

NEXT  
GENERATION  
INFRASTRUCTURES



# Integration of GIS and BIM

Sisi Zlatanova, TUDelft

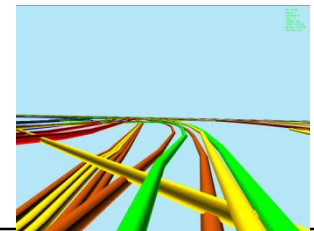
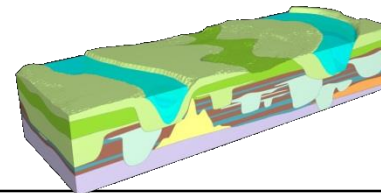
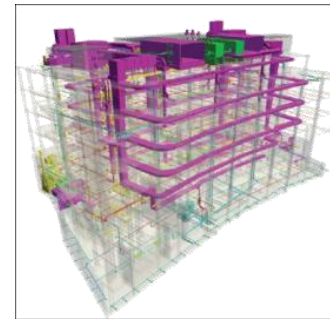
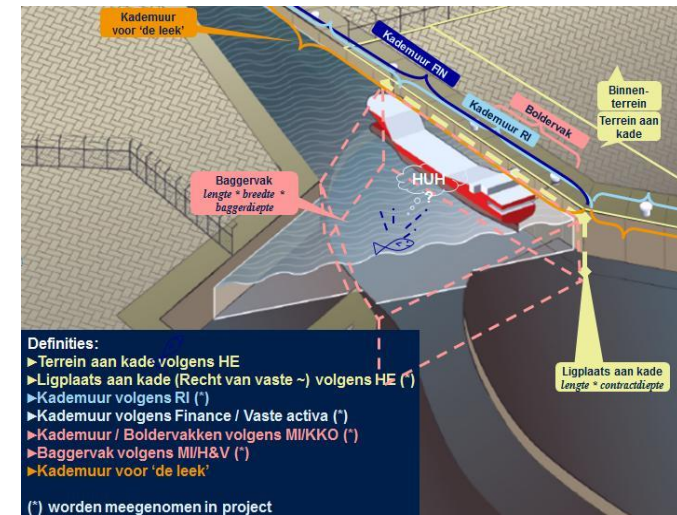
Jacob Beetz, TUE

Anne Jan Boersma, Albert Mulder, Port Rotterdam

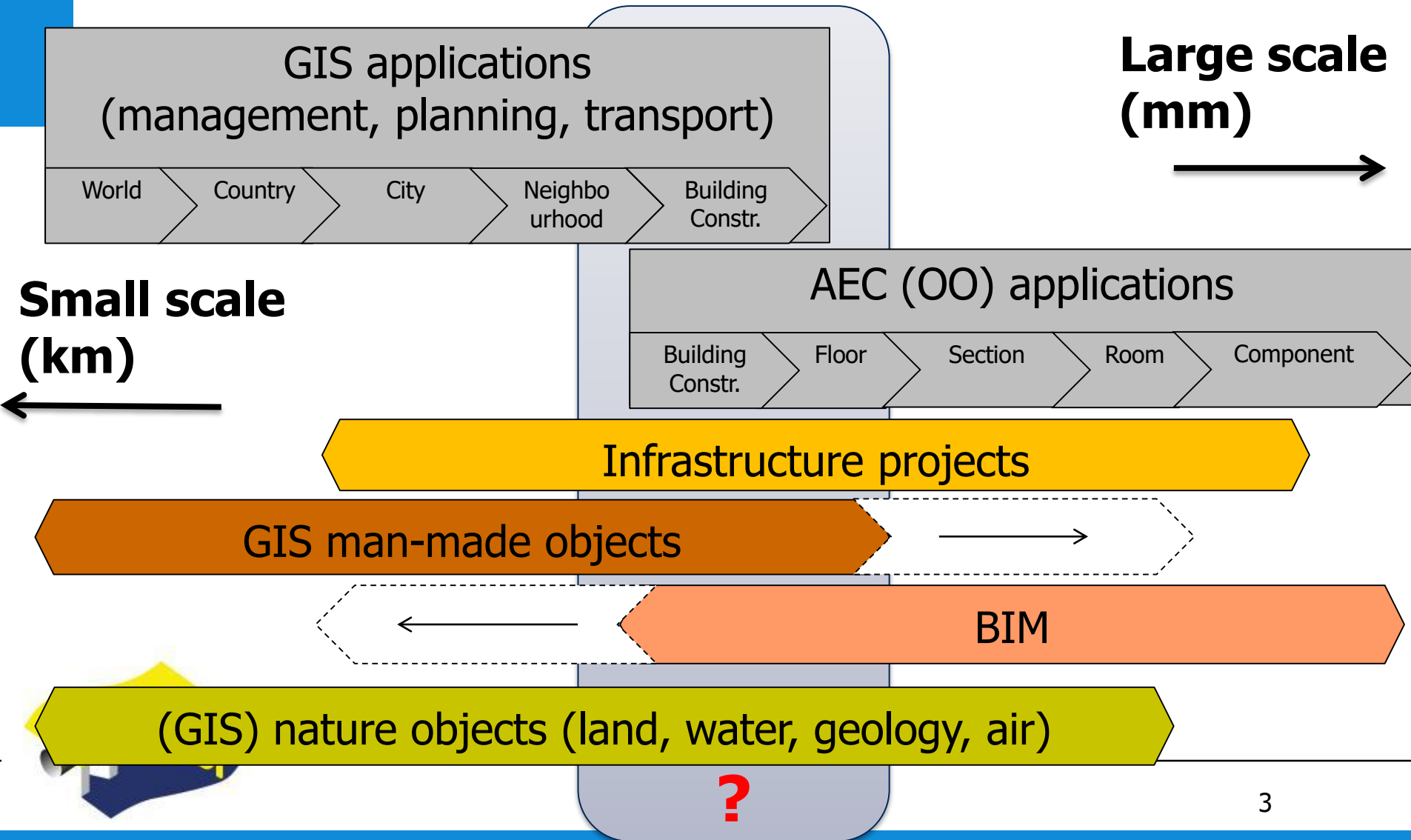
Joris Goos, City of Rotterdam

# Large infrastructure projects

- Large spectrum of objects (GIS BIM)
- Many actors: public and private stakeholders, companies and other institutions
- Current 2D systems are confronted with available 3D data and BIM



