NATIONAAL GEOGRAFISCH INSTITUUT
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The Topo-Geographic Inventory (ITGI)

Inventaire Topo-Géographique

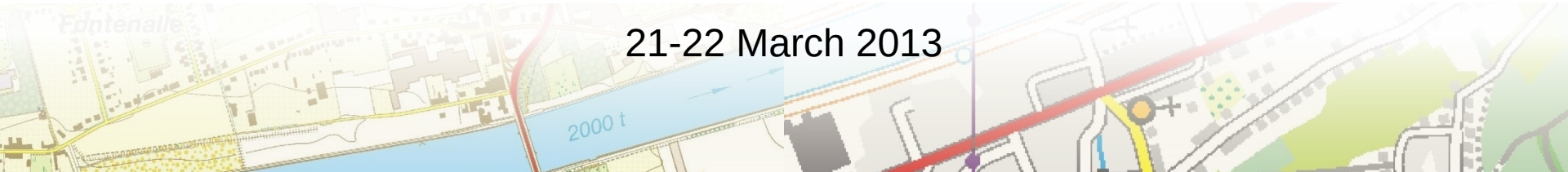
Topo-Geografische Inventaris

Anne Féchir

IGN Belgium

Barcelona

21-22 March 2013



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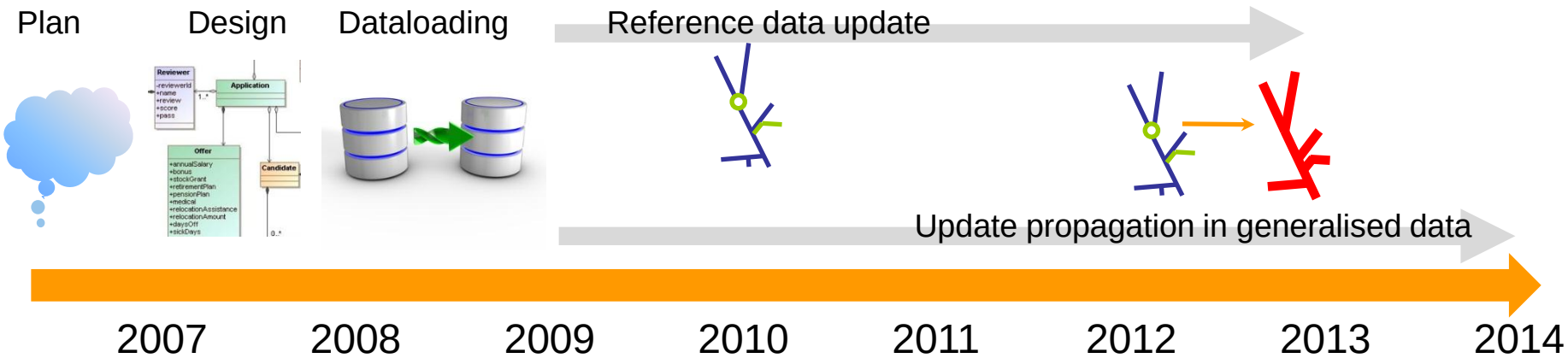
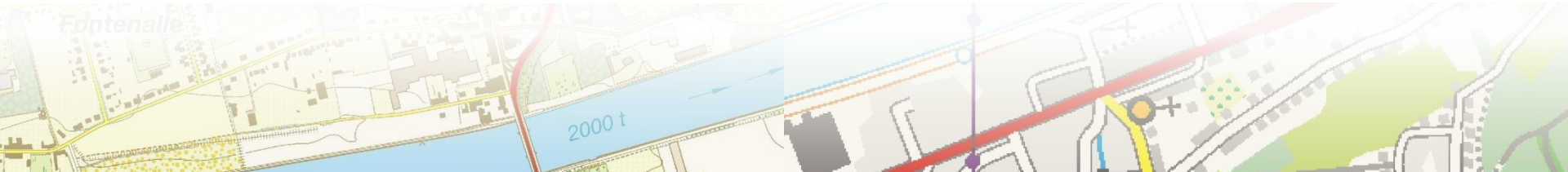
Presentation overview



- What we planned
- What we did
- What failed and what we learned
- Result and future



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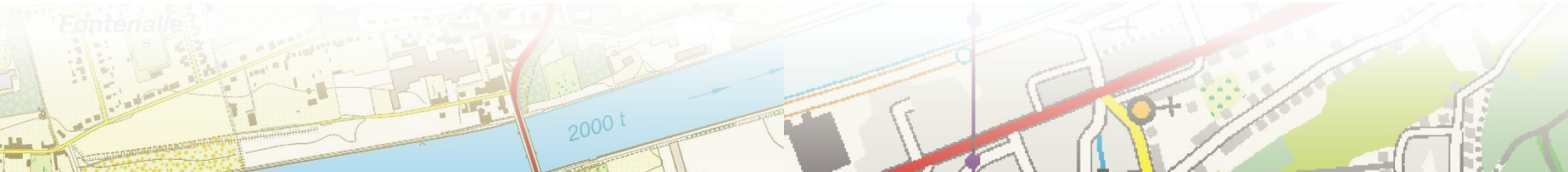
Presentation overview

Plan

2007 2008 2009 2010 2011 2012 2013 2014

- What we planned



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The plan

2008

Updates

1:10 000

Updates

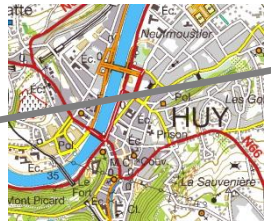
1:50 000

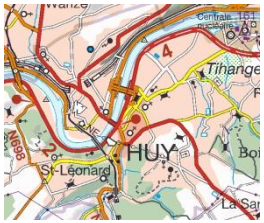
Updates

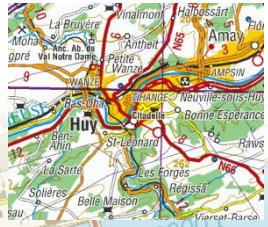
1:100 000

Updates

1:250 000







Updates

ITGI

1:10 000

Updates

1:50 000

1:100 000

Updates

1:250 000

ITGI

1:10 000
1:50 000
1:100 000
1:250 000

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The plan

Before 2008

Cartography

Production line 1:10000

3D-line → Top10V

Production line 1:50000

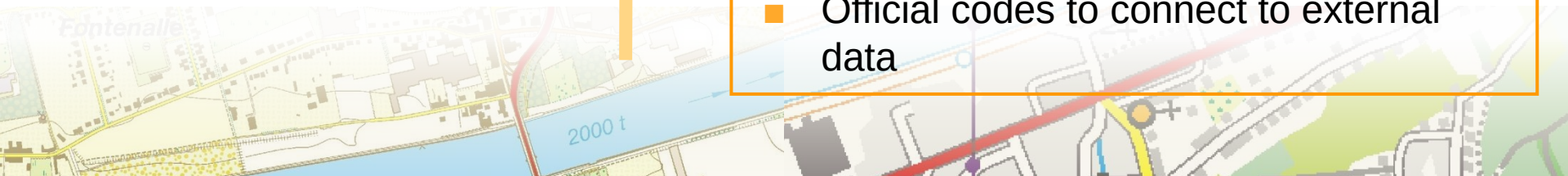
Top50V

From 2008

Geography

Production line ITGI (from 2008)

- Centralized GIS data 2D + Z
- Spatially continuous (seamless)
- Unique ID
- 1 integrated updating procedure
- Generalization tools
- ISO normalised models and FC (ISO19110)
- Metadata (ISO19115)
- Integrated quality model en control
- New data structure and content
- Official codes to connect to external data



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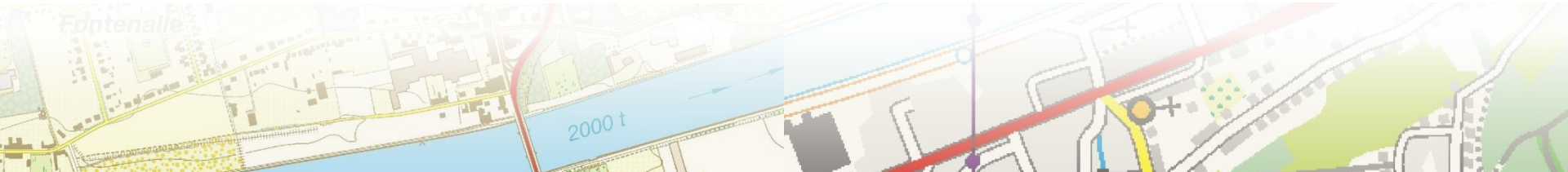
Presentation overview

Plan

2007 2008 2009 2010 2011 2012 2013 2014

- What we planned
- What we did



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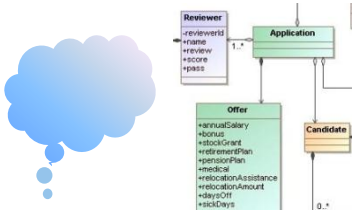
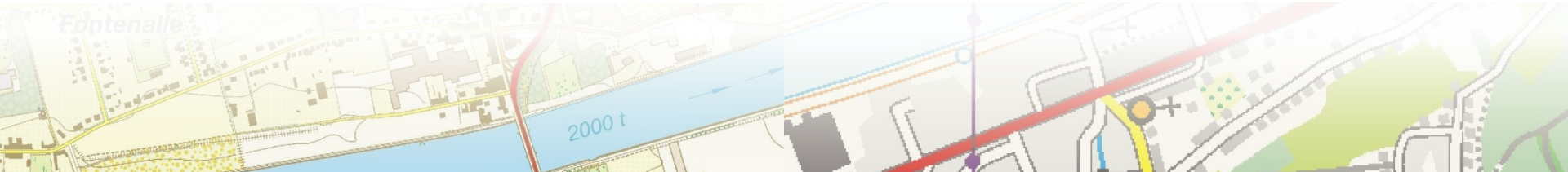
Presentation overview

