Radiological characterisation by means of 3D-laser modelling and positioning of measurements

AB SVAFO

MultiInfo 3D Laser Scan Solution AB

Field work:

GPS measuring:

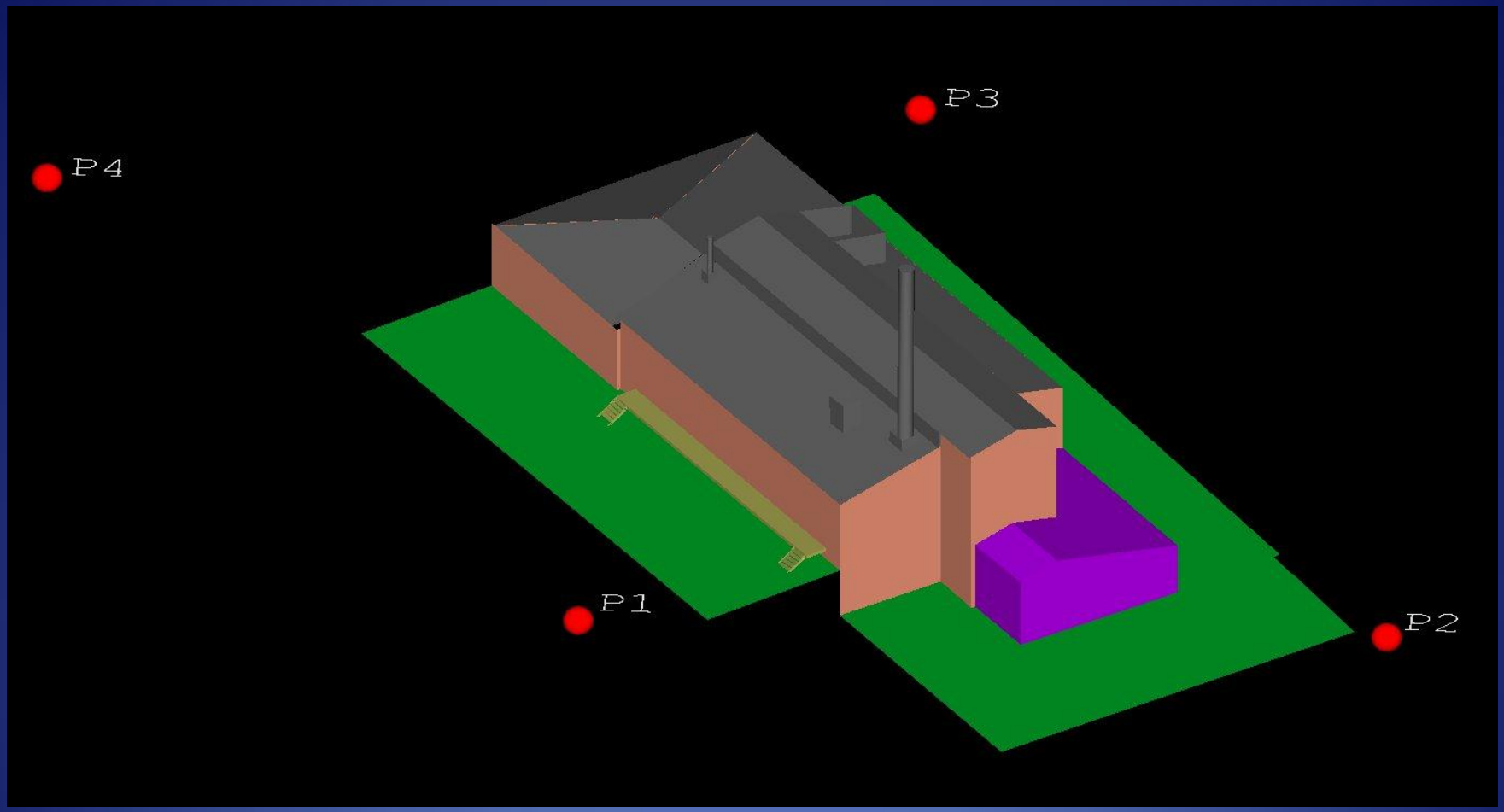
- 4 points
- Coordinate system:
  Sveref99 (X-Y), RH00 (Z)

Reference surveying with TS:

- 275

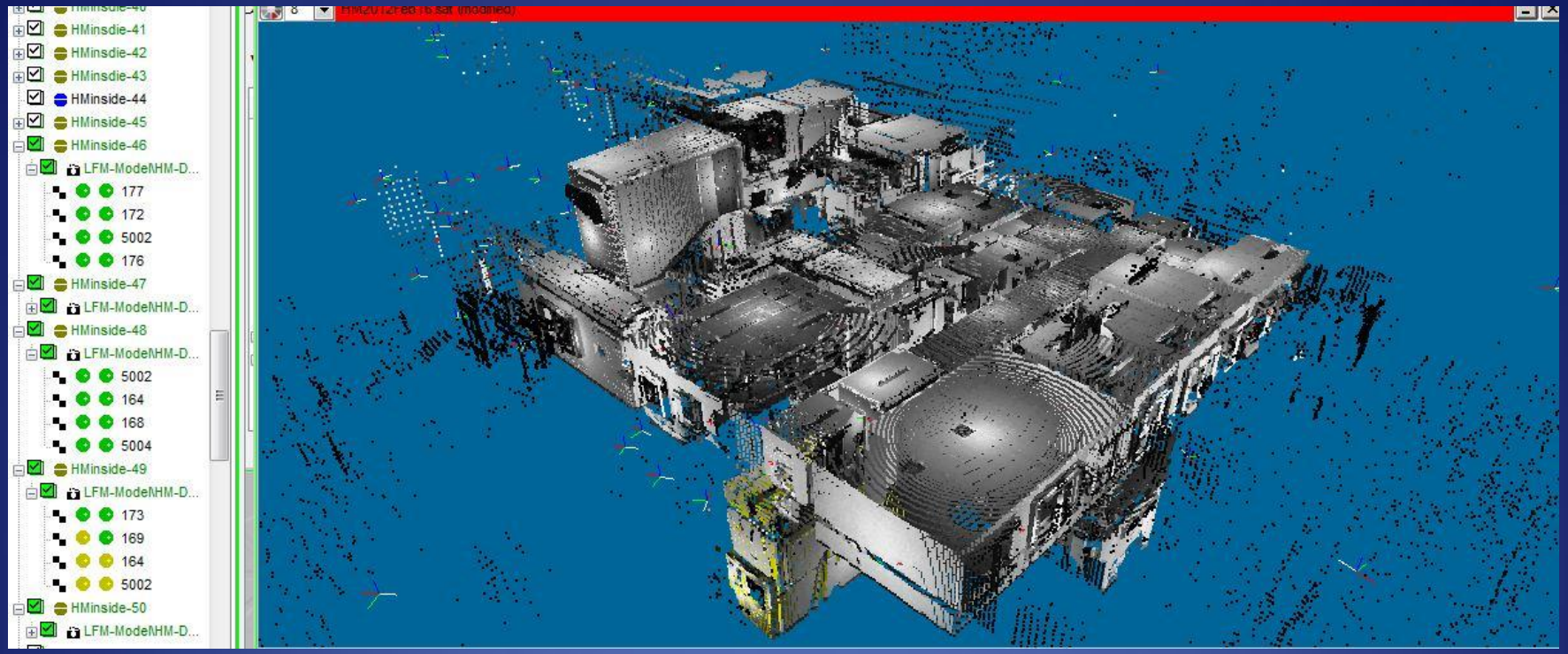
Laser scanning:

- 108


P3
P4
P1
P2

Pre-processing:

Register all scans into the same coordinate system as a point cloud



Modelling:

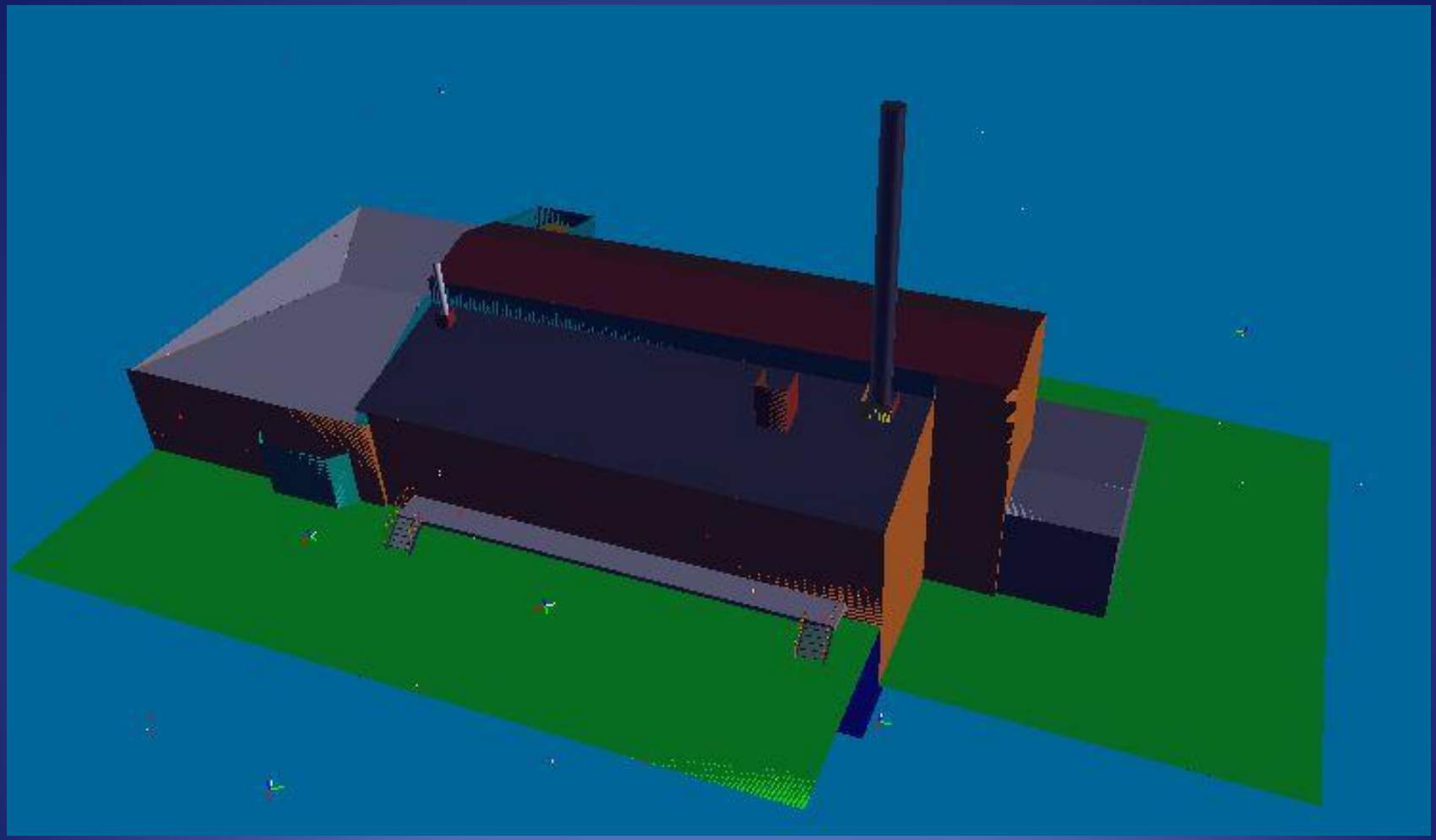
Create 3D CAD model

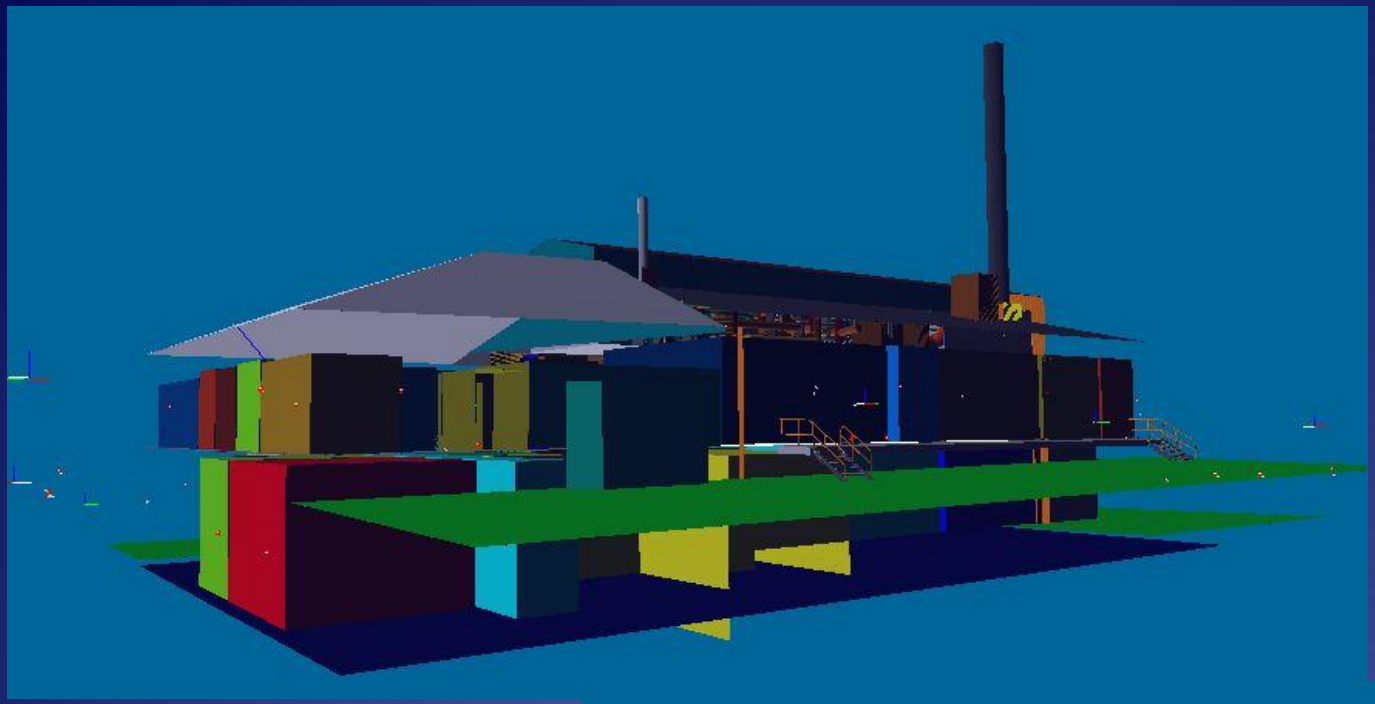
Create 3D laser image

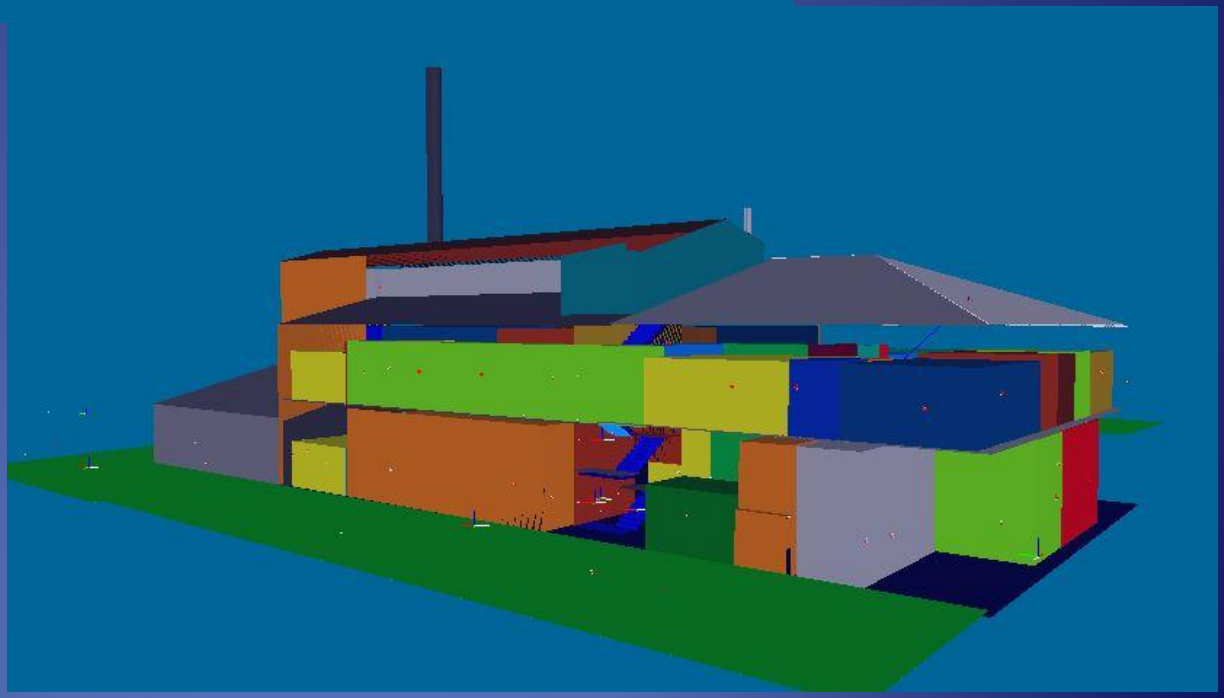
Link 3D CAD model and 3D laser image

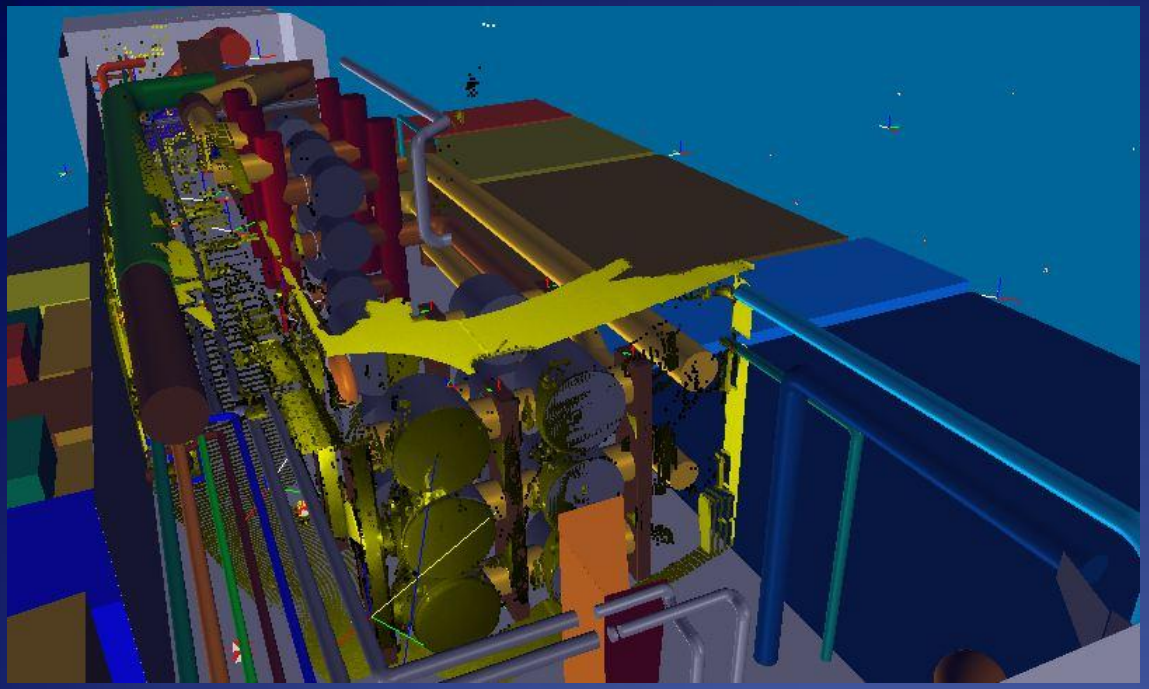
Modelling:

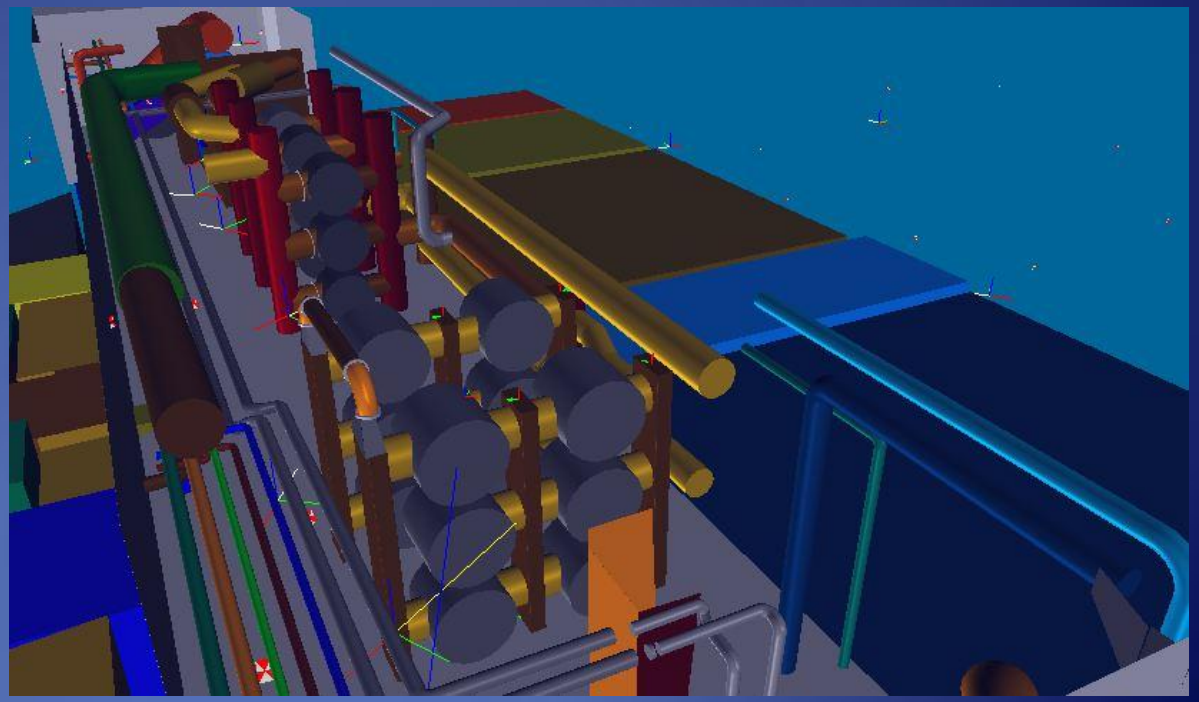
Create 3D CAD model from point clouds

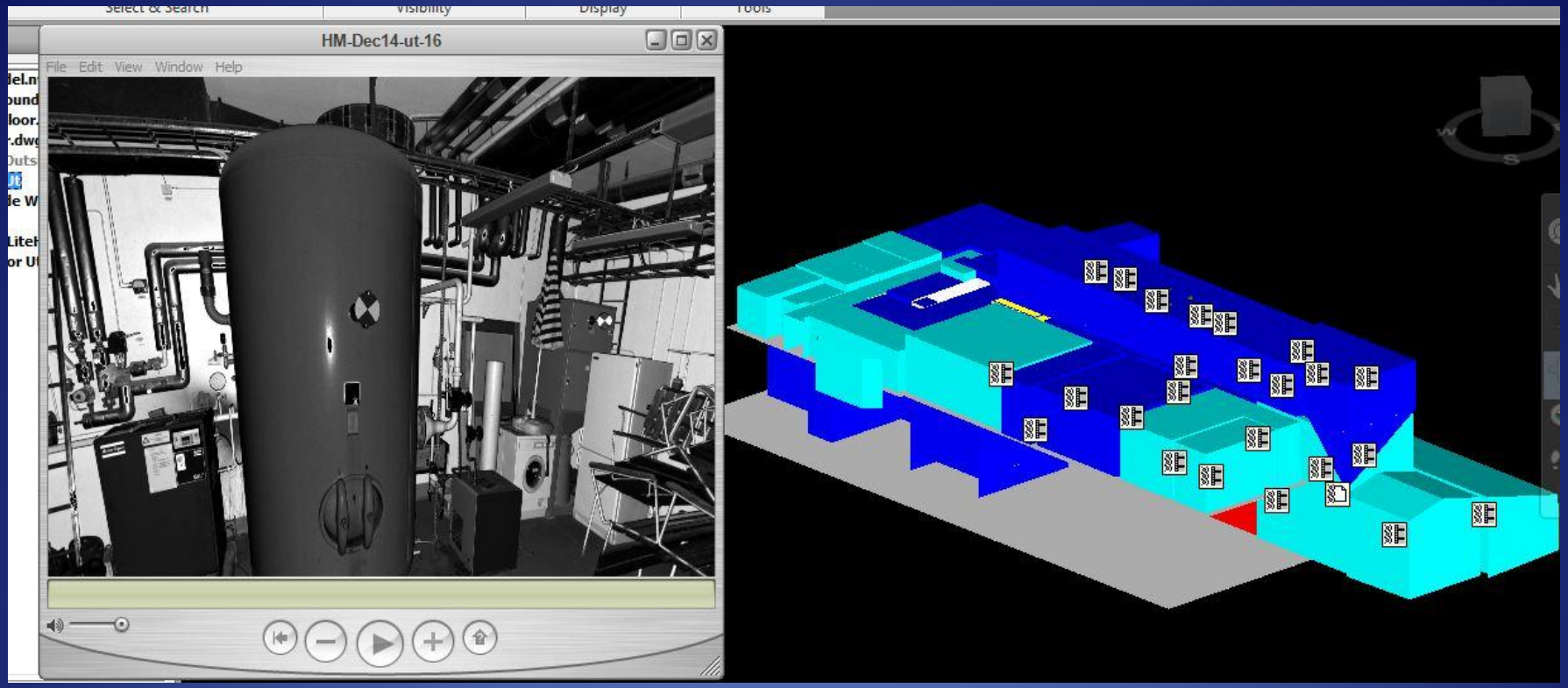




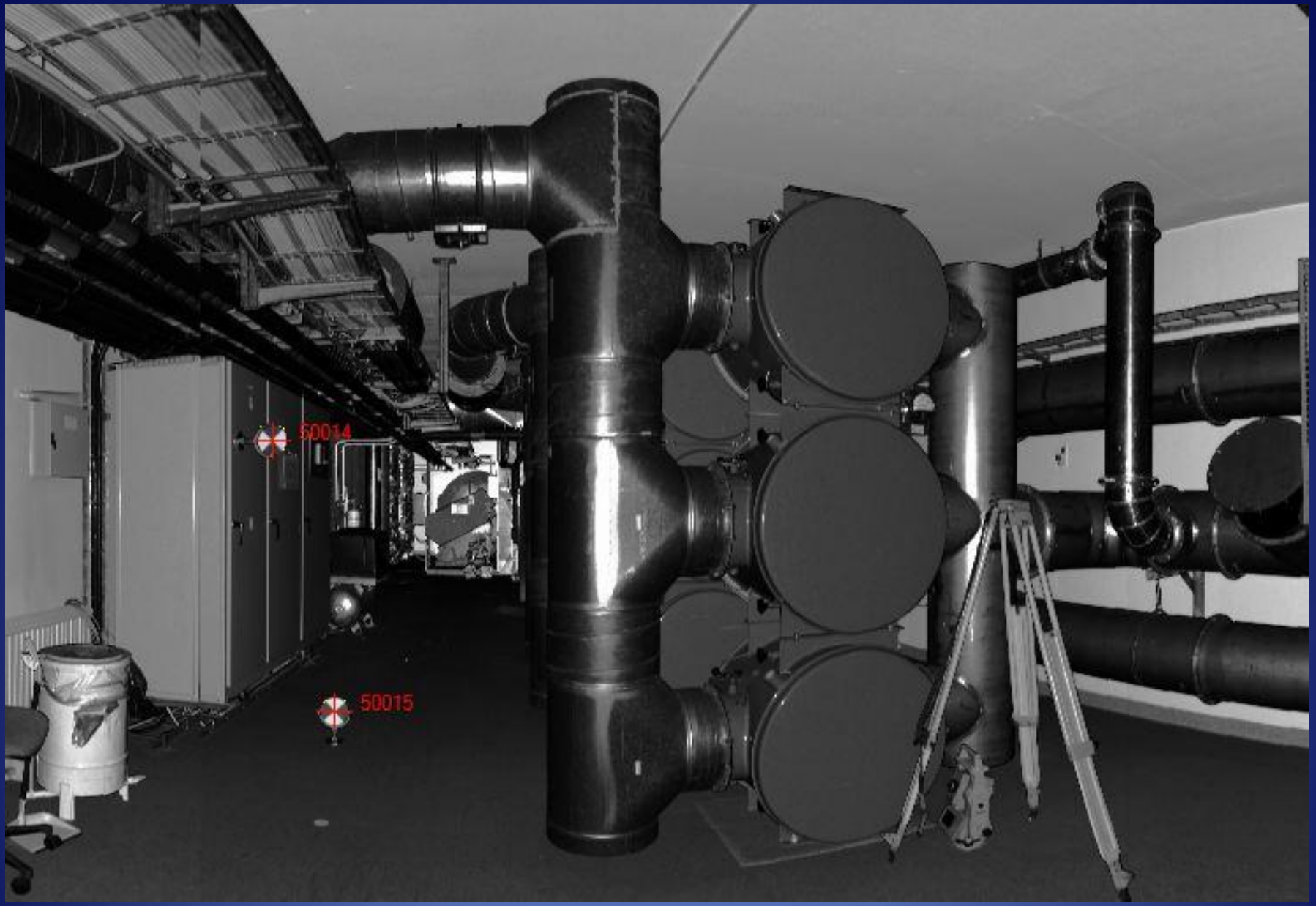






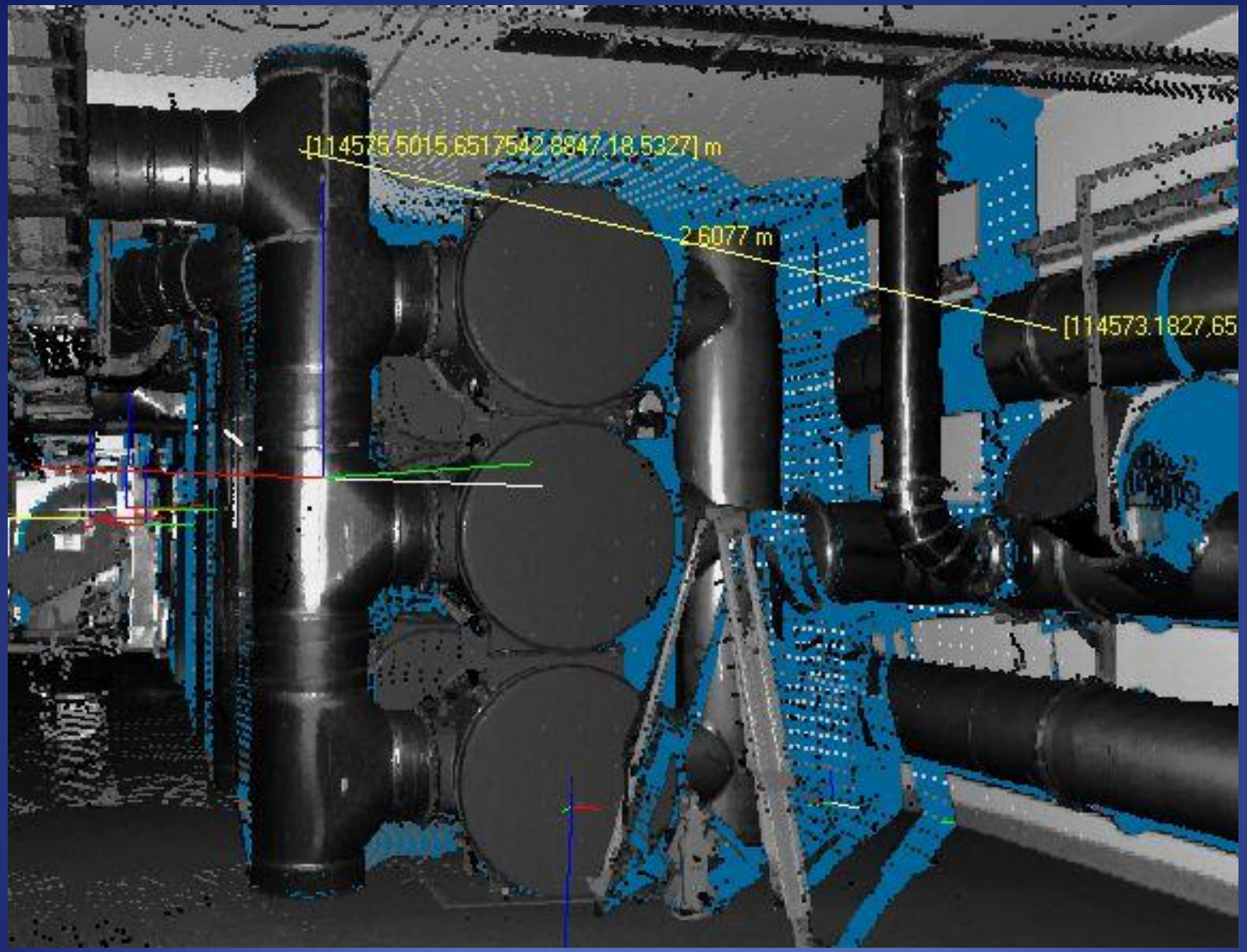

