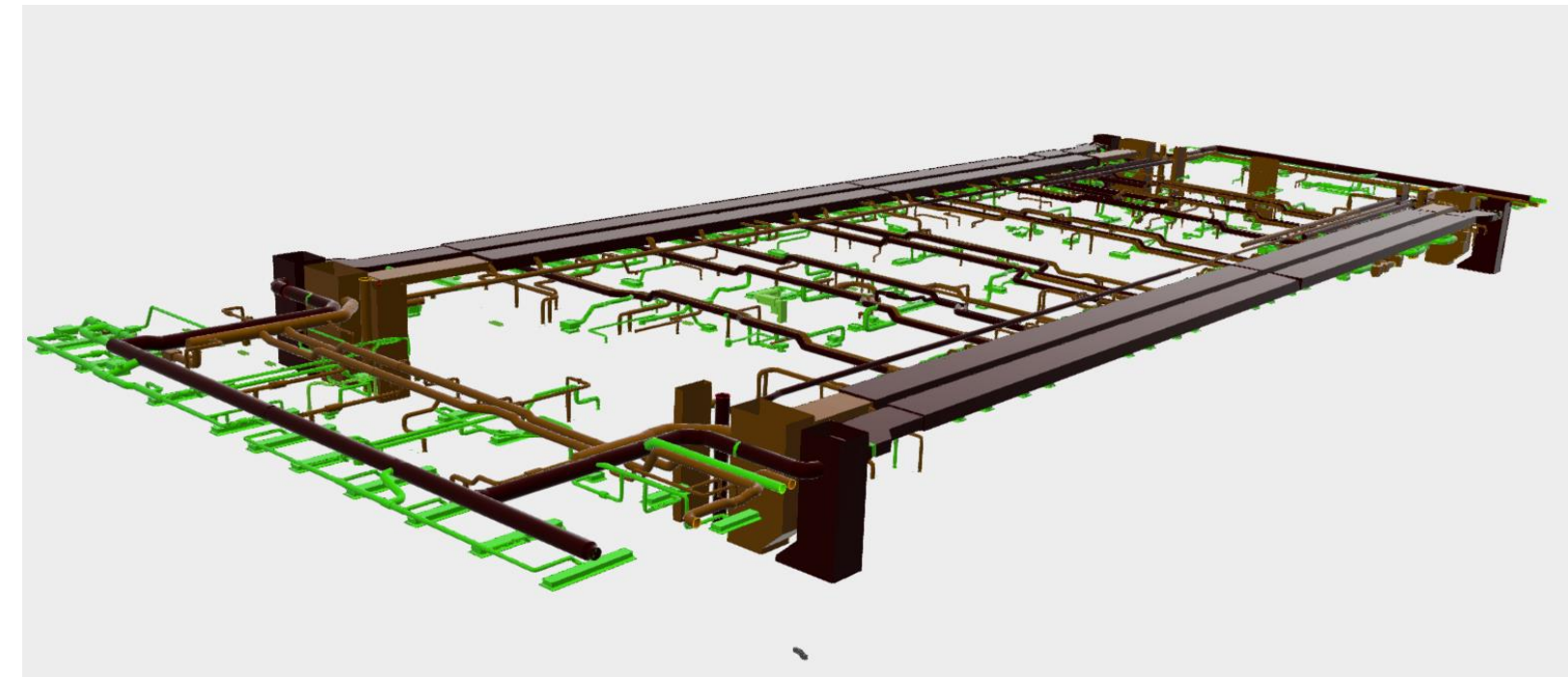
IT infrastructure



Forge multimodel



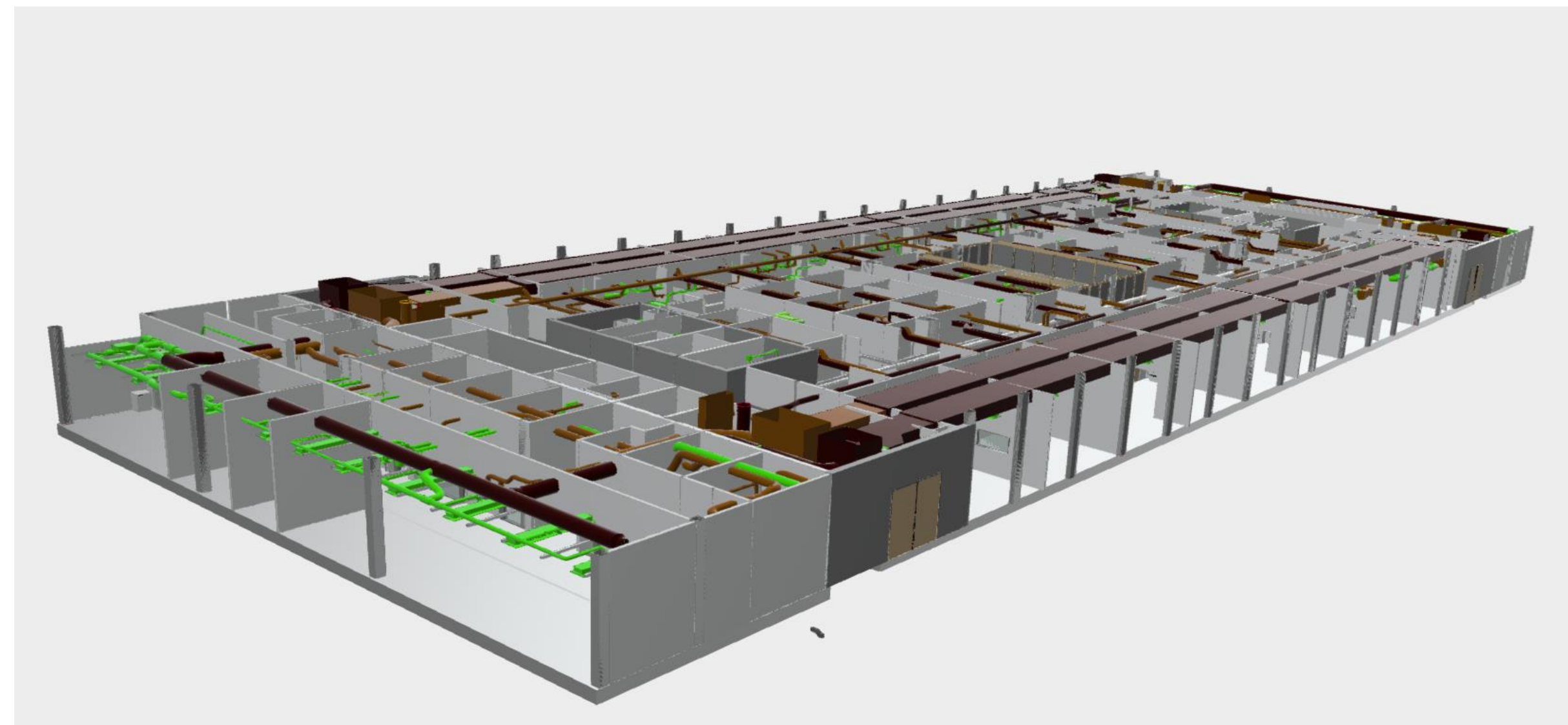
+



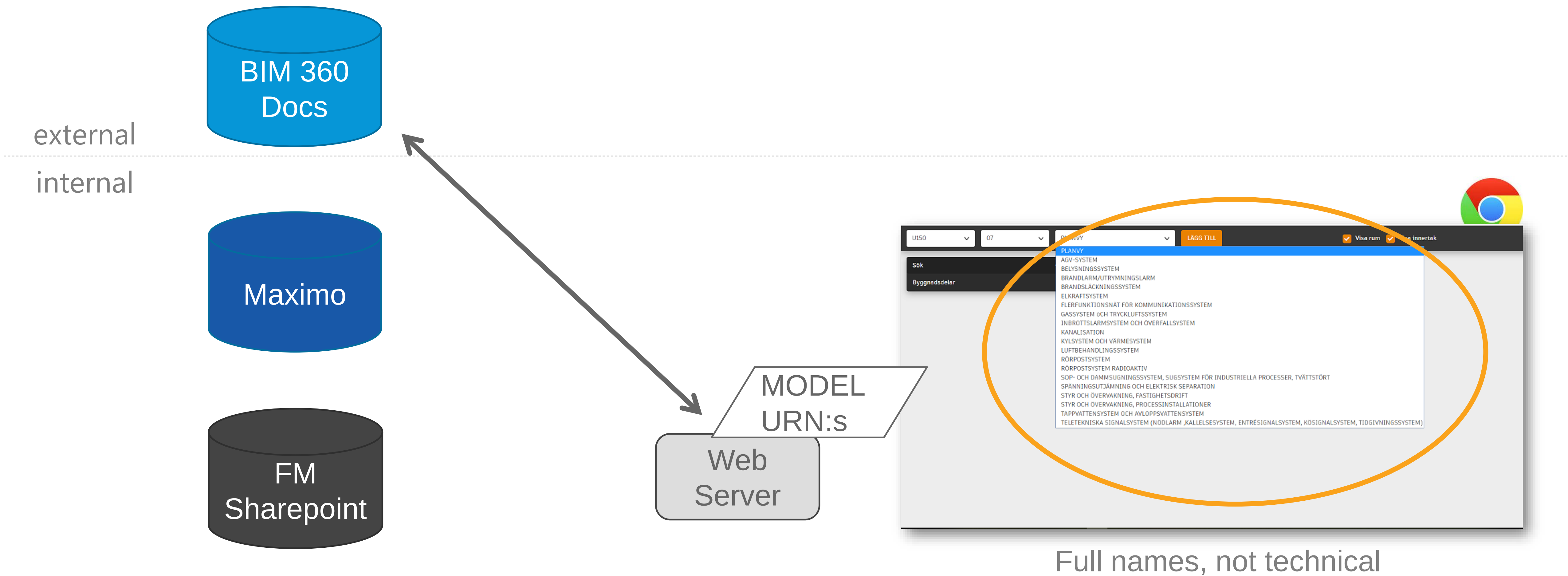
```
(new THREE.Matrix4()).setPosition({ x: 0, y: 0, z: 0 }).scale({ x: 304.8, y: 304.8, z: 304.8 });