Plan Design



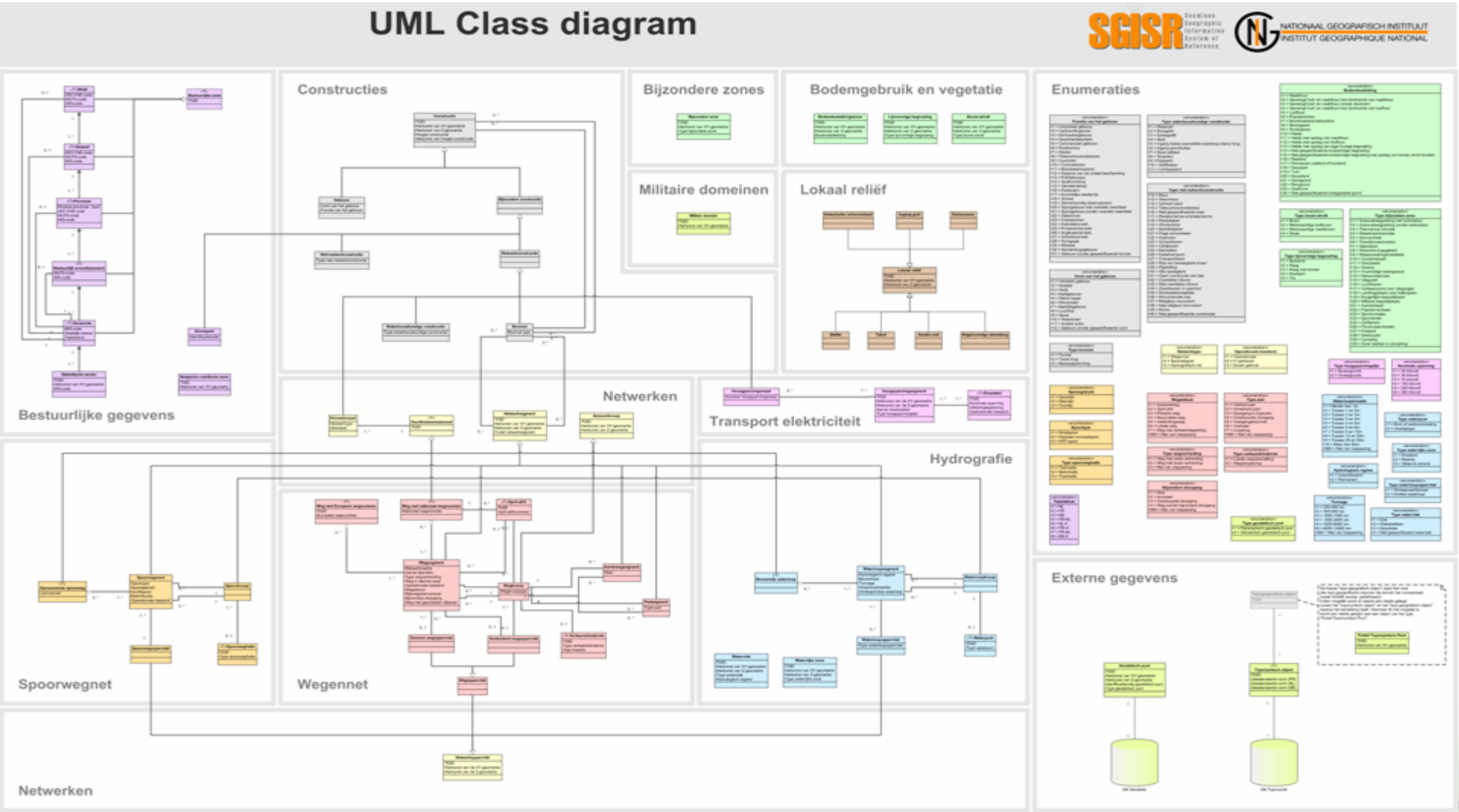
2007 2008 2009 2010 2011 2012 2013 2014

- What we planned
- What we did
  - Design



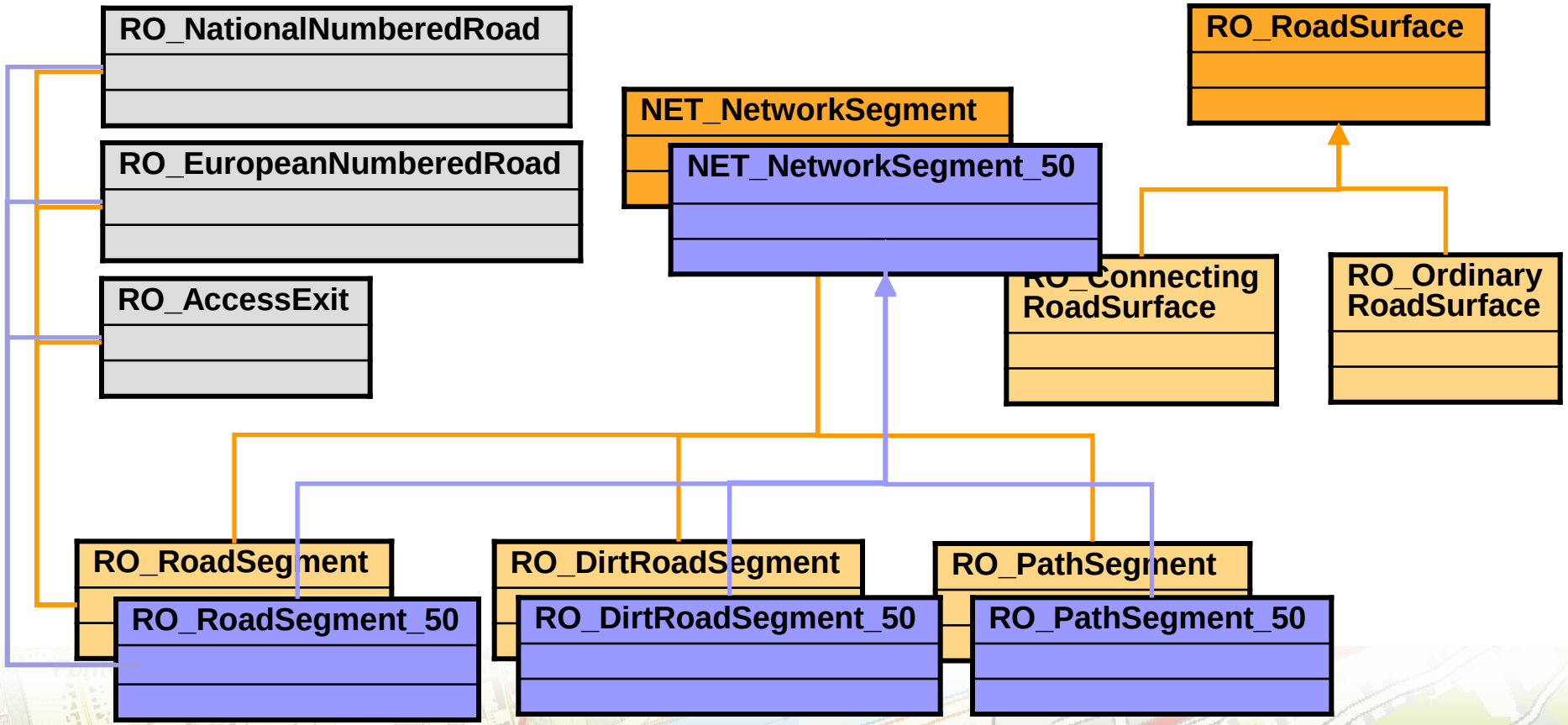
Design

- Conceptual data model



Design

- Data model: consistent classes



Design

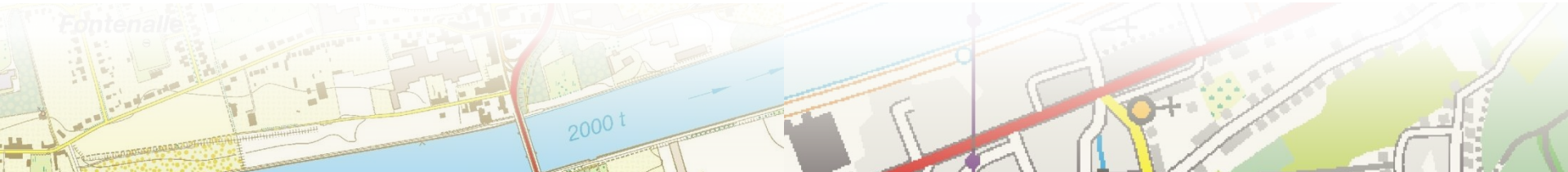
- Data model: consistent attributes names

Ref (1:10K)

RO_RoadSegment
+RoadWidth +TrafficLanesNumber +RoadSurfaceType +RoadInBadCondition +OperationalState +RoadStatus +NationalRegistrationNumber +ParticularPassage +RoadWithSeparatedCarriageways +TGID_AccessExit

Gen (1:50K)

RO_RoadSegment_50
+RoadWidthClass +TrafficLanesNumber +RoadSurfaceType +RoadInBadCondition +OperationalState +RoadStatus +NationalRegistrationNumber +ParticularPassage +RoadWithSeparatedCarriageways +TGID_AccessExit +TGID_SmallRoundabout +TGID_LargeRoundabout



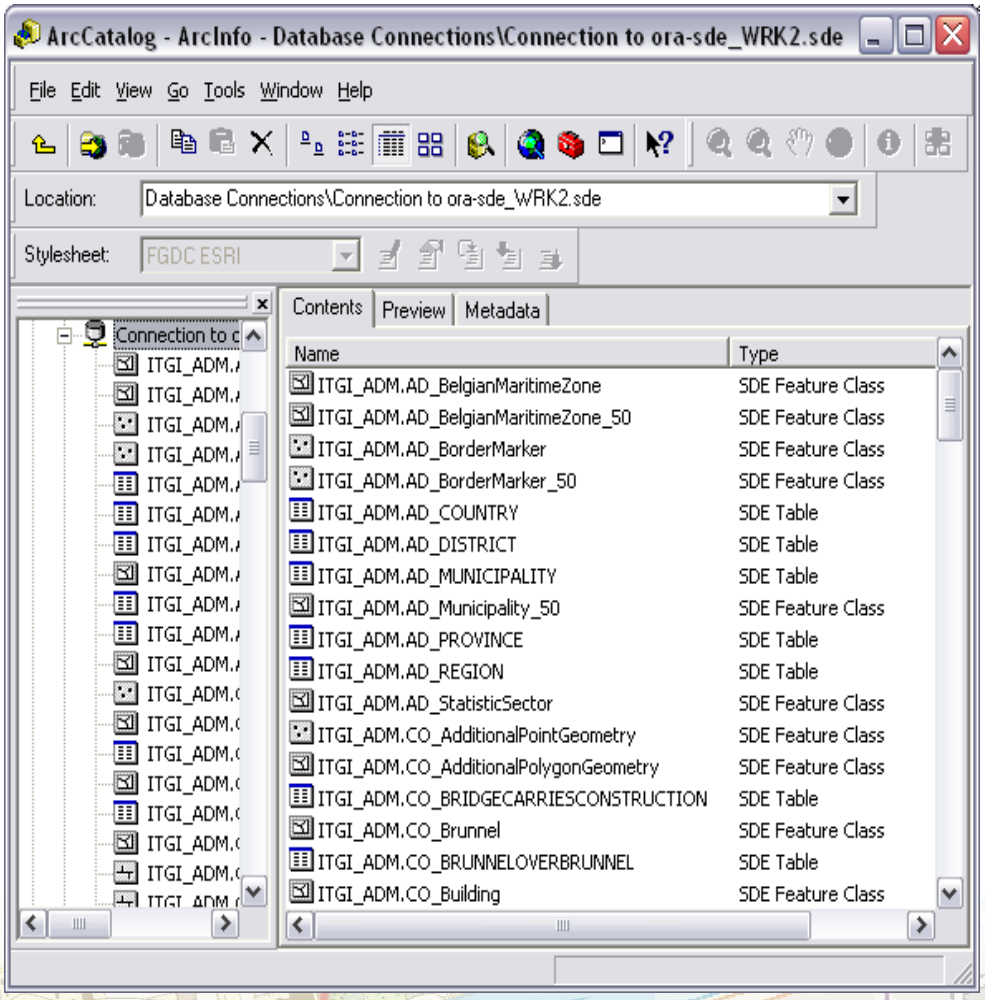
Design

- Data model: consistent attributes values

Ref (1:10K)	Gen (1:50K)
D_Landcover	**D_Landcover_50**
+Coniferous woodland = 1	**+Coniferous woodland = 1**
+Predominantly coniferous mixed woodland = 2	***+Mixed woodland = 51***
+Mixed woodland = 3	
+Predominantly broad-leaved mixed woodland = 4	
+Broad-leaved woodland = 5	***+Broad-leaved woodland = 52***
+Poplar plantation = 6	
+Tree nursery-osier-bed = 7	**+Tree nursery-osier-bed = 7**
+Orchard = 8	**+Orchard = 8**
+Brushwood = 9	
+Heathland = 10	***+Heathland = 53***
+Heathand with coniferous tree = 11	
+Heathland with broad-leaved trees = 12	
+Heathland with brushwood = 13	
+Unspecified herbaceous vegetation = 14	
+Unspecified herbaceous vegetation with brushwood = 15	***+Brushwood and unspecified herbaceous vegetation = 54***
+Reed-land = 16	
+Permanenet grassland or haymeadow = 17	
+Lawn = 18	**+Lawn = 18**

