

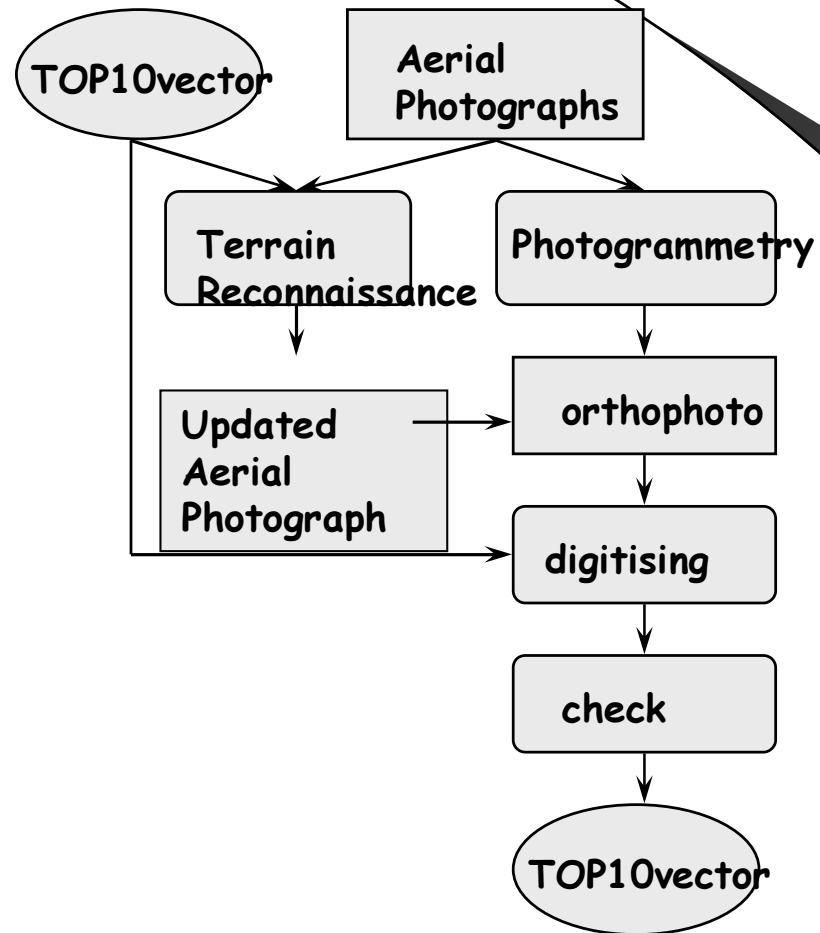
Topographic Information Systems in the Netherlands

Ferjan Ormeling
(based on material from TDN)



Map samples: copyright Topografische Dienst Nederland (TDN)

Production overview



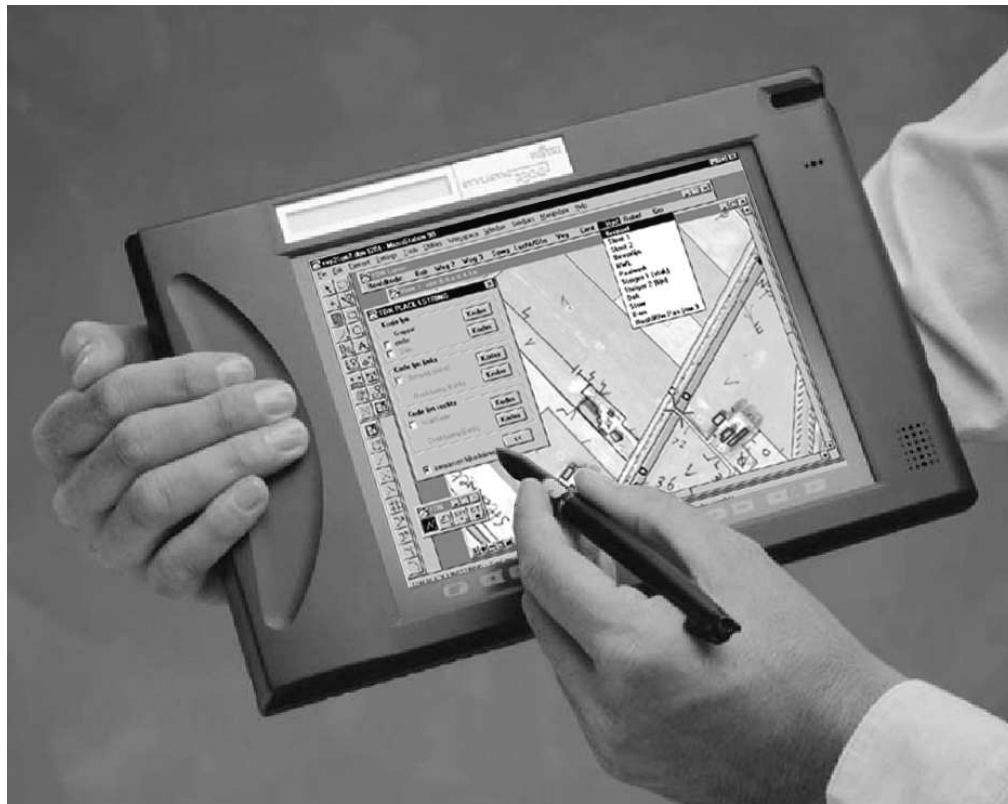
Interpretation aerial photographs



Reconnaissance in the field



Pencomputer for reconnaissance



Updated Aerial photograph



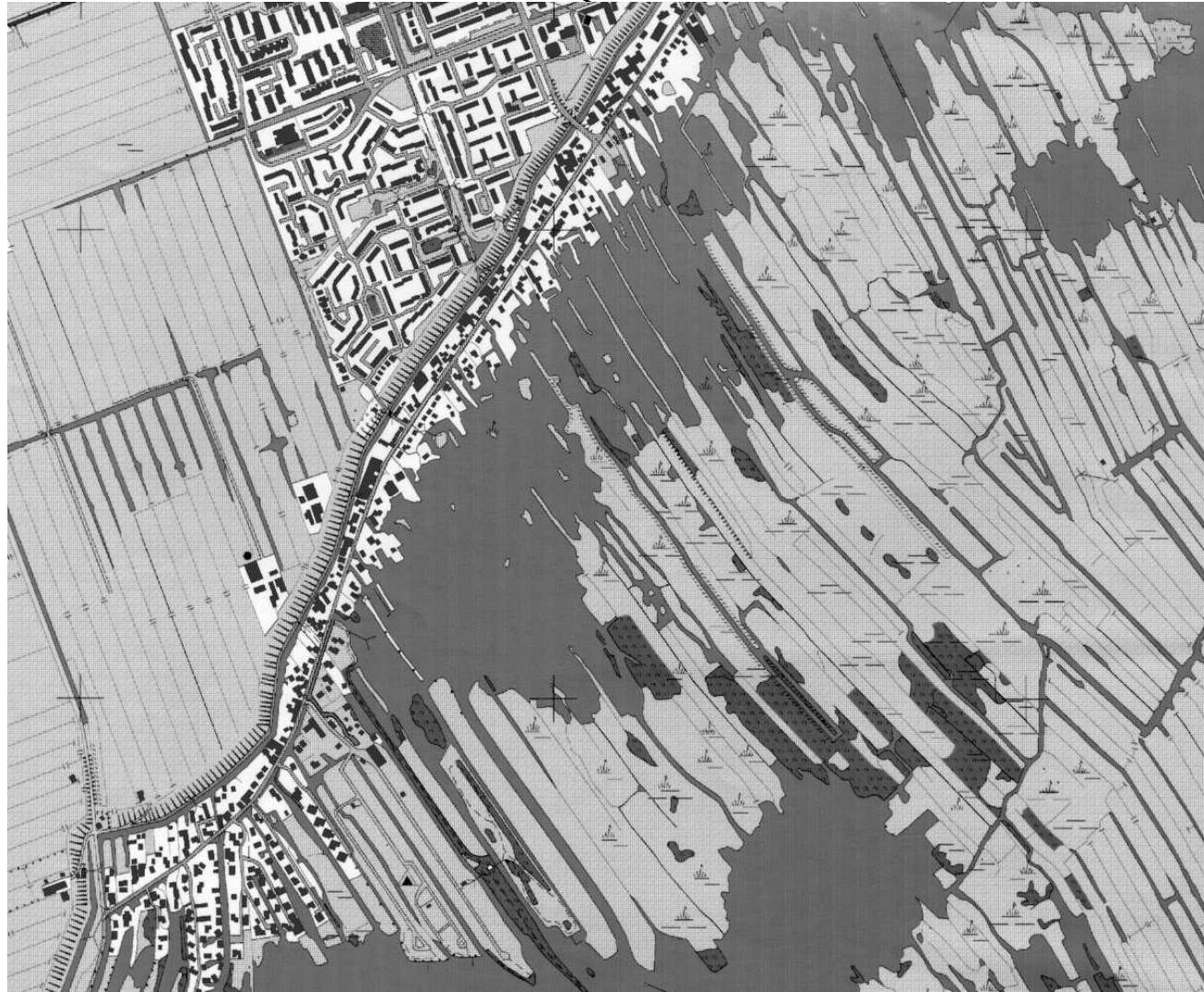
Digitising aerial photographs







Interface (Microstation)