```

A1-40-15007-000.nwc

V1-57-15007-000.nwc



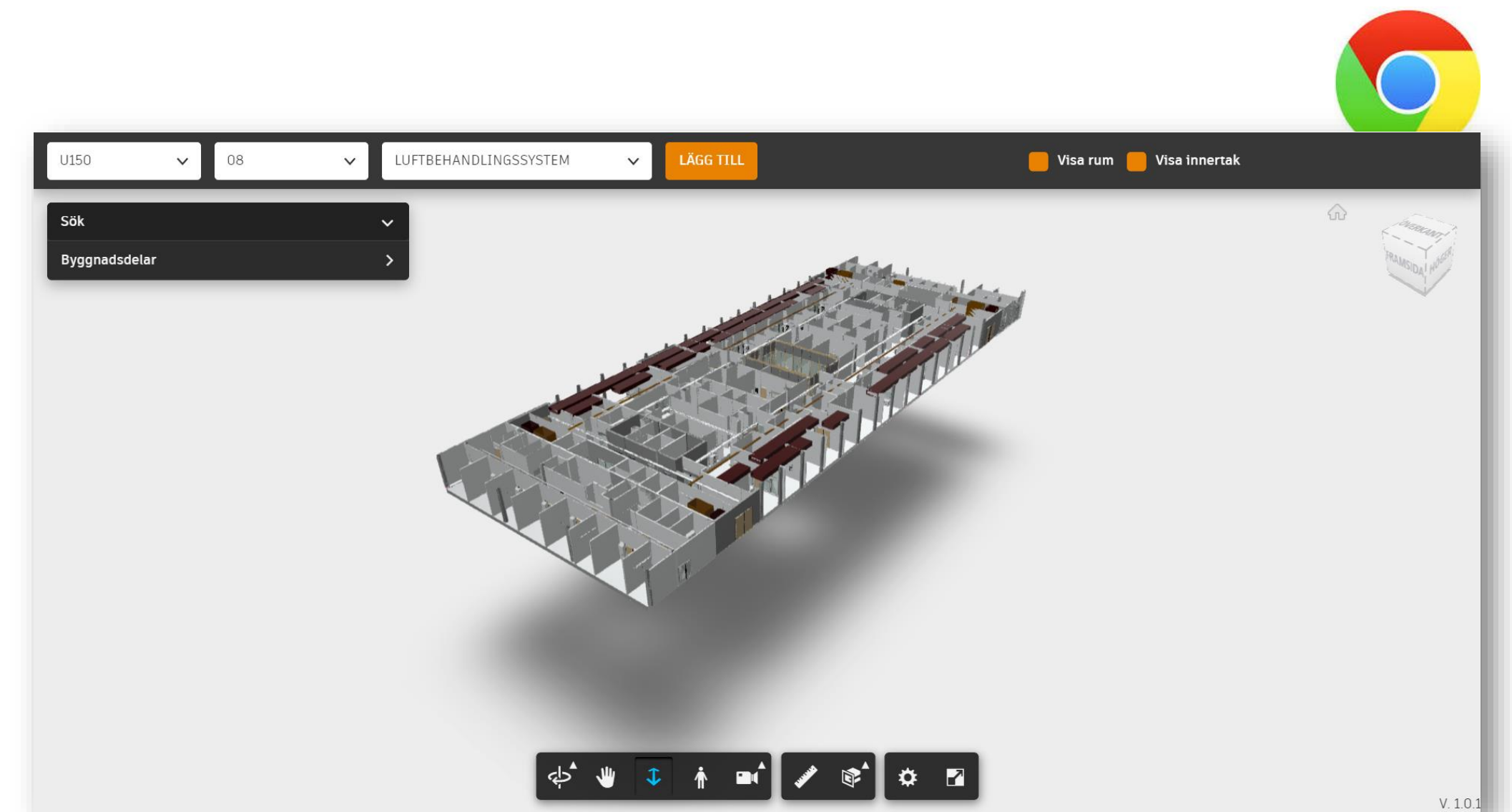
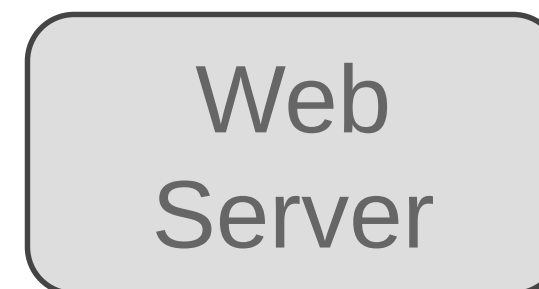
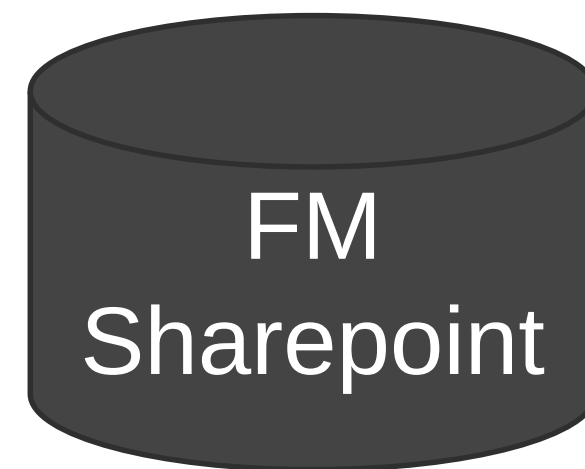
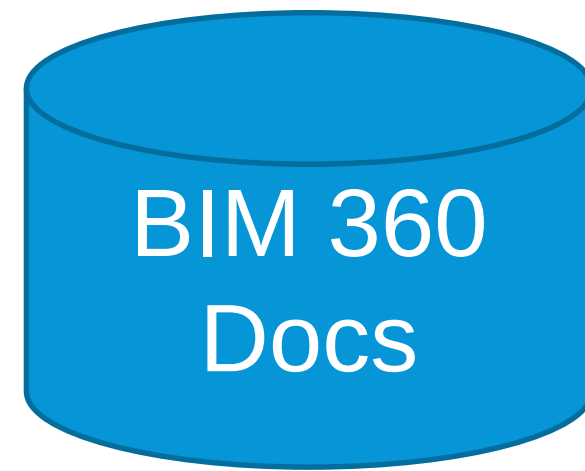
Loading models