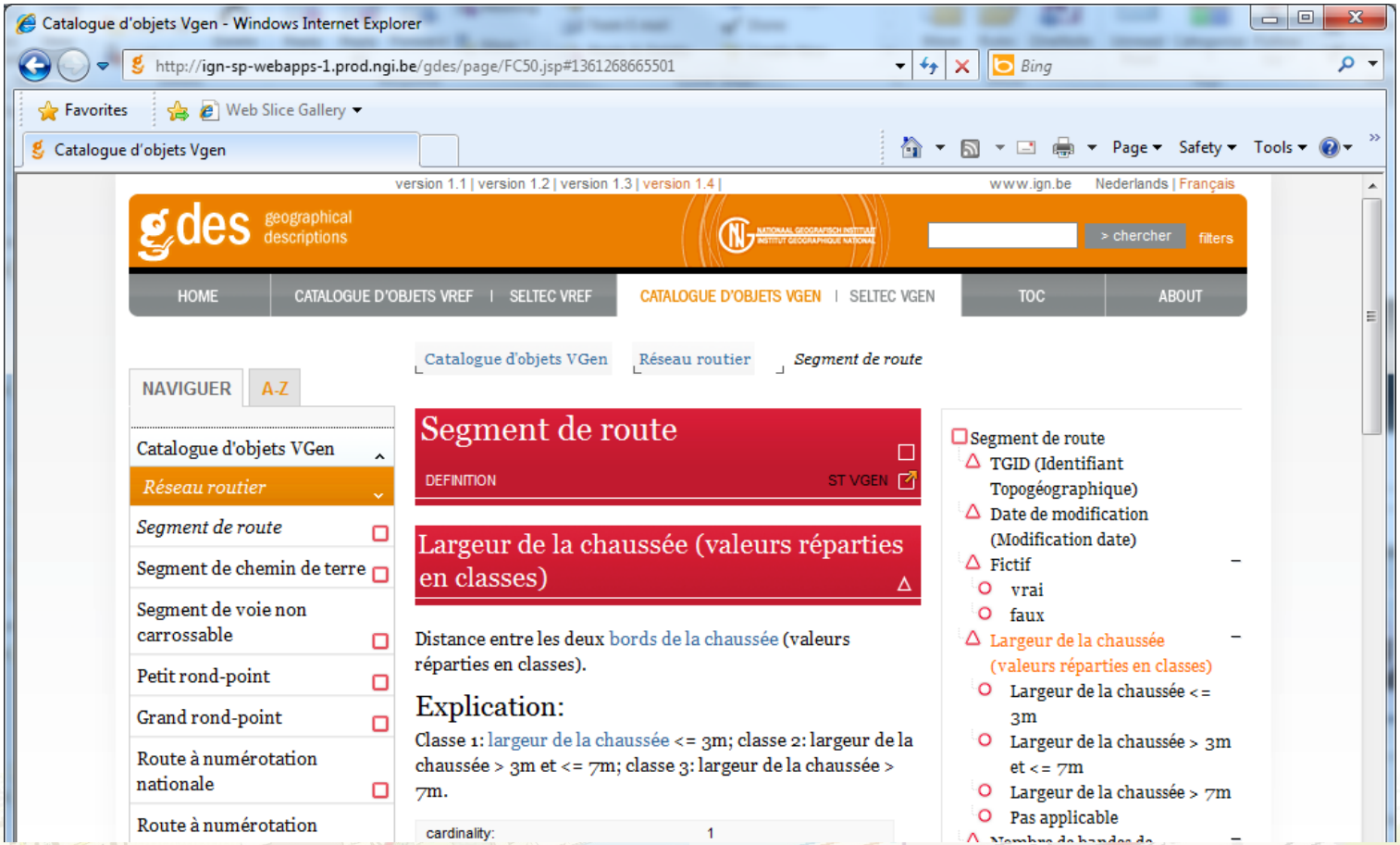
Design

- Implementation in an Oracle database



Design

- Definition and publication of selection criteria and technical specifications



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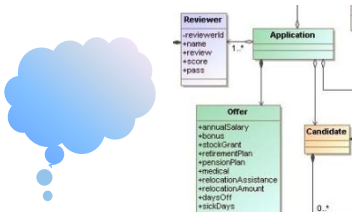
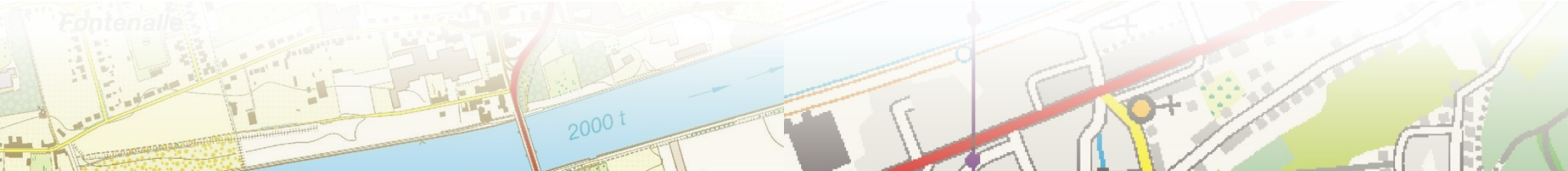
Presentation overview

Plan Design



2007 2008 2009 2010 2011 2012 2013 2014

- What we planned
- What we did



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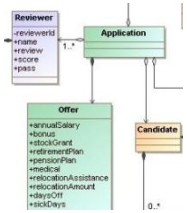
Plan

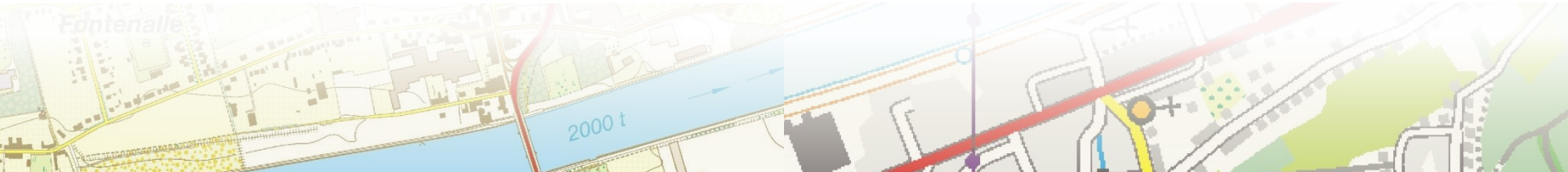
Design



Dataloading

2007 2008 2009 2010 2011 2012 2013 2014

- What we planned
- What we did
  - Dataloading



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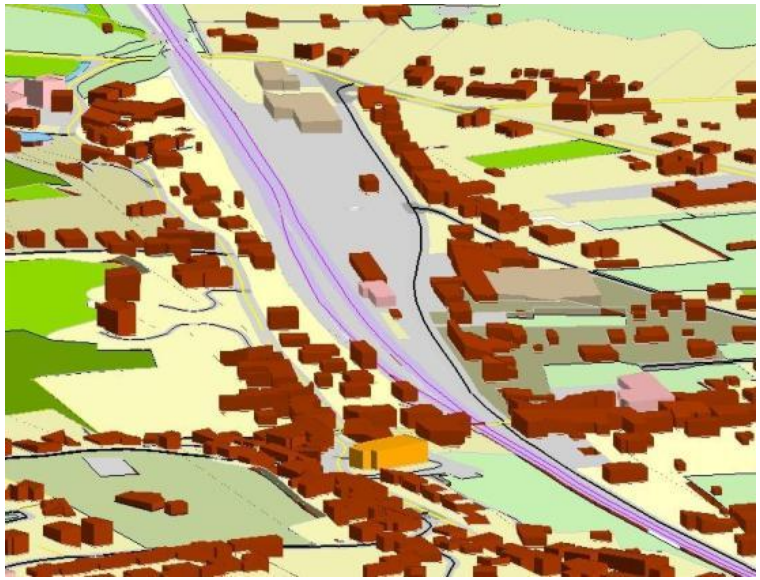
Dataloading

- Dataloading 10K (Ref data) : 2007-2009

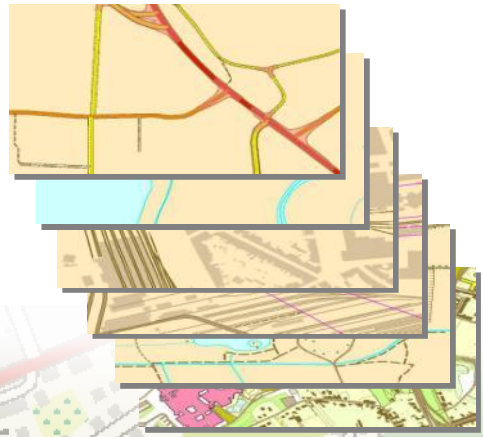
DTM

3Dline
x,y,Z coordinates
CAD files (buildings and bridges)



ITGI
ESRI geodatabase
X,Y,Z coordinates for the 1:10K classes

Top10v-GIS
X,Y coordinates
ESRI coverages

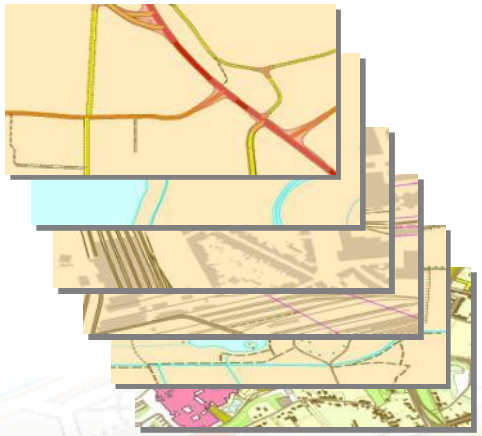


Dataloading

- Dataloading 1:50K (Gen data): 2008

ITGI
ESRI geodatabase
X,Y coordinates for the 1:50K classes

Top 50v-GIS
X,Y coordinates
ESRI coverages



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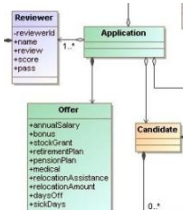
Presentation overview

Plan

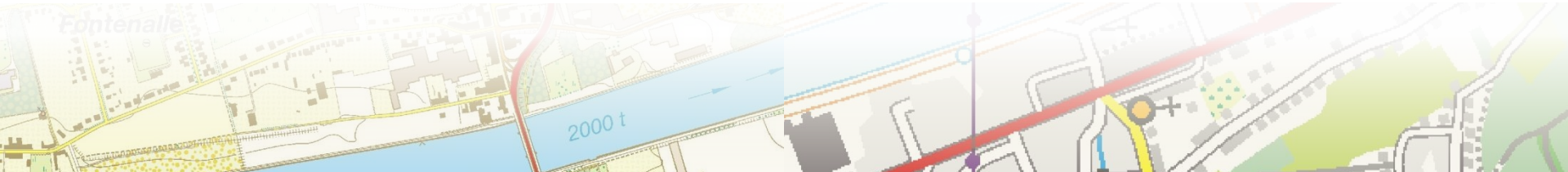
Design



Dataloading

2007 2008 2009 2010 2011 2012 2013 2014

- What we planned
- What we did
  - Updates



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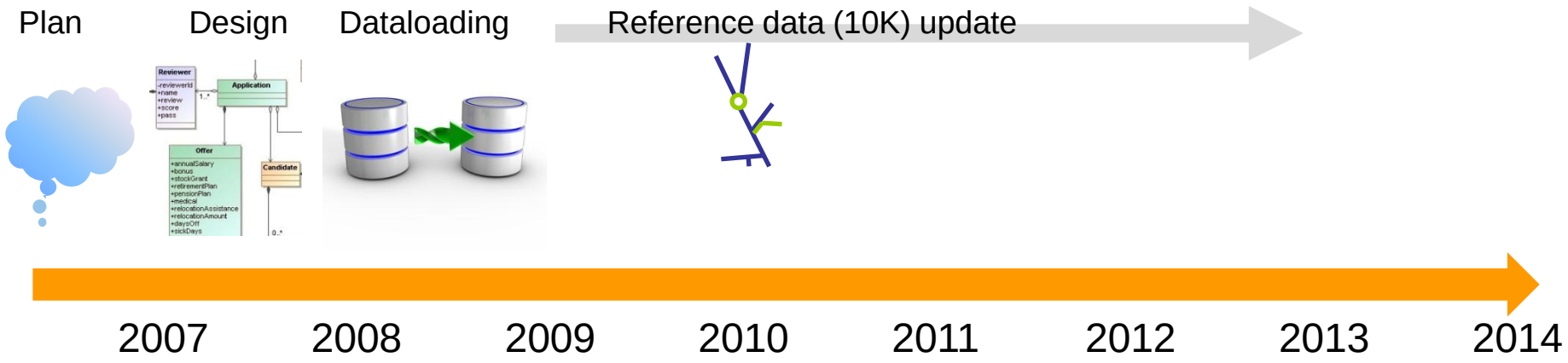
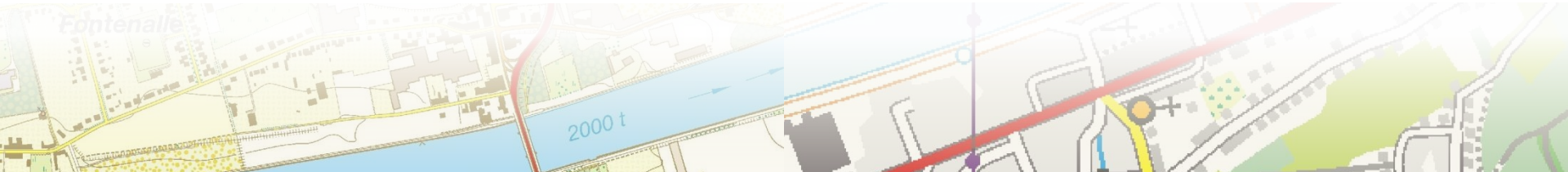
Presentation overview