# Above, below, on surface

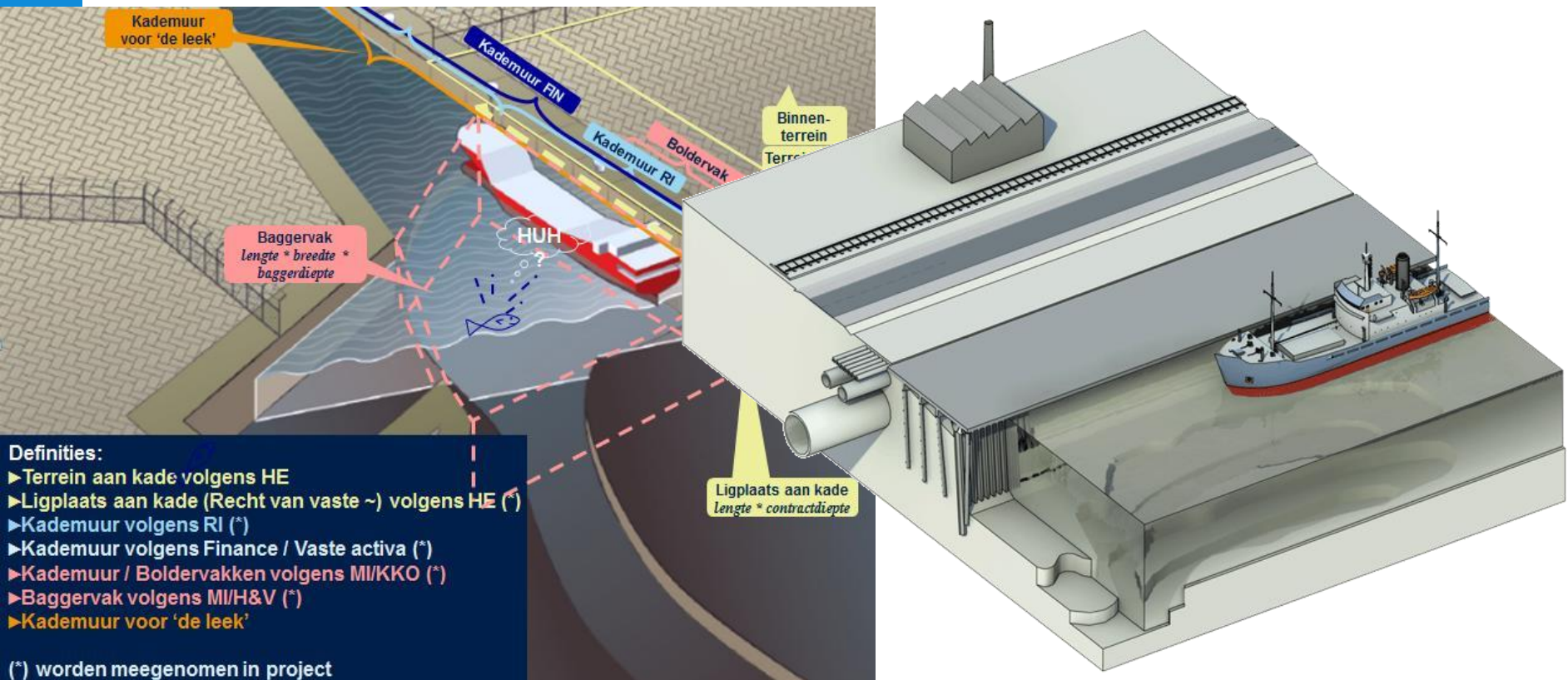


# Many different standards

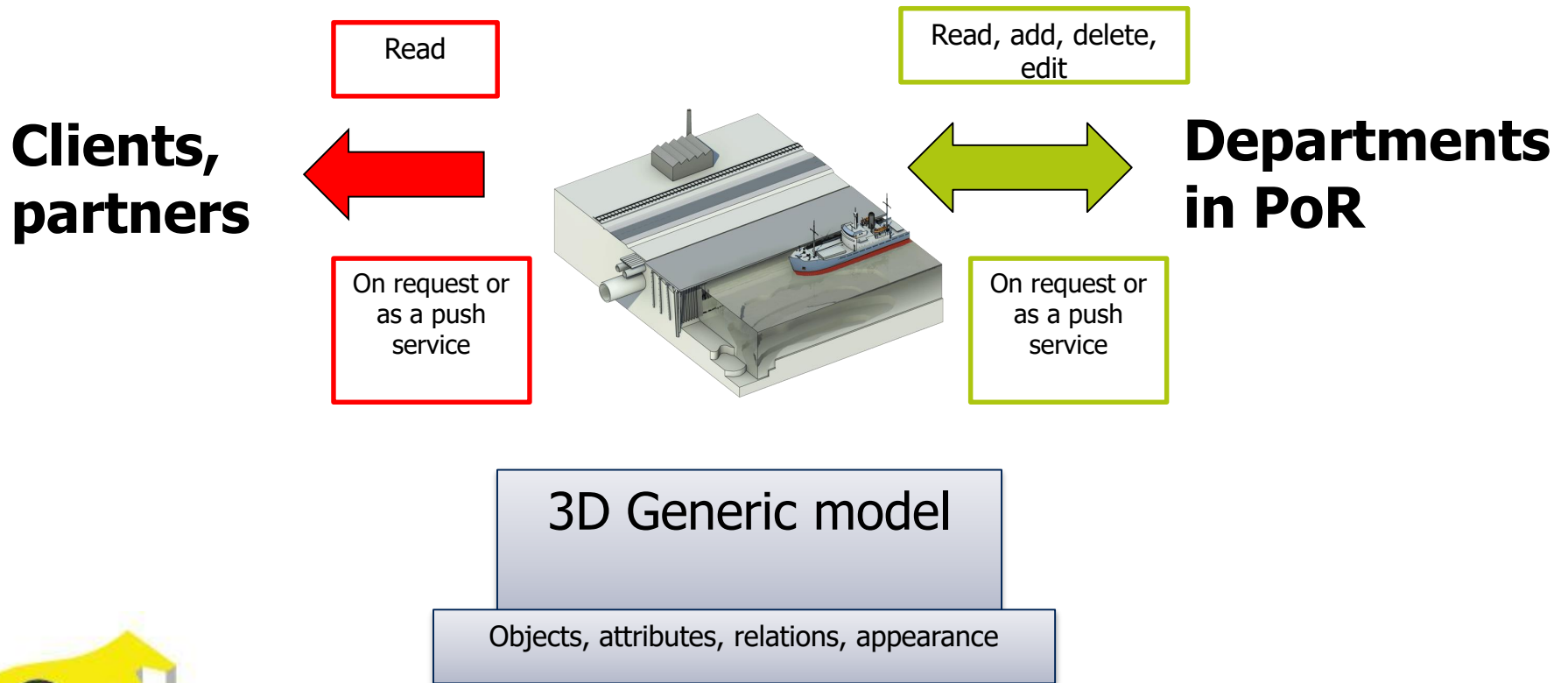
**Table 2:** Comparison of 3D standards

Standard/Criterion	DXF	SHP	VRML	X3D	KML	Collada	IFC	CityGML	3D PDF
Geometry	++	+	++	++	+	++	++	+	++
Topology	-	-	0	0	-	+	+	+	-
Texture	-	-	++	++	0	++	-	+	+
LOD	-	-	+	+	-	-	-	+	-
Objects	0	+	+	+	-	-	+	+	+
Semantic	+	+	0	0	0	0	++	++	+
Attributes	-	+	0	0	0	-	+	+	+
XML based	-	-	-	+	-	-	+	+	-
Web	-	-	+	++	++	+	-	+	0
Georef.	+	+	-	+	+	-	-	+	+
Acceptance	++	++	++	0	++	+	0	+	++

# Port of Rotterdam: from 2D to 3D



# Main goal: 3D information model

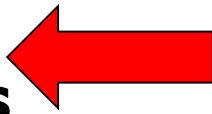


# Applications

## Web Applications

VR Globes, WebGL, X3D, HTML...