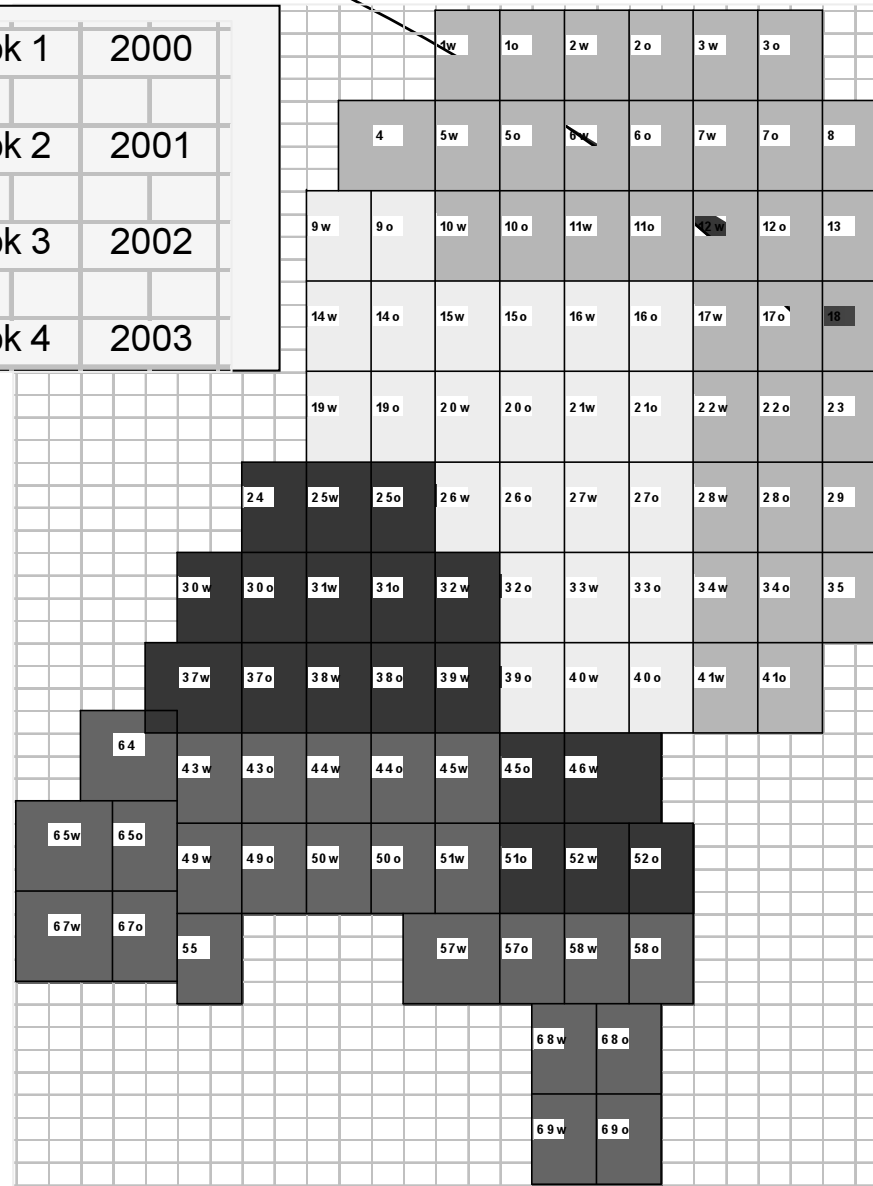


Test plot TOP10vector



4-Year cycle TOP10vector

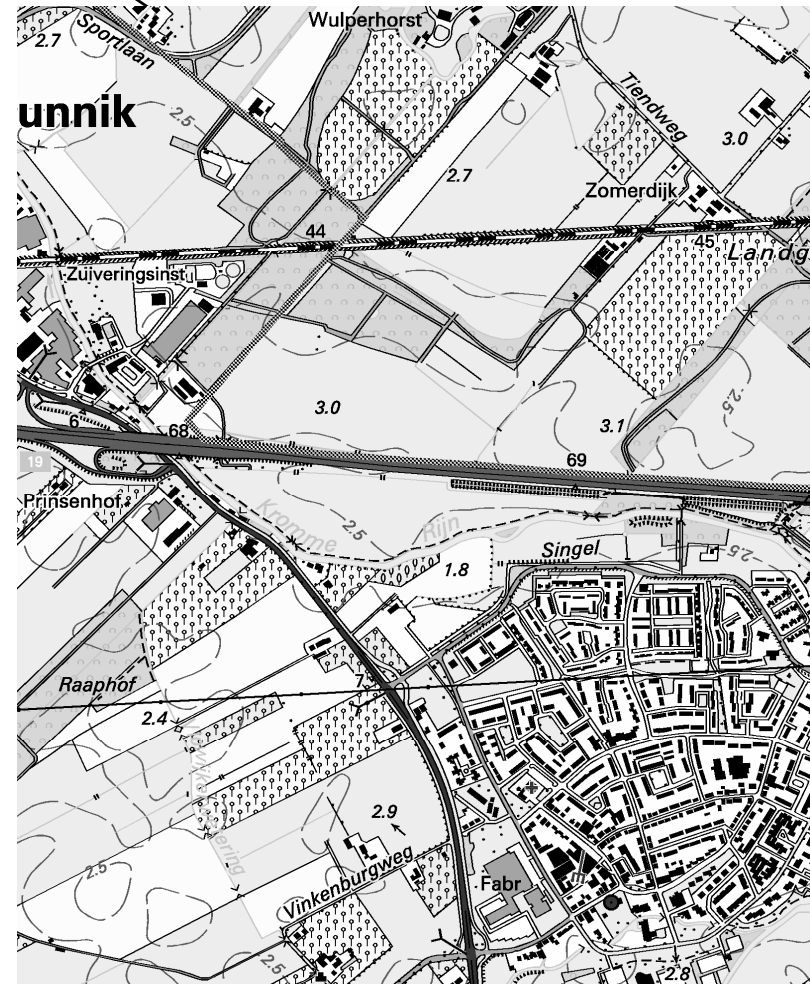
	Blok 1	2000
	Blok 2	2001
	Blok 3	2002
	Blok 4	2003



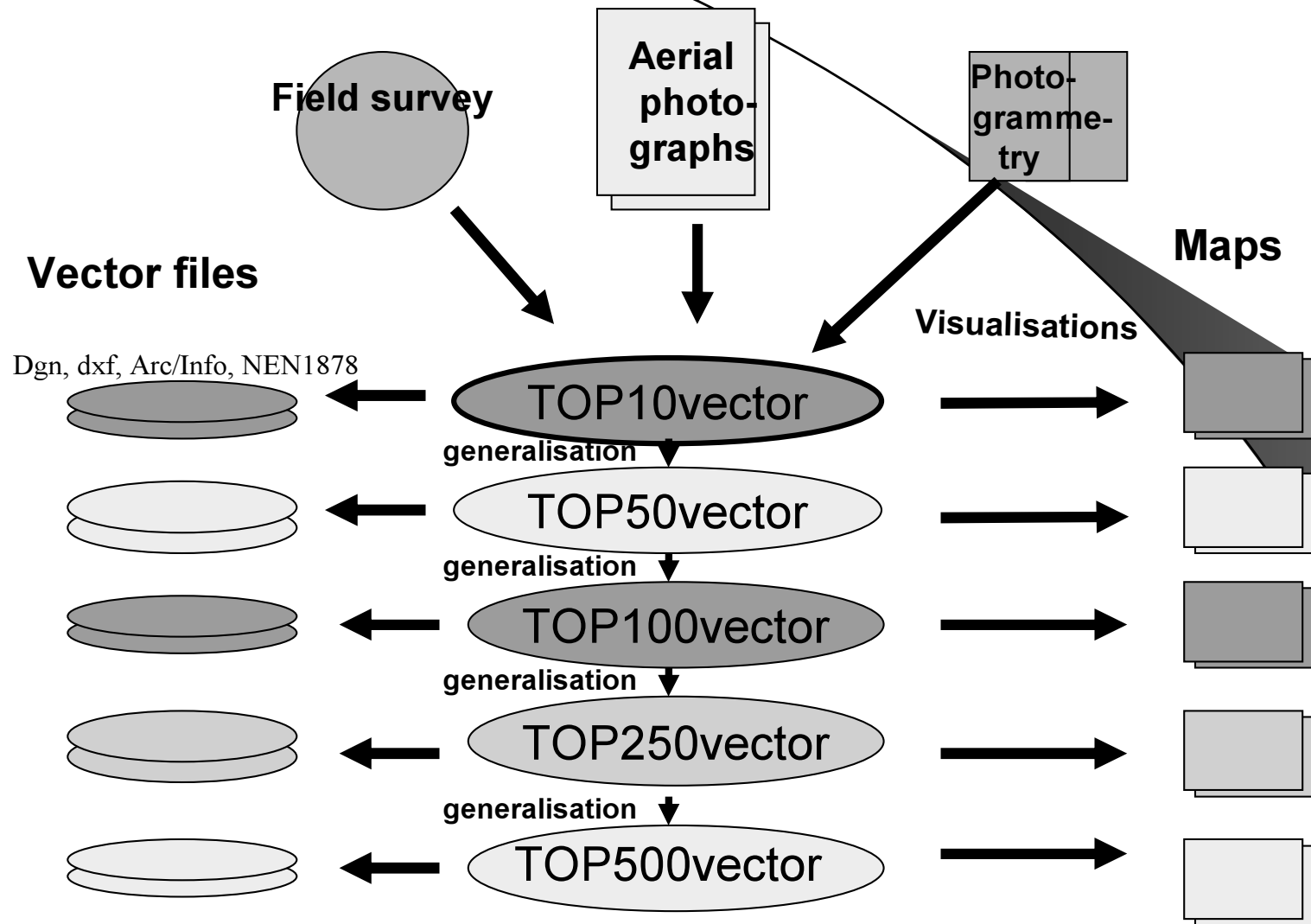
Top10vector (DCM)