Loading models

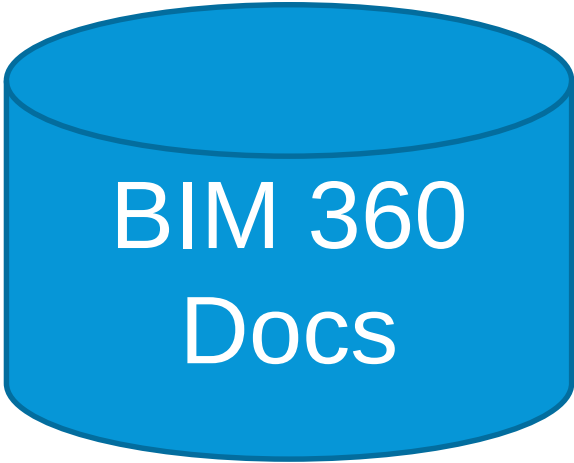
external

internal

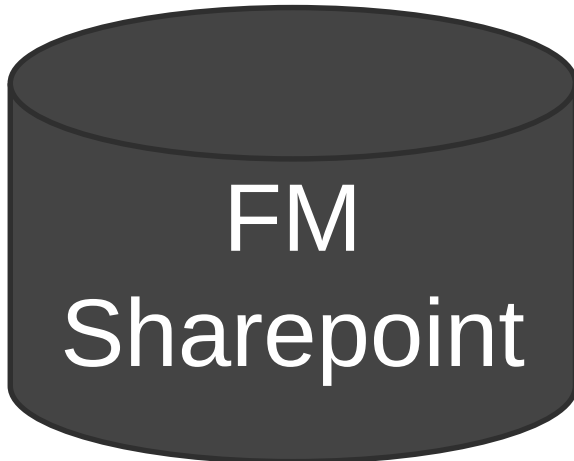


Loading models

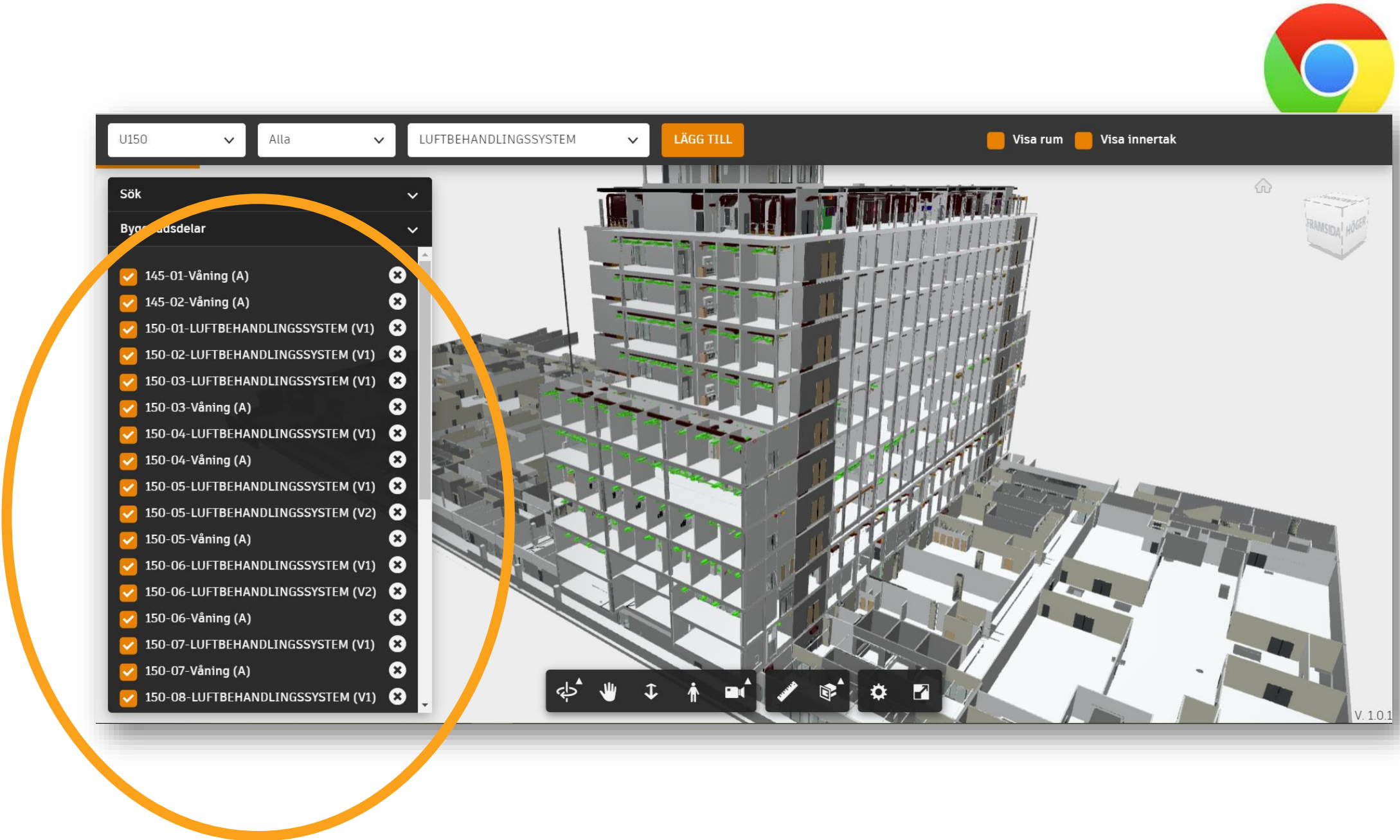
external



internal

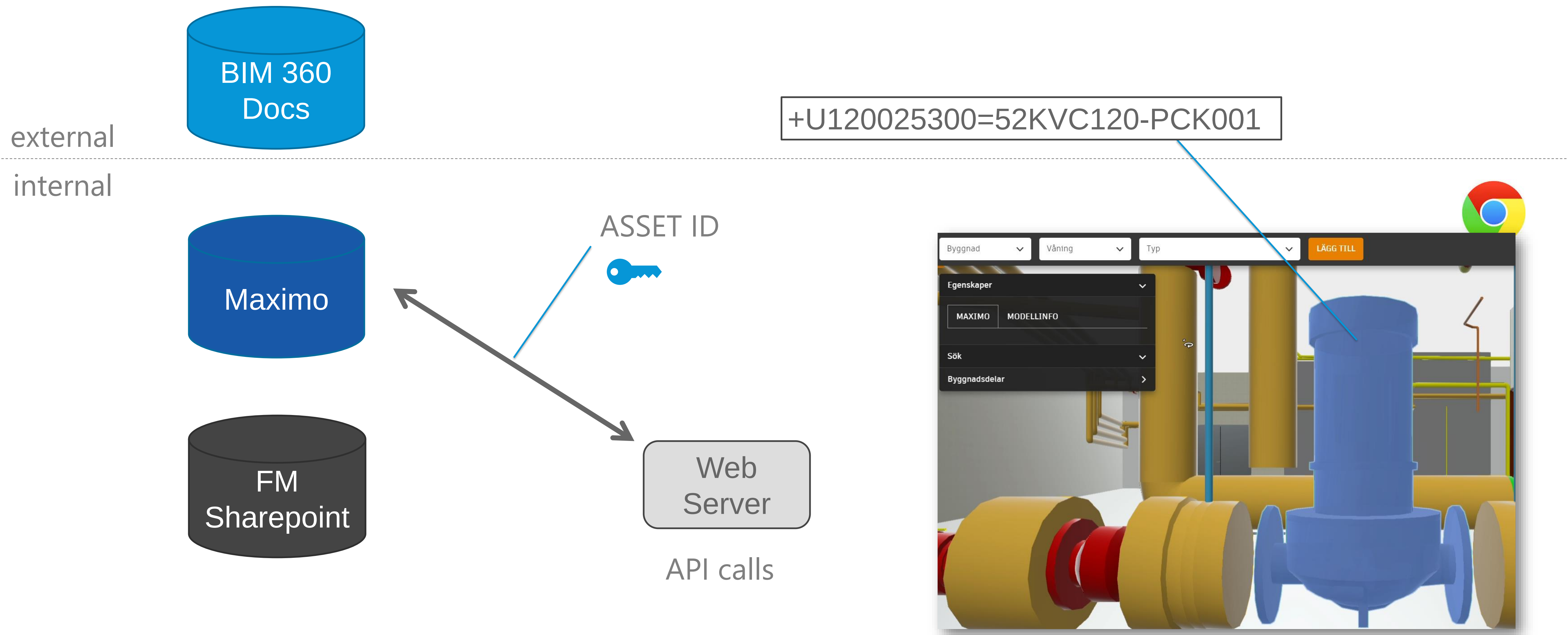