Read  
(query)

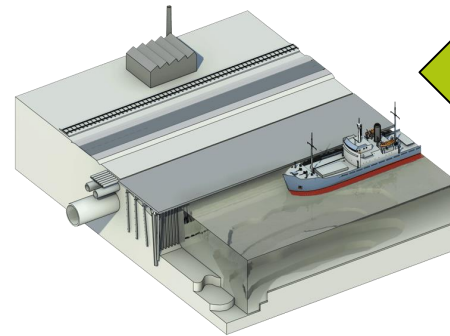


Read(query), add,  
delete, edit, analyse ...



## GIS, ACE, BIM Packages:

ArcGIS, AutoCAD, Revit, ...



### 3D Generic model

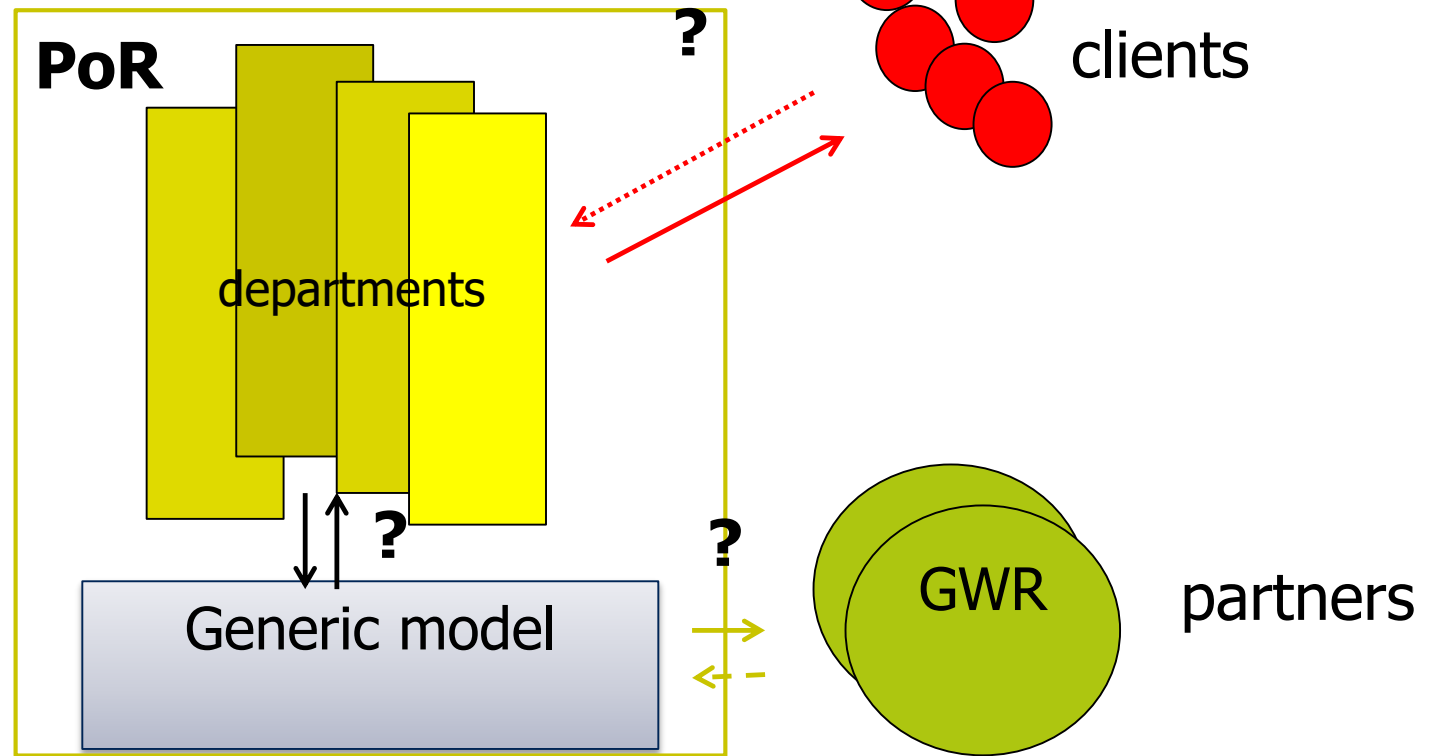
Objects, attributes, relations, appearance





# Advise on 3D SDI: interfaces

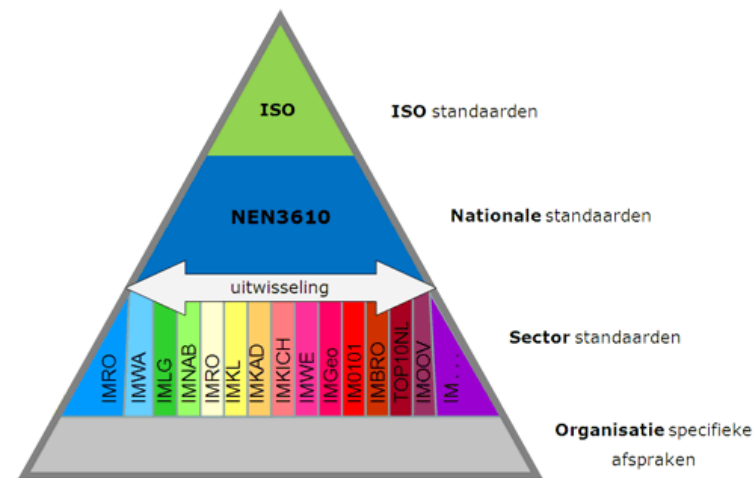
- National SDI vs Corporate SDI
- 2D SDI vs 3D SDI