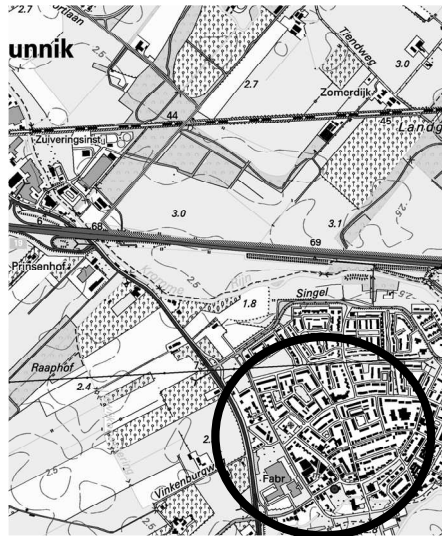
Top10vector (DCM) Topogr.Map 1:25 000



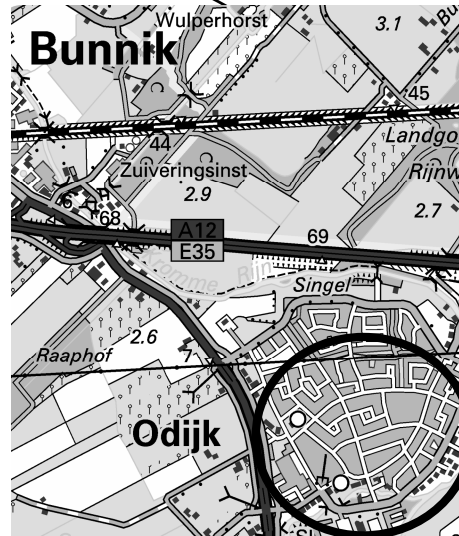
Production of topographic map series, Netherlands



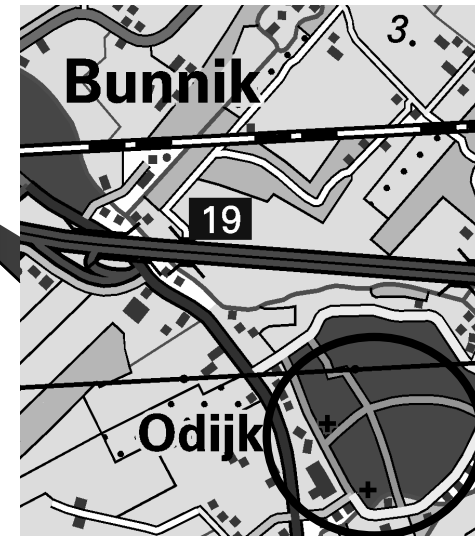
Generalization from 1:25.000 to 1:500.000



1:25.000



1:50.000



1:100.000



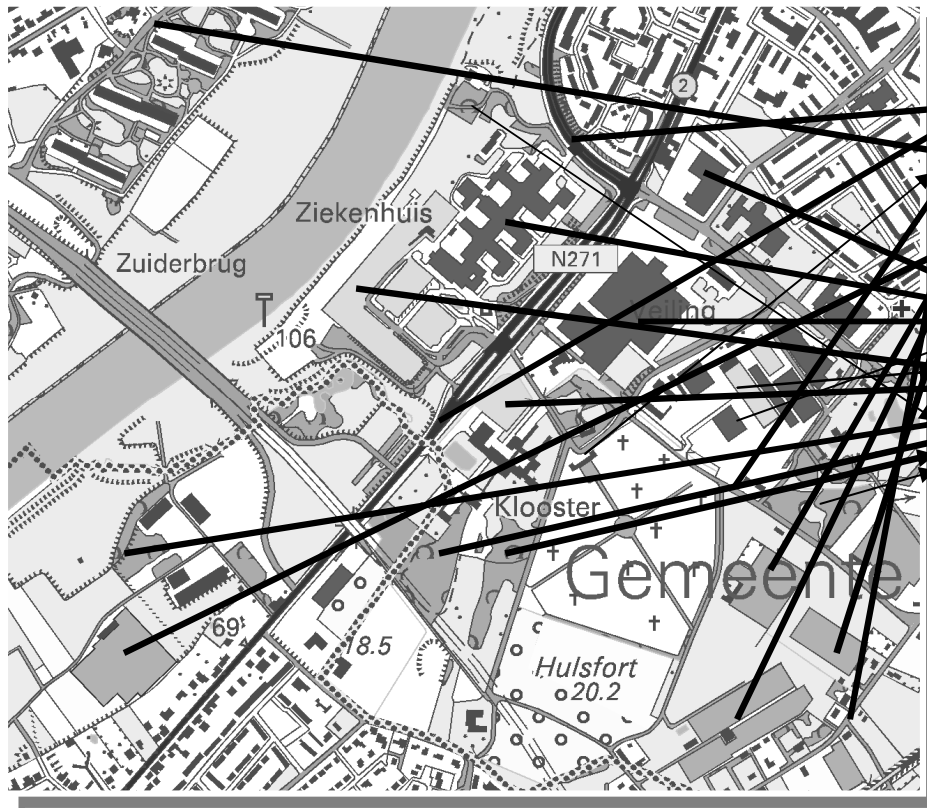
1:250.000



1:500.000

Current selection possibilities at TDN

Selection possible on
Object category code



- Main Road
- Regional Road
- Street
- Hothouses
- Big building
- Parking lots
- Deciduous forest

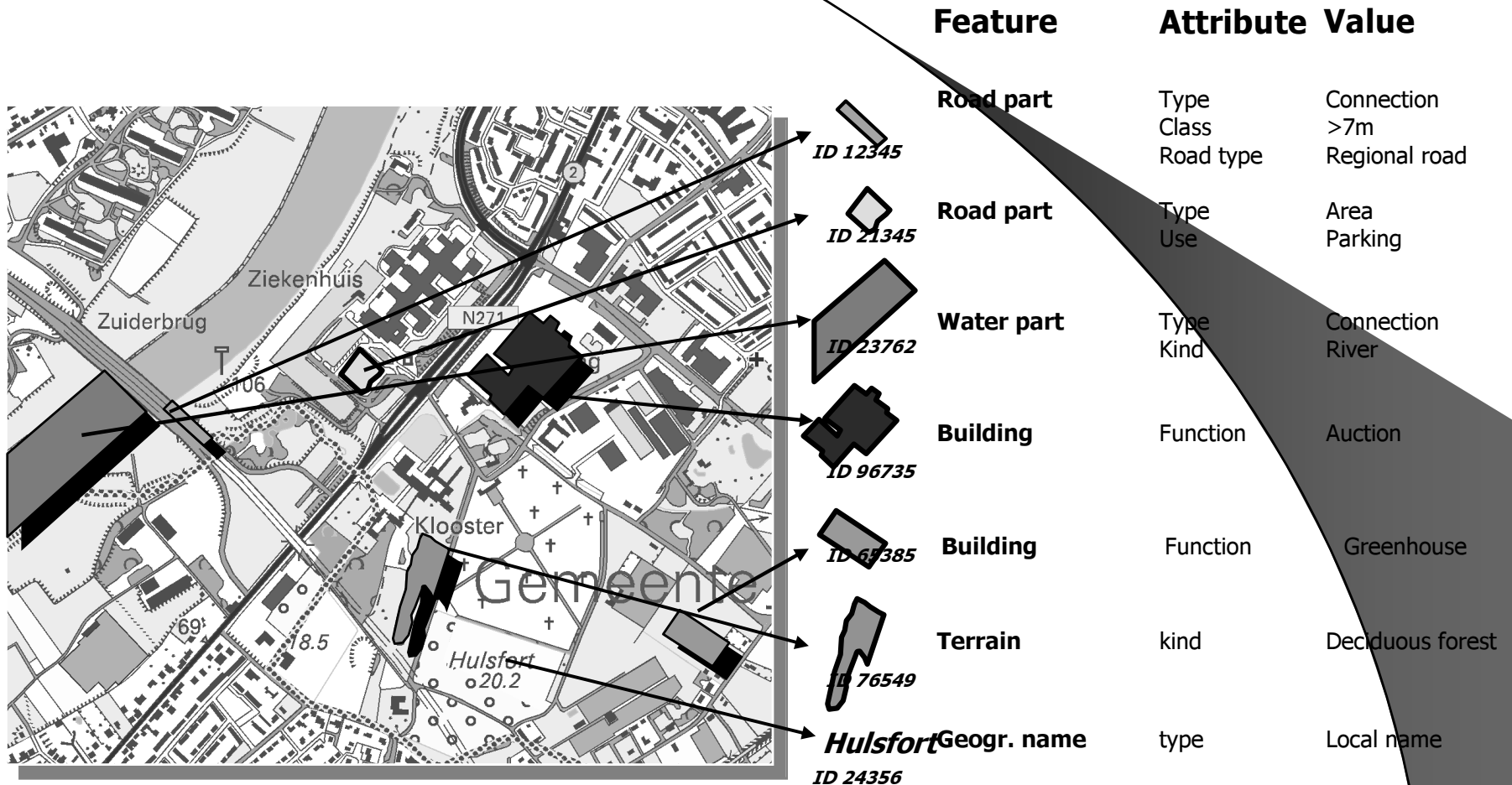
Current data model for Top10vector

code description

#1000	building, house
#1010	built-up area
#1020	large building, complex of buildings
#1030	high-rise building
#1040	wall
#1050	barn
#1060	greenhouse
#1090	tank
#1100	police-station
#1110	post-office
#1120	municipal hall
#2000	motorway
#2020	motorway under construction
#2030	motorway, planned
#2040	motorway without median

Object-oriented data

Individual objects can be selected and presented with their attributes



Present topographic map 1:25 000

ArcView GIS Version 3.1

File Edit View Theme Graphics Window Help

Scale 1: 158,145.86
433,723.18

View1

- Inrichtings_element_point.s
o Boom
↑ Kilometerraambord
+ Lichtopstand
● Paal
| Peilschaal
- 39d_kb.tif
- Inrichtings_element_line.shp
Aanlegsteiger
Heg
Veer
- Wegdeel_area.shp
Hoofdweg
Lokale weg
Overige weg
Regionale weg
Straat
- Waterdeel_line.shp
- Waterdeel_area.shp
Meer, plas, ven, vijve
Waterloop
- Terrein_area.shp
Akkerland
Boomgaard
Dodenakker
Fruittkwekerij
Grasland
Loofbos
Overig
Plaveisel, basaltblok
Populieren
Zand
- SpoorbaandeeL_area.shp
- Geografisch_gebied_area...