- What we planned
- What we did
  - Updates
    - Reference data (10K) updates



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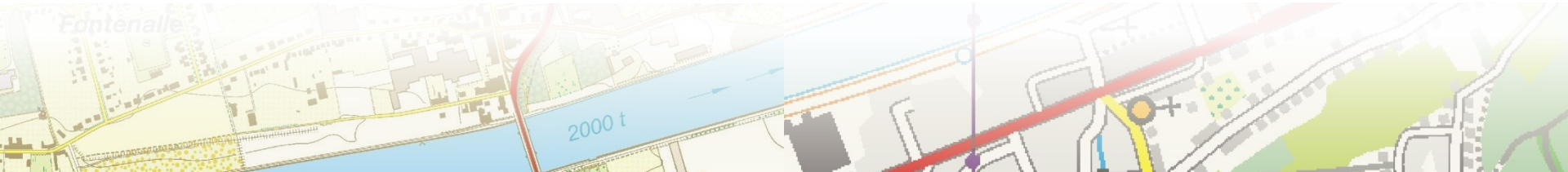
Updates of the reference data

- Four constraints
  - 1. Time
    - Acceptable updates cycles have been defined:
    - 3 years for
      - Aerial photography and orthophotos
      - Communication networks
      - Buildings
    - 6 years for
      - Landcover
      - Administrative units
      - Altimetry(DSM, DTM)
      - Names
      - + consistence between all the data



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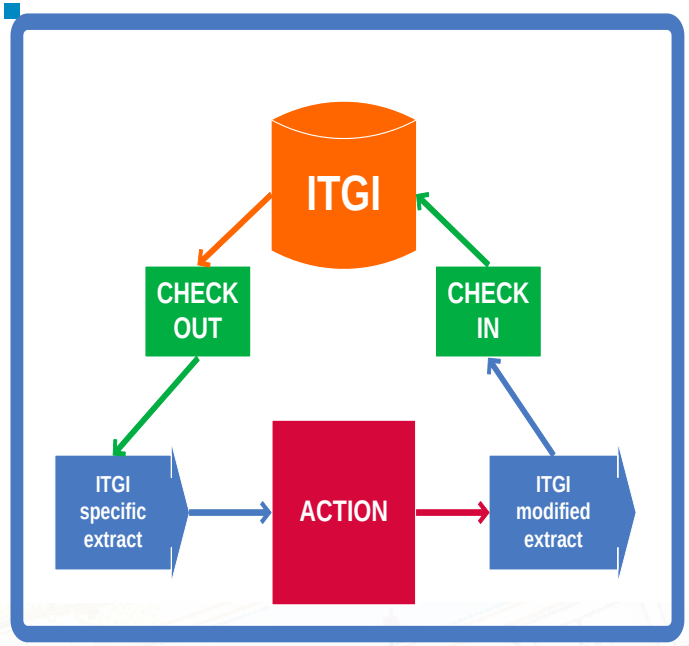
Updates of the reference data

- Four constraints
  - 2. Method
    - IGN uses various software solutions
    - → disconnected editing



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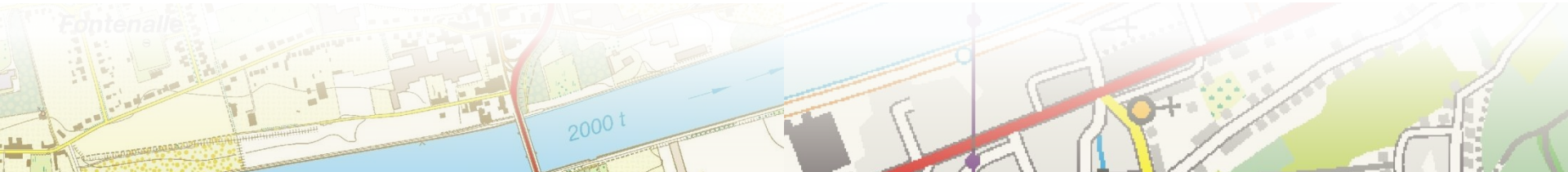
Updates of the reference data

- Four constraints
  - 3. Unique ID management
    - Management rules



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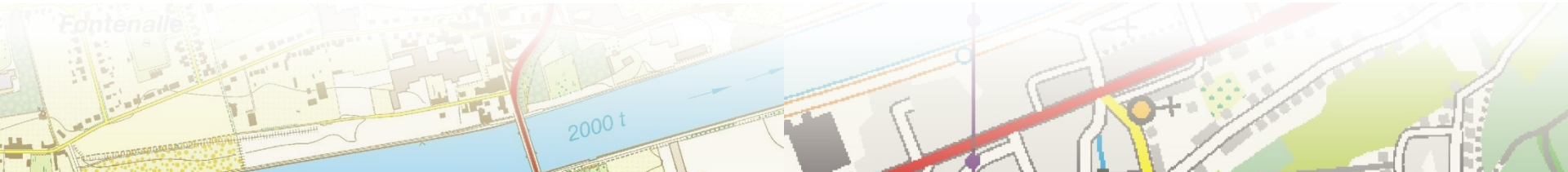
Updates of the reference data

- Four constraints
  - 4. Resources
    - No extra resources available, and much shorter update cycles.



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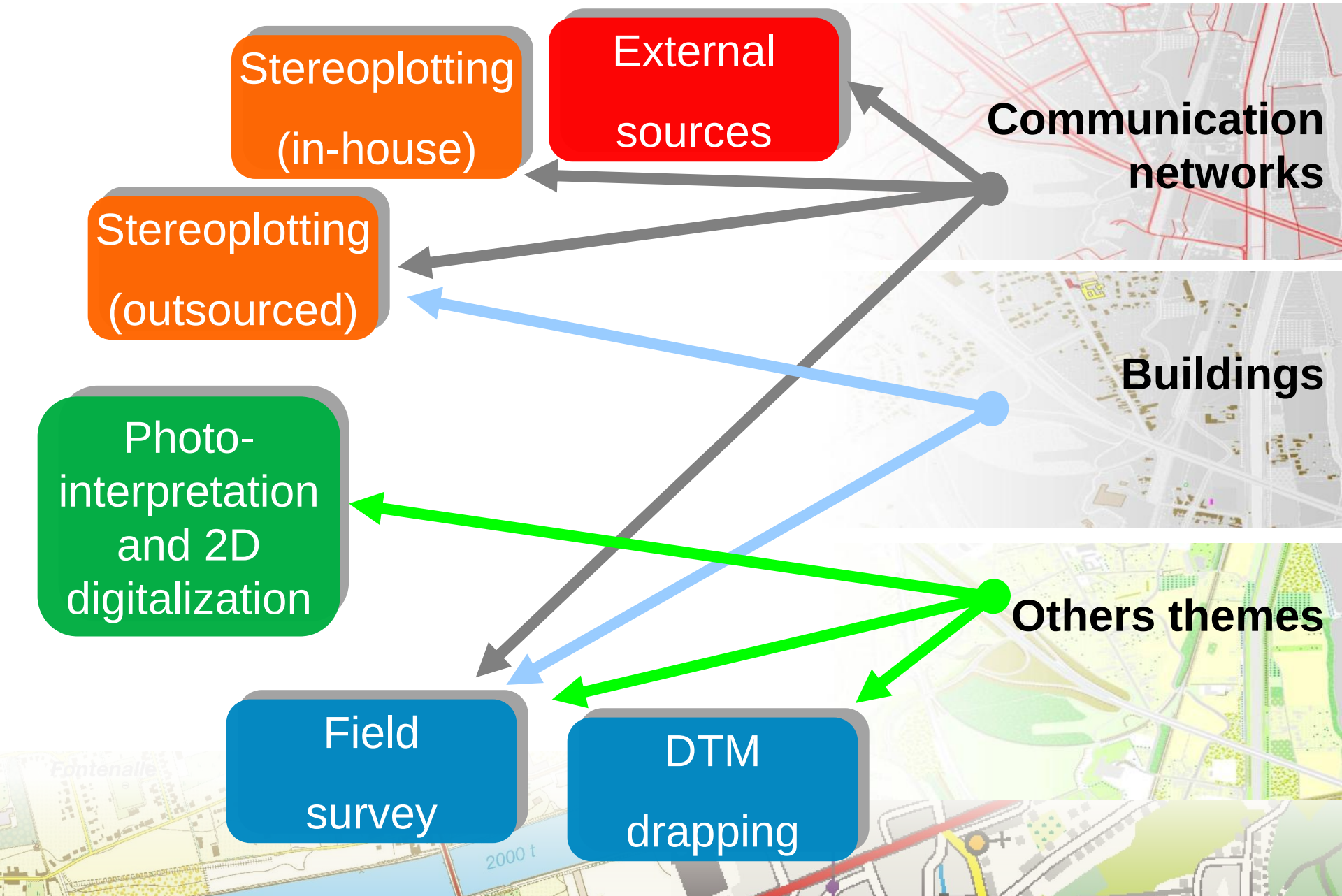
Updates of the reference data



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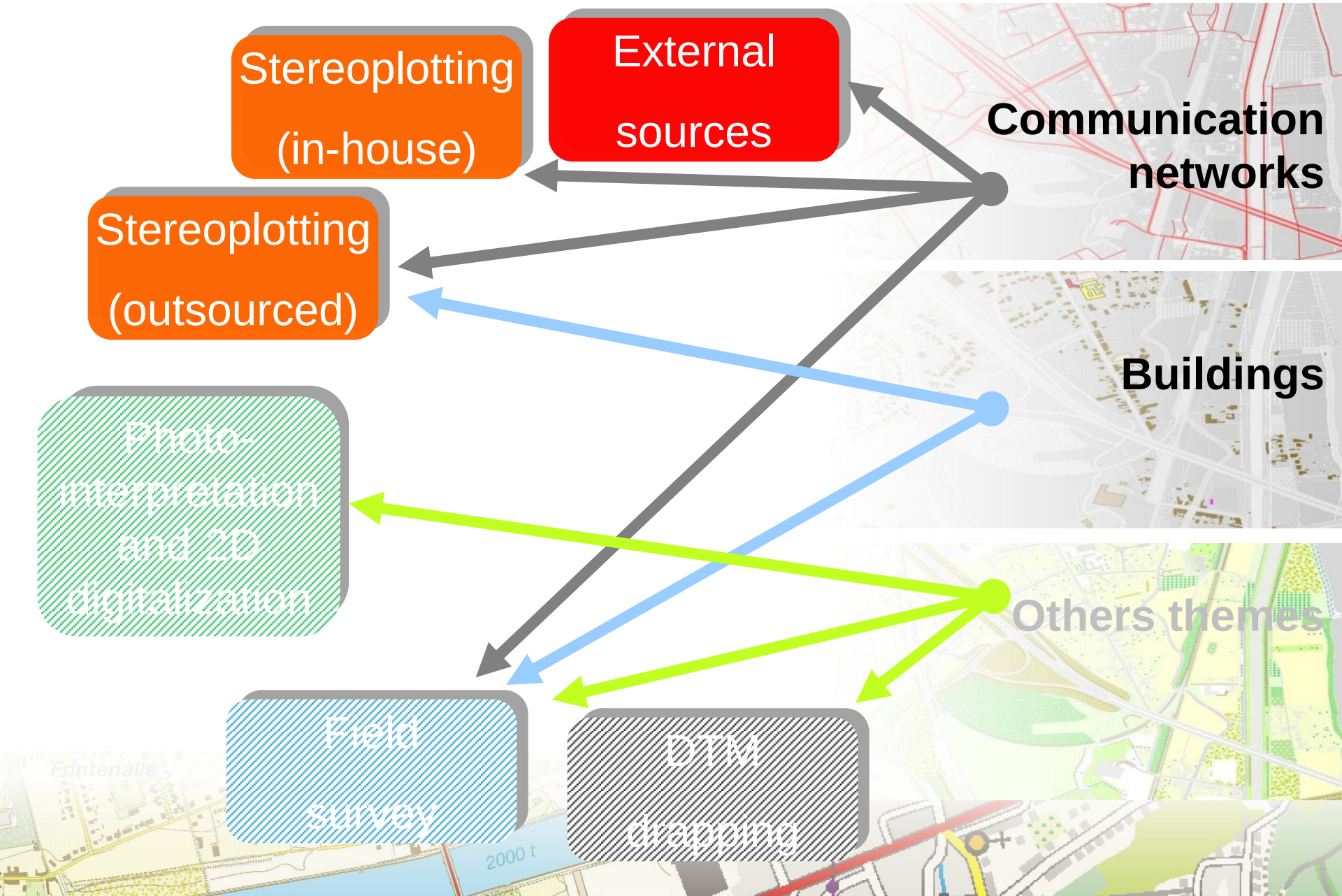
Updates of the reference data