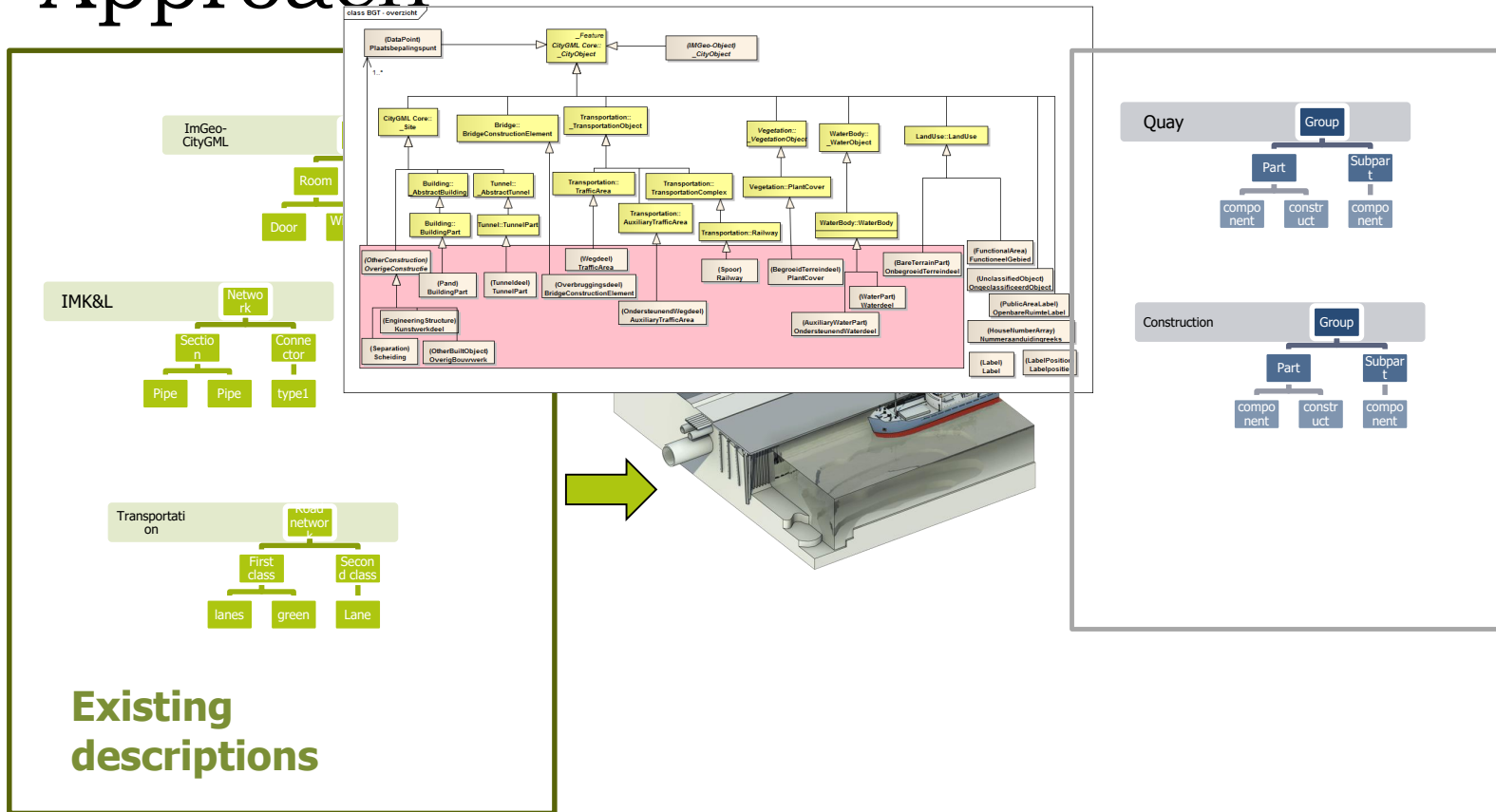


# 3D Model: principles

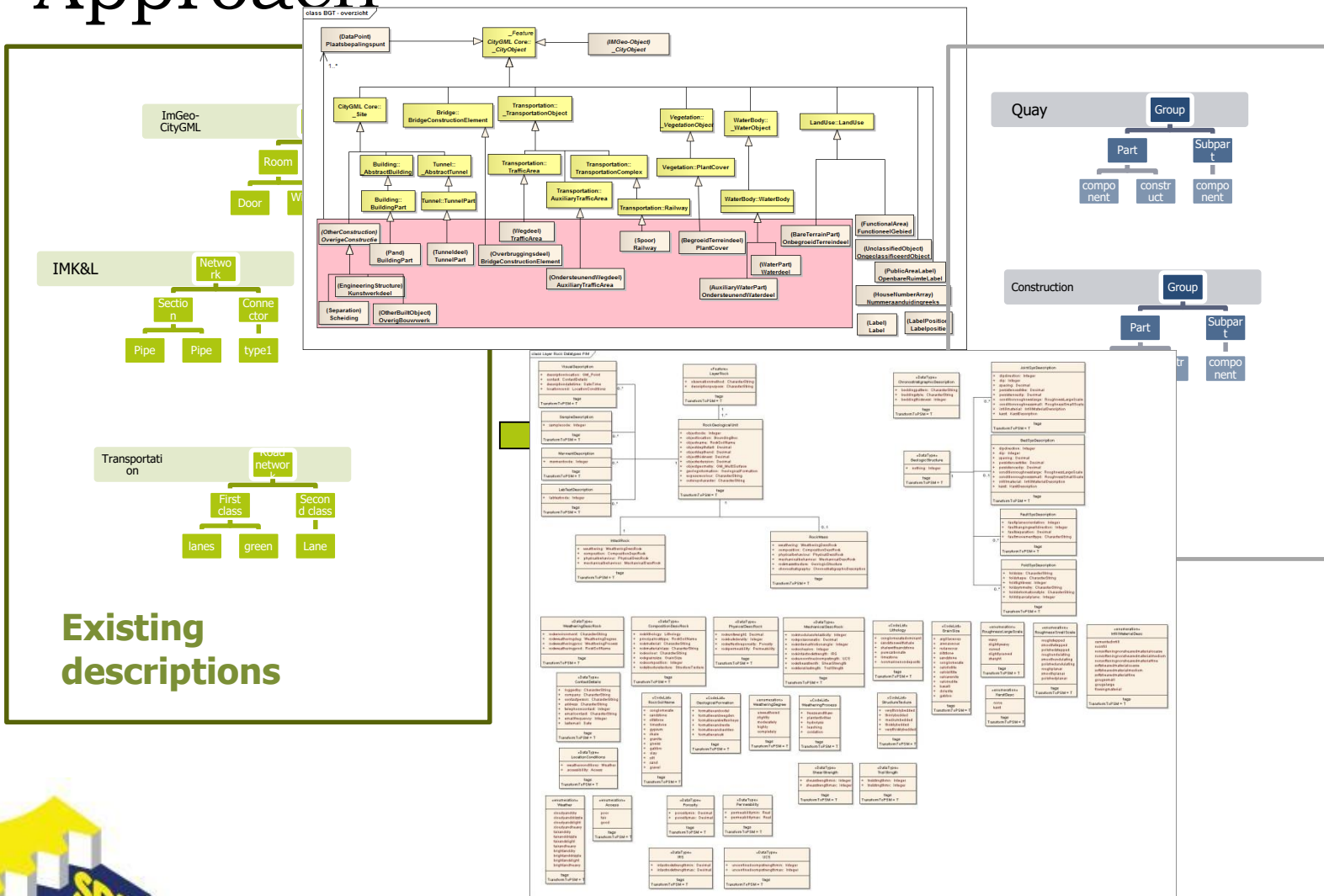
- Define an object only once
- Re-use of existing standards (GIS and BIM) for objects that are already specified
- Define new objects if not available
- Consider national and international tendencies (OGC, buildingSMART, Web3D)
- Intelligent objects