The map displays a topographic view of the Tiel and Wamel region. Key features include:

- Contour Lines:** Elevation contours are labeled with values such as 6.0, 7.2, 7.5, 8.4, 9.0, 11.1, and 11.3.
- Water Features:** The 'Vlucht haven' (refuge harbor) is visible, along with the 'Wamelsche' and 'Uiterwaarden' waterways.
- Infrastructure:** A network of roads is shown, including 'Hoofdweg' (main road) and 'Lokale weg' (local road).
- Land Use:** Various land use types are represented by different shades and patterns, such as 'Akkerland' (arable land) and 'Grasland' (grassland).
- Labels:** Place names like 'Tiel', 'Wamel', 'De Kil', 'Hardepoort', 't Veerhuis', and 'Molen' are clearly marked.

Creates a point on the display

Office Microsoft

Start Inbox - Microsoft Outlook ArcView GIS Version ... Microsoft PowerPoint - [Pla... 4:25 PM

TOP10 converted to objects

The screenshot displays the ArcView GIS Version 3.1 interface. The main window, titled 'View1', shows a map of a town area with various land use and infrastructure layers. The legend on the left side of the View1 window lists the following layers and their corresponding symbols:

- Wegdeel_area.shp
 - Hoofdweg
 - Lokale weg
 - Overige weg
 - Regionale weg
 - Straat
- Waterdeel_line.shp
- Waterdeel_area.shp
 - Meer, plas, ven vijve
 - Waterloop
- Terrein_area.shp
 - Akkerland
 - Boomgaard
 - Dodenakker
 - Fruittkwekerij
 - Grasland
 - Loofbos
 - Overig
 - Plaveisel, basaltblok
 - Populieren
 - Zand
- SpoorbaandeeL_area.shp
- Geografisch_gebied_area.
- Bebouwing_area.shp
 - Gemeentehuis
 - Overig
 - Postkantoor
 - Religieus gebouw
- Administratief_gebied_are
 - Tiel
 - West Maas en W aal

The Windows taskbar at the bottom shows the Start button, several open applications including Microsoft Outlook, ArcView GIS Version, and Microsoft PowerPoint, and the system tray with the time 4:24 PM.

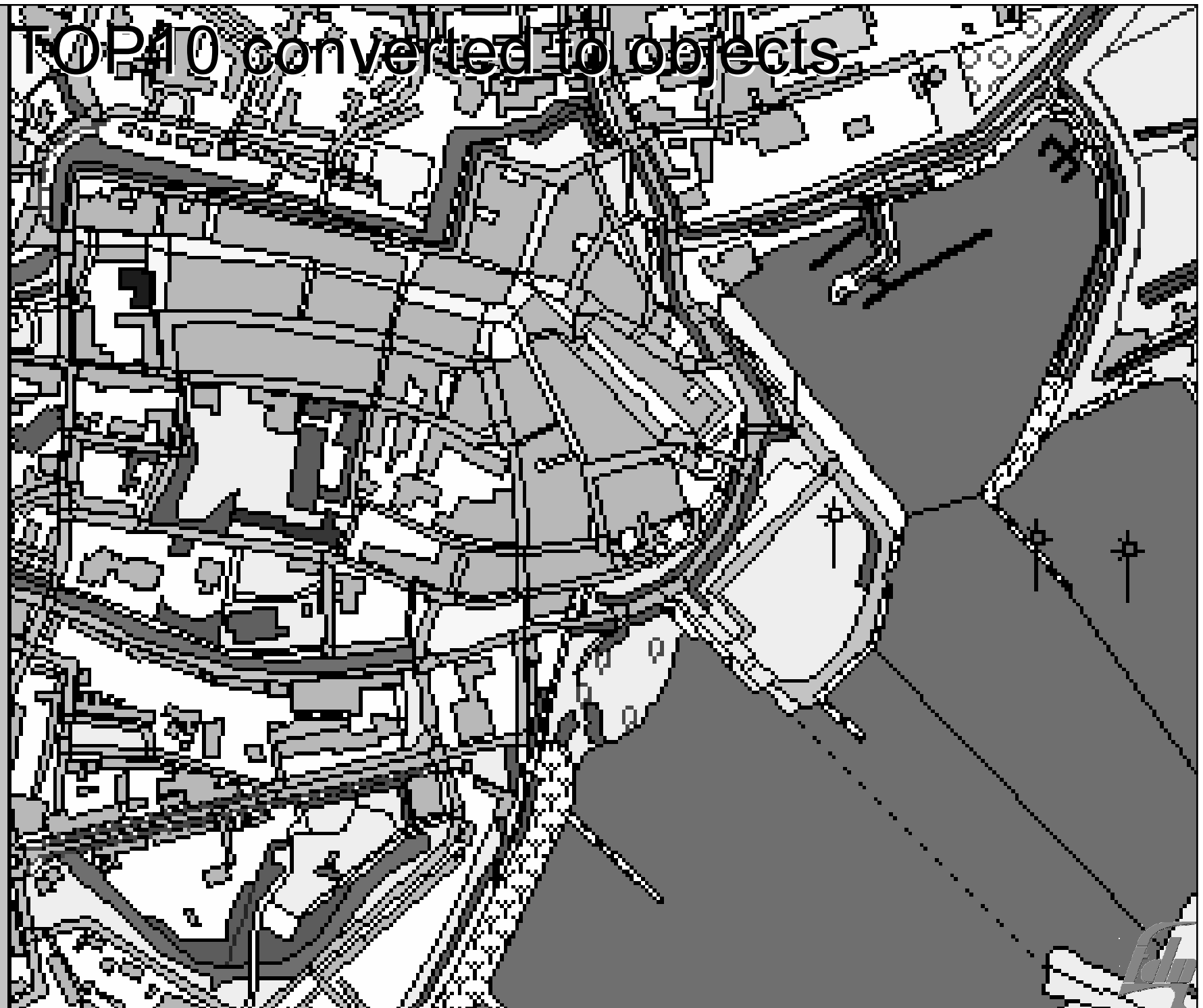
ijve

TOP40 converted to objects

blokl

hp

rea.



Objects with attributes (1)

The screenshot shows the ArcView GIS Version 3.1 interface. The main window displays a map with various layers. The left sidebar shows the following layers:

- Wegdeel_area.shp
 - Hoofdweg
 - Lokale weg
 - Overige weg
 - Regionale weg
 - Straat
- Waterdeel_line.shp
- Waterdeel_area.shp
 - Meer, plas, ven vijve
 - Waterloop
- Terrein_area.shp
 - Akkerland
 - Boomgaard
 - Dodenakker
 - Fruittwekerij
 - Grasland
 - Loofbos
 - Overig
 - Plaveisel, basatbloki
 - Populieren
 - Zand
- Spoorbaanddeel_area.shp
- Geografisch_gebied_area.shp
- Bebouwing_area.shp
 - Gemeentehuis
 - Overig
 - Postkantoor
 - Religieus gebouw
- Administratief_gebied_area.shp
 - Tiel
 - West Maas en Waal

The 'Identify Results' dialog box is open, showing the following data for a selected object:

Field	Value
Shape	Polygon
Oid	1100341
Top10_id	1100341
Begindatum	24 JUN 2001 15:51
Einddatum	31 DEC 2999 23:59
Type	Gebouw
Functie	Religieus gebouw
Hoogteklas	Laagbouw
Hoogte	Onbekend
Status	In gebruik
Naam	Onbekend
Hoogtenive	0
Tdrcode	1700

The dialog box also includes 'Clear' and 'Clear All' buttons at the bottom.



Object met attributen (voorbeeld 3)

Identify Results

Shape	Polygon
Oid	5100178
Top10_id	5100178
Begindatum	24 JUN 2001 16:03:13
Einddatum	31 DEC 2999 23:59:59
Landgebruik	Loofbos
Voorkomen	Overig
Toegankelijk	Openbaar
Voorkome0	Overig
Naam	Onbekend
Toegentive	0
Toegode	5023

The screenshot shows the ArcView GIS interface with a map of a town. The 'Identify Results' window is open, displaying the attributes of a selected polygon. A black arrow points from the 'Identify Results' window to a specific polygon on the map. The map shows various land use types, including roads, buildings, and green spaces. The 'Identify Results' window has a 'Clear' button and a 'Clear All' button. The map is titled 'View1' and has a scale of 1:158,247.58 and 433,165.78. The ArcView GIS Version 3.1 interface includes a menu bar (File, Edit, View, Theme, Graphics, Window, Help) and a toolbar with various GIS tools. The Windows taskbar at the bottom shows the Start button, several open applications (Office, Microsoft Outlook, ArcView GIS Version, Microsoft PowerPoint), and the system clock (4:15 PM).