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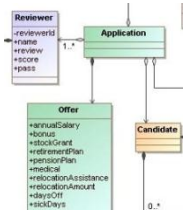
Presentation overview

Plan

Design

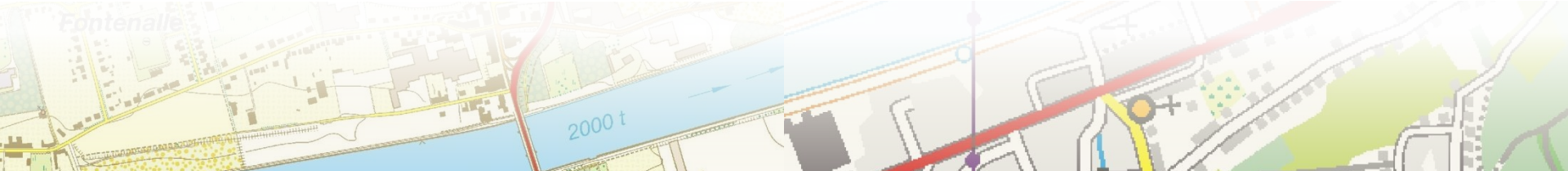


Dataloading

Reference data (10K) update

2007 2008 2009 2010 2011 2012 2013 2014

- What we planned
- What we did
  - Updates



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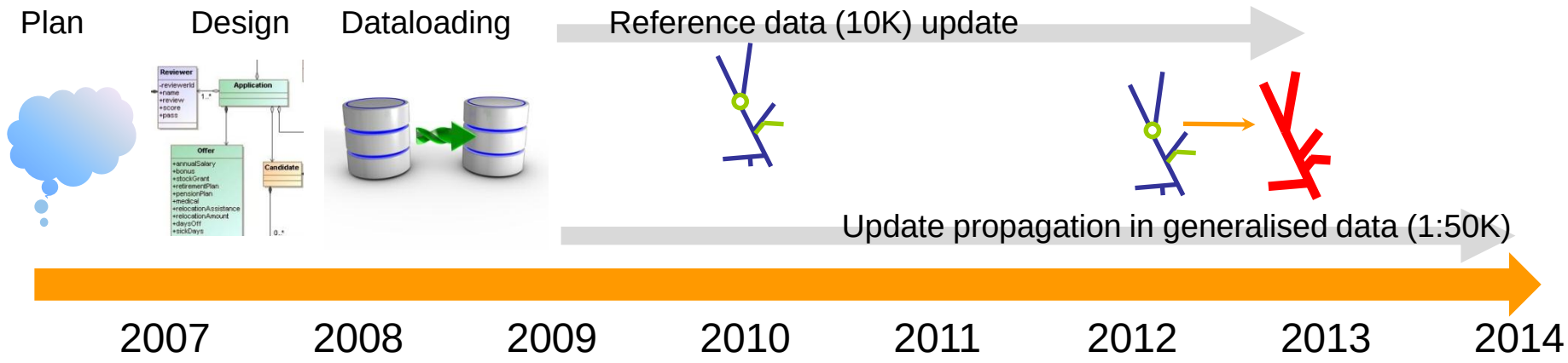
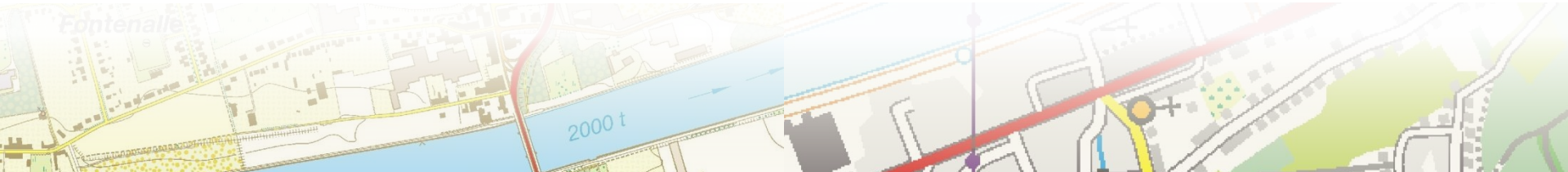


- What we planned
- What we did
  - Updates
    - Updates propagation in generalised data (1:50K)



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Updates of the 1:50K data

- What we planned

Fully automated

Fully manual

Generalisation

Buildings

Vegetation

Updates propagation

Road network

The rest

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Updates of the 1:50K data

- What we did

Fully automated

Fully manual

Generalisation

Buildings

Updates propagation

Road network

- Only roads and buildings were updated in the Ref data so the Gen data for the other themes could not be updated

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Updates of the 1:50K data

- What we did

Fully automated

Fully manual

Generalisation

Buildings

Updates propagation

Road network

- The automation level of the two processes was lower than expected

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1:50K buildings update

Fully automated

Fully manual

Generalisation

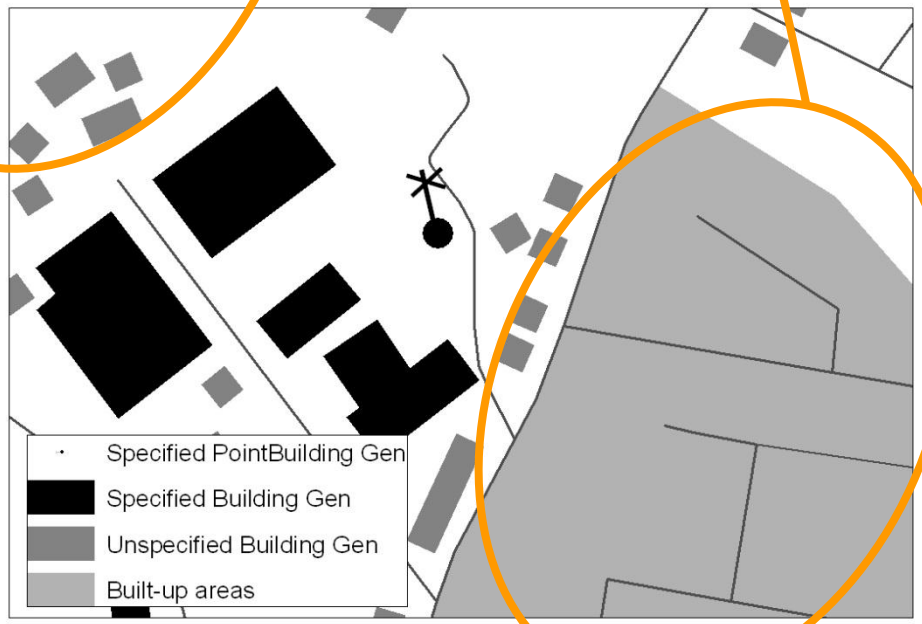
Buildings

- Why:
  - Some of the generalisation tools were not ready when we started the update cycle

Buildings generalization

Buildings in high density areas

Ref



Gen

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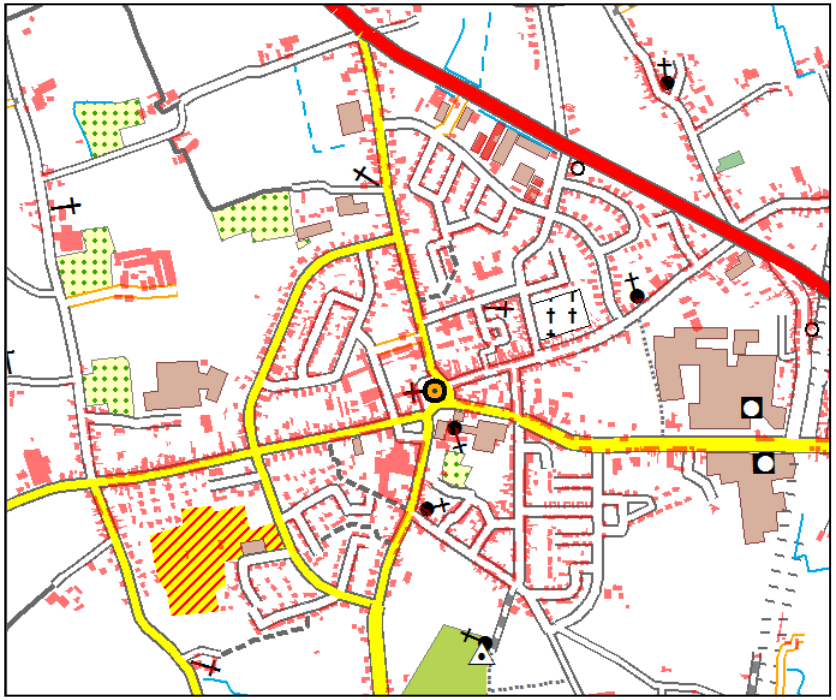
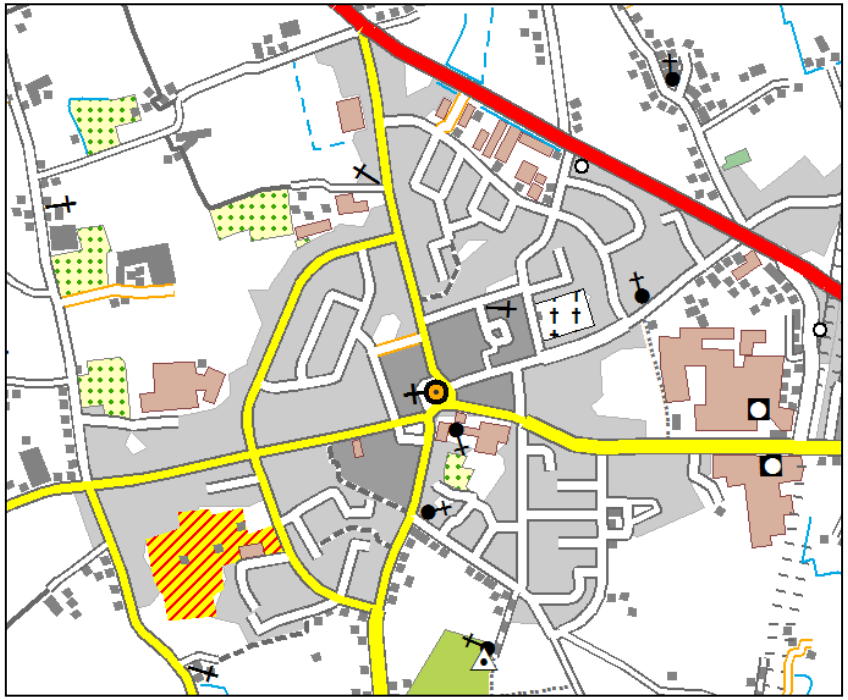
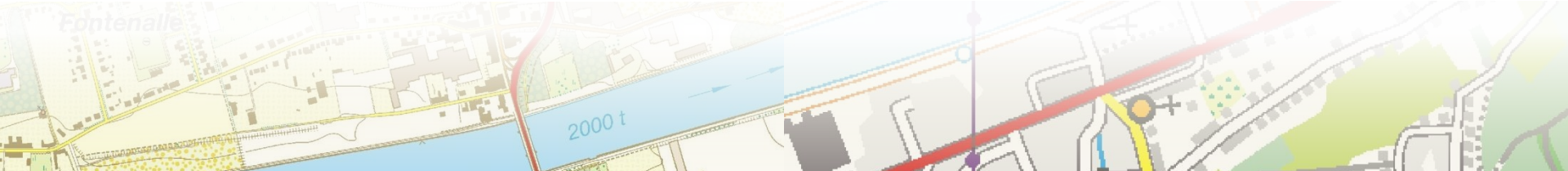
Buildings generalization