# Approach

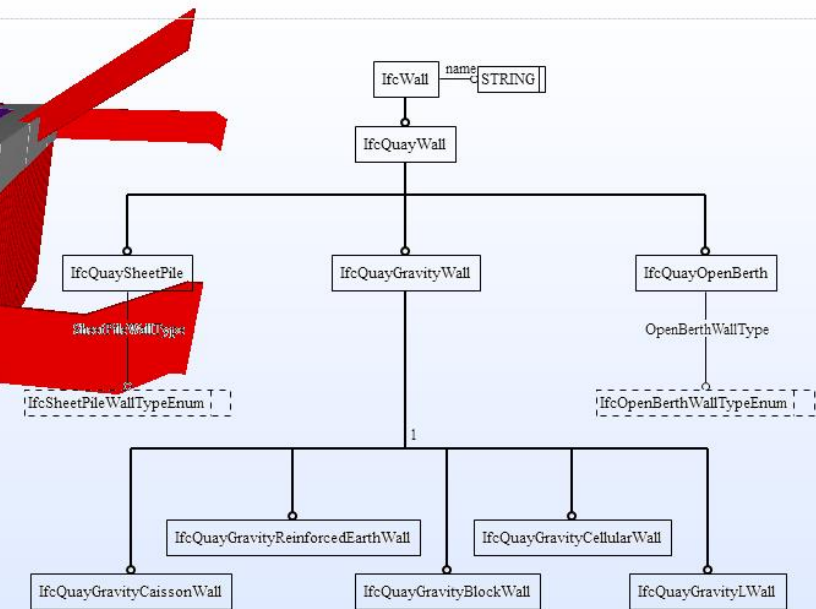
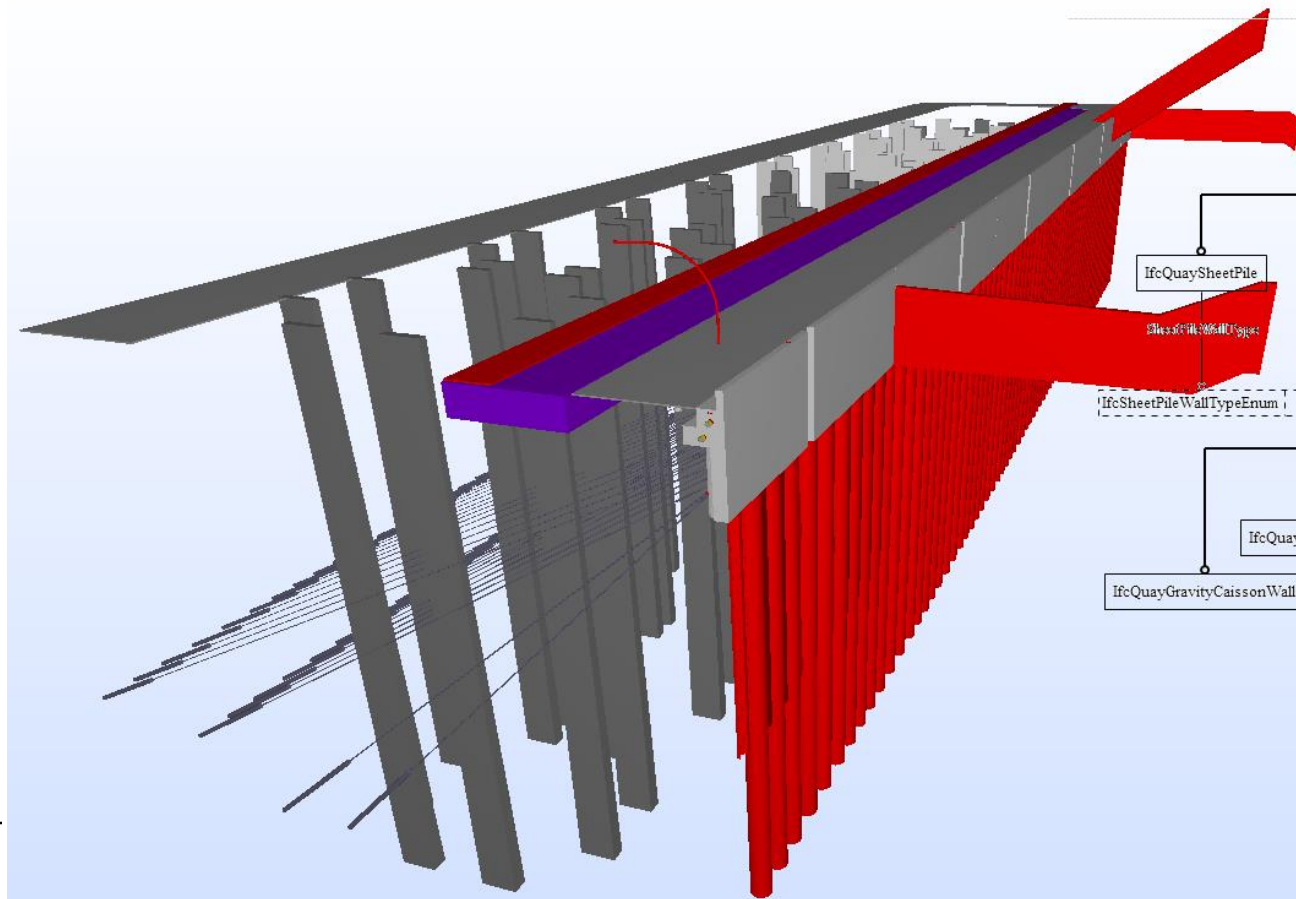


# Approach



[illegible]

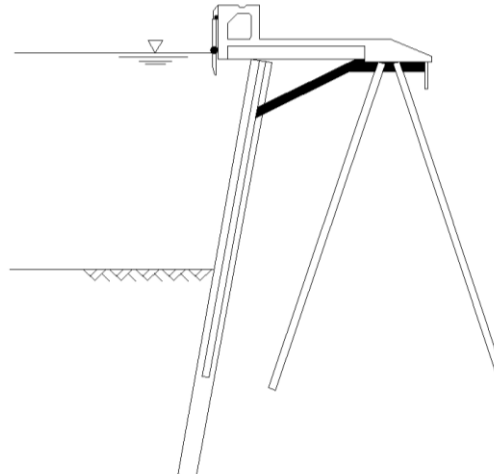
# Definition of IfcQuay



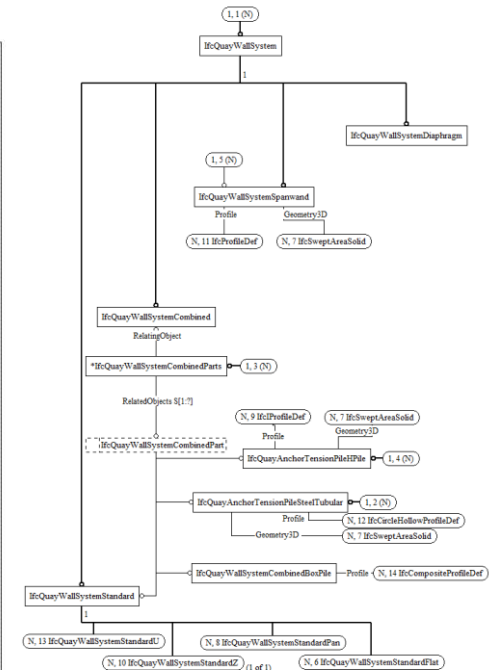
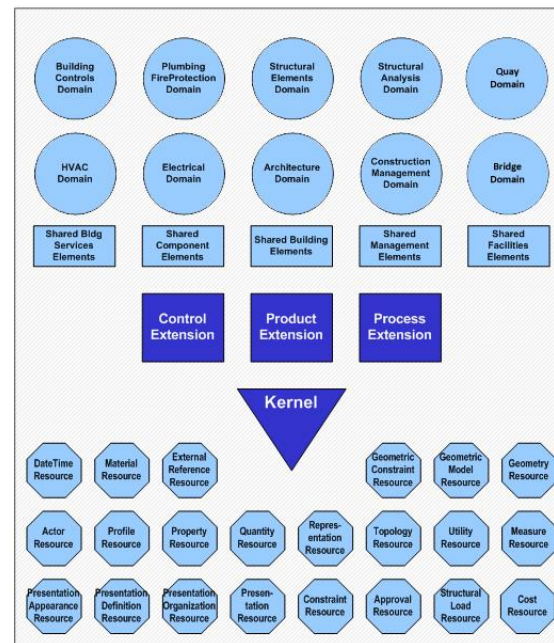
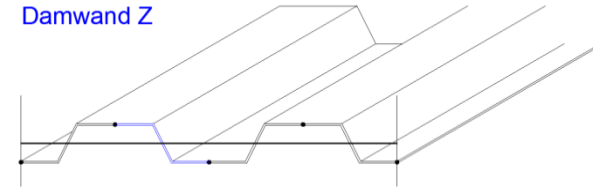