Object met attributen (voorbeeld 4)

The screenshot shows the ArcView GIS interface with an Identify Results dialog box open over a map. The dialog box displays the following attributes for the selected object:

Attribute	Value
Shape	Polygon
Oid	2100196
Top10_id	2100196
Begindatum	24 JUN 2001 16:11
Einddatum	31 DEC 2999 23:59
Type	Verbinding
Wegtype	Regionale weg
Hoofdverke	Gemengd verkeer
Voorkomen	Op verhoogd vlak
Ruisingst	Overig
Verharding	4-7m
Verhard10	Onbekend
Verhard1	Verhard
Verhard2	Onbekend
Rijstroken	Onbekend
Rijrichtin	Tweerichting
Toegankelijk	Openbaar
Status	In gebruik
Straatnaam	Waalstraat
Wegnummer	Onbekend
Hoogtenive	0
Tdncode	3203

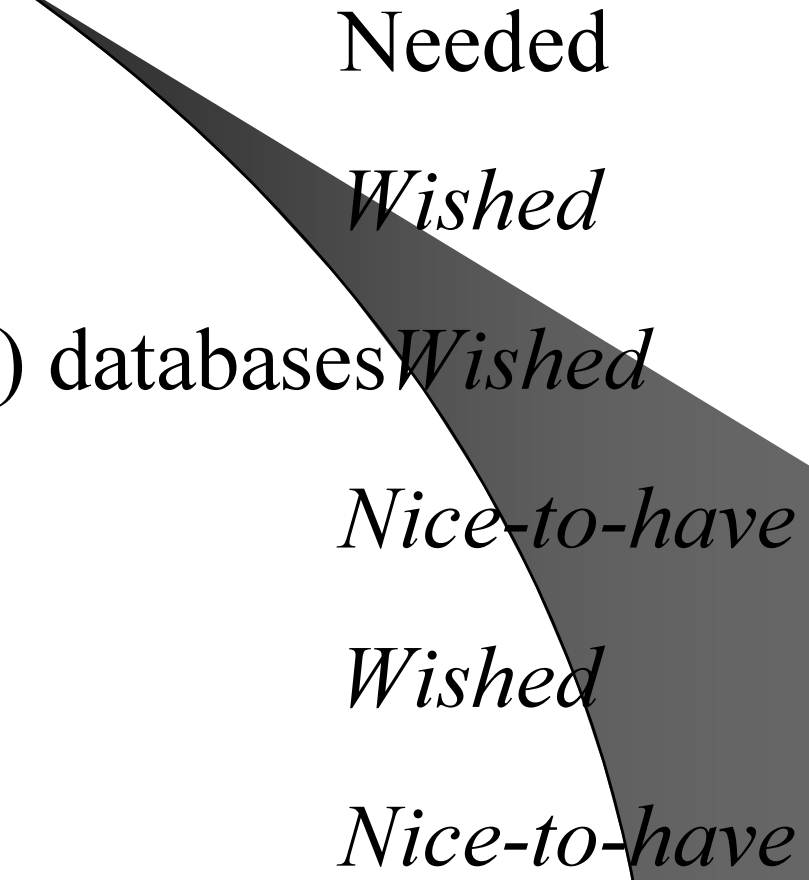
The dialog box also includes a list of layers on the left and buttons for 'Clear' and 'Clear All' at the bottom. A black arrow points from the 'Identify Results' dialog box to the map area.



User-specifications TOP10-21st century (1) in the Netherlands

- Link older and newer versions Needed
- Open standards (OpenGIS) Needed
- Meta data Needed
- Real world objects Needed
- Covering the whole country, no gaps Needed

User-specifications TOP10- 21st century (2)

- Time aspect of objects *Needed*
 - Multi-scale representation *Wished*
 - Linking with other (thematic) databases *Wished*
 - Payable use *Nice-to-have*
 - Usability *Wished*
 - Delivery via Internet *Nice-to-have*
- 

Linking older and newer versions of Top10vector

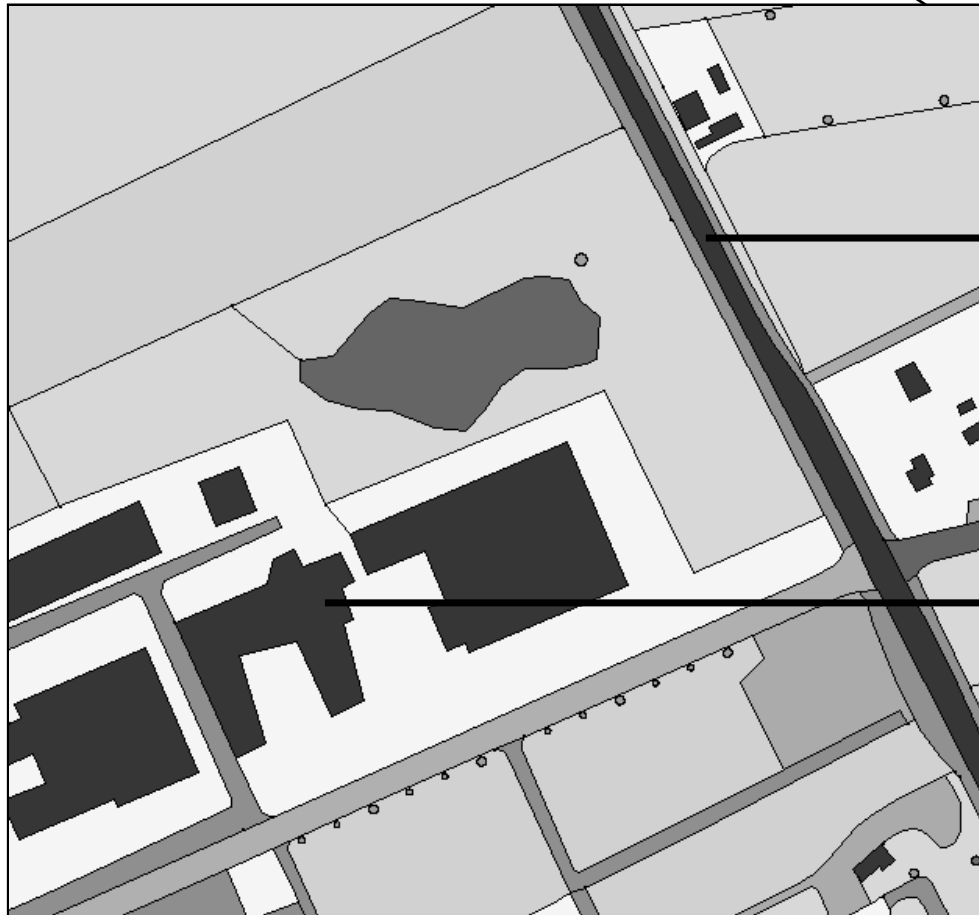
- 1) Protection of users' investments in the current version.
- 2) Possibilities for data exchange with customers that do not buy updates
- 3) (New) customers must be able to start using every available version Re-use of objects that did not change must be possible

Meta-information required

Making available data on the data on object level

1. Description of the classification structure of the objects;
2. Information on the manner and time of data gathering and on the latest check, per object;
3. Information on the quality of the individual object data (precision, reliability, up-to-dateness).

Example of objects with meta-information

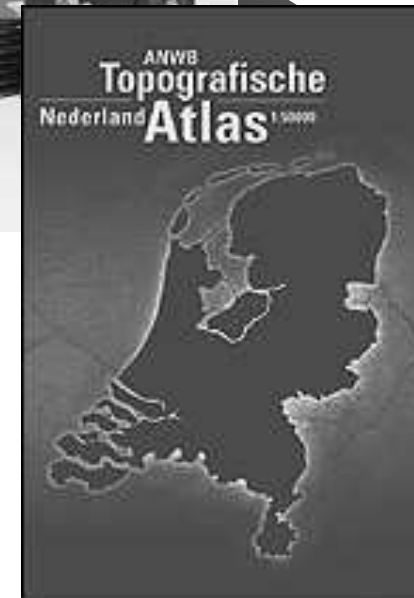
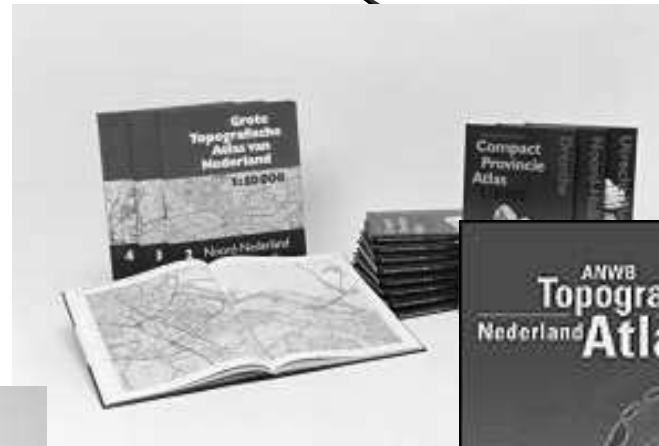


