NEXT
GENERATION
INFRASTRUCTURES

3D Spatial Data Infrastructure

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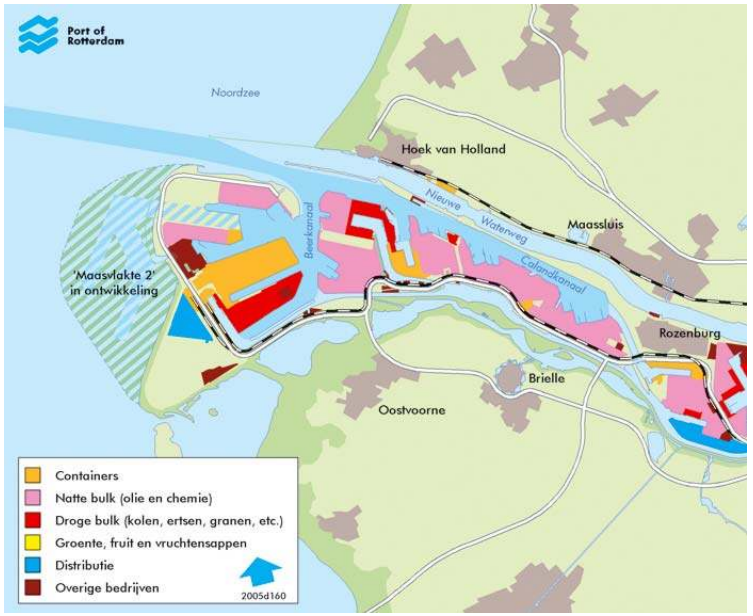
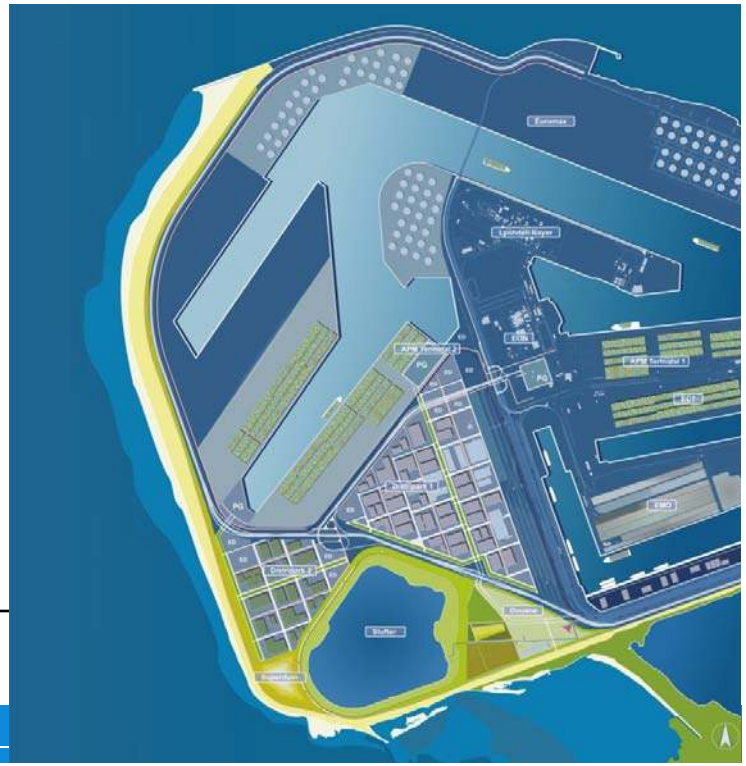
The Port of Rotterdam

- One of the largest harbours
- Annual throughput 434 million tons
- Distance of 45 km
- Dense populated surrounding area
- Pipes and cables 155 km
- Quays 64 km
- Maasvlakte 2 –extension into the sea



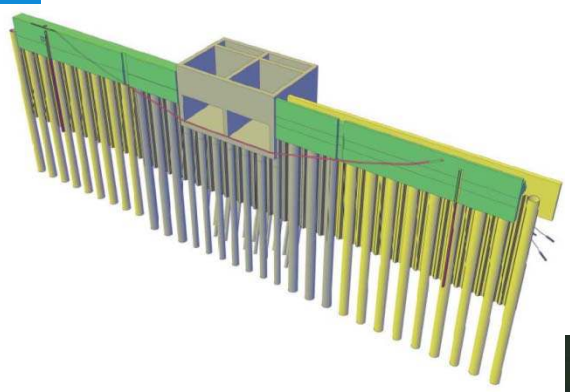


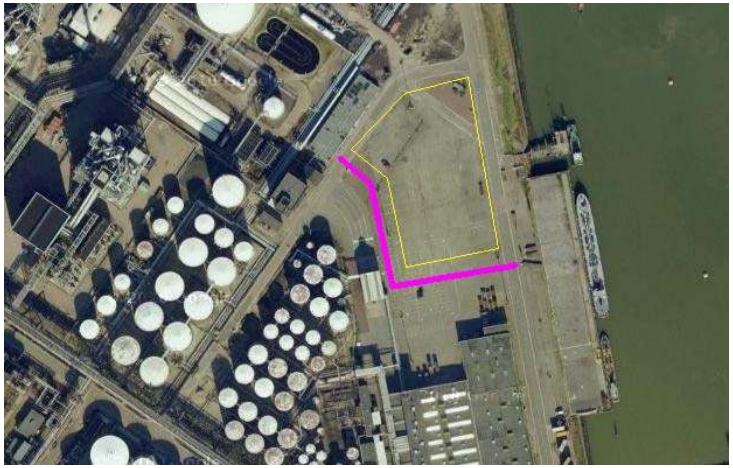
New clients in the harbour area

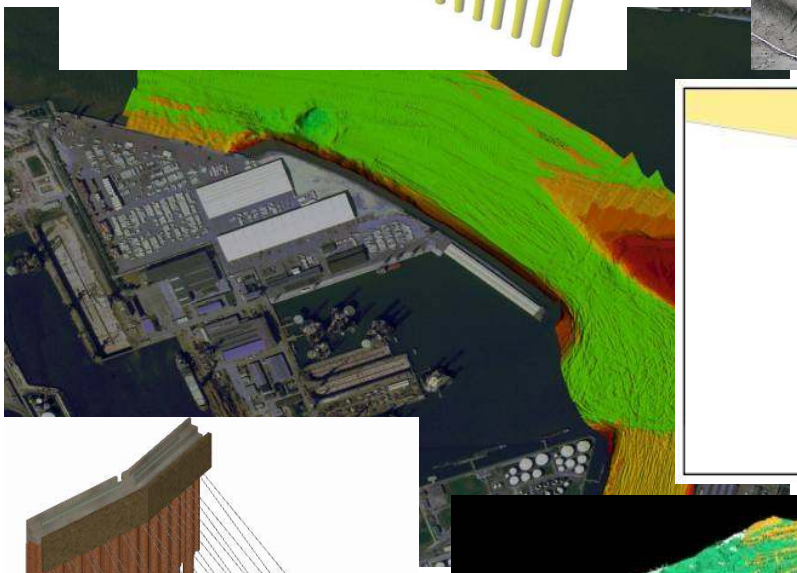
Port Rotterdam should take into account:

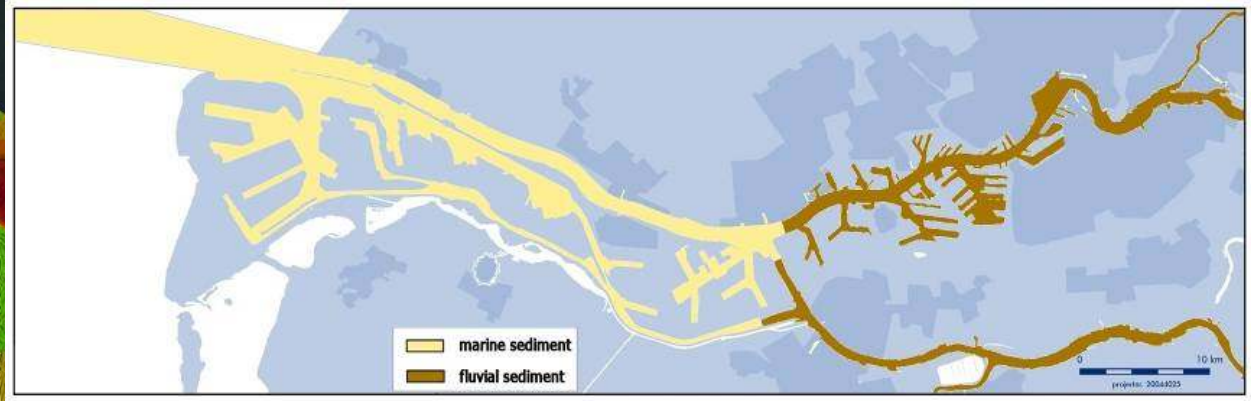
- Various external data (DCMR (environment and safety), Province, Municipality, Stakeholders)
- Underground information: Noise, Nox, CO2…
- Accessibility of the area
- (Im)Possibilities for laying down pipes and cables
- Constructions and adaptations needed for the new clients
- …

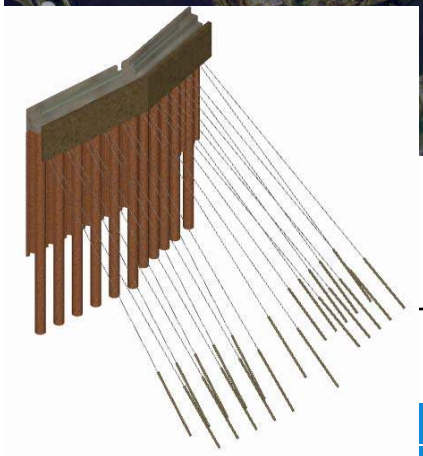
Examples of data

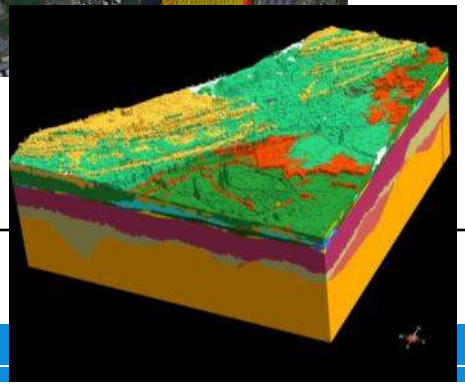










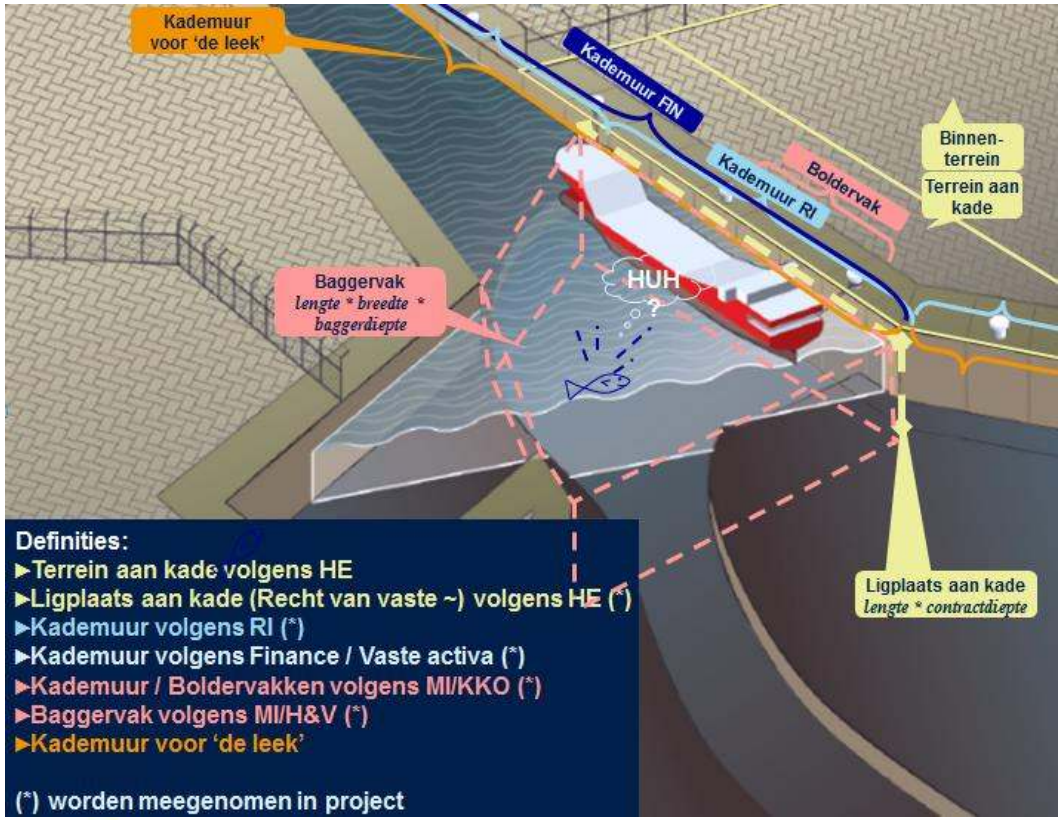


The problem

Complex processes. Variety of data!