# IfcQuay

- Industry Foundation Classes (IFC) standard (BIM)
- Only Civil Engineering domain model up to now: Bridge (IfcBridge)
- This project adds a domain model for quays and quay walls
- world-wide only project
- Lots of interest from 3<sup>rd</sup> parties already



Damwand Z





## Roadmap

- Initial model schema ISO 10303-11 created
- Initial implementation for creation and visualization
- coupling with GIS models taken into account on conceptual level
- Feedback from domain experts (CE TU Delft, PoR, international community)



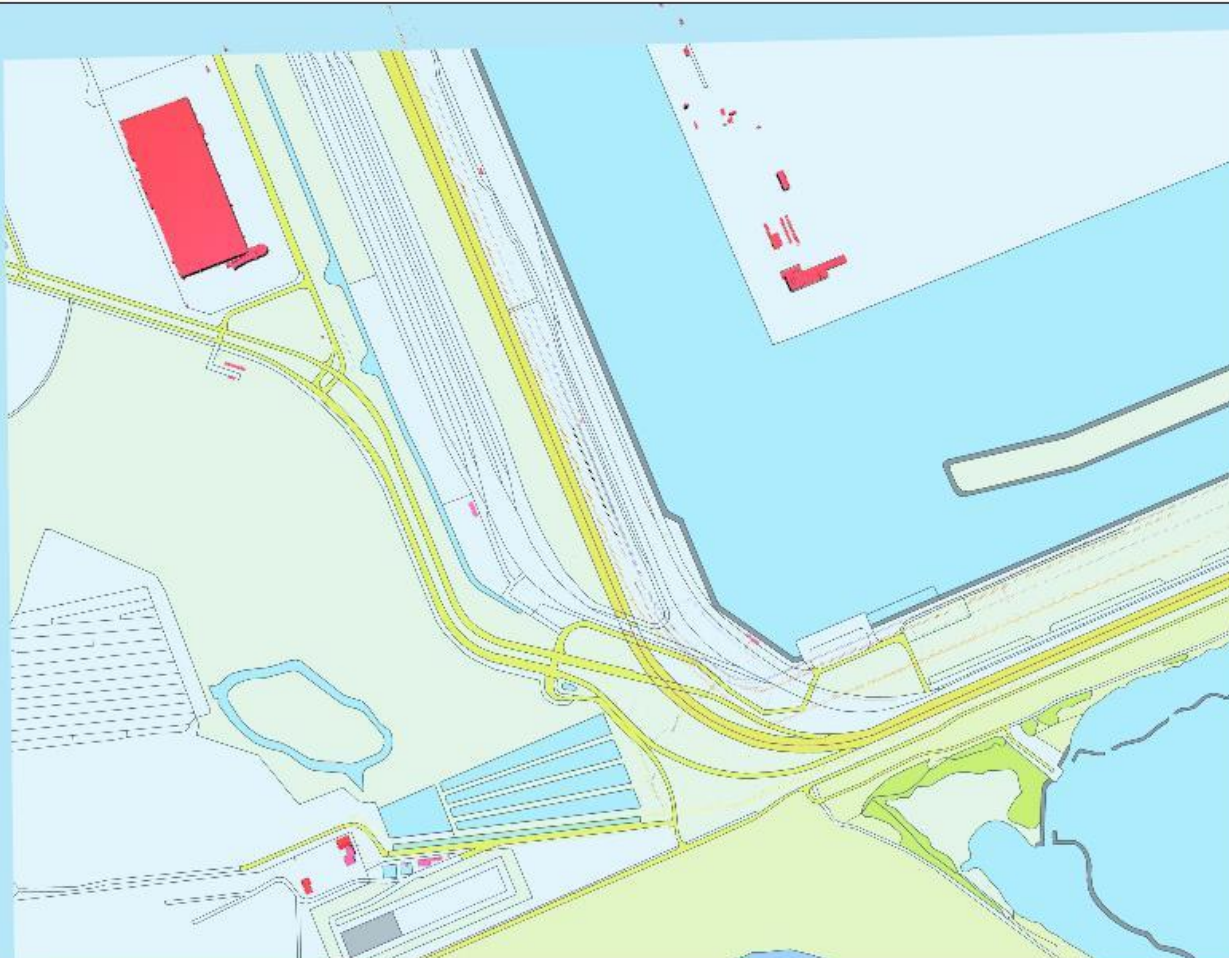
# WebGL demo: Mississipihaven

<http://mapster.com.mx:8080/reddrop/>



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HBR: MV2 Study area  
demo.