<i>Attribute</i>	<i>Value</i>
-------------------------	---------------------

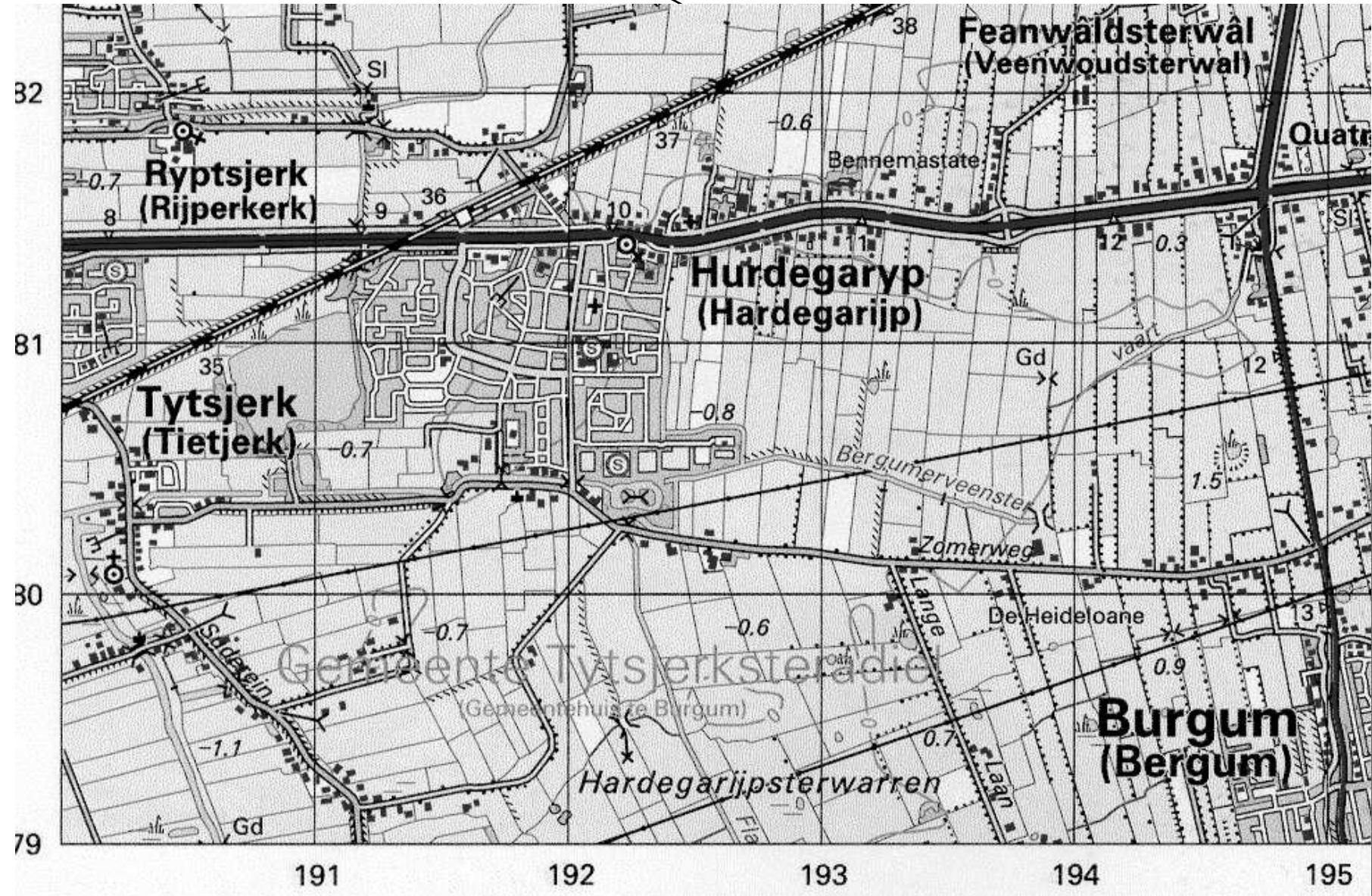
Road part_id:	348290016
Type:	Connection
Conn.width:	7 meter
Conn. material:	Asphalt
Road type:	Regional road
Streetname:	Mansholtlaan
Road number:	N781
Administrator:	Province
Source	NWB
year	1998
Quality	class 2
Accuracy	2 meter

Building_id	44699
Surface area:	3291 m ²
Type:	Building
Name:	Alterra-West
Streetname:	Droevendaalsesteeg
House number:	3
Postcode:	6708PB
Town:	Wageningen
Source	Municipality Wageningen
Year	1999
Quality	class 2
Accuracy	2 meter

Analogue products from TOPvector



Frisian and Dutch names



Use of colours at different maps

	1:25,000	1:50,000	1:100,000	1:250,000	1:500,000
Black	yes	yes	yes	yes	yes
Red			yes	yes	yes
Blue	yes	yes	yes	yes	yes
Brown	yes	yes	yes		
Violet					

<i>Gazet</i>	<i>TDN kode</i>	<i>Omschrijving gazet_code_EN</i>	<i>25d</i>	<i>50d</i>	<i>100d</i>	<i>250d</i>	<i>500d</i>	<i>Omschrijving van de TDN-kode</i>
<i>EN</i>	<i>object_code</i>	<i>Object_description_EN</i>						
BLDG	1009	Building, group of buildings						Gebouw (-encomplex)
BLDG	1029	Building, group of buildings						Gebouw encomplex (groot)
BLDG	1179	Building, group of buildings						Kazerne/legerplaats/Milit.gebou
MISC	1209	Miscellaneous landmarks						Belangrijk gebouw /Bijzonder o
BLDG	1219	Building, group of buildings						Ziekenhuis
BLDG	1229	Building, group of buildings						Universiteit
BLDG	1239	Building, group of buildings						Kasteel
POWS	1349	Power station						Electriciteitscentrale
MILL	1599	Mill						Molen
BLDG	1719	Building, group of buildings				sbm		Religieus gebouw
BLDG	1729	Building, group of buildings						Klooster/Abdij
MONU	1789	Monument, memorial						Monument/gedenkteken
LH	1859	Lighthouse						Vuurtoren
FORT	1899	Fort, entrenchment						[Voormalig] fort
RECR	1919	Recreational facilities						IJsstadion
RECR	1929	Recreational facilities						Renbaan
RECR	1939	Recreational facilities						Circuit
RECR	1979	Recreational facilities						Dierenpark/Safaripark

<i>Gazet</i>	<i>TDN code</i>	<i>Omschrijving gazet_code_E</i>	<i>25d</i>	<i>50d</i>	<i>100d</i>	<i>250d</i>	<i>500d</i>	<i>Omschrijving van de TDN-code</i>
<i>EN</i>	<i>Object_cod</i>	Object_description_EN						
LAKE	6119	Lake, pool, pond						Meer/Plas
CNAL	6159	Canal, waterway, ditch						Kanaal (>50m.)
CNAL	6159	Canal, waterway, ditch						Kanaal >40m.
CNAL	6169	Canal, waterway, ditch						Kanaal 600-1350 ton
CNAL	6179	Canal, waterway, ditch						Kanaal meer dan 1350 ton
CNAL	6179	Canal, waterway, ditch						Kanaal meer dan 600 ton
CHAN	6199	Channel, fairway						Vaargeul
TDFL	6219	Tidel flat						Droogvallende grond
DAM	6259	Dam, groyne, pier						Dam/havenhoofd/krib
AN	6339	Area name, local name						Spaarbekken
STRM	6349	River, stream, creek						Rivier (waterloop)
TDFL	6409	Tidel flat						Slikken
SHOL	6419	Bank, shallow, shoal						(Natte) Bank/Plaat
CHAN	6429	Channel, fairway						Geul
INL	6439	Inlet, estuary						Zeearm/gat
PT	6459	Point, cape						Kaap/hoek
IS	6469	Island						Eiland
IS	6479	Island						Waddeneiland
HBR	6489	Harbour						Jachthaven
HBR	6499	Harbour						Haven
LOCK	6729	Sluice, lock						Stuw/(schut)sluis
LOCK	6849	Sluice, lock						Uitwateringssluis
LOCK	6859	Sluice, lock						Sluis
AQDT	6889	Aqueduct						Aquaduct

<i>Gazet</i>	<i>TDN kode</i>	<i>Omschrijving gazet_code_E</i>	<i>25d</i>	<i>50d</i>	<i>100d</i>	<i>250d</i>	<i>500d</i>	<i>Omschrijving van de TDN-kode</i>
<i>EN</i>	<i>object_code</i>	Object_description_EN						
AN	8809	Area name, local name						Streek/veldnaam
PLDR	8819	Polder						Polder
IND	8839	Industrial estate						Industrieterrein
AN	8849	Area name, local name						Natuurreservaat
AN	8859	Area name, local name						Boswachterij
AN	8869	Area name, local name						Landgoed
RECR	8879	Recreational facilities						Recreatiegebied
RECR	8889	Recreational facilities						Recreatie object
-	8909	Very small size area						Oppervlakte zeer klein
-	8919	Small size area						Oppervlakte klein
-	8919	Area < 0.5 km ² .						Oppervlakte < 0.5 km ² .
-	8929	Area 0.5-1 km ² .						Oppervlakte 0.5-1 km ² .
-	8939	Area < 3 km ² .						Oppervlakte < 3 km ² .
-	8939	Area 1-3 km ² .						Oppervlakte 1-3 km ² .
-	8949	Area 3-6 km ² .						Oppervlakte 3-6 km ² .
-	8959	Area 3-15 km ² .						Oppervlakte 3-15 km ² .
-	8959	Area 6-15 km ² .						Oppervlakte 6-15 km ² .
-	8959	Medium size area						Oppervlakte middelgroot
-	8969	Area 15-25 km ² .						Oppervlakte 15-25 km ² .
-	8979	Area 15-40 km ² .						Oppervlakte 15-40 km ² .
-	8979	Area 25-40 km ² .						Oppervlakte 25-40 km ² .
-	8989	Area > 40 km ² .						Oppervlakte > 40 km ² .
-	8989	Large size area						Oppervlakte groot