Select & Search
Visibility
Display
Tools
HM-Dec14-ut-16
File Edit View Window Help

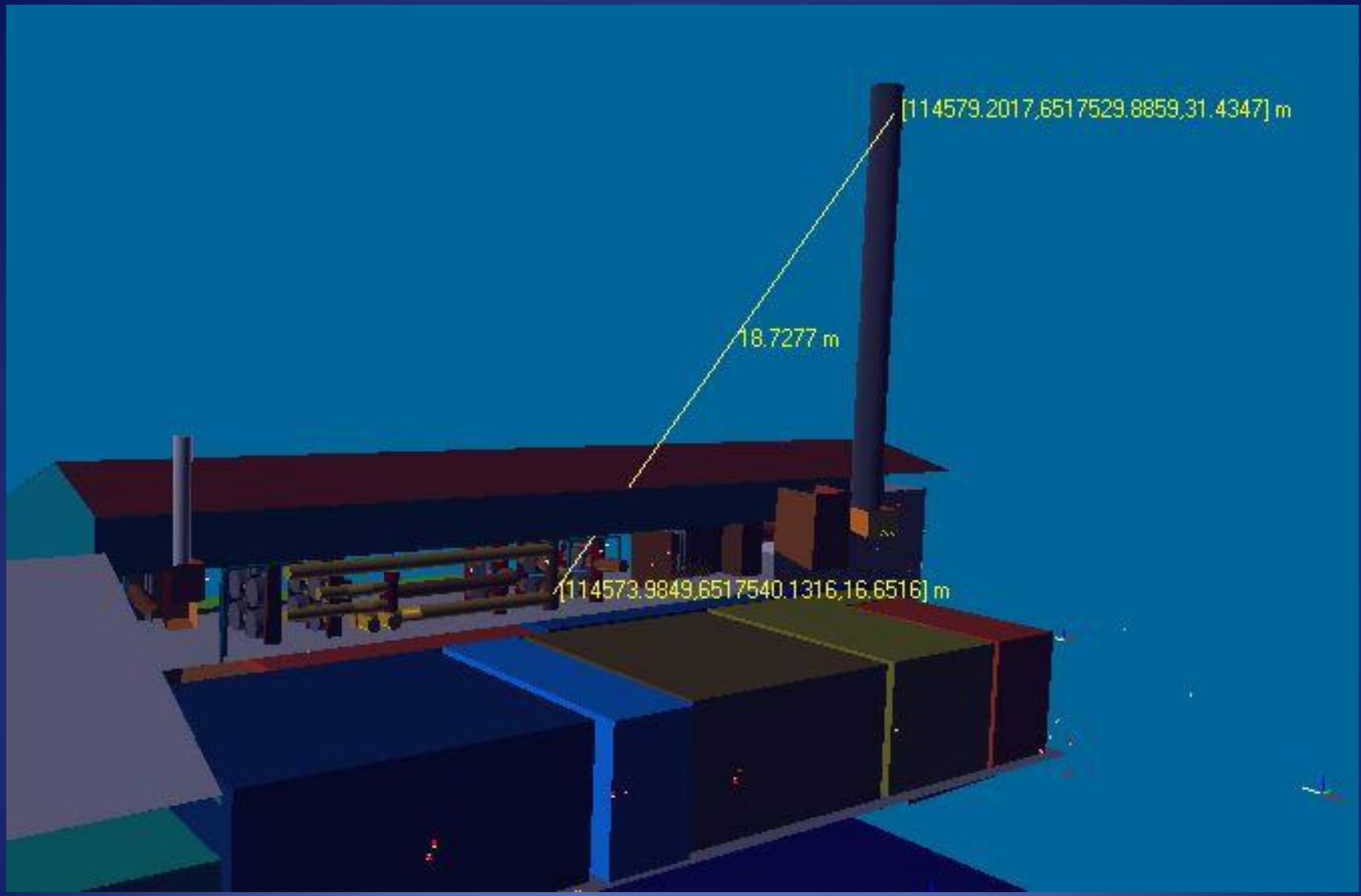
KOPPARSULFAT
CUSO4
T83
T82


50014
50015

Potential possibility:

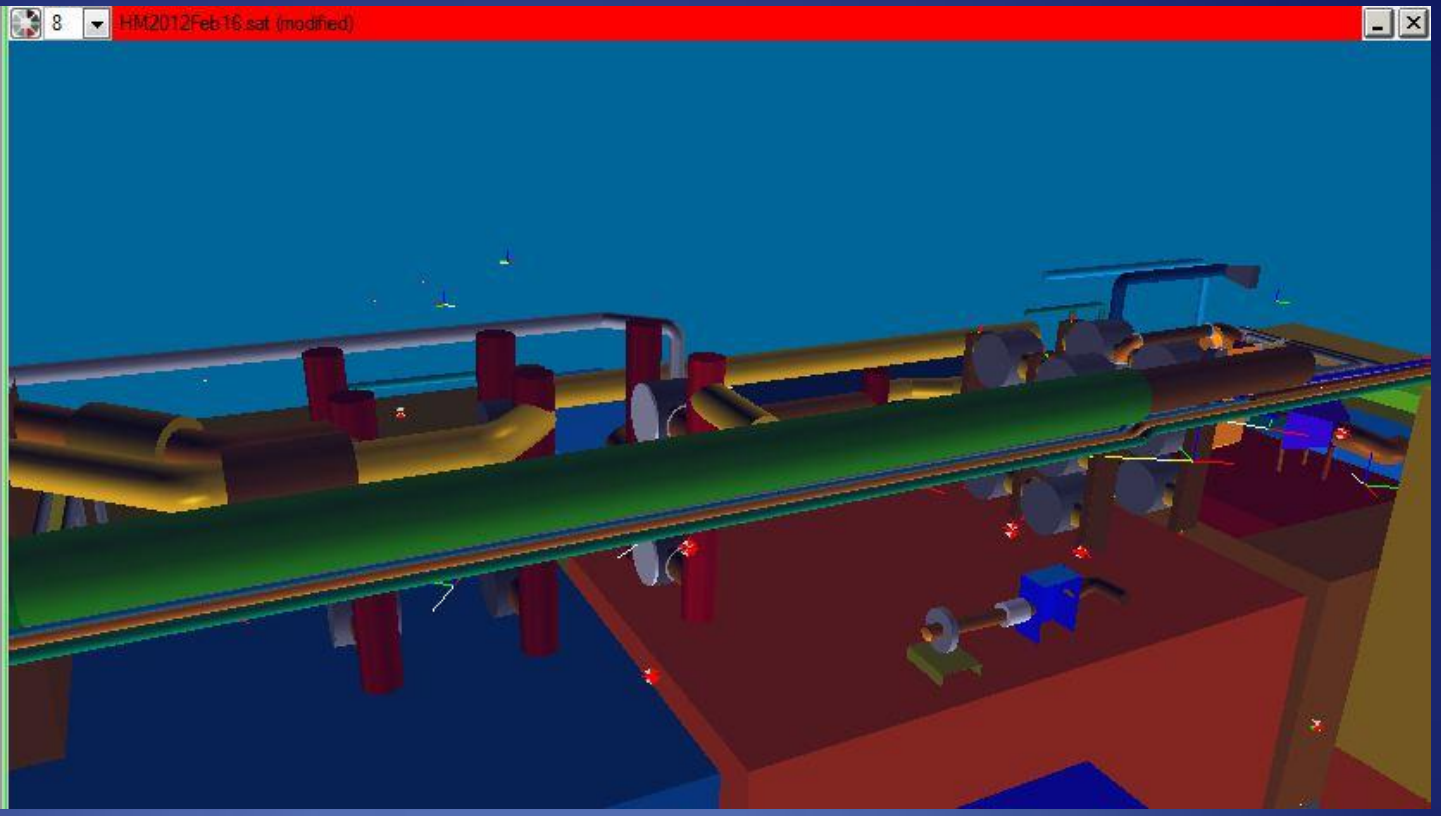
3D measurement in point clouds and 3D model




[114579.2017,6517529.8859,31.4347] m
18.7277 m
[114573.9849,6517540.1316,16.6516] m

[114574.0719,6517546.5314,15.9422] m

Object Info	Value
Name	pipe10
Type	CYLINDER
Diameter	0.6000 m
Length	10.1061 m
Direction X	-0.6042
Y	0.7969
Z	0.0035
Start X	114580.6463
Y	6517539.0524
Z	18.5403
End X	114574.5406
Y	6517547.1056
Z	18.5758
Transform	Yes
	World Frame



3D visualisation of radiological measurement:

AutoCAD platform

SVALA-database

Different 3D data:
- 3D CAD model
- 3D laser image
- 3D coordinates
- Point cloud
- Cross-section