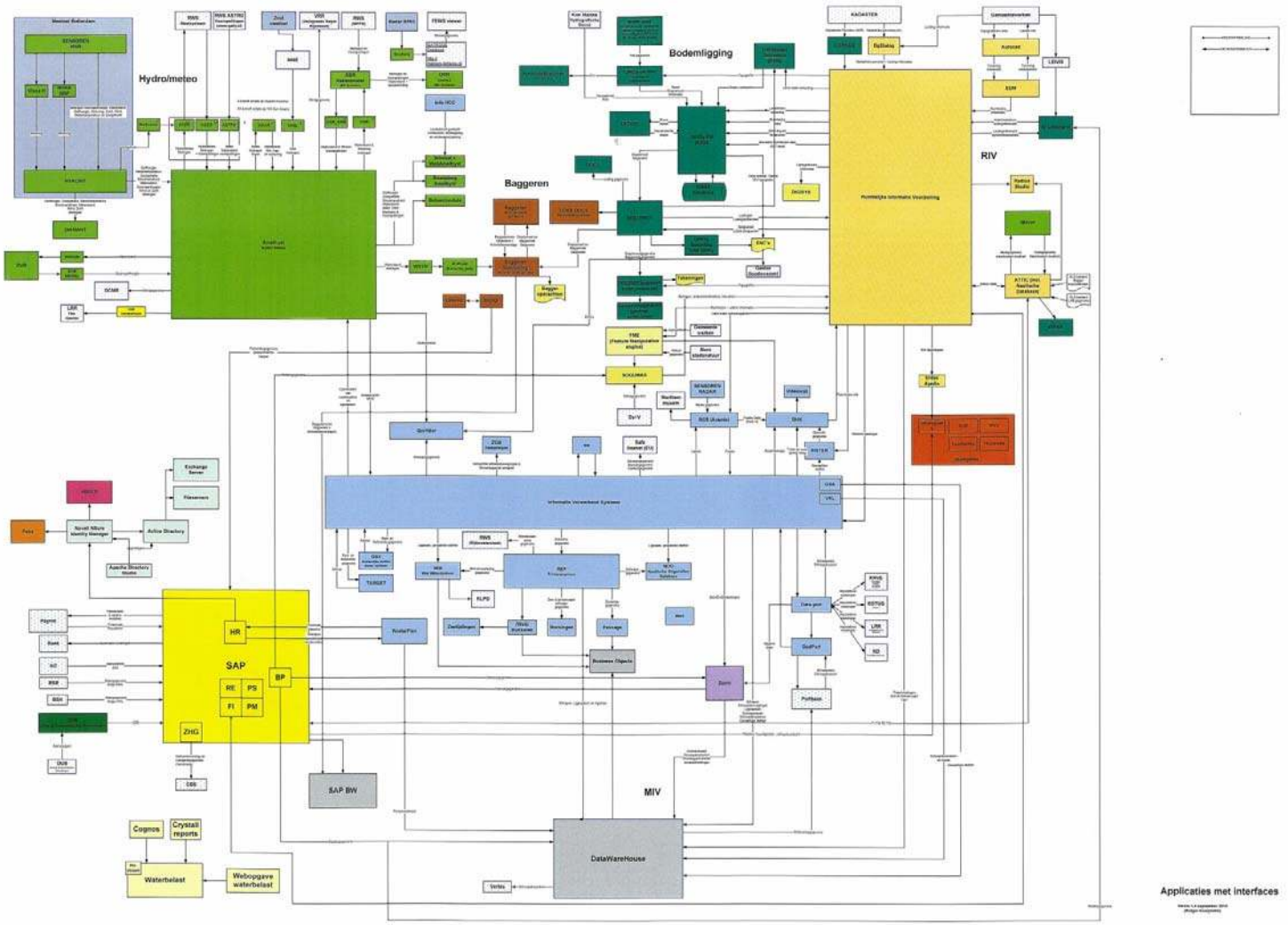
- Many different object descriptions and representations (above, through and below the surface)
- Different dimensionality (2D/3D and time)
- Many systems for management of data
- Exchange of data using proprietary file formats
- Increased use of BIM models (for new designs)