Layers

Selection

Navigation

Colors

Views

NextView

PrevView

ResetView

Options

# WebGL demo: Mississipihaven

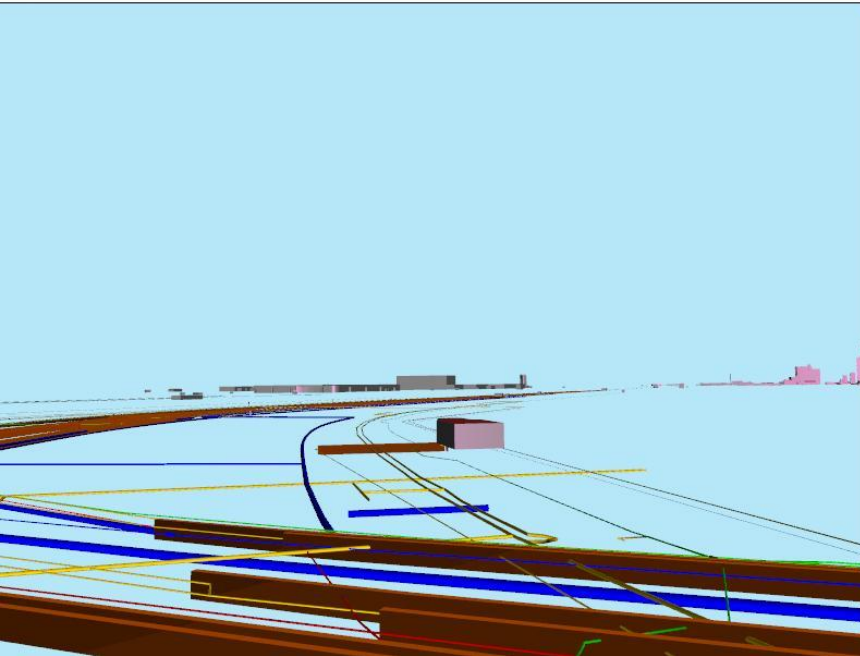
<http://mapster.com.mx:8080/reddrop/>



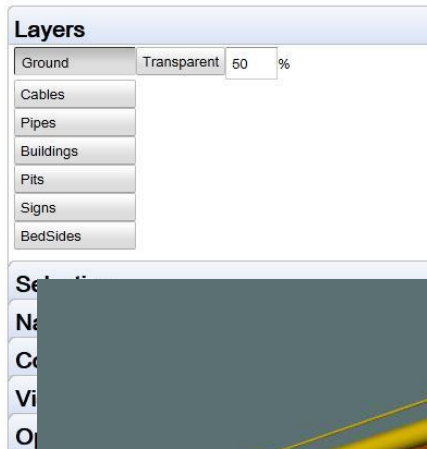
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HBR: MV2 Study area  
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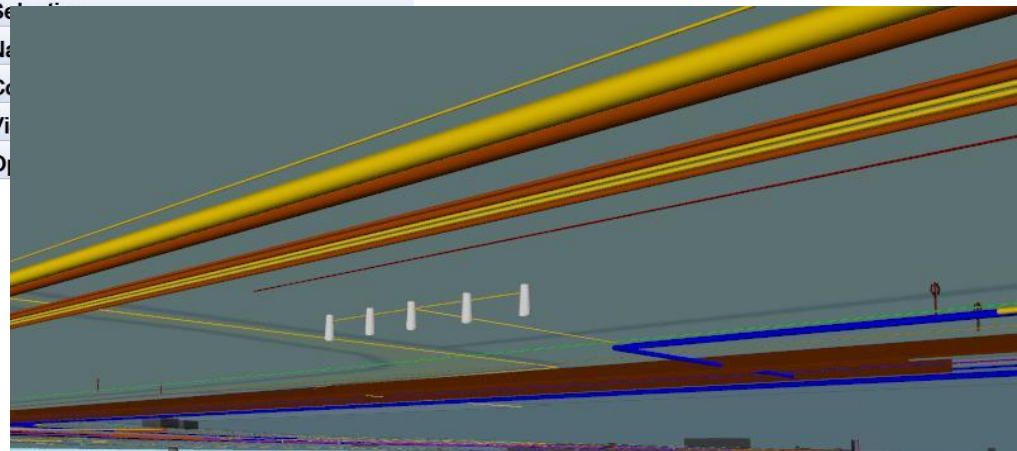
TU Delft  
Delft University of Technology