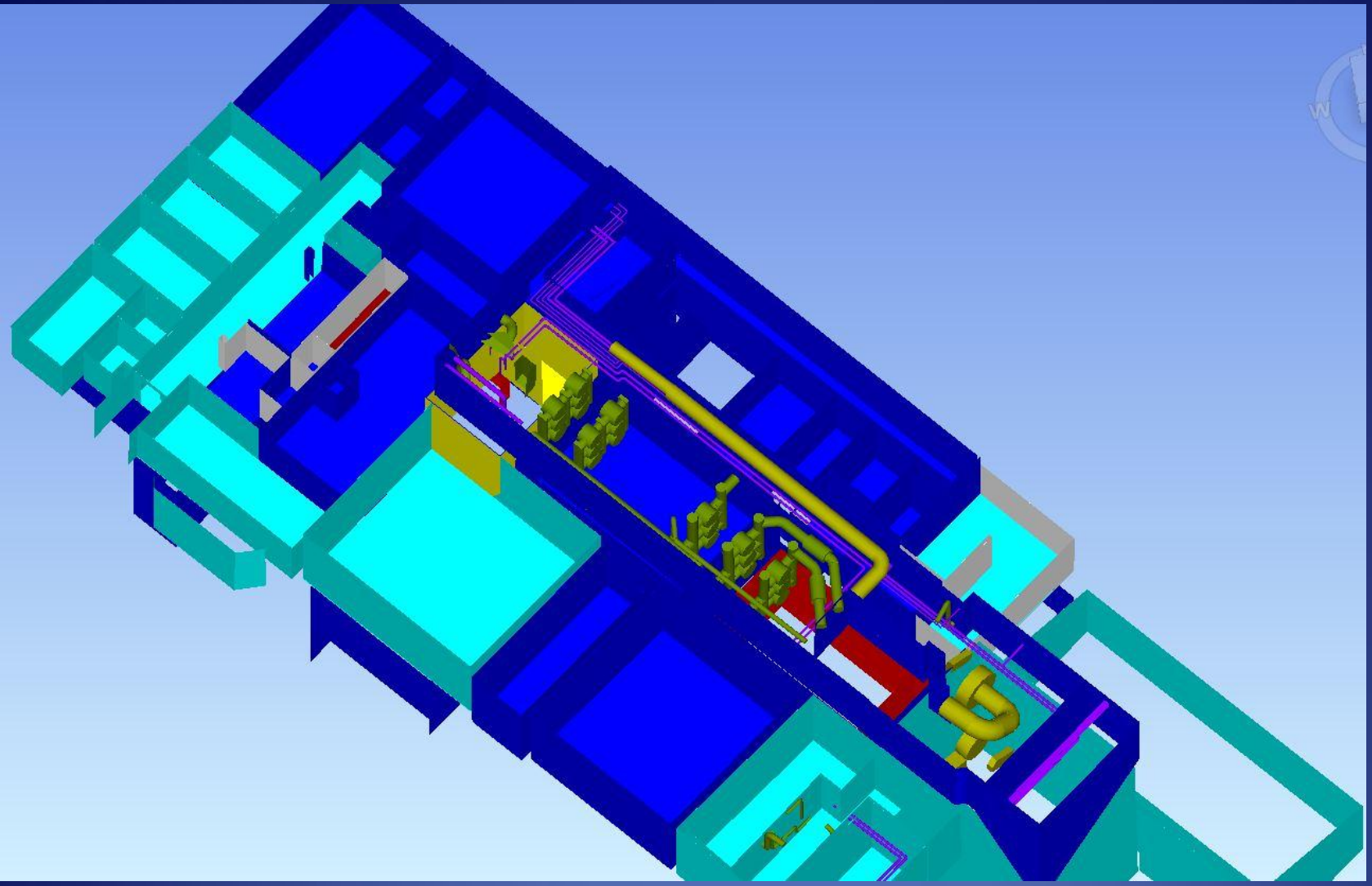
3D visualizing with Data i Svala

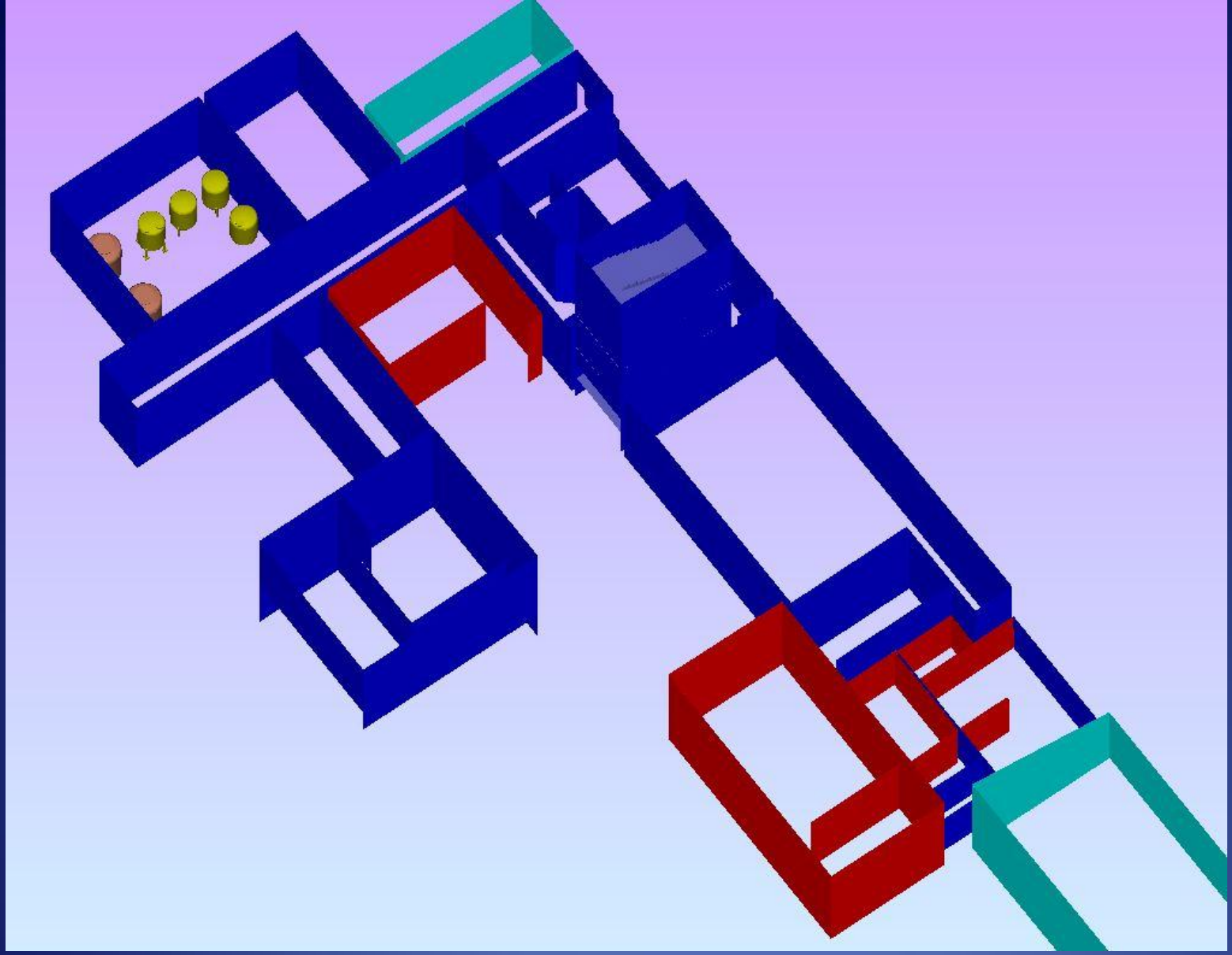
Different methods for 3D visualization of radiation measurements:

1) Classify radioactivity level with colour for different rooms

2) Capture position data (x-y-z) from laser scanning, and 3D visualization of radioation measurement with different symbols

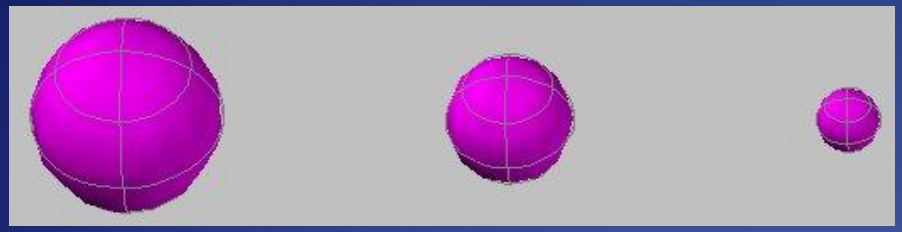
- Different types of symbols represent different types of measuring methods
- Size of the symbol represent radiation levels
- Colour of the symbol represent different measuring time

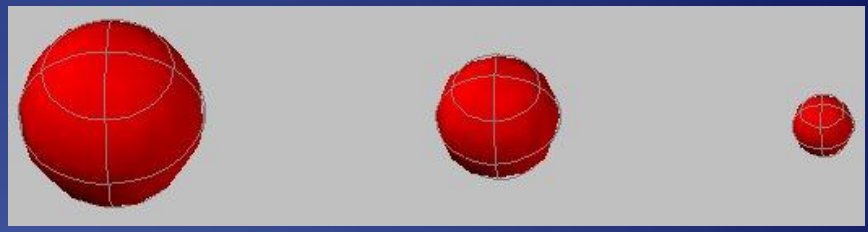


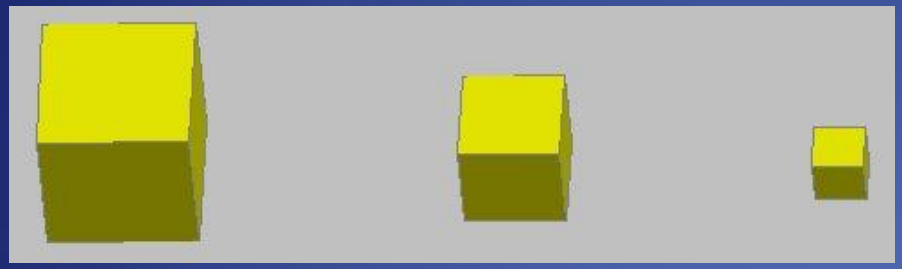


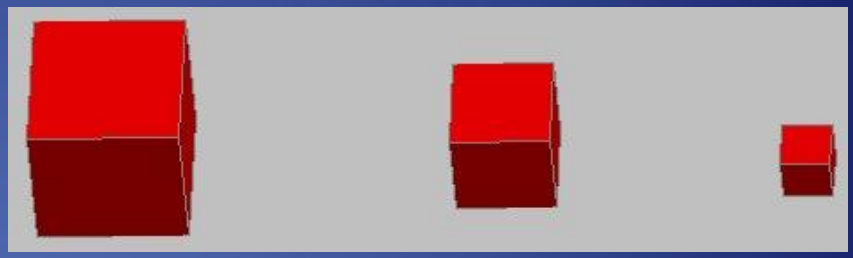
Different measuring methods:

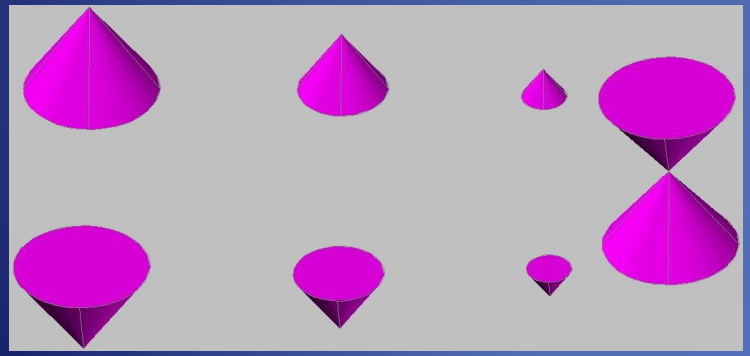
1) Drilling samples
2) Grab samples
3) Smear samples