Web
Server

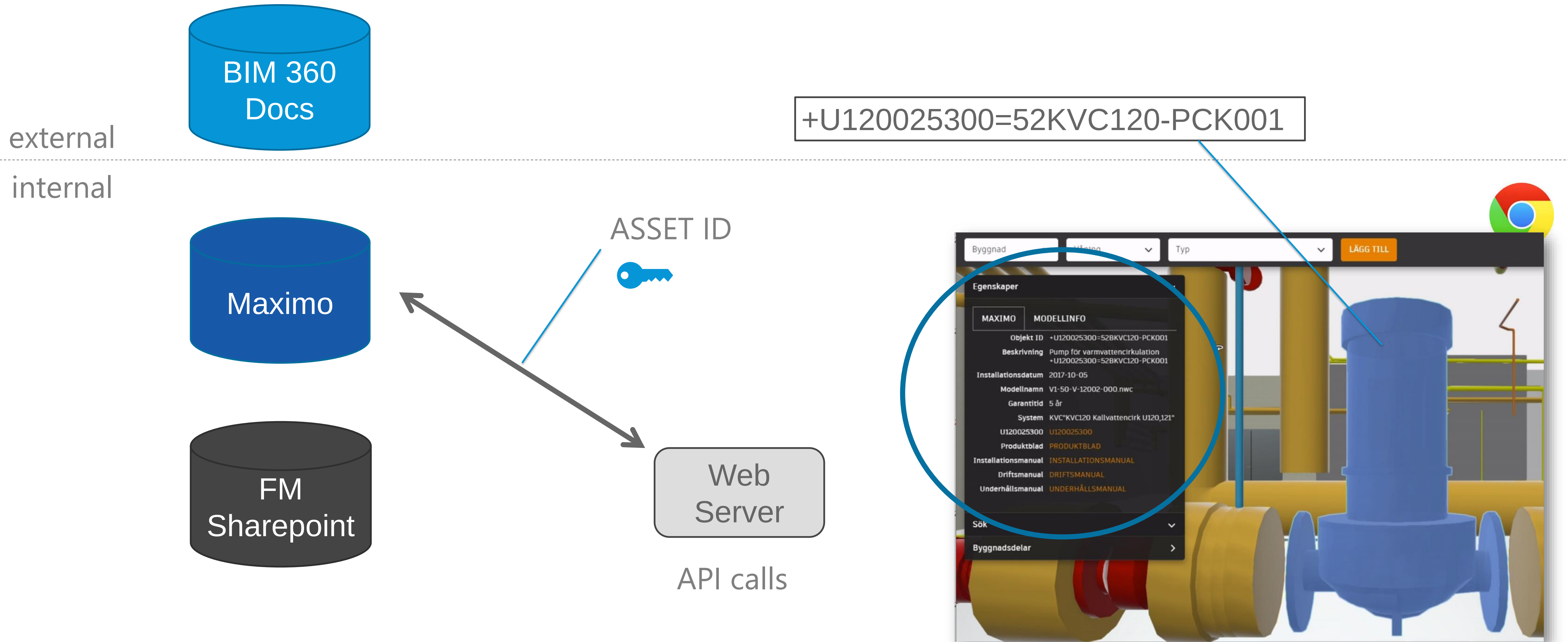


Hide or remove loaded models

Displaying Maximo information in viewer

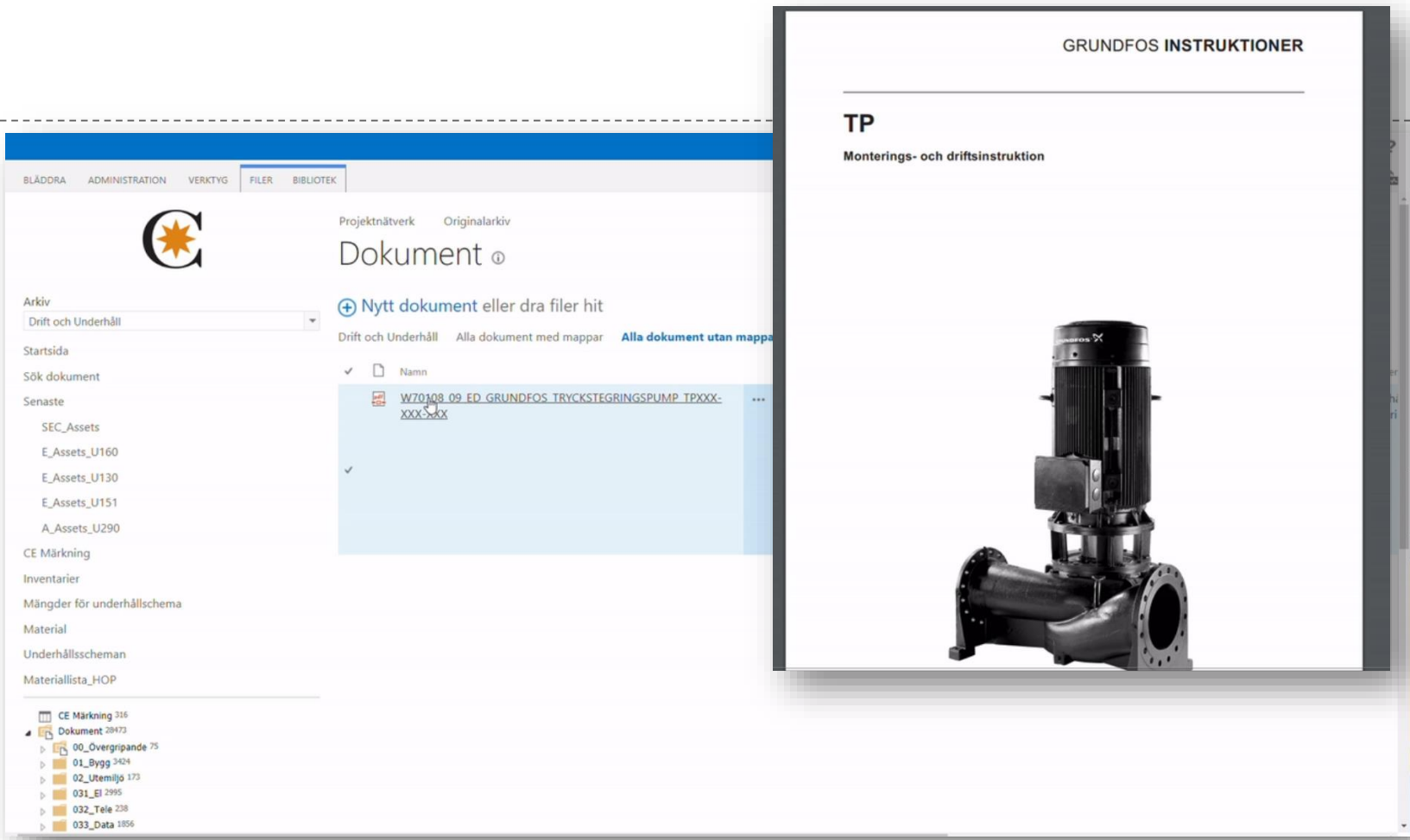
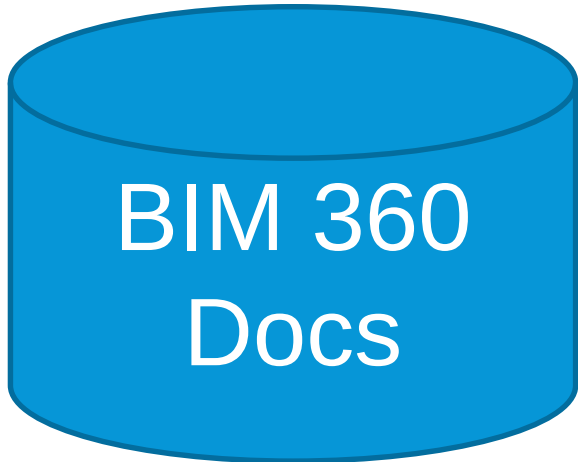