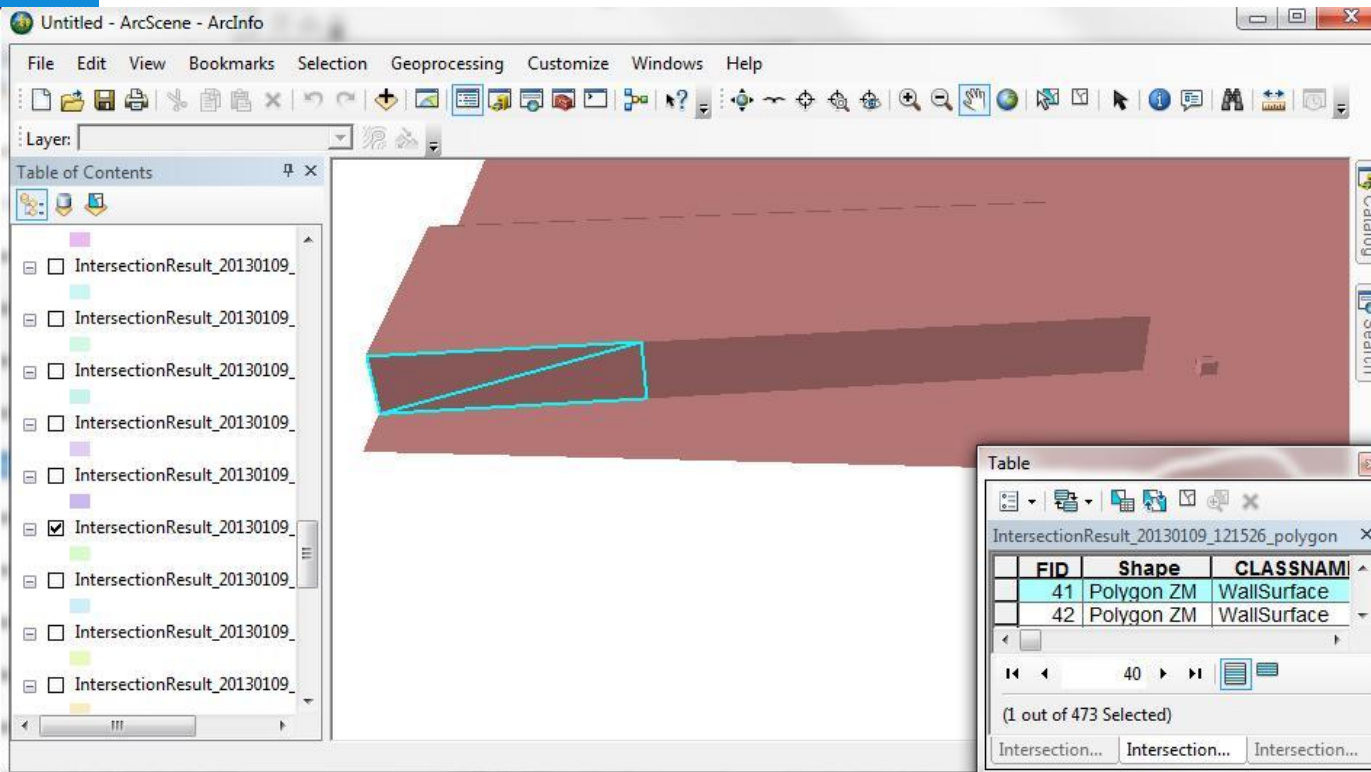
View from above



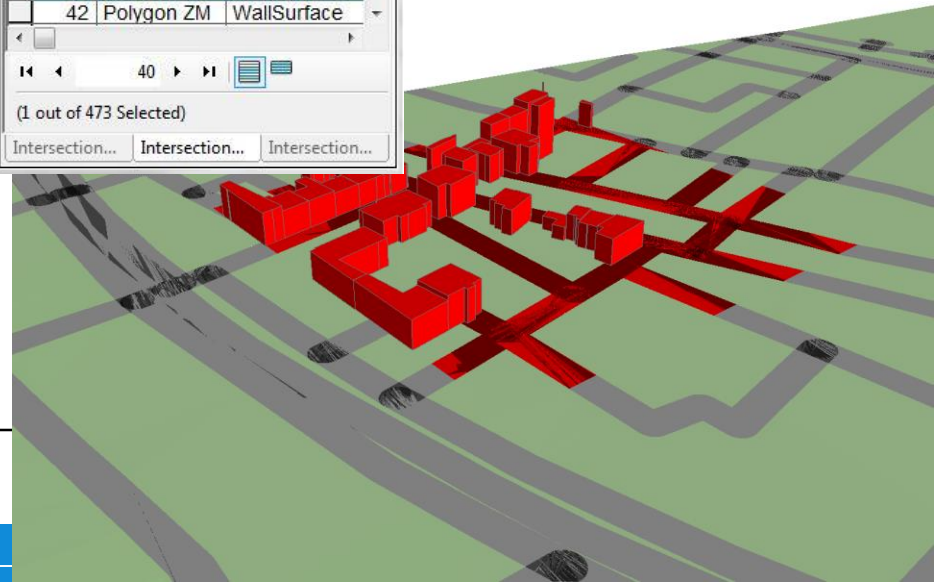
View from below



# ESRI 3D Clip and Cross section

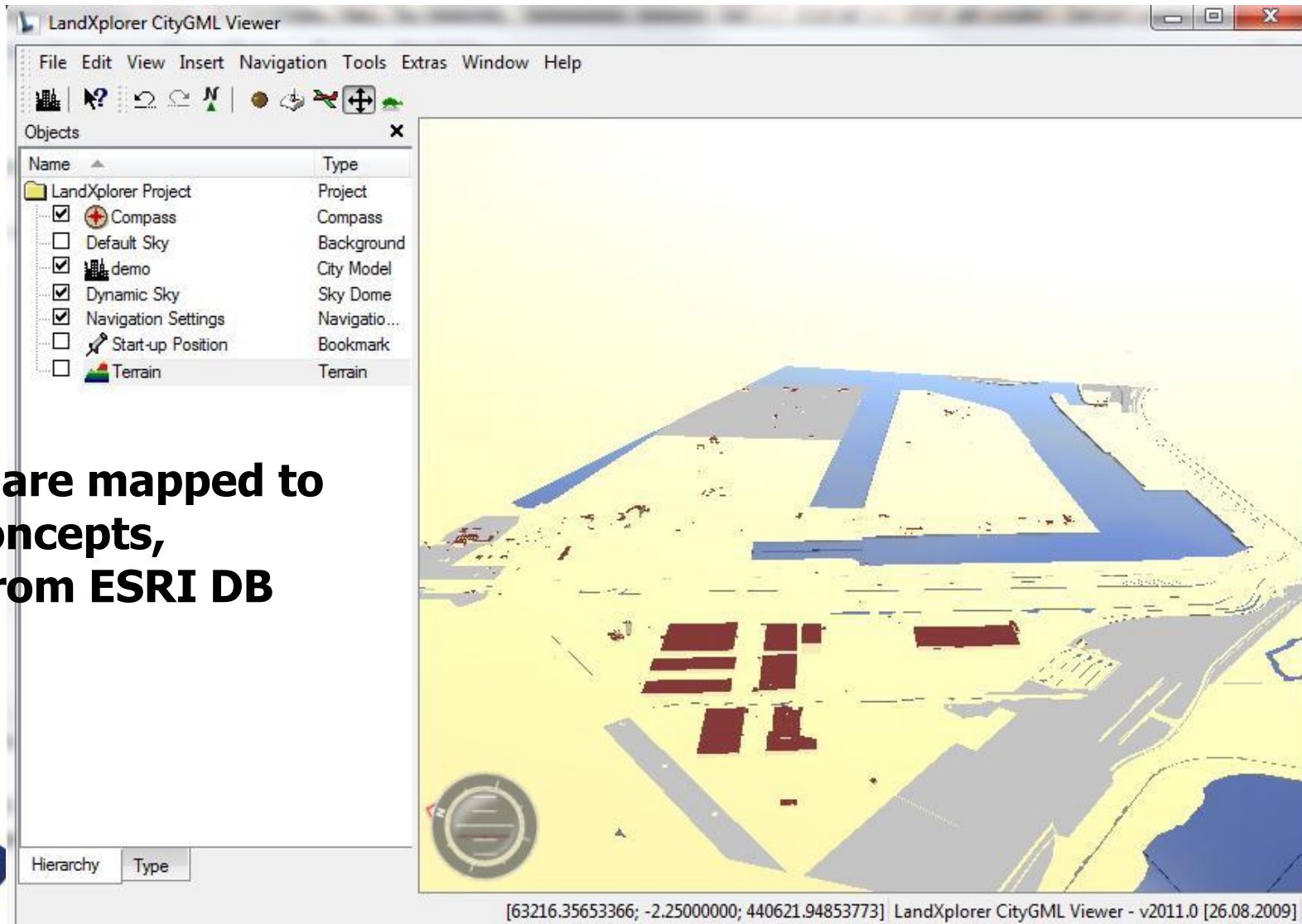


**Objects are closed**  
**Attributes are preserved!**





# LandXplorer: Amazonehaven



**All objects are mapped to  
CityGML concepts,  
exported from ESRI DB**



# Final demo (Flee3D): Amazonehaven

In 5 steps

1. **Define** area for development (coordinates MinMaxBox)
2. **Query and Clip** existing 2D data (prepare them for integration with 3D)
3. **Query and Clip** existing 3D data and integrate with upgraded' 2D data (send to design office)
4. **Import** design BIM model (quay Amazonehaven)
5. **Check** the desing againts newlly queried existing 2D/3D data. Return for corrections
6. **Export** (simplified) 3DGIS and (final) BIM of the quay



# Final demo Flare3D

<http://www.buildingbits.nl/projecten/NGI/v10/HBRCaseSDI.html>

The screenshot displays the 3D haven software interface. At the top, there is a navigation bar with buttons: 'toon overzicht', 'definieer casusgebied', 'importeer 3D GIS', 'importeer BIM', 'controleer ontwerp', and 'exporteer BIM en GIS'. A blue box on the right states: 'Ontwerp varianten worden geïmporteerd in het systeem op basis van internationale BIM uitwisselingsstandaarden'. Below the navigation bar, the 'Objecten' panel on the left shows a tree view of the project structure. The 'Kenmerken' panel at the bottom left shows the name 'Kademuur\_nieuw\_kolom\_rond:(no)' and a table of characteristics.

**Objecten**

- ▼ Ontwerp(7)
  - ▼ Kademuur(7)
    - kademuur\_nieuw\_damwandprofiel
    - ▼ kademuur\_nieuw\_kolom\_rond
      - Kademuur\_nieuw\_kolom\_rond
      - Kademuur\_nieuw\_kolom\_rond
      - Kademuur\_nieuw\_kolom\_rond
      - Kademuur\_nieuw\_kolom\_rond
      - Kademuur\_nieuw\_kolom\_rond
      - Kademuur\_nieuw\_kolom\_rond
      - Kademuur\_nieuw\_kolom\_rond

**Kenmerken**

naam: Kademuur\_nieuw\_kolom\_rond:(no)

Kenmerk	Waarde
broneigenaar	GWR
bron	IFC

3D haven i

toon overzicht definieer casusgebied importeer 3D GIS importeer BIM controleer ontwerp exporteer BIM en GIS

Ontwerp varianten worden geïmporteerd in het systeem op basis van internationale BIM uitwisselingsstandaarden

developed by 8B Building Bits

3D haven i

3D haven i



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Follow the developments at:

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