- Fully automated production of built-up-areas based on the reference buildings

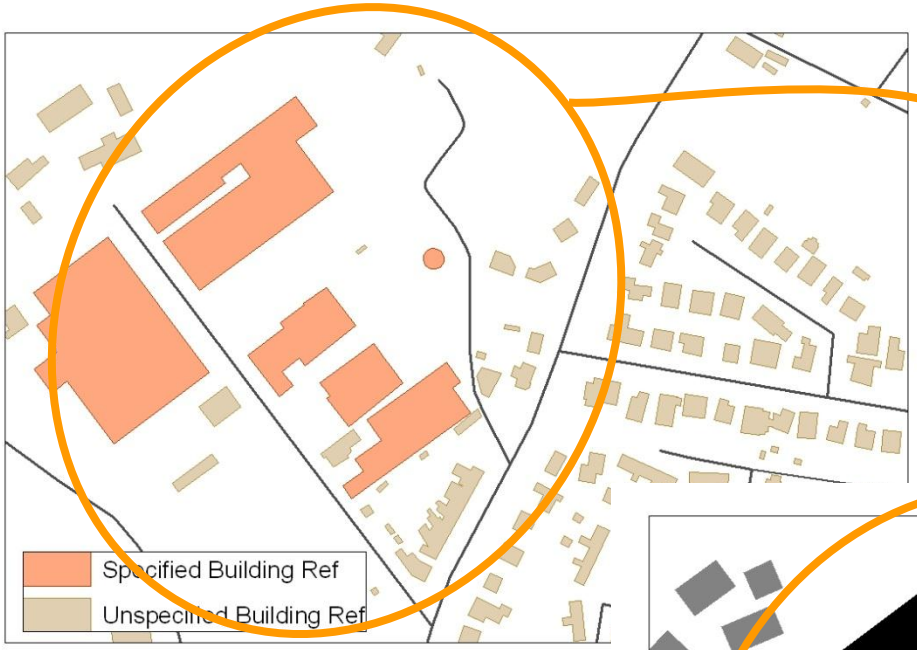




- VBA script in ArcGis

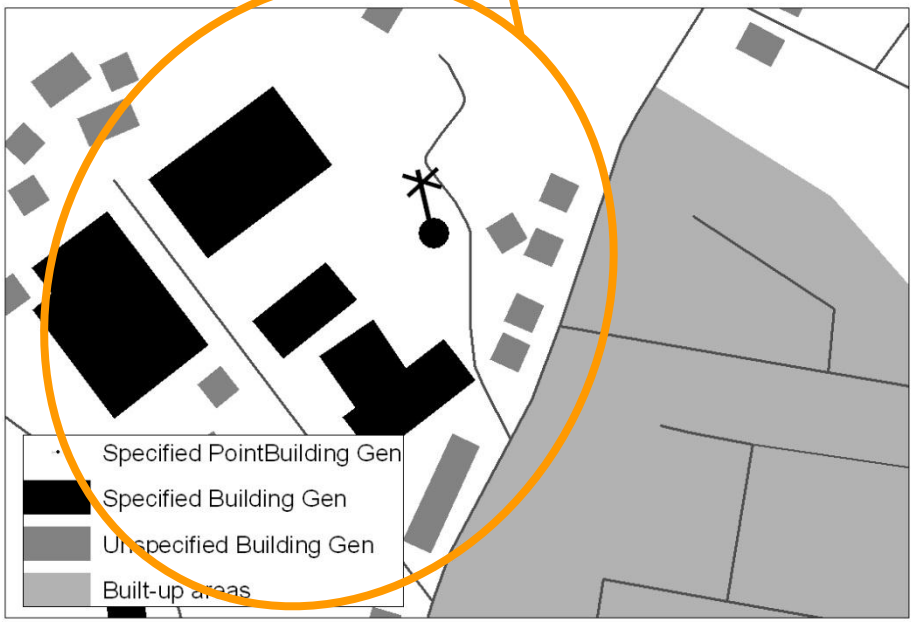


Buildings generalization



Ref

Buildings in low density areas



Gen

- Clarity + manual check since 2012

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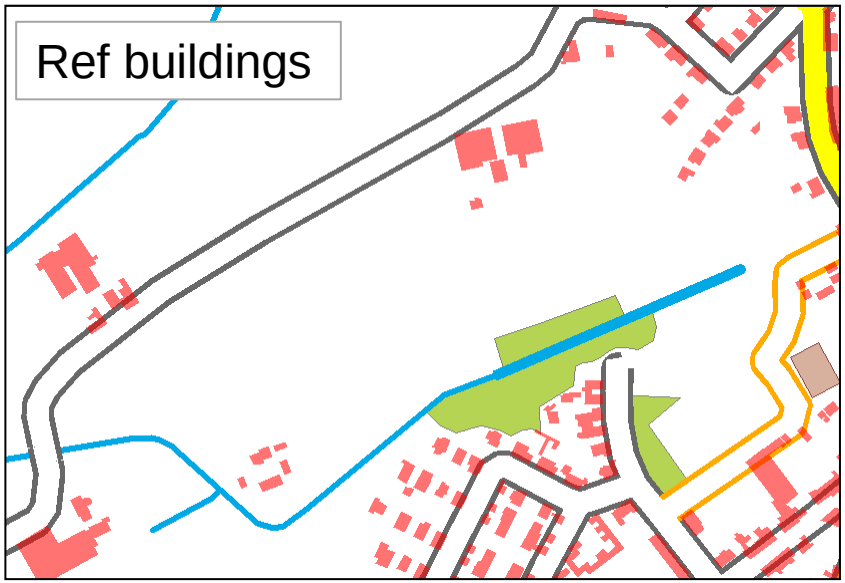
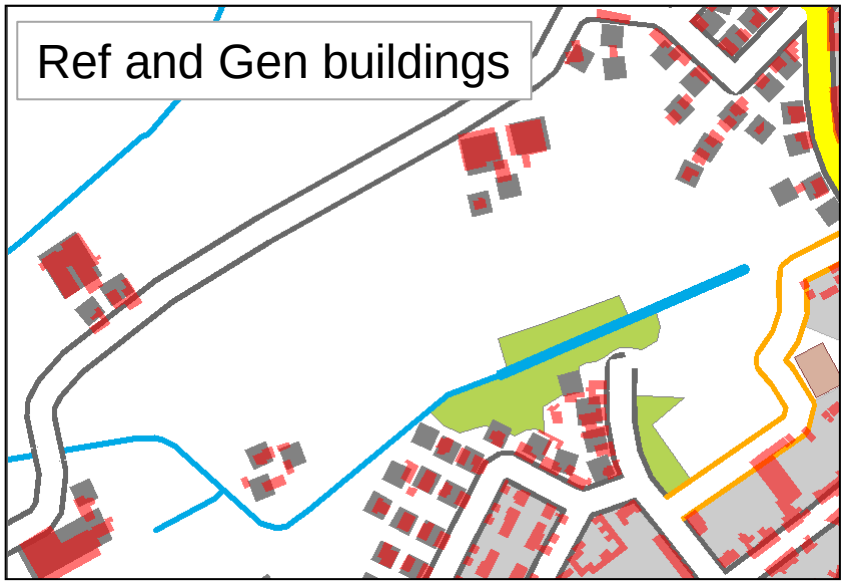
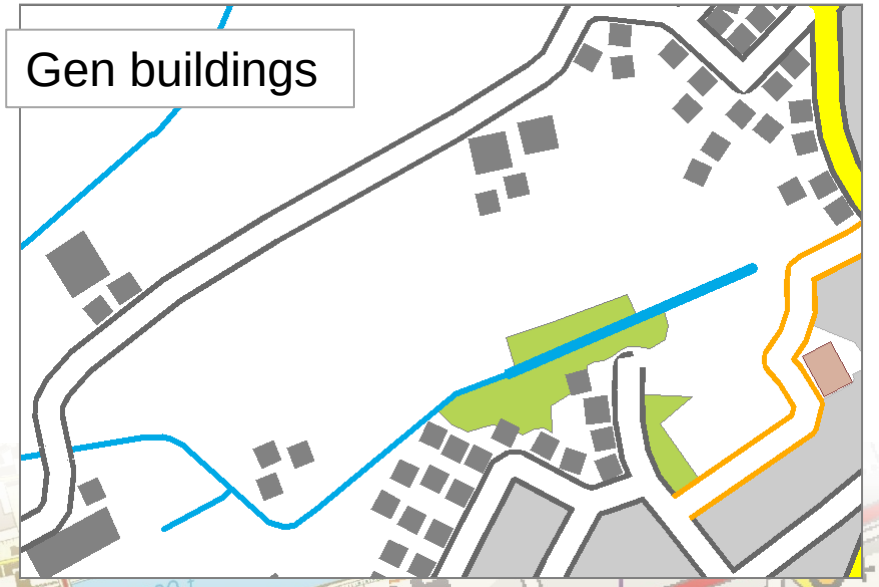
Buildings generalization





Result after Clarity generalization



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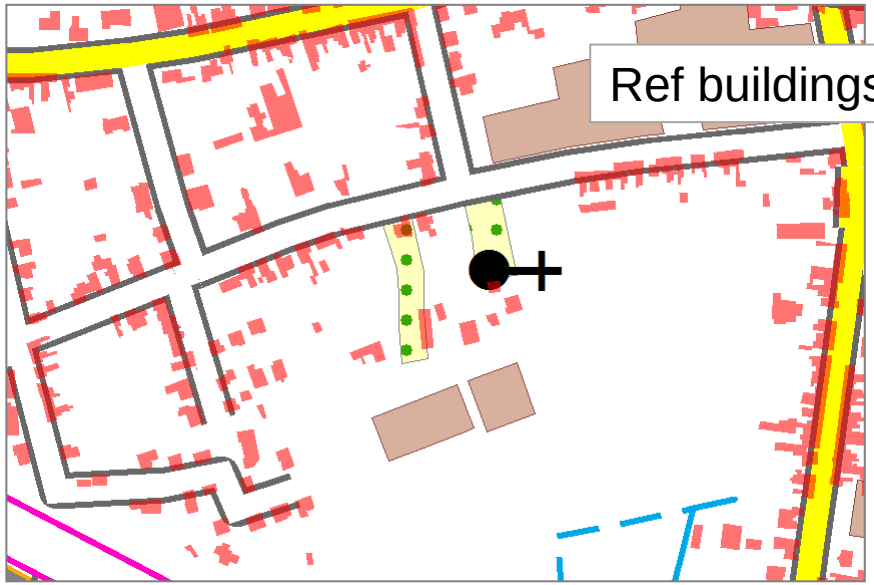
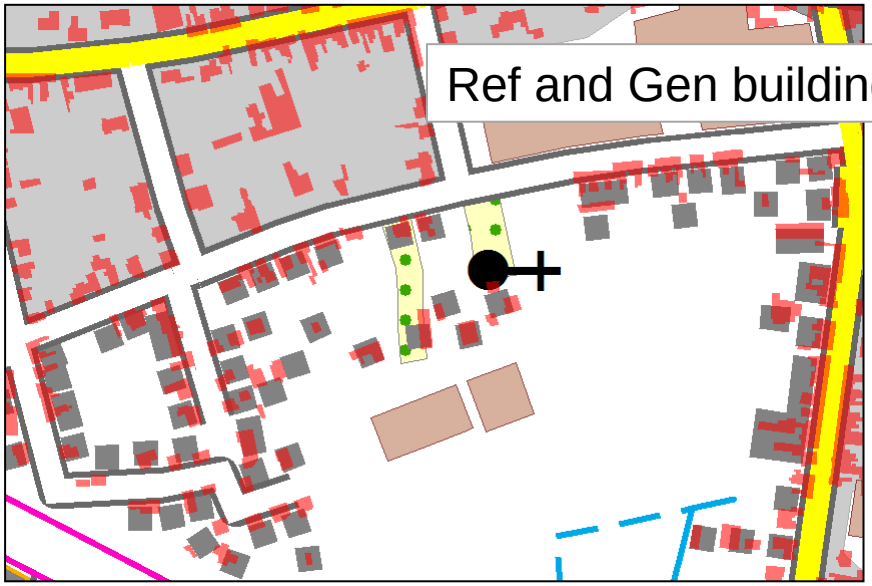
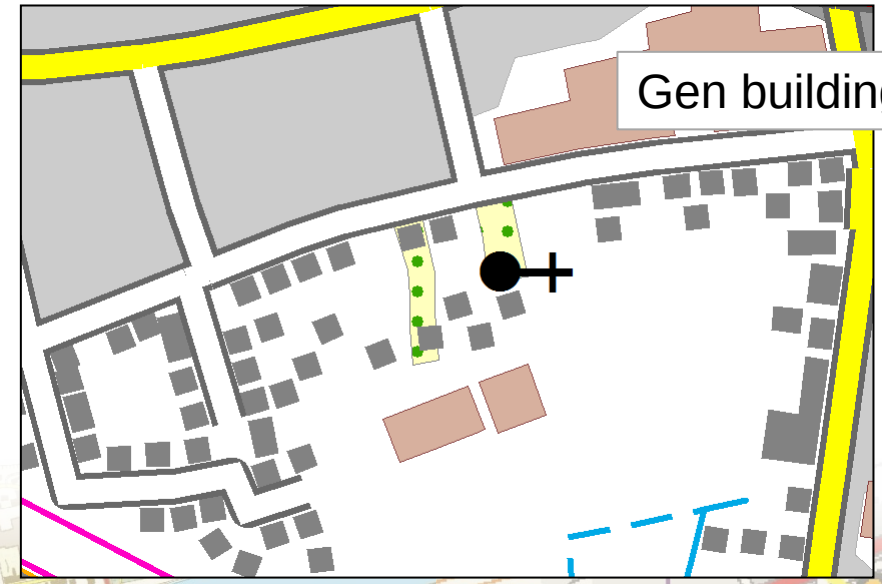
Buildings generalization