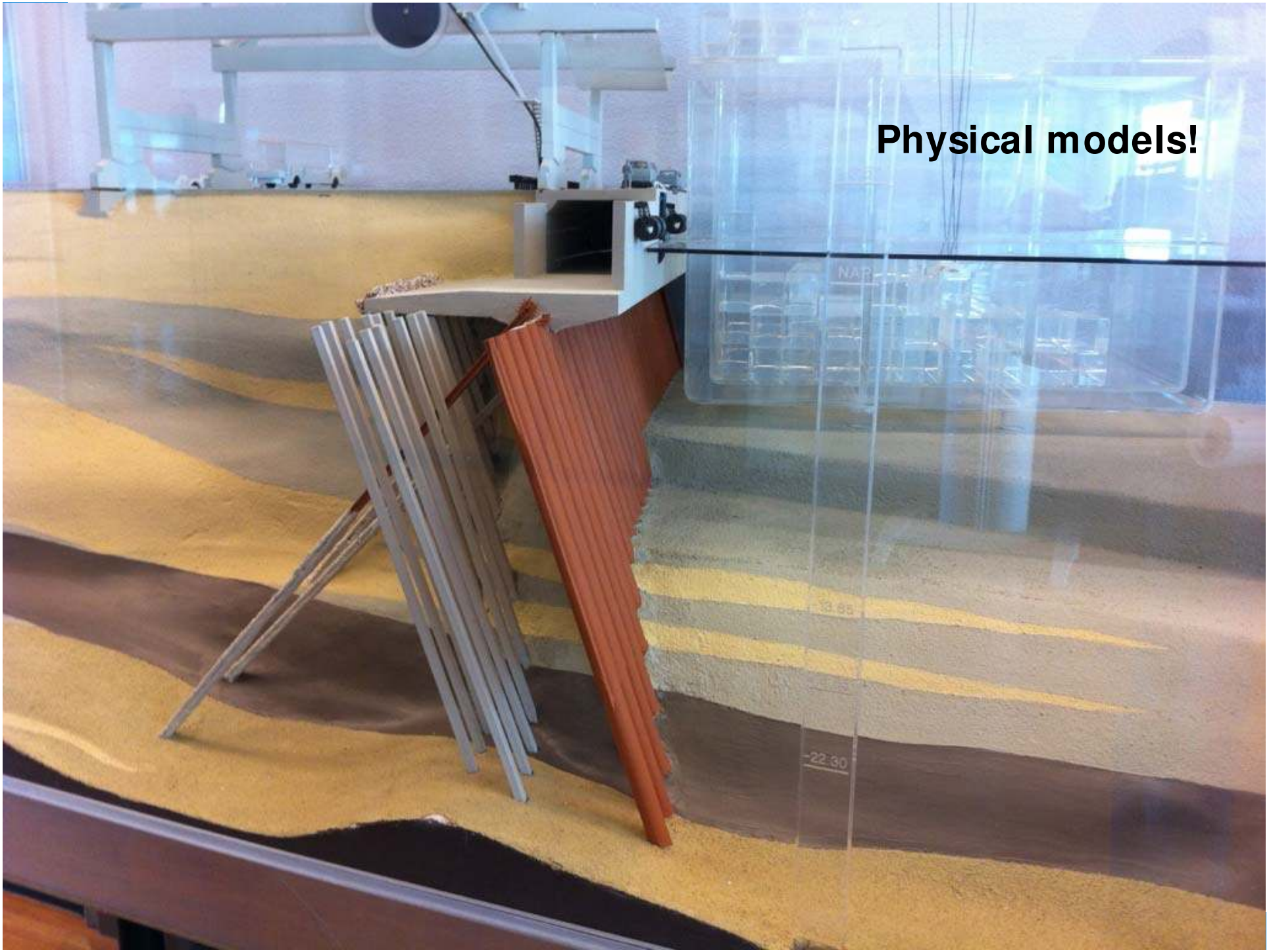
Example: quays



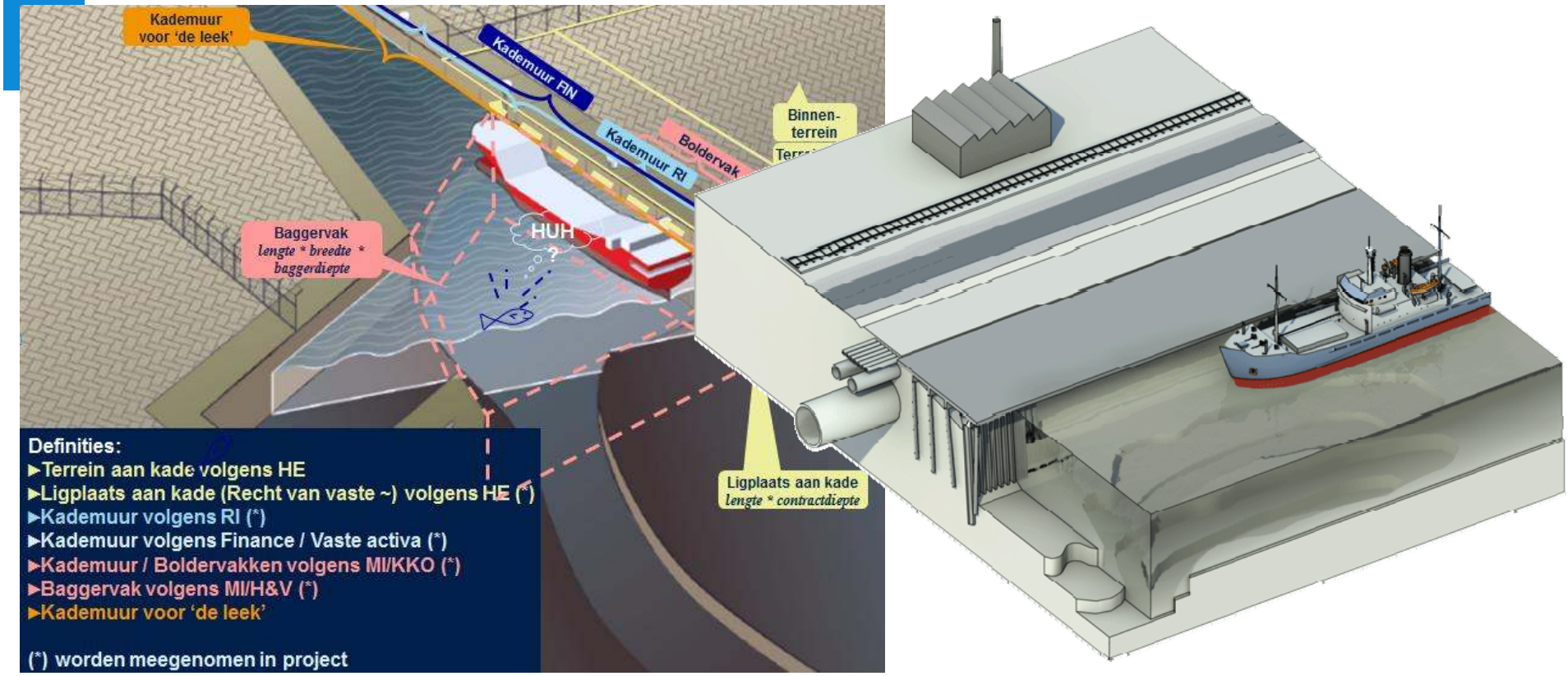
- One object in reality gets 7 different representation in the different systems

Information Management is complex




Physical models!

From 2D to 3D


Kademuur voor 'de leek'
Kademuur RIN
Kademuur RI
Boldervak
Binnen-terrein
Baggervak
lengte * breedte * baggerdiepte
HUH
?
Ligplaats aan kade
lengte * contractdiepte
Definities:
►Terrein aan kade volgens HE
►Ligplaats aan kade (Recht van vaste ~) volgens HE (*)
►Kademuur volgens RI (*)
►Kademuur volgens Finance / Vaste activa (*)
►Kademuur / Boldervakken volgens MI/KKO (*)
►Baggervak volgens MI/H&V (*)
►Kademuur voor 'de leek'
(*) worden meegenomen in project

Research questions 1/2

Which 3D SII is most appropriate for Port of Rotterdam to be able to face urgent data management needs?

- Which objects (features) are relevant? (semantics, geometry, topology, appearance, LOD);
- What kind of data structure is most appropriate to maintain the objects, their properties and relationships;
- What kind of mapping technology between different models should be utilised: syntax and structure vs. semantics (ontology);

Research questions 2/2

Which 3D SII is most appropriate for Port of Rotterdam to be able to face urgent data management needs?