Displaying Maximo information in viewer



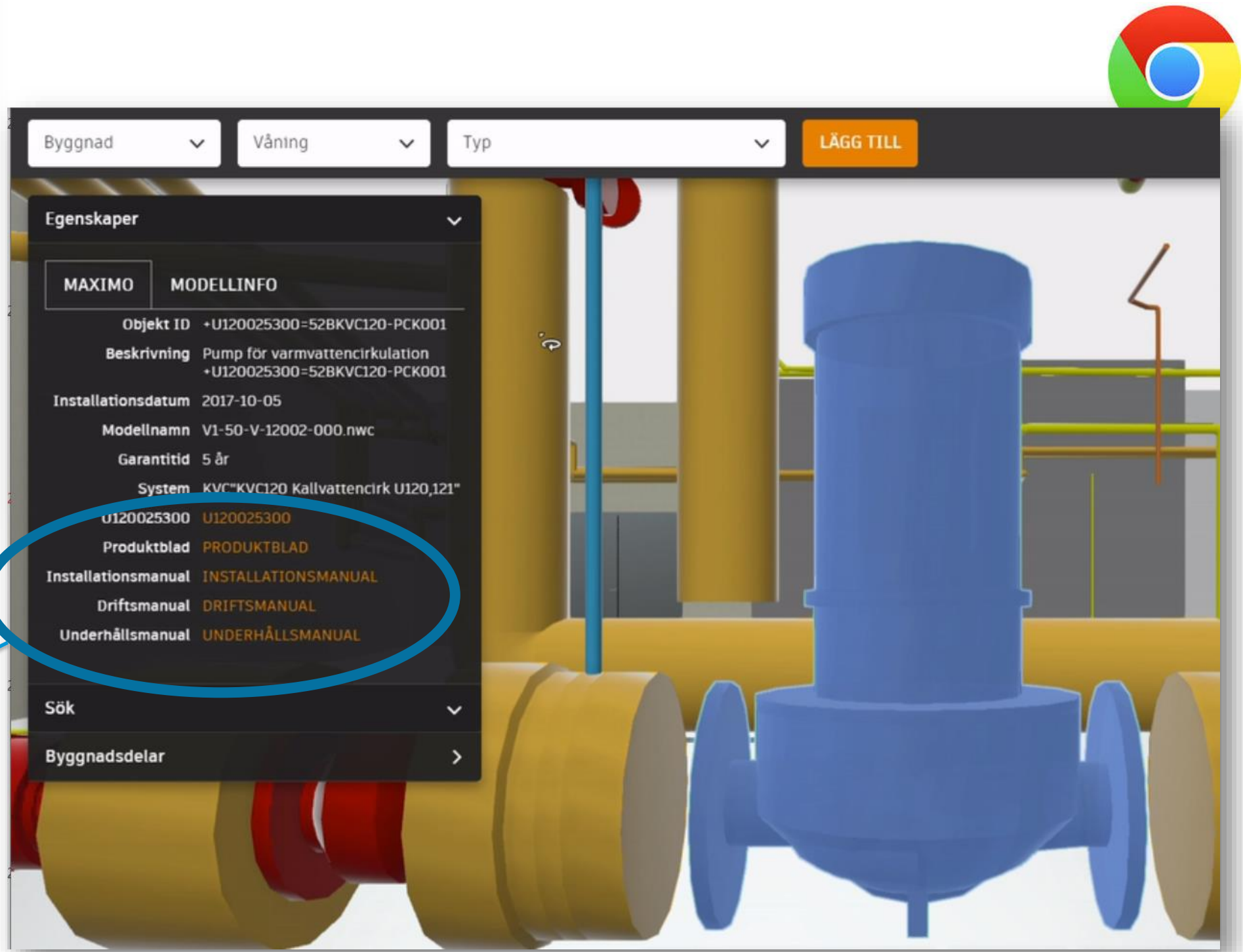
Link to documents

external
internal



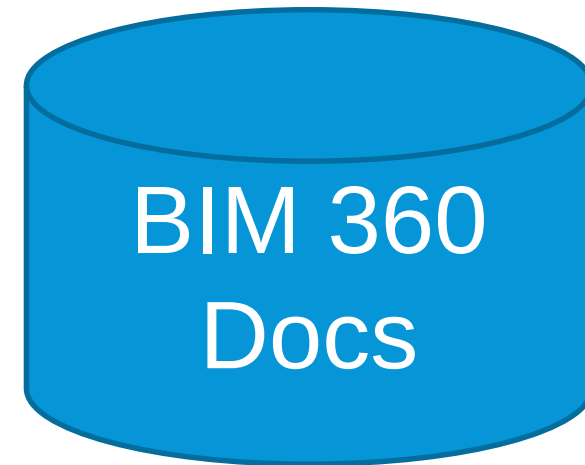
Web
Server

Hyperlinks

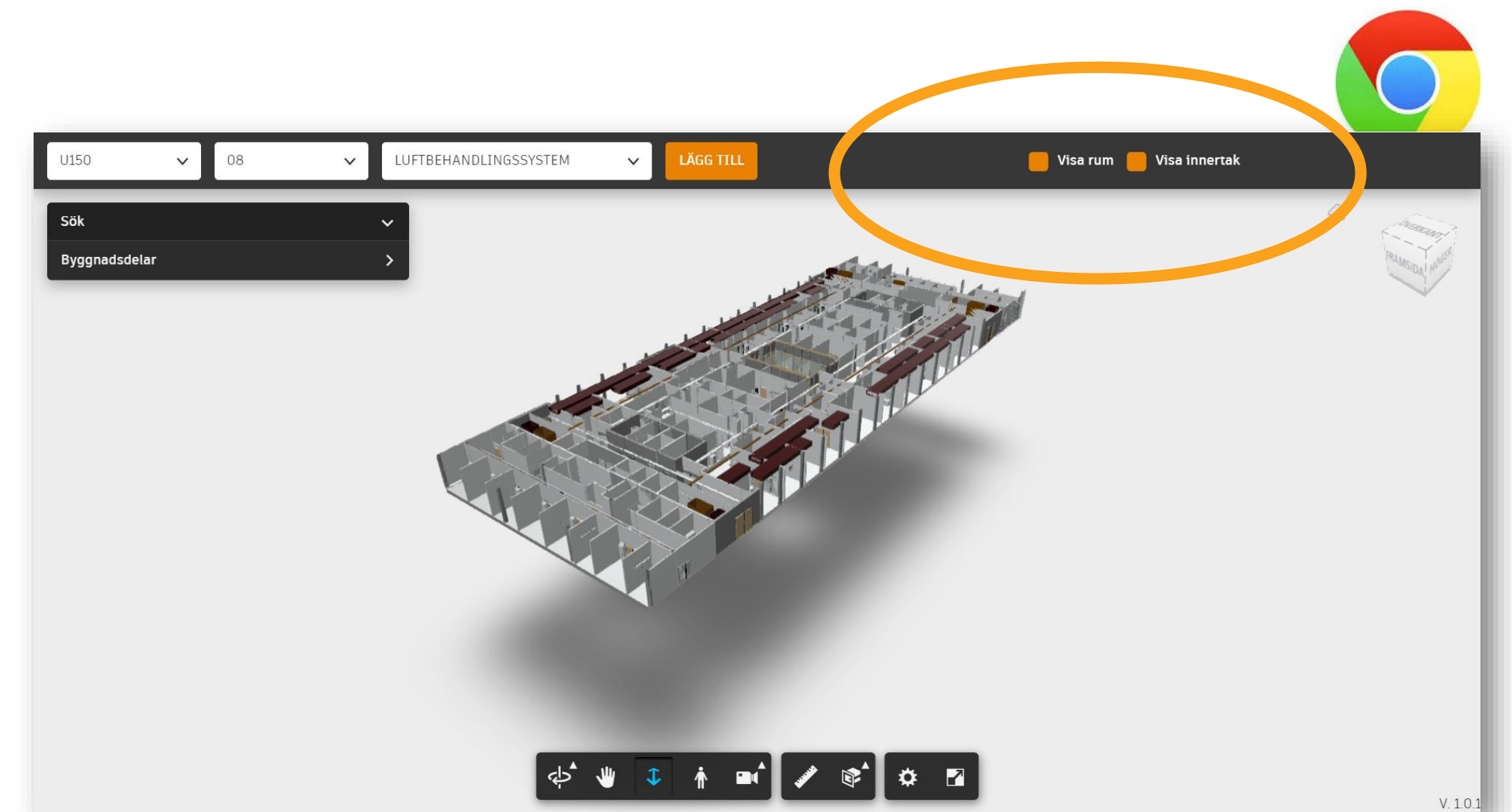
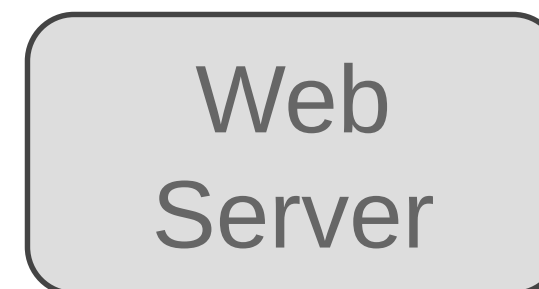
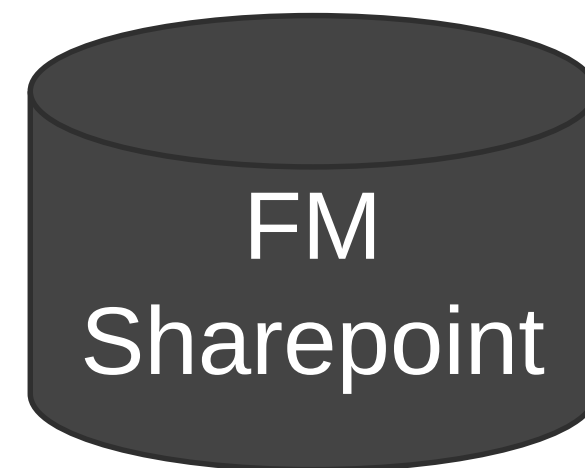


