Identifying the problem of uncertainty determination and communication in infrastructural development

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Overview

- Introduction
- Quality & uncertainty aspects of geo-information
- Geoportals
  - Geoportals in the Netherlands
- Quality & uncertainty handling in Dutch companies and provinces
- Critical research issues & developments
- Future research
Civil Engineering Infrastructural Development

- essential
- reduction
- detailed
- professional
- major
- lack
Quality & uncertainty aspects of geo-information

- “Quality: The totality of features and characteristics of a product or service that bear on its ability to satisfy stated or implied needs.”

- “Uncertainty: ...a measure of the difference between estimation and reality...”
Quality & uncertainty aspects of geo-information

Quality & uncertainty:

- Data quality is influenced by various factors, leading into different types of imperfect data:
  - Imprecision (e.g. resulting from site investigations)
  - Inconsistency (e.g. choice of modelling method & parameters)
  - Uncertainty (e.g. resulting from interpretation process)
Quality & uncertainty aspects of geo-information

What are the so-called ‘interpretation uncertainties’?

Example: Marine or Fluvial Environment?

Marine

Layer 1

Layer 2 (i.e. sand)

Layer 3

Fluvial

Layer 1

Layer 2 incl. sand lenses

Layer 3
Geoportals
## Geoportals in the Netherlands

<table>
<thead>
<tr>
<th>Geoportal</th>
<th>Content</th>
<th>Information</th>
<th>Selection</th>
<th>Pricing</th>
<th>Data Format</th>
<th>Quality &amp; Uncertainty</th>
</tr>
</thead>
<tbody>
<tr>
<td>Het rode loket</td>
<td>Building information</td>
<td>Location, construction, use</td>
<td>Location, type of information</td>
<td>0,10-0,30 €</td>
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<tr>
<td>Het groene loket</td>
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<td>Location, standards, data types</td>
<td>Location, time, data type</td>
<td>free of charge</td>
<td>ArcGIS map, MS Access, .jpg, .pdf</td>
<td>Quality element in metadata</td>
</tr>
<tr>
<td>Het witte loket</td>
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<td>Time, status, constraints</td>
<td>Location, content, data type</td>
<td>depending on data type</td>
<td>Data sets, satellite image, map</td>
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<tr>
<td>Kadaster</td>
<td>Cadastral information</td>
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<td>Location, type of information</td>
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<tr>
<td>Rijkswaterstaat</td>
<td>Road- &amp; waterways</td>
<td>Topographic height map, aerial photo</td>
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</table>
# Geoportals in the Netherlands

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</thead>
<tbody>
<tr>
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<td>Location, method, depth, time period</td>
<td>basic: 50 €, +15 to 90 € depending on data</td>
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<td>Location, method, ground structure</td>
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<td>insert as .pdf, view online</td>
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<td>DinoLoket</td>
<td>Subsurface information</td>
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<td>free of charge for private use</td>
<td>ASCII, .xml, .pdf</td>
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# Quality & Uncertainty Handling in Dutch (Engineering) Companies and Provinces

<table>
<thead>
<tr>
<th>No. of Companies</th>
<th>Quality Control Estimation</th>
<th>Quality Control Estimation Method</th>
<th>Quality Control Estimation Management</th>
<th>Quality Control Estimation Exchange</th>
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<td>Hardcopy</td>
<td>Orally</td>
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<td></td>
<td>1/12</td>
<td>7/12</td>
<td>3/12</td>
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<td>3/12</td>
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</tbody>
</table>
Resulting in...
Critical research issues & developments

Critical Research Issues:

- Quality and (possible) uncertainties regarding geo-information and real-world representations
  - Most important for subsurface geotechnical representations
  - Main type of uncertainty to be considered: Personal uncertainties (i.e. interpretation uncertainties)
- Identification of necessity to define and communicate quality and uncertainty information
- First step made by a number of companies and provinces
- Several geoportals include "quality elements" in the metadata of their geo-information
  - Ideally included in metadata of specific object or representation
Leading to...
Future Research

Aspects of interpretation uncertainty
- Quantity of Data
- Quality of Data
- Complexity of Data
- Extent Construction
- Impact Construction
- Experience Interpreter

Attaching parameters to various aspects

Weighting of the different factors

Indication factors for the level of interpretation uncertainty to be expected in a representation; to be included in metadata
THANK YOU