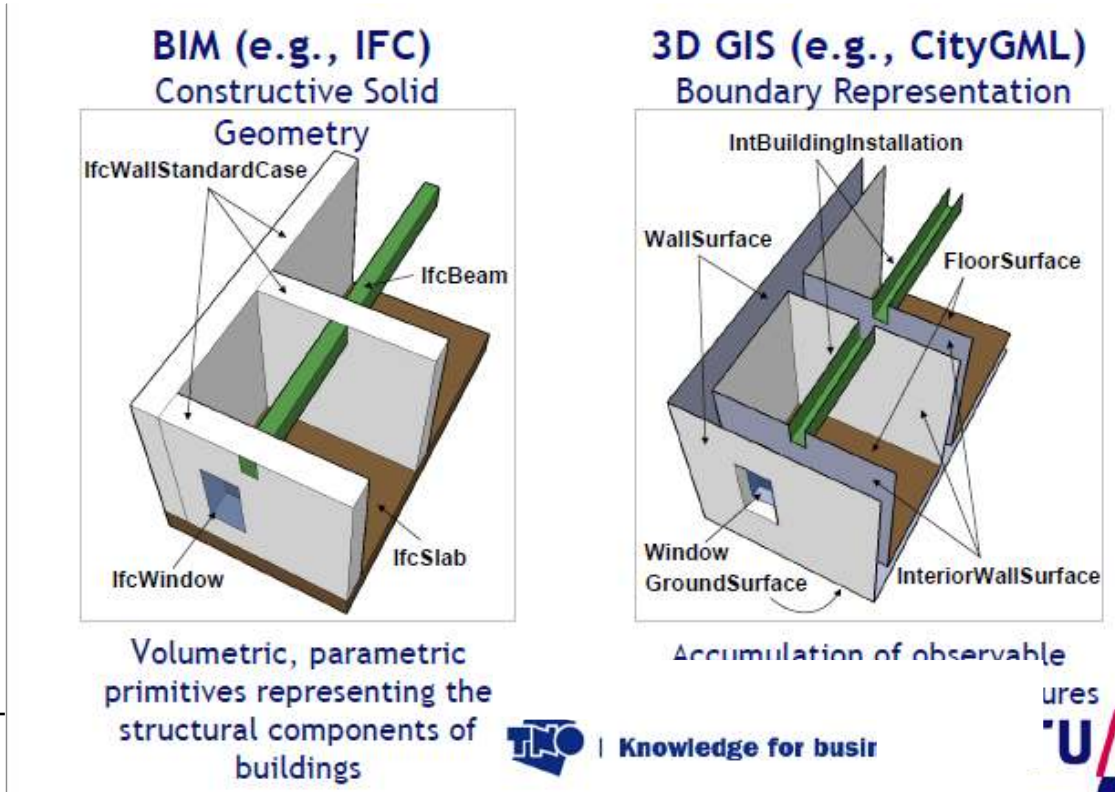
- Which standard for exchange of information should be used: GML, CityGML, BIM (IFC), IMxxx;
- Which system architecture should be utilised: NORA, OGC web services, RESTful vs. SOAP;
- What visualisation approaches should be followed: thin clients vs. front-end application, mobile vs. desktop environment.

Use case 1 quays

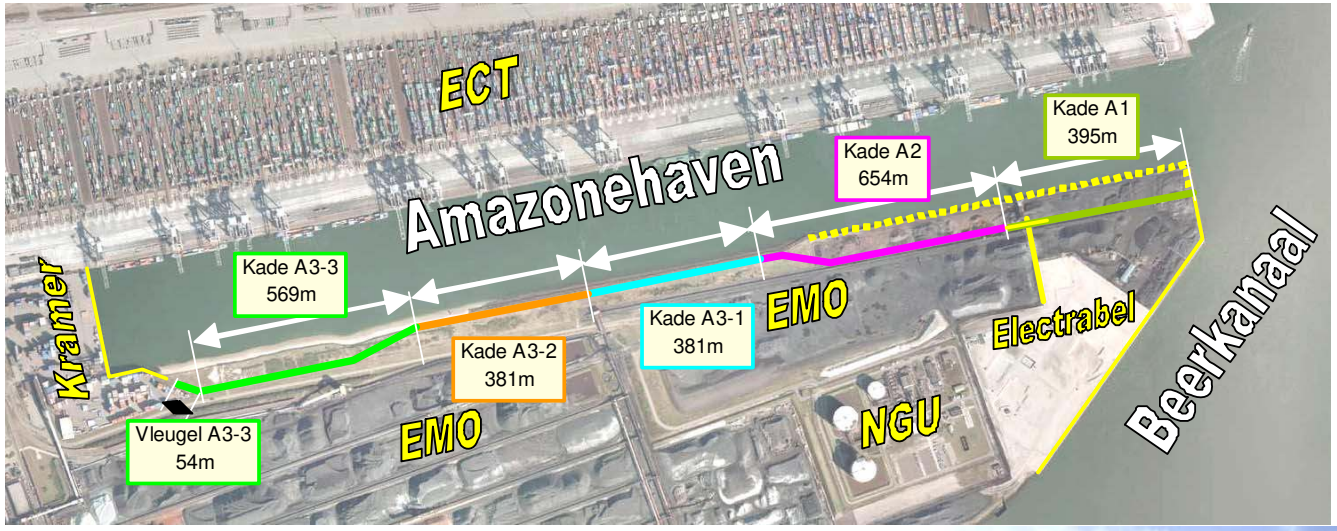
- Focus on:
  - integration of BIM and GIS
  - 3D Profiles 3D Clip

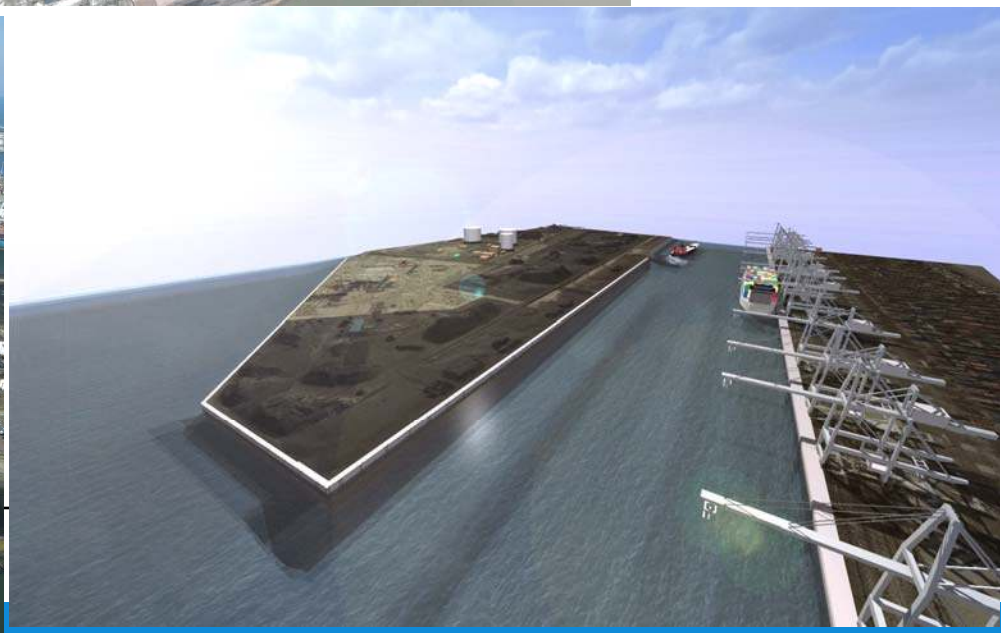
IFC vs CityGML-IMGeo

- Which one IFC or CityGML (which concept)
- Make agreements on formal mappings, so that conversion is done in the same way