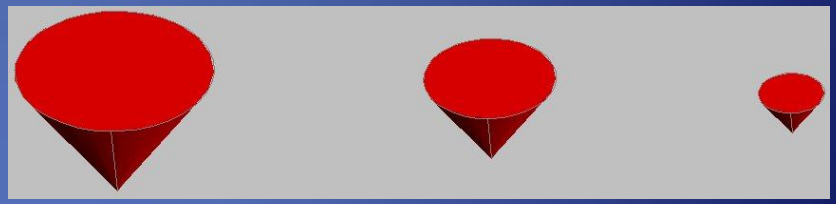


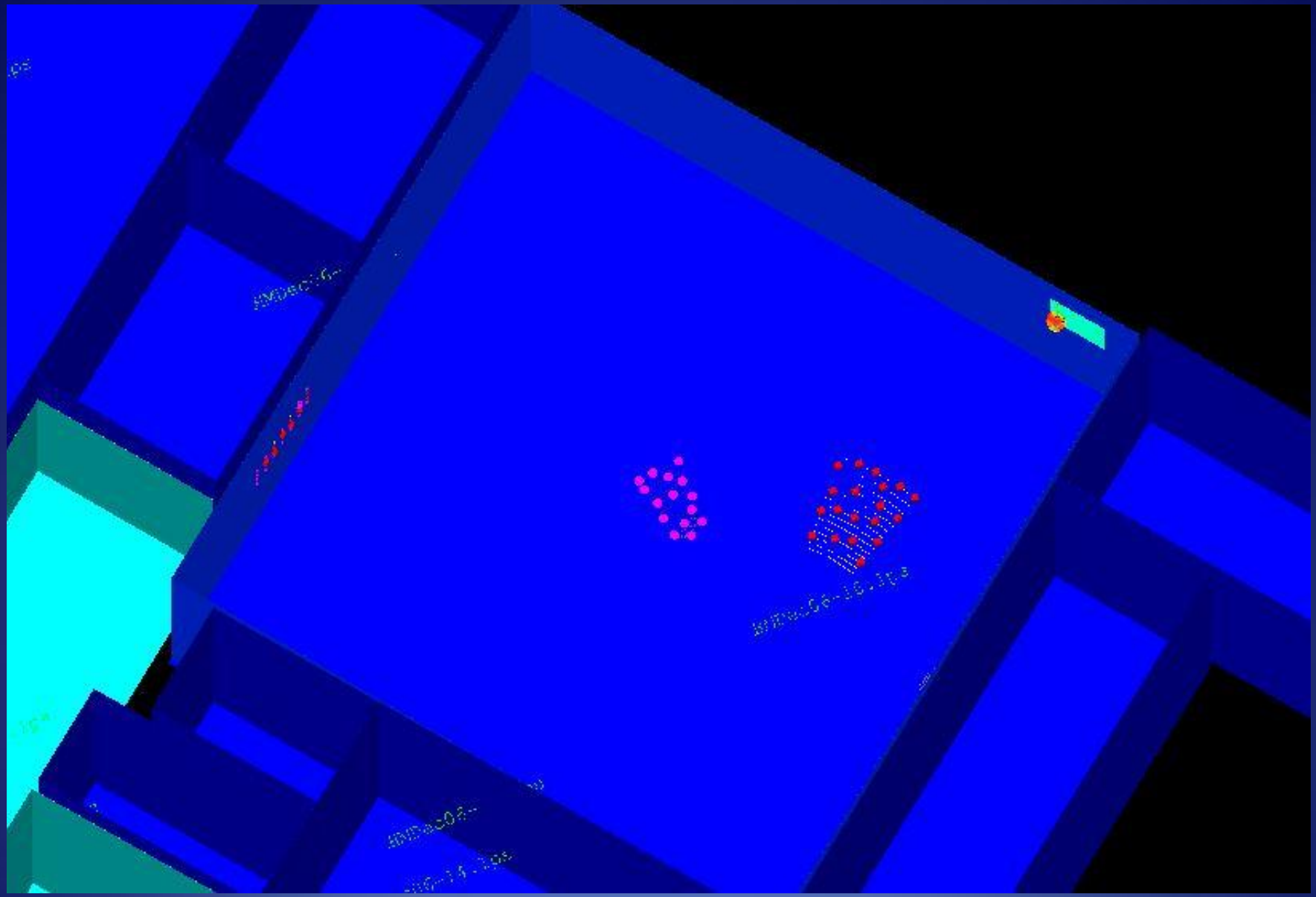


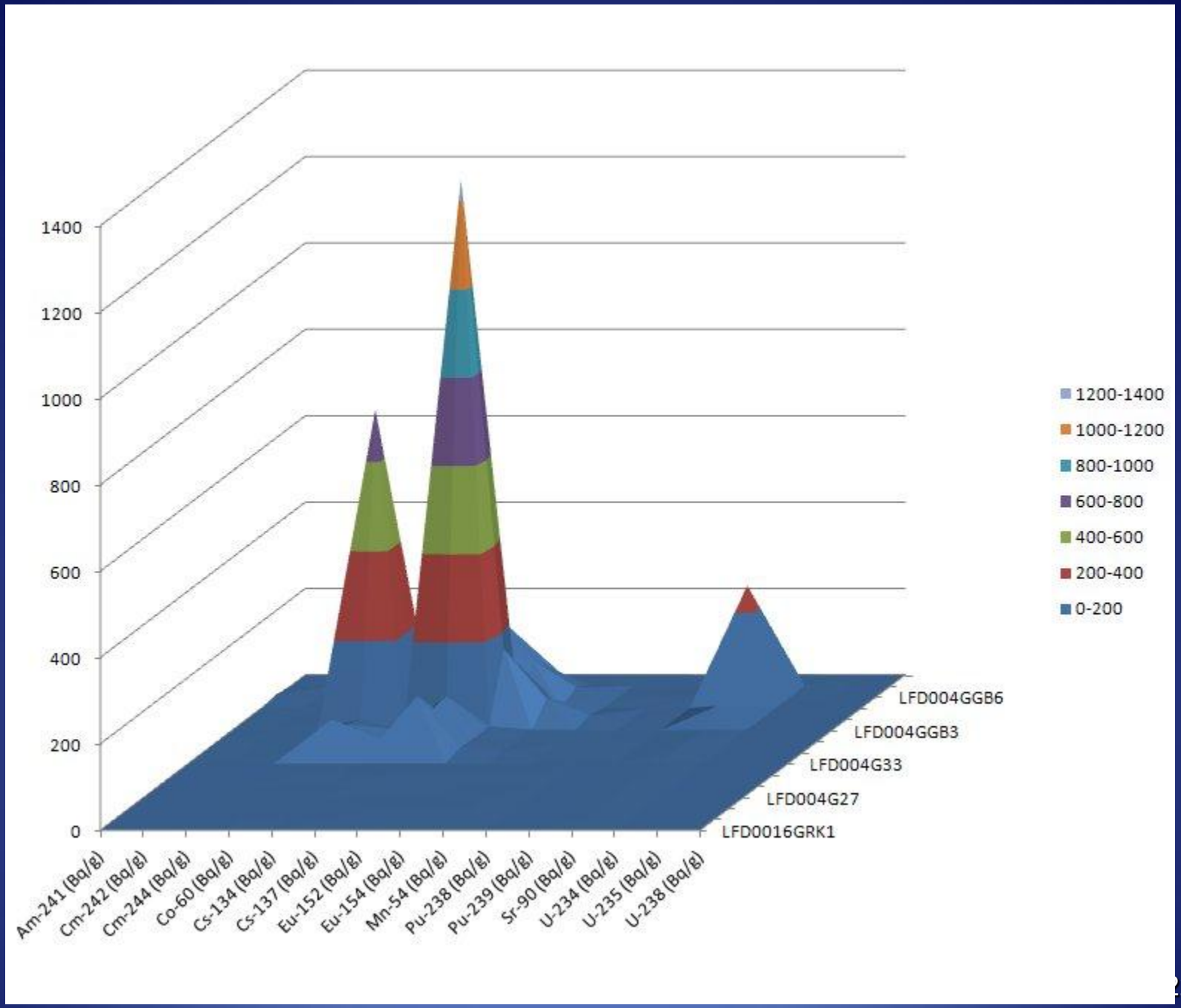




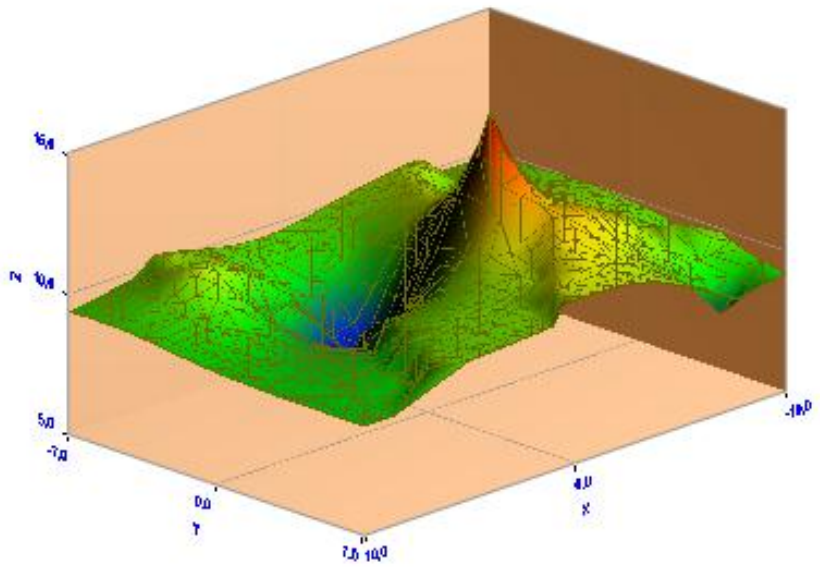







1400
1200
1000
800
600
400
200
0
1200-1400
1000-1200
800-1000
600-800
400-600
200-400
0-200
LFD004GGB6
LFD004GGB3
LFD004G33
LFD004G27
LFD0016GRK1
Am-241 (Bq/g)
Cm-242 (Bq/g)
Cm-244 (Bq/g)
Co-60 (Bq/g)
Cs-134 (Bq/g)
Cs-137 (Bq/g)
Eu-152 (Bq/g)
Eu-154 (Bq/g)
Mn-54 (Bq/g)
Pu-238 (Bq/g)
Pu-239 (Bq/g)
Sr-90 (Bq/g)
U-234 (Bq/g)
U-235 (Bq/g)
U-238 (Bq/g)

Trend surface analysis of radioactivity level for whole floor



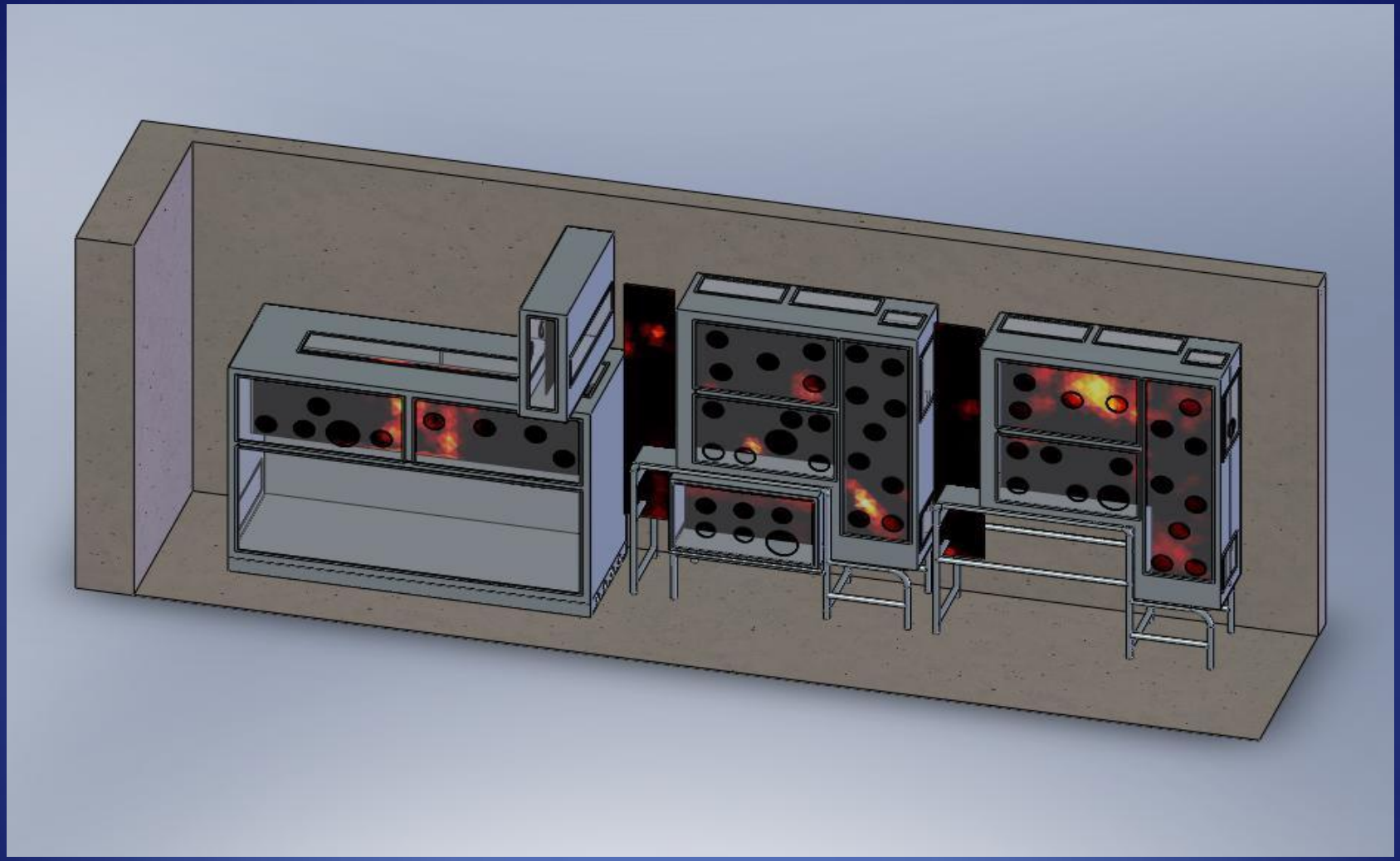
Ideas about classification of radioactivity measurements:

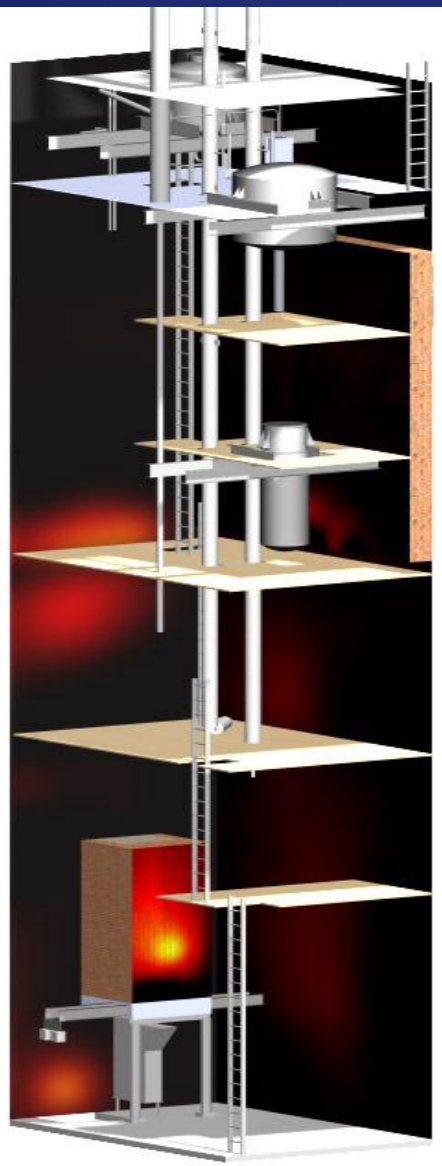
1)Classify radioactivity level for different objects, e.g. ventilation, drains, rooms.
2)Classify measuring data of alpha-, beta- and gamma radiation with different radioactivity levels
3)Different radioactivity levels corresponding to different colours

Capture position data (x-y-z) from laser scanning:

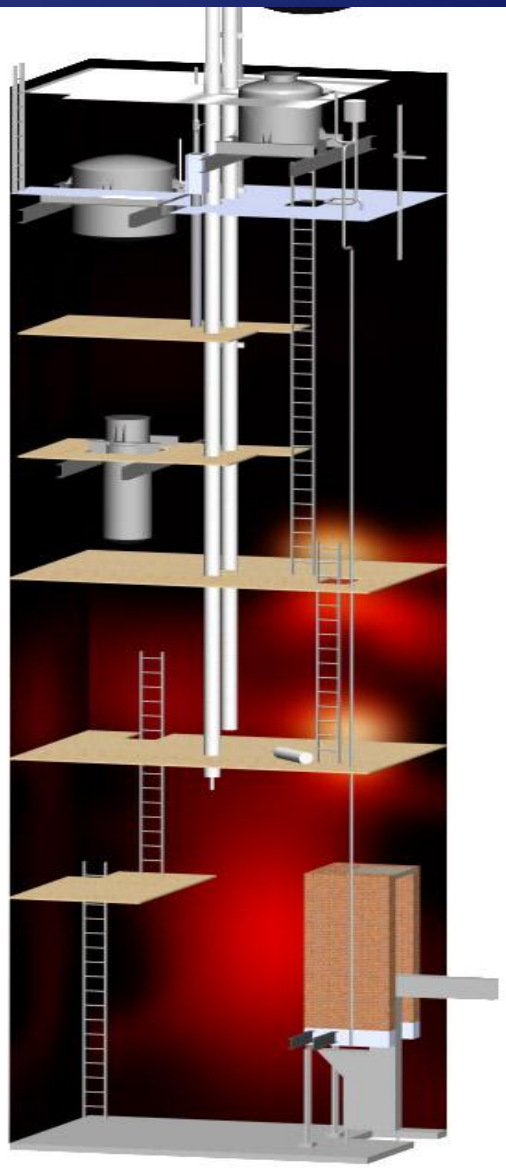
1)If RFID-tags can be identified, the position data are captured from laser scanning data
2)If no tags are used, but position description is available, e.g. on the ground, distances from the door and above the floor.

Visualization of gamma measurements:

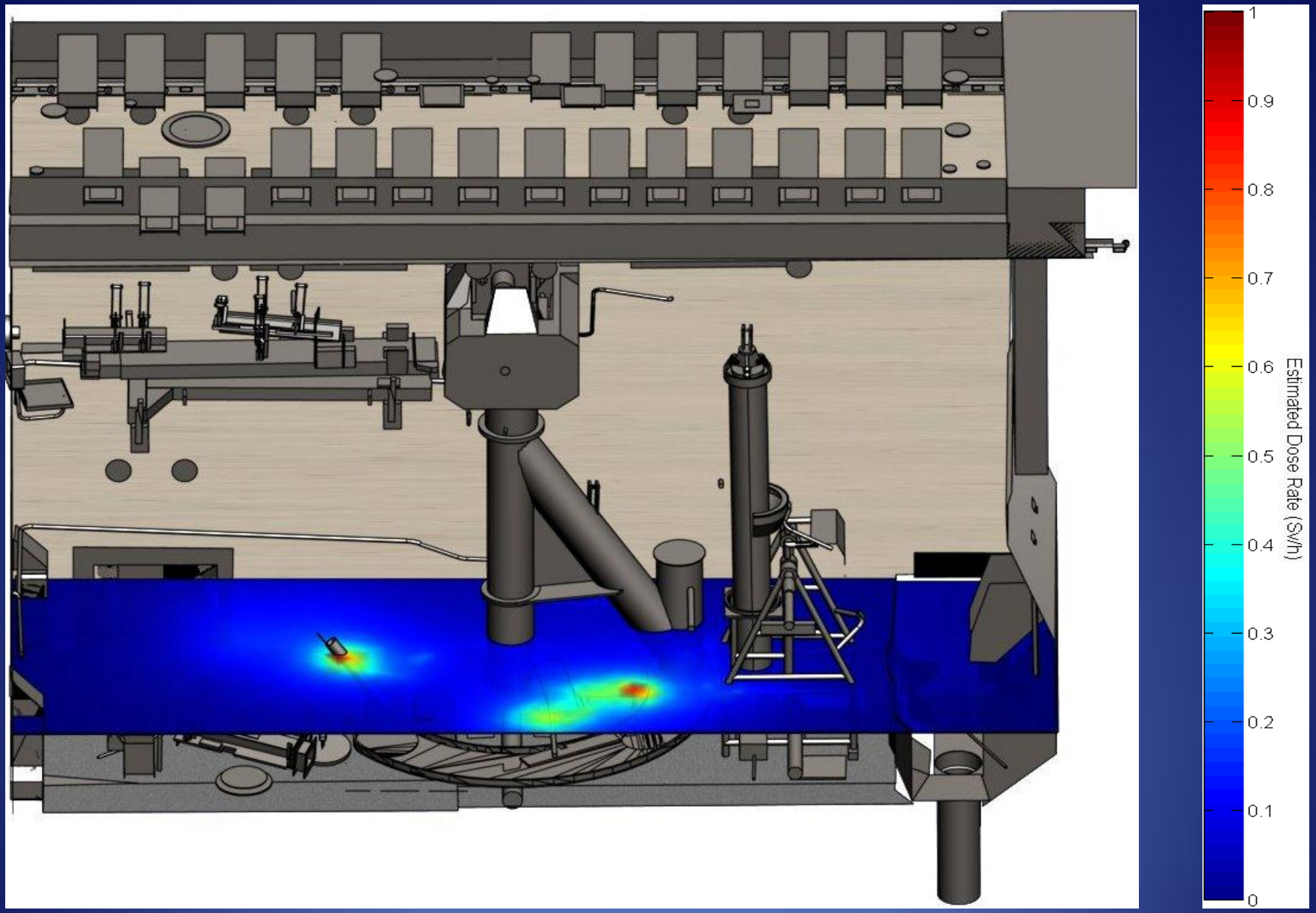




SE view



NW view


1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
Estimated Dose Rate (Sv/h)

Thanks!