3D Data Modelling in the Netherlands

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TU Delft & Kadaster & Geonovum
3D modelling in the Netherlands

1. 3D national standard for large scale topography
2. Adoption process of the national 3D standard
3. Implementation phase (work in progress)
4. Generation of a nation wide 3D topographic data set at mid scale
3D national standard: CityGML ADE for Information Model Geography

Integration of:
1. CityGML:
   - OGC standard for 3D geoinformation
   - Semantics and geometry
2. 2D Information model large scale topography (IMGeo)
   - object definitions for large scale representations of roads, water, land use/land cover, bridges, tunnels etc
   - data providers: municipalities, provinces, ProRail, RWS,
IMGeo 2.0

- Formally established in February 2012
- 2D descriptions mandatory
- can be extended into 2.5D/3D according to principles of CityGML
- Reuse of valuable concepts and efforts (!) in the 2D domain
- 3D becomes in reach
CityGML ADE for IMGeo

LOD2

Extrusion upwards

3D+semantics

Extrusion downwards

2.5D+semantics+topology

LOD1

LOD0

IMGeo

2D+semantics

3D data modelling

TU Delft

3D national standard
Adoption process
Implementation
Nation wide 3D data set
3D national standard
Adoption process
Implementation
Nation wide 3D data set

3D data modelling

Courtesy of Linda van den Brink
Why Align to 2D Information Model?

- Step from 2D to 3D makes 3D feasible
- Connecting to existing application provides justification for 3D
- Reuse of rich semantics available in 2D data sets
- Update process of 2D data can be used for 3D data
Information model is available

For everyone

- As XSD
- UML models in Enterprise Architect format


**OGC 3DSIG adopted our approach to model ADE of CityGML**
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3D is practice in The Netherlands

Source: TNO

Source: Prov NB

3D national standard
Adoption process
Implementation
Nation wide 3D data set

3D data modell
But 3D is not mainstream:

- No generic 3D approach
- Project based
- Reinvest and restart for every new project
- For governmental organisations not clear what you can do with 3D and how to do it

- 3D in NL is: ad hoc, redundant, not efficient + not all potentials are being used
Adoption process of the 3D Standard

• Within 3D Pilot NL (March 2010 - June 2011)

• Initiated by: Kadaster, Geonovum, Ministry of Infrastructure and Environment, Netherlands Geodetic commission

• Goals of 3D Pilot:
  • Give directions to & push 3D in the Netherlands
  • Collaborate with many stakeholders on use cases and test bed
  • Share knowledge on 3D in a non-competitive setting
## 3D Pilot Partners Phase I (68)

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Other partners:

- 550 LinkedIn members; also active on Twitter
Approach 3D Pilot

1. 3D data acquisition

2. Use cases

3. 3D testbed

4. 3D standard

Central database

3D national standard
Adoption process
Implementation
Nation wide 3D data set
Approach 3D Pilot

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Approach 3D Pilot

1. 3D data acquisition

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4. 3D standard

Central-database
Test Data: “Kop van Zuid” area, Rotterdam

AHN2 (Lidar)

Fugro (Lidar; for Rotterdam)

Topcon Sokkia

Mobile laser scanning
Horus Surround Vision

TNO

Cyclomedia

Imagem

DTB, RWS

GBKN

TOP10NL
Comparison of 3D standards and establishment of national 3D standard

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Data Further Processed to CityGML Data

3D national standard
Adoption process
Implementation
Nation wide 3D data set
Point Cloud viewer

Airstream simulation

Geological subsurface

Trees

3D city model

3D Spatial Plans

Mutation detection

3D Kadaster

.... 3D data applied to use cases
• Use cases available at YouTube:

http://www.geonovum.nl/dossiers/3dpilot/congres/english#3D_use_cases
3D modelling in the Netherlands

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3. **Implementation phase**
4. Generation of a nation wide 3D topographic data set at mid scale
Next National 3D Steps

- We have a 3D standard; but are not there yet
- Follow-up pilot has started (Sept 2011- Sept 2012)
  - Goals:
    - Gain experience in working with the 3D standard
    - Make further agreements in community driven setting
    - Develop starterskit for new people
New call for participation: 100 organizations

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200 persons; 550 LinkedIn members
Phase II 3D Pilot

6 work packages
Work package 1

Collecting input 3D data and creating example 3D IMGeo data

- compliant to 3D standard
- several levels of detail
- several themes (buildings, bridge, trees)
Work package 2

- Defining example specifications for tendering documents for building 3D datasets

*CityGML Den haag* ≠ *CityGML Rotterdam*
Work Package 3

• **Design and implementation of 3D Validator**

1. **Upload IMGeo-GML file**

2. **Validate**

3. **Get result**

Source: 3D Pilot – 3D Validation Team
Work package 4

- Generic approach for maintenance, update and dissemination of 3D data

- CityGML relay planned
Work package 5

Collecting 3D killer applications
www.3dpilot.nl
Work package 6

Aligning CityGML and BIM standard (IFC)

- Prepare IFC models for use in GIS
- Make agreements on formal mappings, so that every conversion is done in the same meaningful way

BIM (e.g., IFC) Constructive Solid

Geometry
- IfcWallStandardCase
- IfcBeam
- IfcWindow
- IfcSlab

3D GIS (e.g., CityGML) Boundary Representation

- IntBuildingInstallation
- WallSurface
- FloorSurface
- Window
- GroundSurface
- InteriorWallSurface

Volumetric, parametric primitives representing the structural components of buildings

Accumulation of observable surfaces of topographic features

source: Thomas H. Kolbe - joint work with Claus Nagel & Alexandra Stadler
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Nation wide 3D topographic data set

- Mid scale (1:10k): easier to generate
- One data provider (Kadaster)
- Smart combination of TOP10NL and AHN2
  - Based on (Oude Elberink & Vosselman 2010)
First results 3D TOP10NL

Water is plane

Road is continuous

Terrain has varying heights

Terrain connects to water

Building as block

Oude Elberink, ITC, U Twente
3D national standard
Adoption process
Implementation

Nation wide 3D data set
Quality

- Low values due to time differences between source data sets
Beyond visualisation
Conclusions (1/2)

- 3D applications are indispensable for managing and planning our densely built-up environment.
- Gained insights in the Netherlands:
  - “3D is nice, but I do not know how” to “focused 3D ambitions”
- Agreements and collaboration are essential to move forward in the highly complex domain of 3D information.
Conclusions (2/2)

• Crucial for the adoption of the standard:
  • Support by many, many stakeholders
  • Aligning to 2D efforts and to international standard (CityGML)
  • Collaboration
  • National governmental organizations take responsibility:
    • Facilitate collaboration
    • Maintenance of standards (by Geonovum)
    • Providing a midscale 3D base data set with national coverage (by Kadaster)
More information 3D Pilot:

www.geonovum.nl/dossiers/3d-pilot

#3dpilot

Linkedin group 3D Pilot NL

Email: j.e.stoter@tudelft.nl