Result after Clarity generalization



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Updates of the 1:50K data

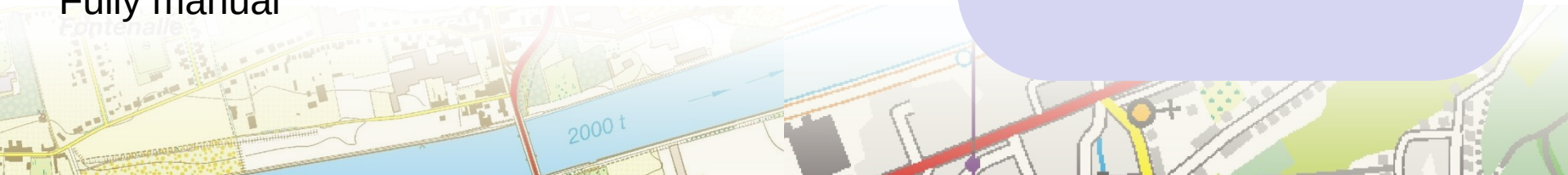
Fully automated

Fully manual

- The idea
  - Link the Ref and Gen data after dataloading and before the update process
  - Use theses links to propagate the updates
- The problem
  - The explicit link between corresponding objects in the two scales was not created

Updates propagation

Road network



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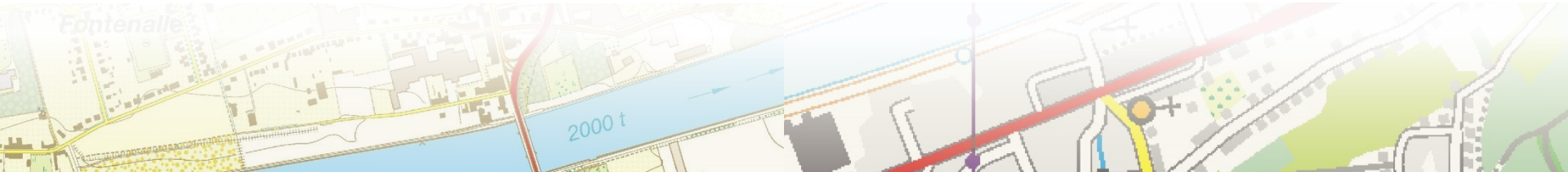
The explicit link

- Matching tests on the road network with
  - A home-made script
  - Geoxygene
  - RoadMatcher



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The explicit link

- Conclusion for the tests on the road network:
  - Differences in geometry and up-to-dateness of Ref and Gen data
    - Decreased the number of correct links that could be automatically detected
    - →Lots interactive work to check
  - Differences in segmentation between Ref and Gen
    - Increased the number of one-to-many relations
    - →Less precision when propagating the updates
  - Instability of the unique ID
    - Increased the risk of loosing links
  - → it becomes less interesting to invest time in the storage and maintenance of links that, even if automatically detected, will in any case have to be checked manually.

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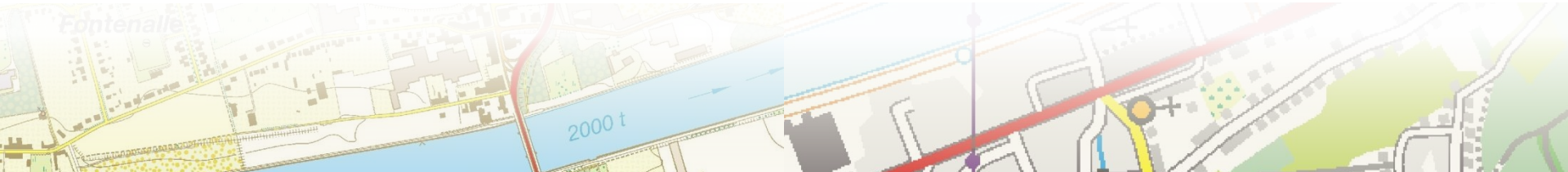
The explicit link

- Conclusion for the road network:
  - No explicit link for the moment
  - →Changes are detected, generalised and propagated interactively
    - With a lot of tools to simplify and speed up the process
  - At the same time, data are adapted to the new selection criteria and technical specification (significant part of the work)



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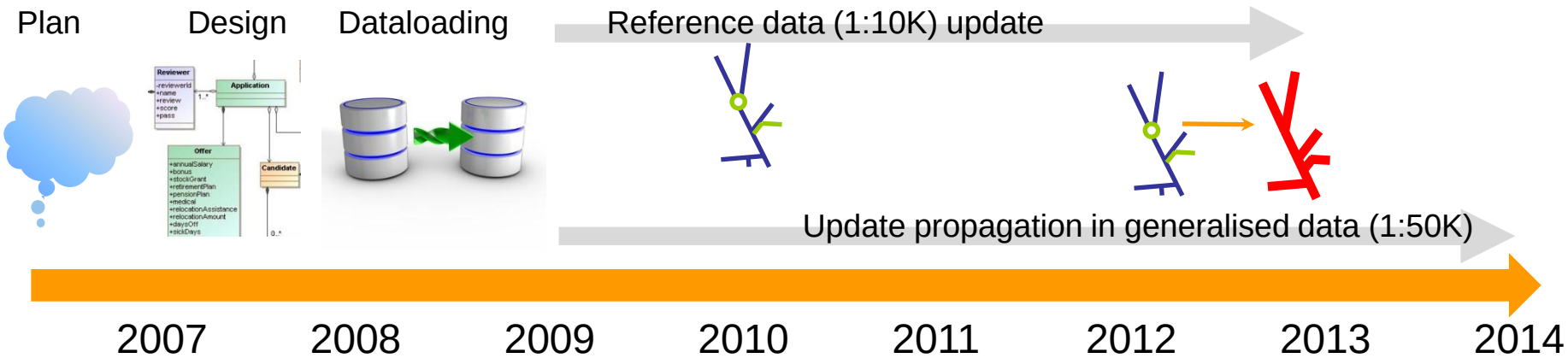
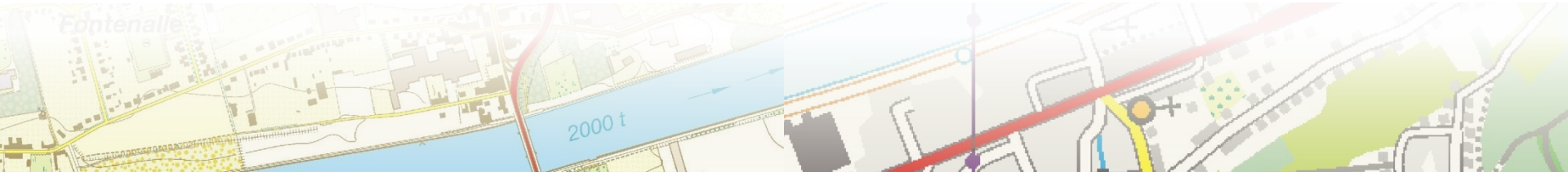
Presentation overview



- What we planned
- What we did
- What failed and what we learned



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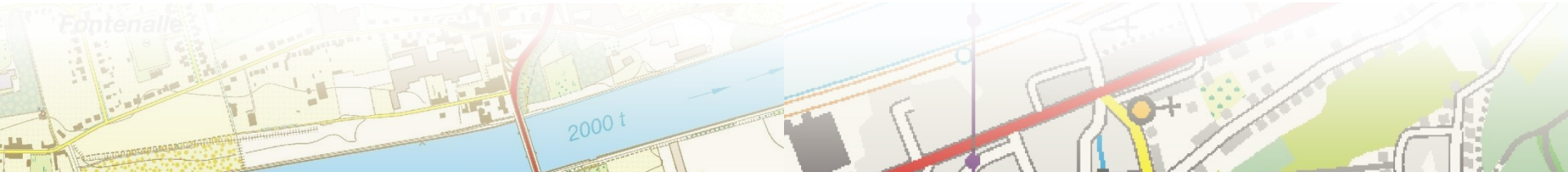
What failed

- 1. Updates of themes other than communication networks and buildings will not be completed in 6 years
  - Resources were under-estimated
  - This process was not enough prepared
  - →Thinking of a more simple model that will be more product and resource driven



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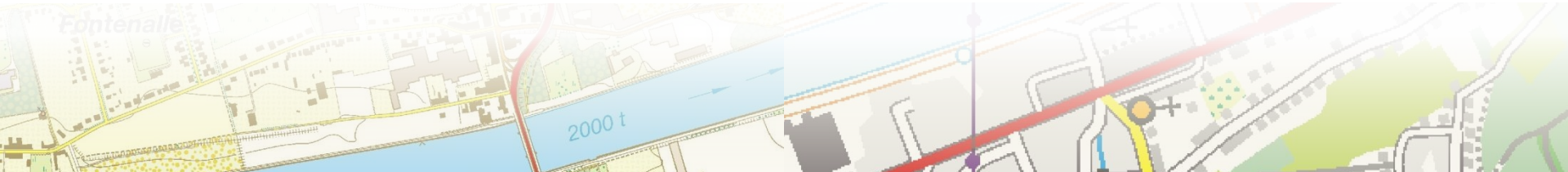
What failed

- 2. Unstability of the unique ID
  - Unclear rules in the beginning
  - Inapropriate methods (delete and recreate instead of modify, …)
  - New specifications → Lots of split and merge



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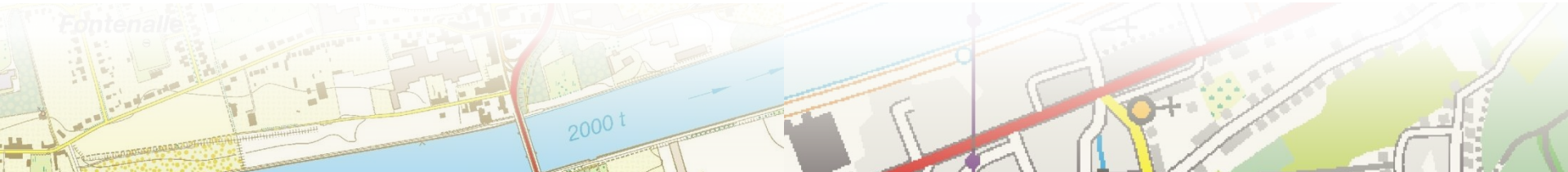
What failed

- 3. Generalization was not as automated as expected
  - Lack of resources
  - 1 person since 2010



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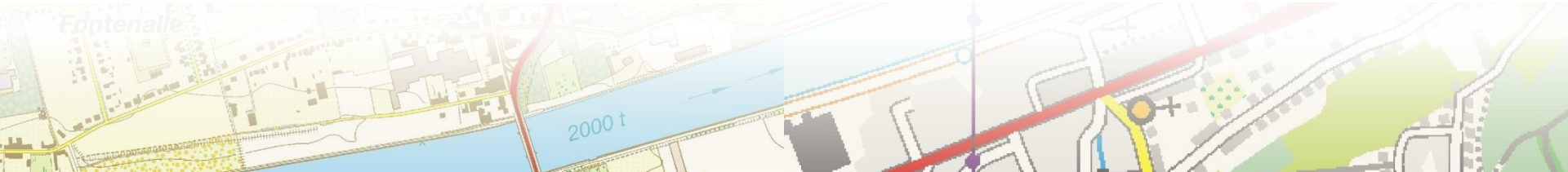
What failed

- 4. No explicit link between corresponding features at different scales
  - Still wondering about the storage of the explicit link between corresponding objects at both scale. Is it worth ?
  - Especially if the update propagation process can't be fully automated and needs in any case a manual check.
  - Advantage of storing an explicit link (and maintain it) vs searching for the corresponding feature in the other scale on the fly when propagating the updates ?