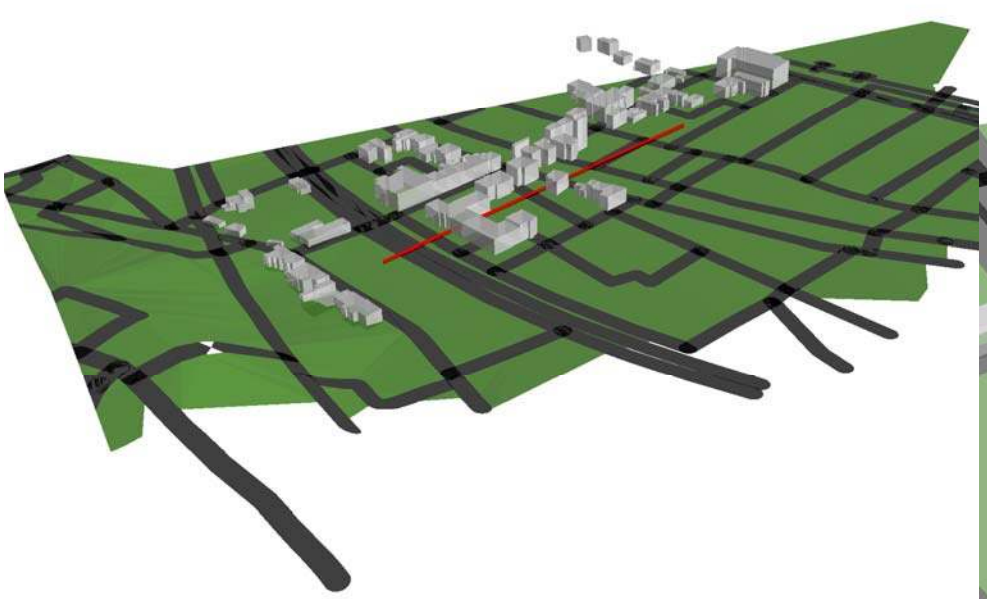
Amazone Haven



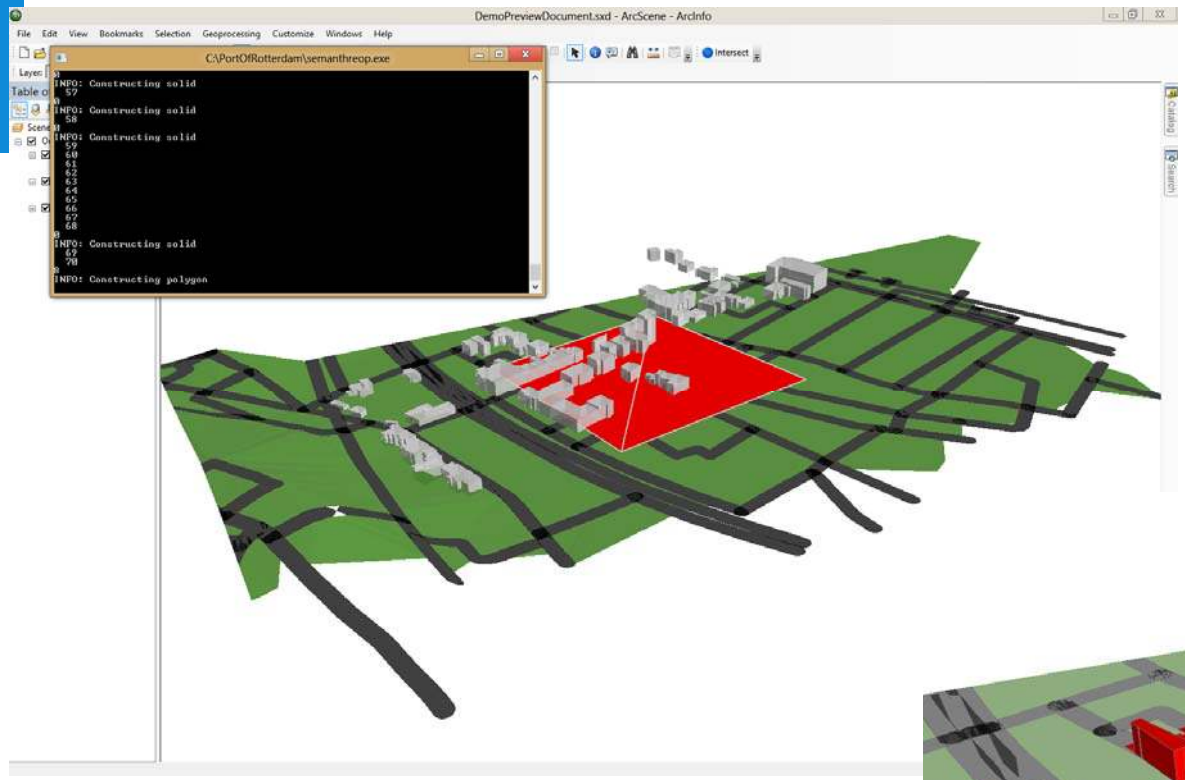


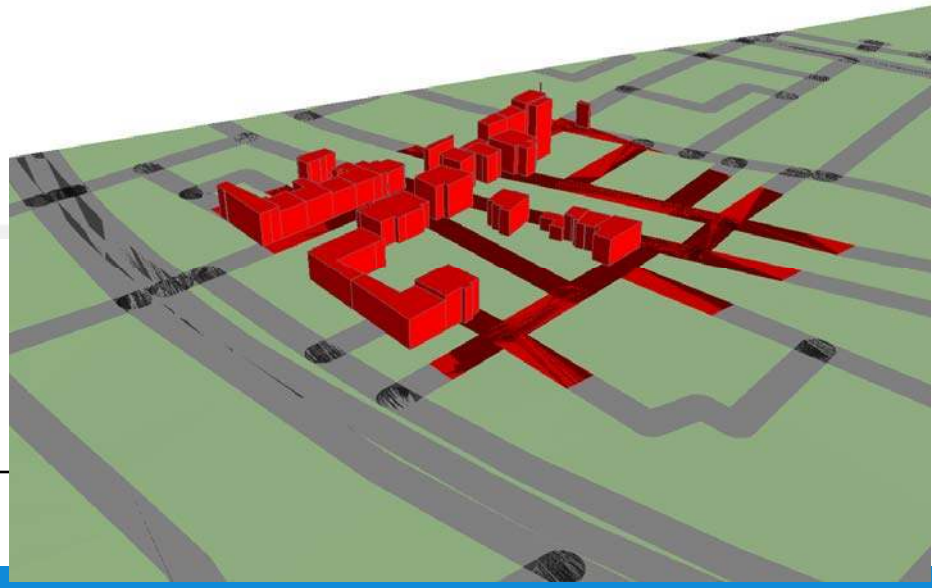
3D profiles

- Clipped objects are topologically correct
- Clipped objects inherit the attributes of the original object