Designing the data-model and its structure the following user requirements are taken into account:

- **Object-oriented data-model with unique ID**
- **More attribute**
- **Integration TOP10vector and TOP10roads**
- **Change-only data instead of a complete update**
- **Historical information will be available**
- **Meta-data on object level**
- **Distinction Landscape Model and Cartographic Model**
- **Seamless database, complete coverage of the Netherlands**
- **Scale less database**
- **Automatic generalisation**
- **Linkage with the present TOP10vector**
- **Linkage with other databases**
- **Standardised way of exchange of information**

Topographic basic objects

Specific terrain element

Road segment

Water segment

Building

Railroad segment

Terrain

Functional area

Geographic area

Administrative area

Conservation area

Topographic basic objects

Entity

Road segment

Railroad segment

Water segment

Building

Terrain

Ispecial terrain element/construction

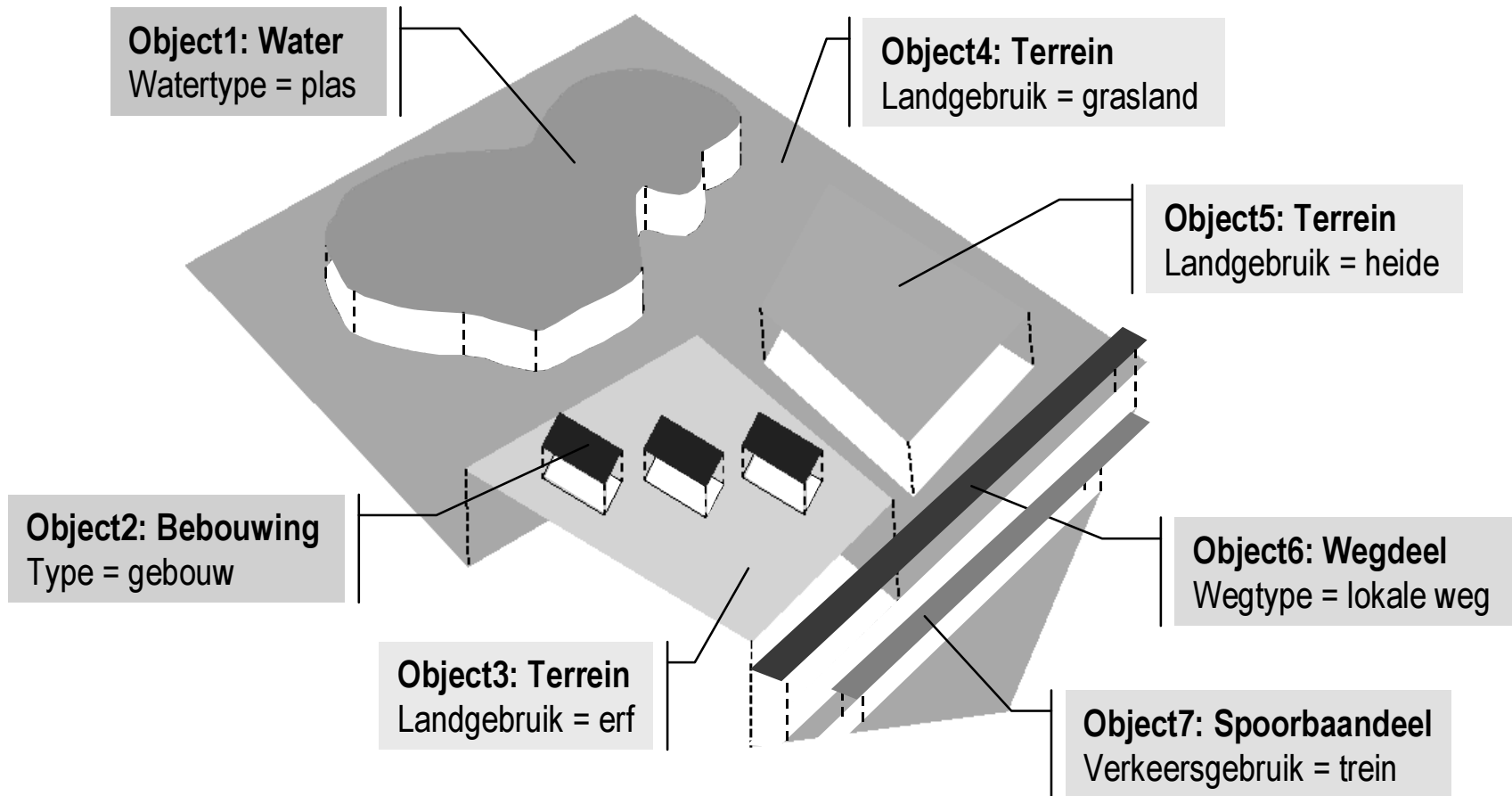
Administrative area

Conservation area

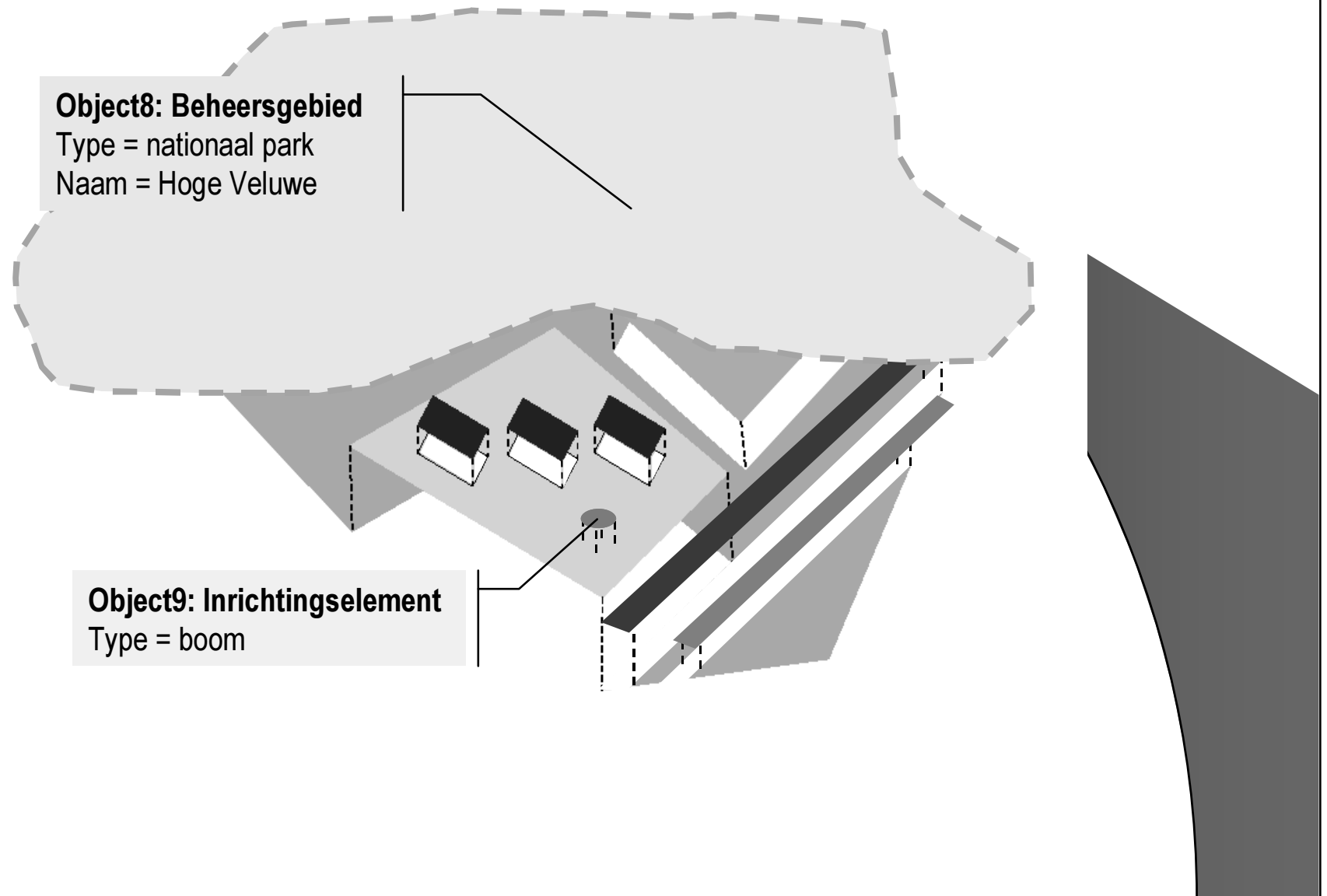
Geographic area

Functional area

Objects with NAME attribute



Special polygon for geographical names



Object characteristics: wegdeel

Attribuut	Domein	Multipliciteit	Optionaliteit
Type ⁶	Verbinding Kruising Vlakte	Enkelvoudig	Verplicht
Wegtype	Kruisingstype	Deel van rotonde Deel van verkeersknooppunt Overig	Enkelvoudig Verplicht
	Verhardingsbreedte-klasse	Aantal rijstroken	< <i>aantal</i> > Enkelvoudig Verplicht
Hoofdverkeersgebruik	Verhardingsbreedte	Rijrichting	Eenrichting Tweerichting Enkelvoudig Verplicht
		Toegankelijk	Openbaar Niet-openbaar Enkelvoudig Verplicht
Fysiek voorkomen	Verhardingstype	Status	In ontwerp In aanleg In gebruik Niet meer in gebruik Enkelvoudig Verplicht
	Verhardingsmateriaal	Straatnaam	< <i>naam</i> > Veelvoudig Optioneel
		Wegnummer	< <i>nummer</i> > Veelvoudig Optioneel
		Hoogteniveau	< <i>negatief geheel getal</i> > 0 (maaiveld) < <i>positief geheel getal</i> > Enkelvoudig Optioneel

Shows attributes of an object

The screenshot displays a GIS application interface. On the left is a legend with various layers and their symbols. In the center is the 'Identify Results' window, which is open to the 'Spoorbaandeeel_area.shp' layer. The window shows a table of attributes for a selected object. On the right is a map showing a railway line crossing a road and a canal.