Spaces and ceiling on/off

external

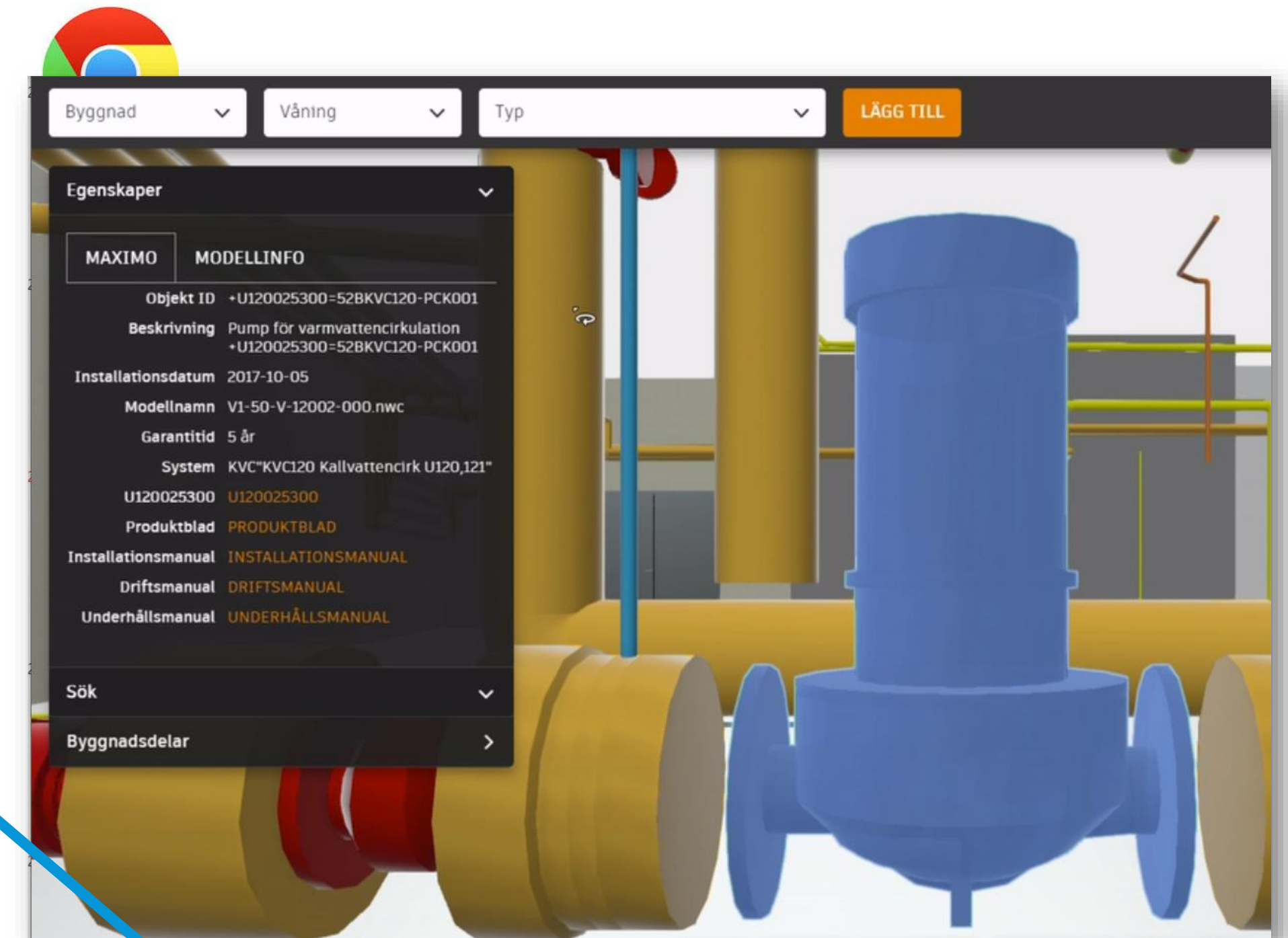
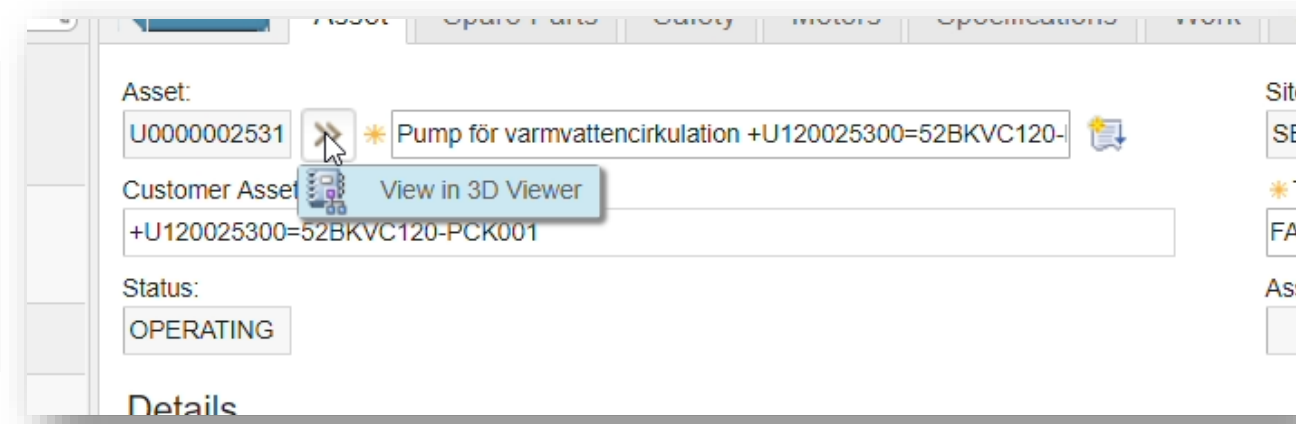


internal



Toggles spaces and ceilings

Maximo to viewer



Load file

Focus on ID

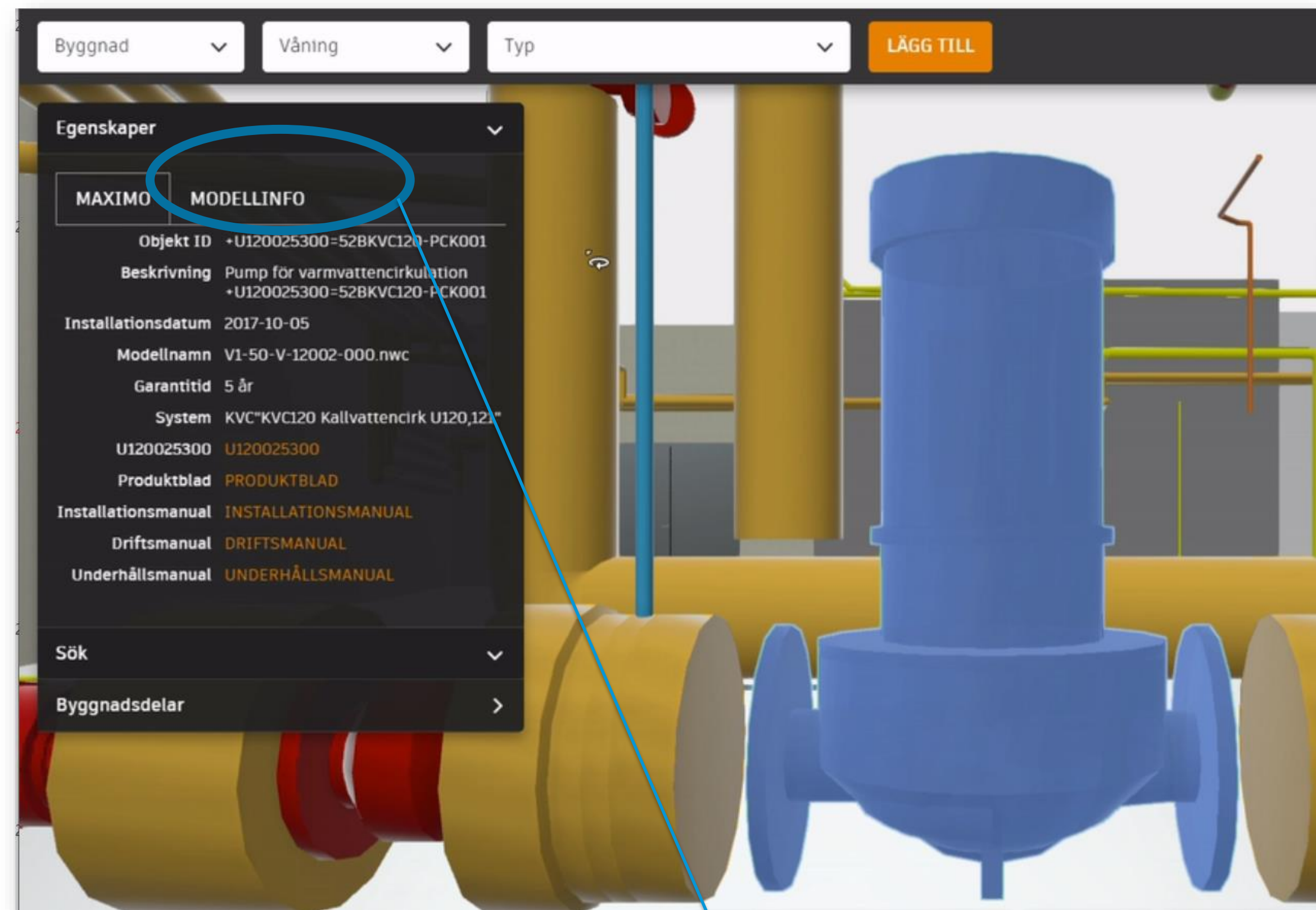
Data from Maximo

Shown in viewer:

- ID
- Description
- Date
- Warranty
- Technical system
- Hyperlinks to documents
- (Manufacturer)

Not shown in viewer:

- Expected life
- Service intervalls
- ...

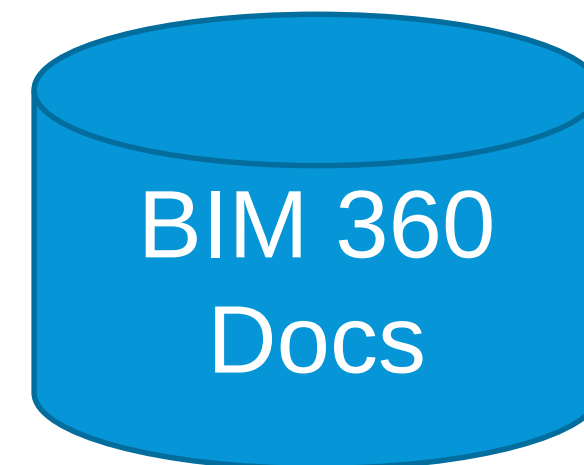


Model info "hidden"

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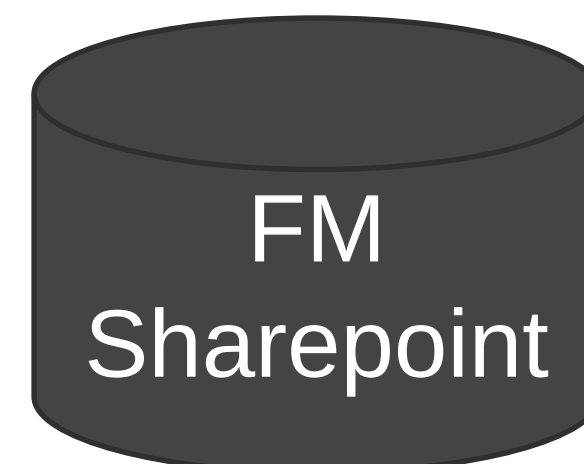
How do we keep the data updated?



Models – for the viewer (NWC)

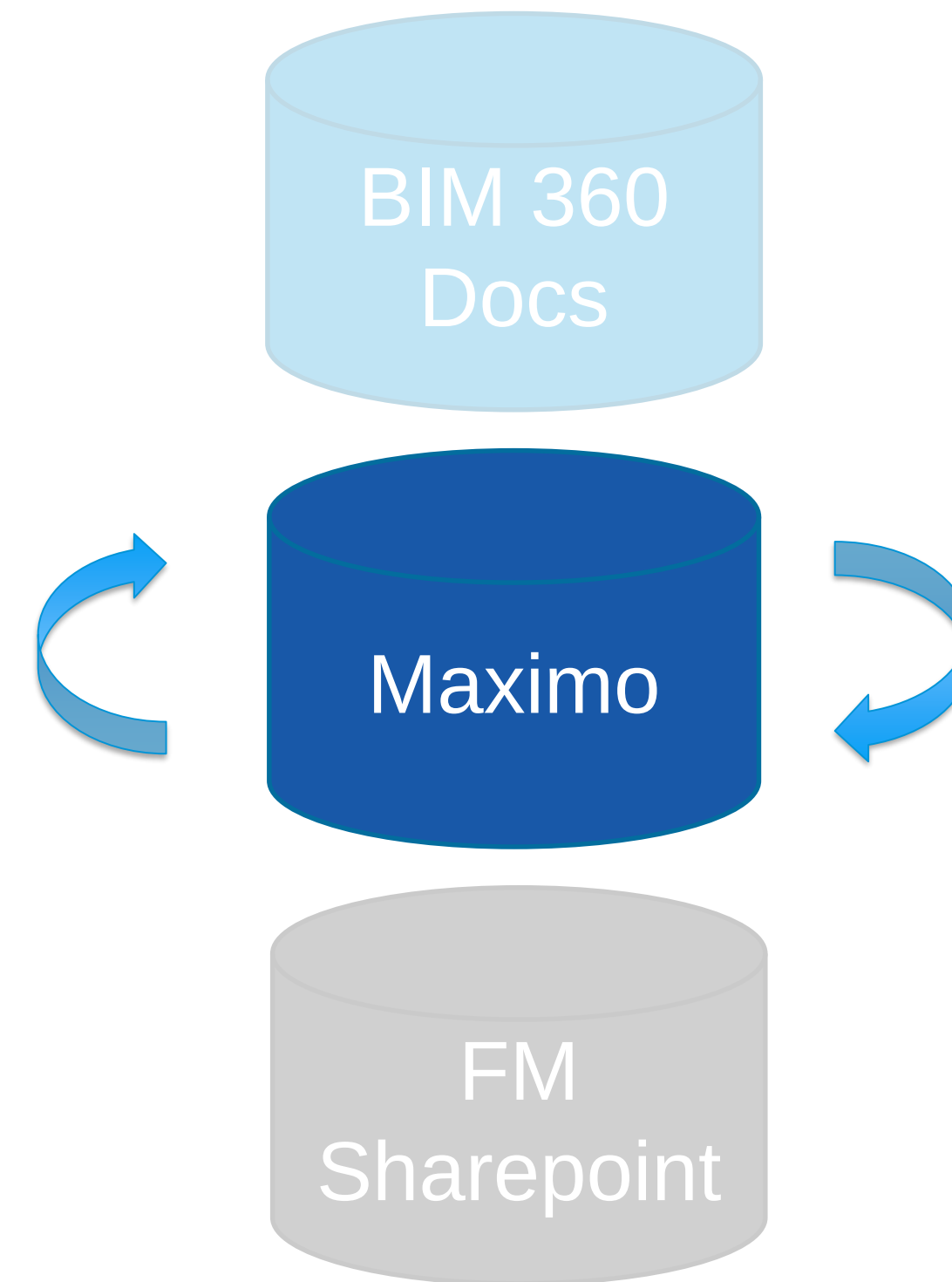
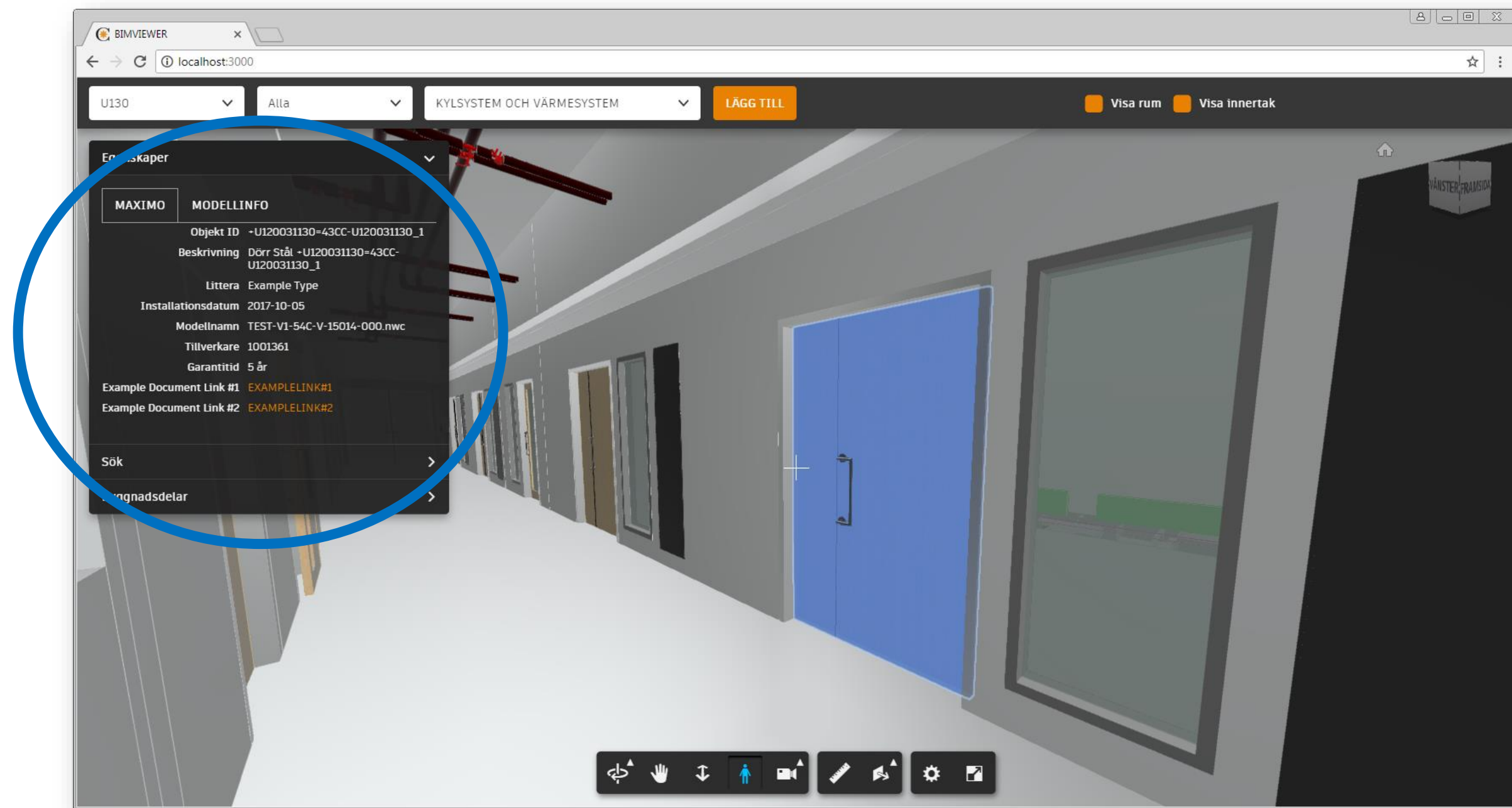