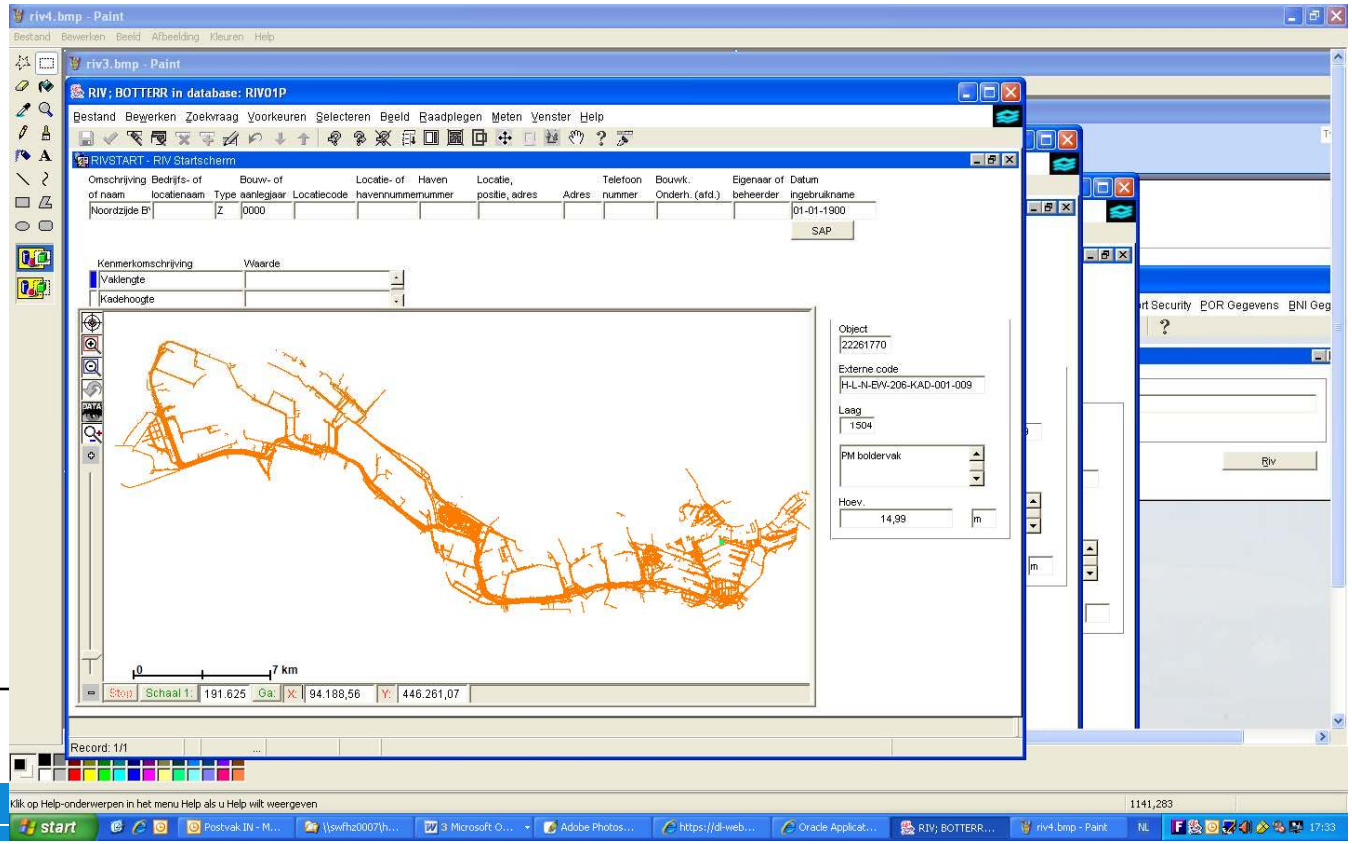
3D areas


DemoPreviewDocument.sxd - ArcScene - ArcInfo
File Edit View Bookmarks Selection Geoprocessing Customize Windows Help
C:\PortOfRotterdam\semanthreop.exe
INFO: Constructing solid
INFO: Constructing solid
INFO: Constructing solid
INFO: Constructing solid
INFO: Constructing polygon
Intersect