Legend:

- Terrein_area.shp
 - Bebouwd geb
 - Kas/warenhui
- Bebouwing_area.shp
 - Gebouw / Hui
 - Hoogbouw
 - Opslagtank
- Spoorbaandeeel_line
- Spoorbaandeeel_area
- Wegdeel_point.shp
- Wegdeel_line.shp
 - Autosnelweg
 - Hoofdweg
 - Regionale we
 - Lokale weg
 - Straat
 - Overige weg
- Wegdeel_area.shp
 - Autosnelweg
 - Hoofdweg
 - Regionale we
 - Lokale weg
 - Straat
 - Overige weg
- Waterdeel_area.shp
 - Meer, plas, ve
 - Waterloop
- Waterdeel_point.shp
- Waterdeel_line.shp
 - Greppel, drog
 - Meer, plas, ve
 - Waterloop

Identify Results:

1: Spoorbaandeeel_area.shp	
Shape	Polygon
Top10_id	4400003
Bron_ref	9000016
Ontstaan_u	
Obj_begdat	17 Dec 2001 13:24:10
Ver_nummer	1
Ver_begdat	17 Dec 2001 13:24:10
Ver_eindda	
Dimensie	2D
Tdncode	4143
Type	Verbinding
Toegankeli	Openbaar
Status	In gebruik
Verkeersge	Trein
Fysiek_voo	Op vast deel van brug
Spoorbreed	Normaalspoor
Aantal_spo	4
Functie	Gemengd gebruik
Elektrific	Geëlektrificeerd
Hoogtenive	2
Naam	Onbekend

GML data visualised + attributes


Top10 testdata - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Back Forward Stop Home Search Favorites Media

Address <http://webmap.geo.tudelft.nl/proto/tiel.html> Go Links

Top10 testdata: Tiel



SVG created from GML using XSLT

Feature-type: tdnWaterDeel
Object-id: 6100002

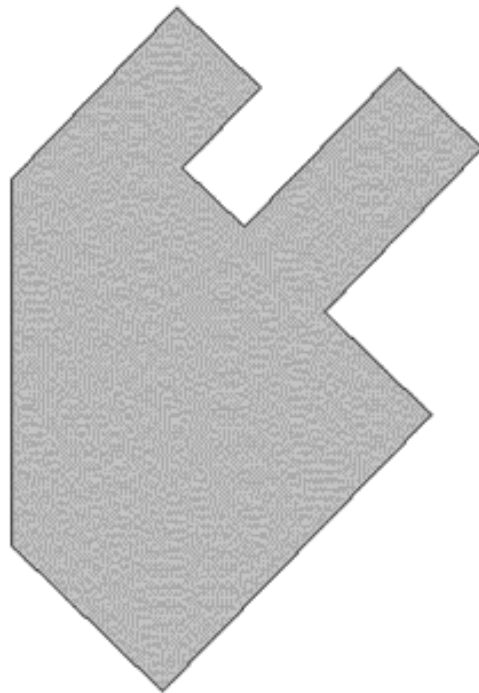
Detailed Data on TOP10.101226 - ...

Feature-type:	tdn:WaterDeel
tdn:top10_id	6100002
tdn:bronRef	
tdn:object_begindatum	2001-12-11T11:38:15+02:00
tdn:versienummer	1
tdn:versie_begindatum	2001-12-11T11:38:15+02:00
tdn:versie_einddatum	2002-02-22T14:38:44+02:00
tdn:dimensie	2D
tdn:tdncode	6113
tdn:type	Verbinding
tdn:toegankelijkheid	Openbaar
tdn:status	In gebruik
tdn:watertype	Waterloop
tdn:breedteklasse	Onbekend
tdn:breedte	Onbekend
tdn:hoofdafwatering	Ja
tdn:zoutgehalte	Zoet
tdn:fysiek_voorkomen	Overig
tdn:gebruik	Overig
tdn:stroomrichting	Stilstaand
tdn:hoogteniveau	0
tdn:naam	Waal

Internet

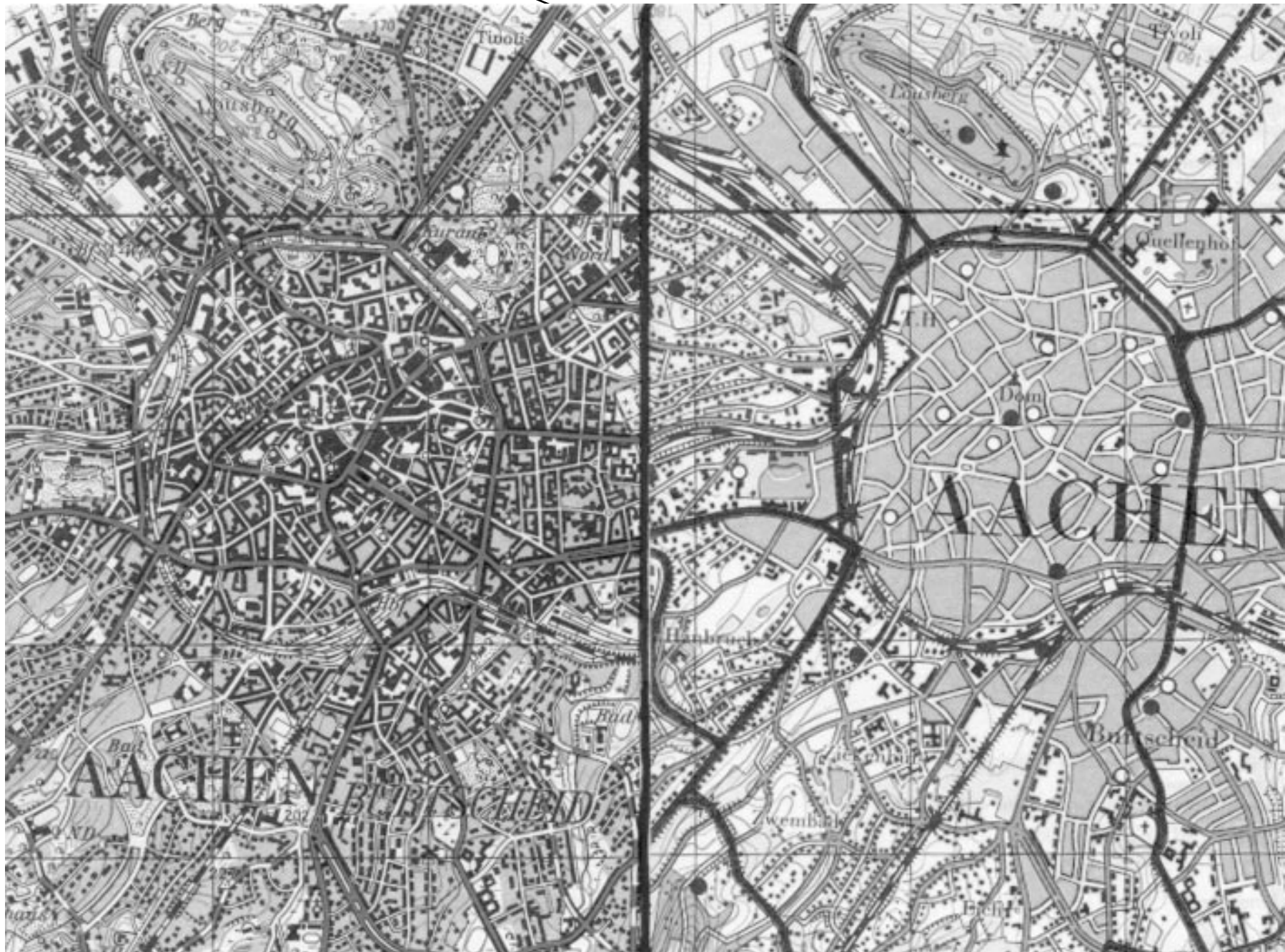
start TDN - Microsoft I... Top10NL Demon... Top10 testdata - ... Detailed Data on ... TielTUDwebplaat... NL 22:11

Meta-information for each object



Attrbuut	Waarde
TOP10_ID	1400262
BRON_REF	9000014
DIMENSIE	2D
TDNCODE	1000
BRONTYPE	Geïnterpreteerde luchtfoto
BRONBESCHR	Orthogonale luchtfoto, vlieghoogte ca 3800 meter; schaal 1:18000B
RONACTUAL	1998
BRONNAUWKE	7 meter

Comparison of urban areas



Comparison of
rural areas;
Germany (top)
and the
Netherlands
1:50 000