Asset information
Planning, work orders



Documents
Models – for projects (Native)

How do we keep the data updated?



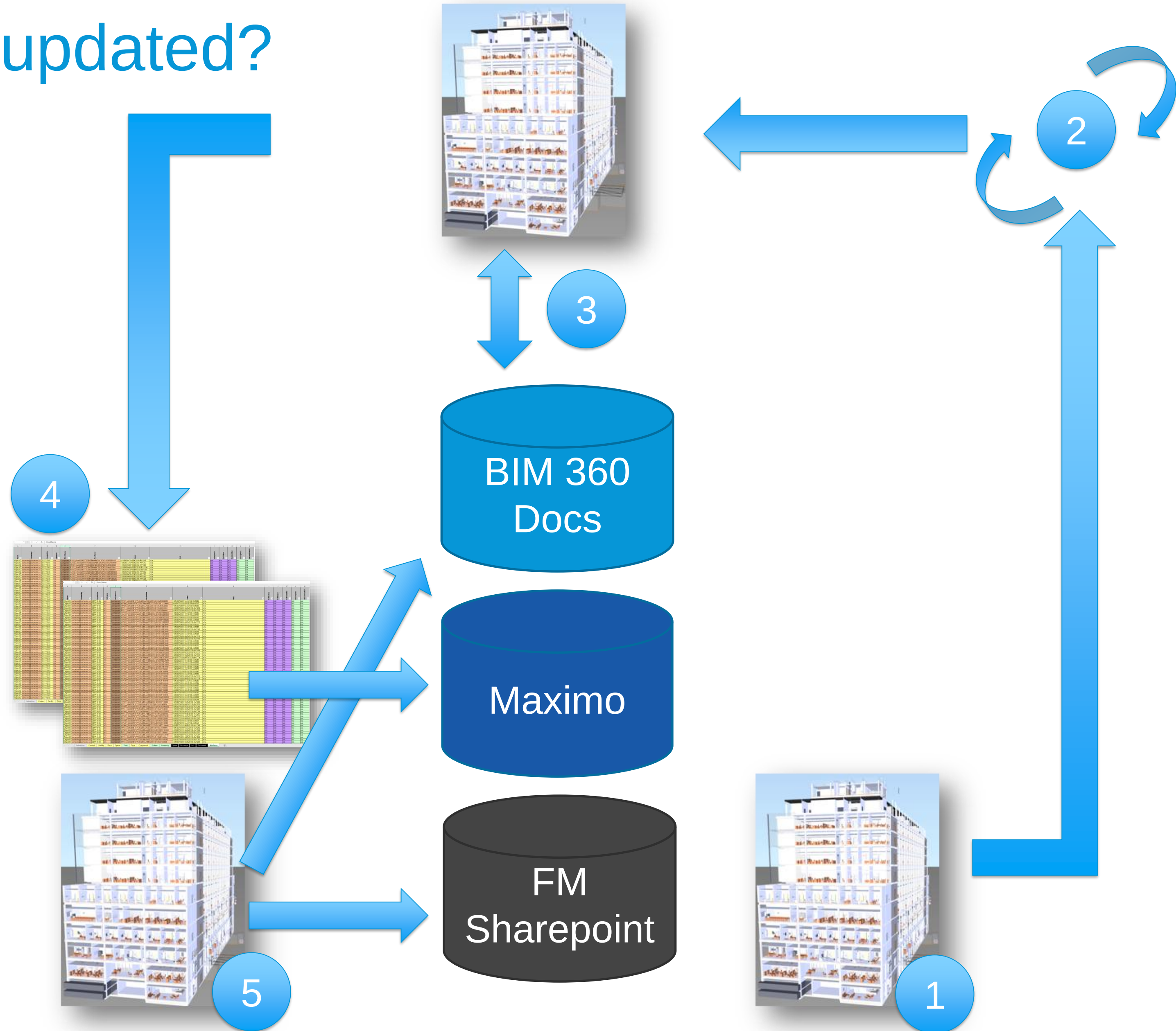
Day-to-day

- Maximo
- Work orders

How do we keep the data updated?

Projects

1. Models from Sharepoint
2. Design
3. Compare models
4. Generate COBie
5. Update,
 - COBie → Maximo
 - Models → BIM360 & FM Sharepoint



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User feedback

*"The viewer is really making
us more professional"*



Advice

- Consistant data, data quality
- Maximo = information, viewer = visualization
- Keep it simple
- High quality models

Future development, ideas

AR/VR

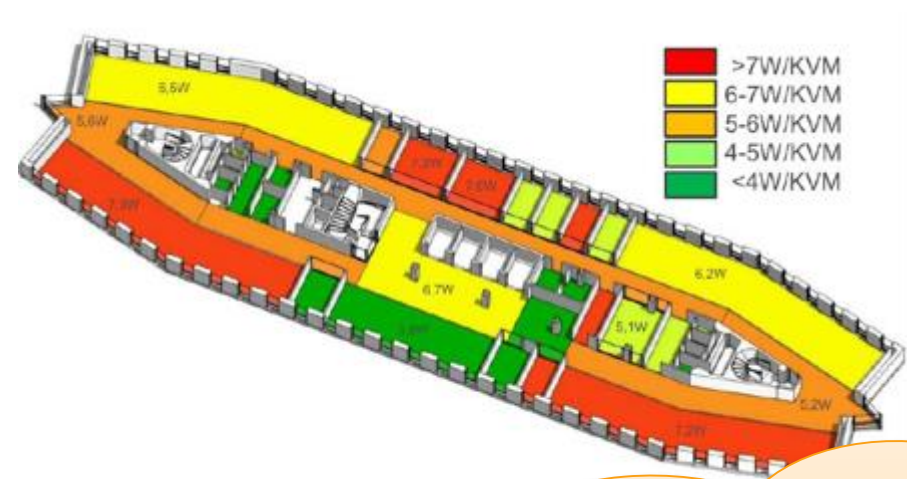
Visualizing work
orders

Environmental
information

Integrated
with design



Photo: Kristoffer Marchi



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BIM in FM
Real Life User-
Case

Integration
Maximo - Forge

Inspire!

How can Forge make *you* more professional?



Photo: Kristoffer Marchi

Thank you!

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nicklas.ring@sweco.se





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