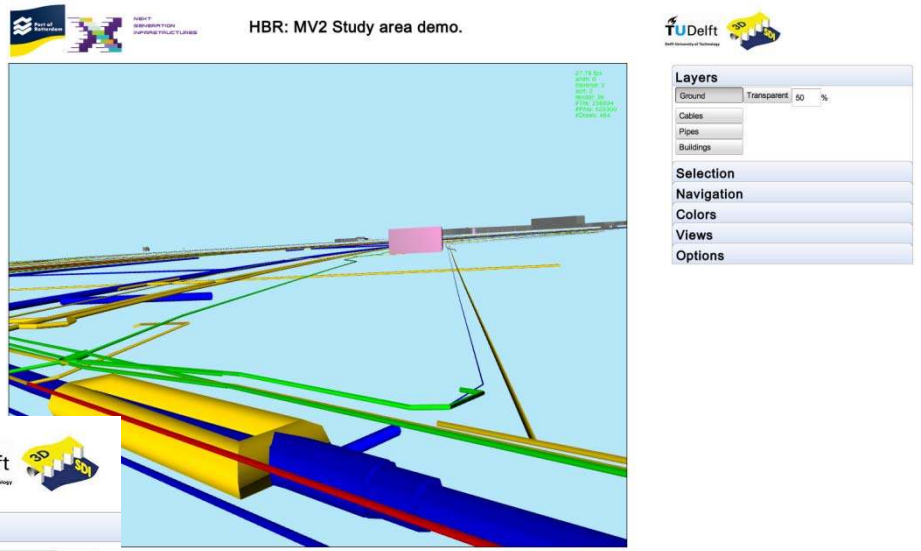
Use Case 2: pipes and cables

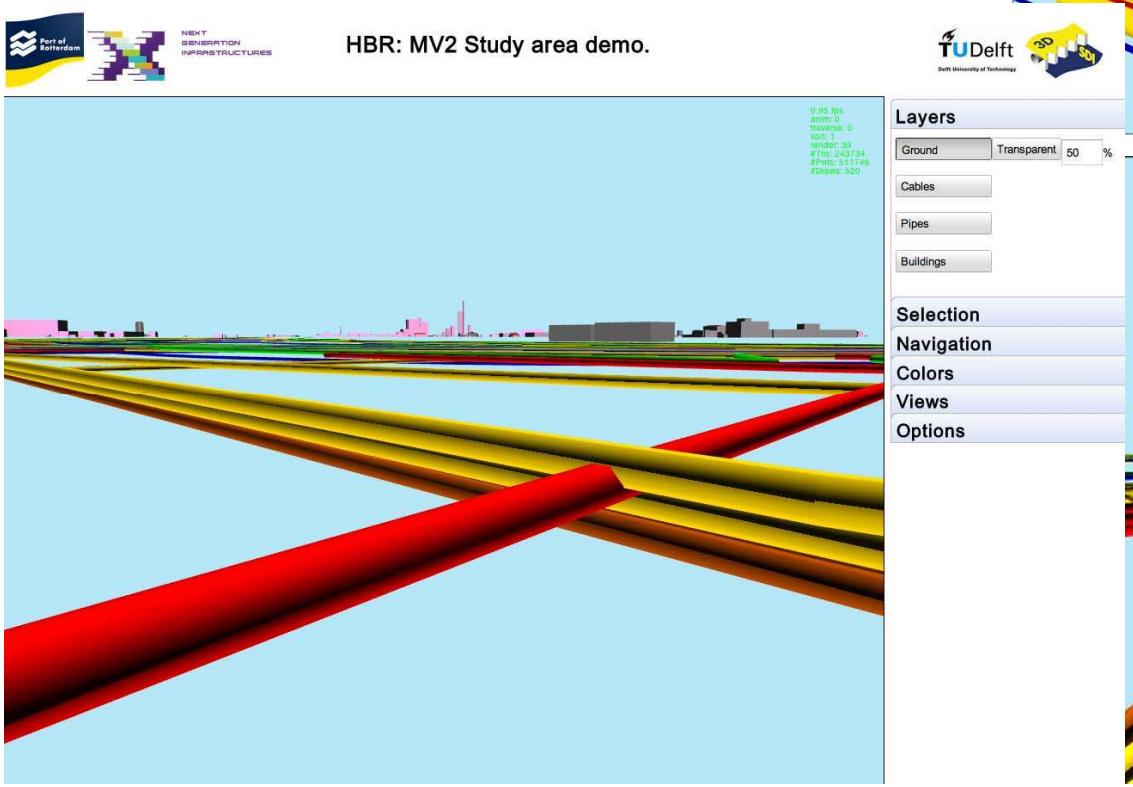
- Visualisation
- Defining free spaces between networks
- Exchange of data

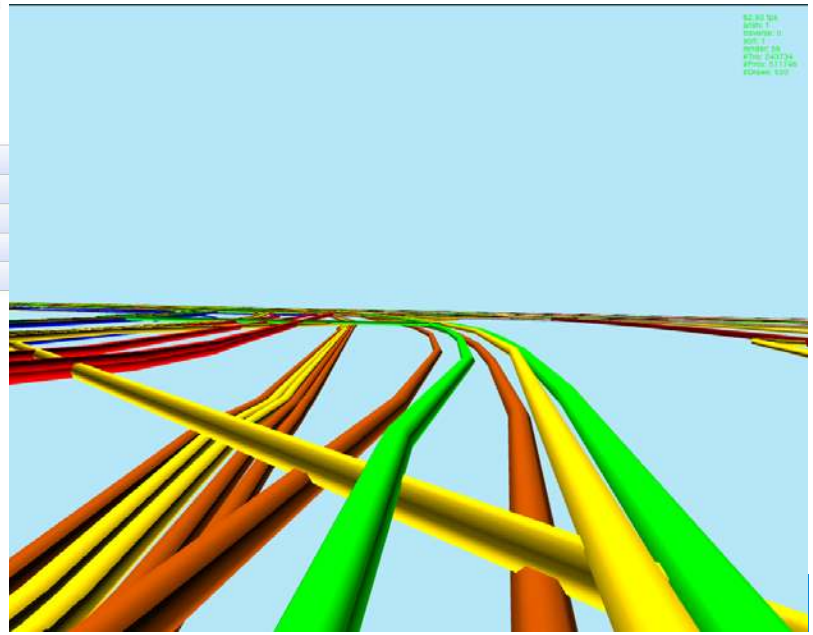


Visualisation with WebGL

- Query attributes
- Hide layers
- Adjust transperancy







3D developments in the area

- The project is of interest for the whole area

- City of Rotterdam has data in 3D (CityGML LOD1 and LOD2)
- Cables and pipes are 3D (the only 3D registration in NL)
- Stadshavens (giving harbour area to the city of Rotterdam)
- High risk area due to dense mixture of industry and residential area
- …

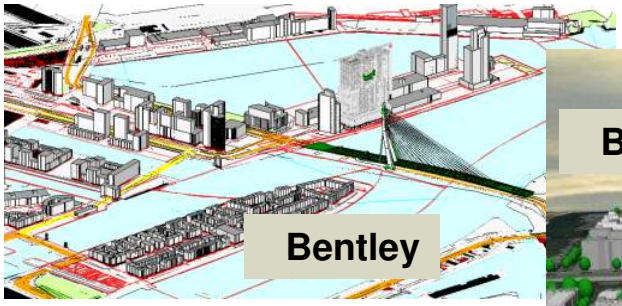
City of Rotterdam in 3D


Bentley


IT-Pro people


iDelft

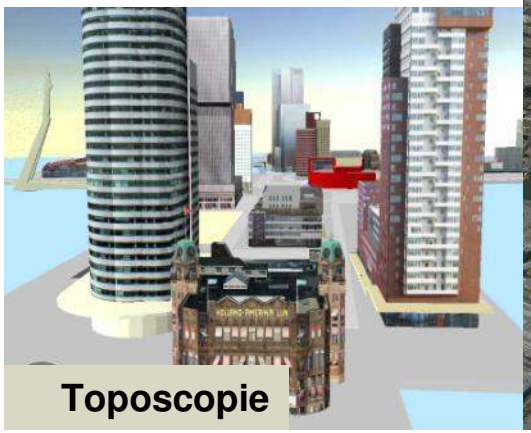

Kadaster


Bentley

Toposcopie


Bentley


Gemeente Rotterdam


Toposcopie

U Twente

NEXT GENERATION INFRASTRUCTURES

Port of Rotterdam

PROJECTORGANISATIE MAASVLAKTE 2

Thank you for you attention

Follow the developments at:

- http://maasvlakte2-3dsdi.ddss.nl