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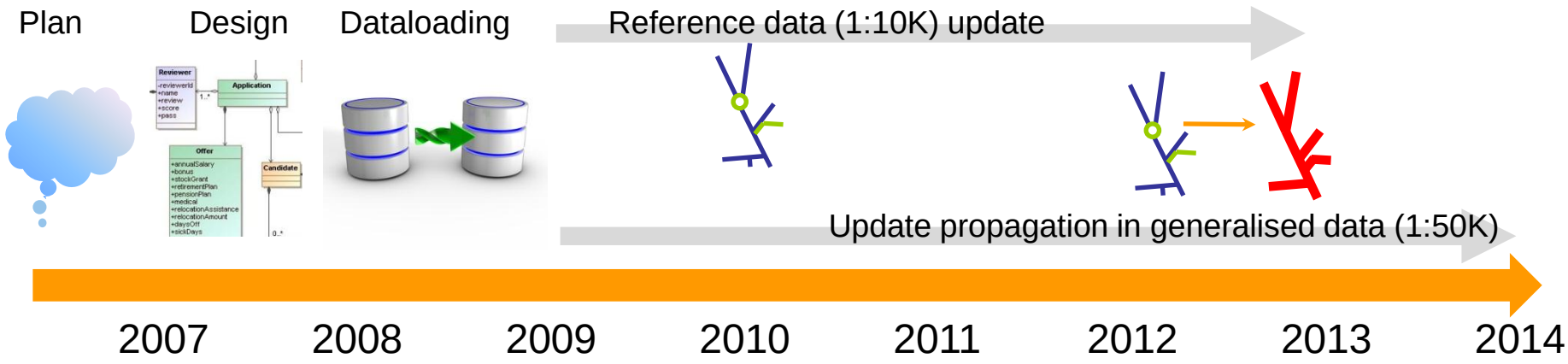
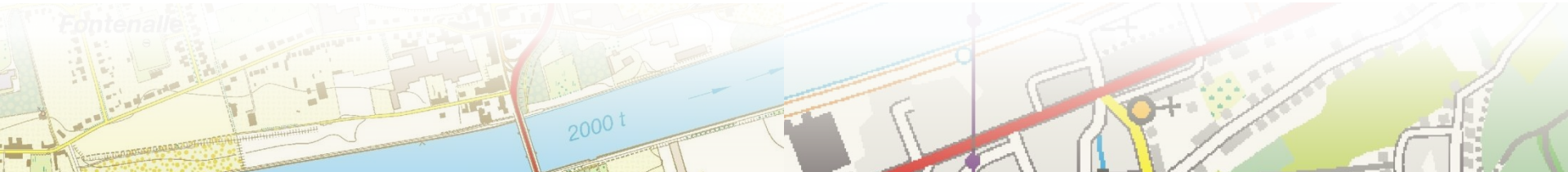
Presentation overview



- What we planned
- What we did
- What failed and what we learned
- Result and future



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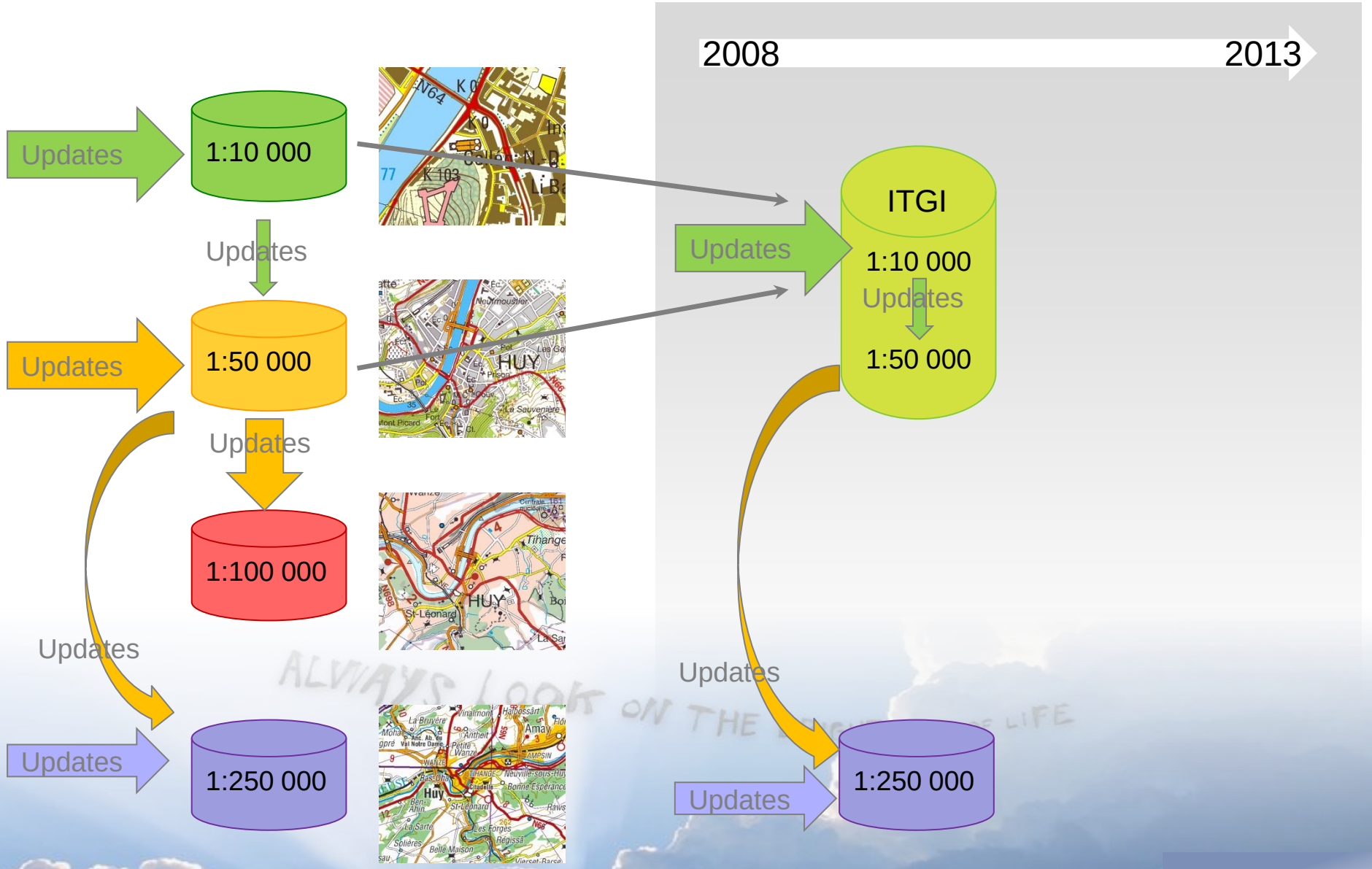
The result



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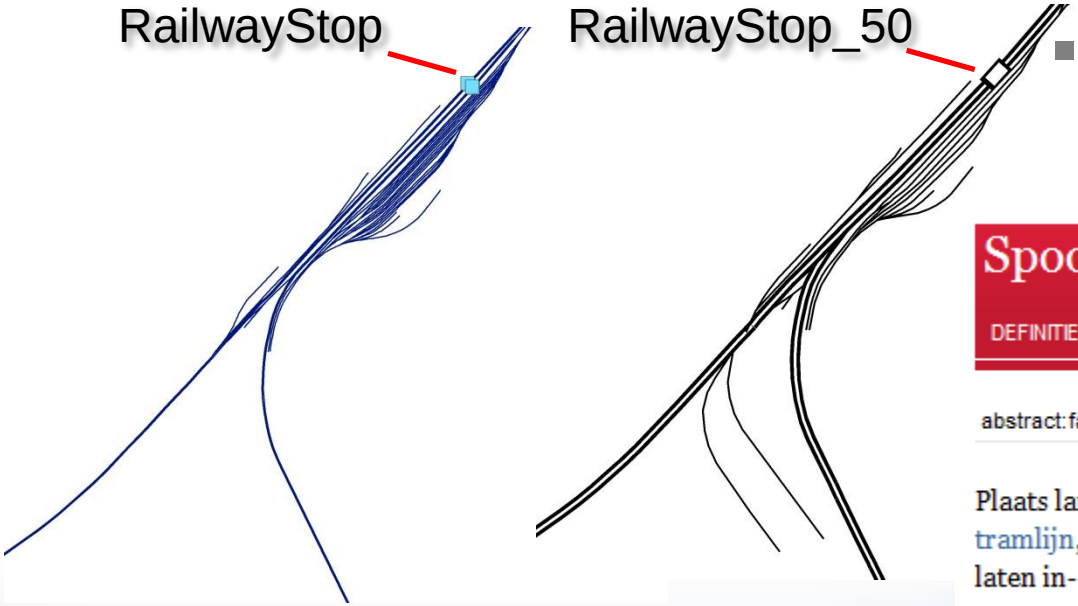
The result

- For all the 1:10K and 1:50K objects:



- Same object definition
- Consistent selection criteria and specifications

Spoorweghalte

DEFINITIE

abstract:false

Plaats langs een Infrabel-spoorlijn, een metrolijn of een tramlijn, waar een trein, tram of metro stopt om reizigers te laten in- of uitstappen. Stations, stopplaatsen, metrostations, premetros

Arrêt de chemin de fer

CRITÈRES DE SÉLECTIONS | SPÉCIFICATIONS TECHNIQUES | FC VREF

Critères de sélections

Les gares et haltes situées le long de lignes de chemin de fer touristiques ne sont pas sélectionnées comme 'arrêt de chemin de fer'.

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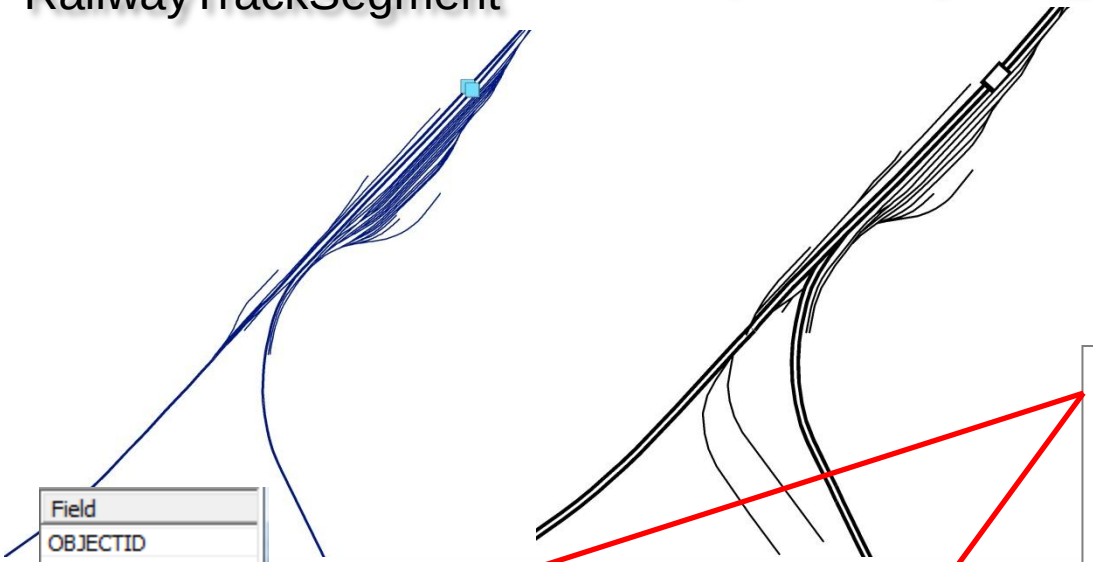
The result

- For all the 1:10K and 1:50K objects:
  - Same object definition
  - Consistent selection criteria and specifications
  - Similar attributes names and definitions

RailwayTrackSegment

RailwayTrackSegment_50



Field
OBJECTID
XYORIGIN
ZORIGIN
MODIFICATIONDATE
RailwayTrackType
RailwayTrackUse
MainTrack
Electrification
OperationalState
Shape
XYEXTRAINFO
ZEXTRAINFO
TGID
SHAPE.LEN

Field
OBJECTID
TGID
MODIFICATIONDATE
Bank
Lev
RailwayTrackType
MainTrack
Electrification
OperationalState
Aggregated
Shape
SHAPE_Length

Type de voie ferrée △

Classification qui indique si un segment de voie ferrée est une voie étroite, une voie normale classique ou une voie pour TGV.

cardinality:	1
valueType:	integer

Cet attribut possède les valeurs d'attribut suivantes:

- Voie normale classique
- Voie pour TGV
- Voie étroite

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The result

- Roads:
  - Up to date Ref road data (4 years old max)

Field	Value
ObjectId	9698
Shape	Polyline
XYOrigin	480
ZOrigin	480
ModificationDate	4/04/2011 13:01:33
Fictitious	False
RoadWidth	7
TrafficLanesNumber	1
RoadSurfaceType	Solid
RoadInBadCondition	False
OperationalState	Operational
RoadStatus	Connecting road
NationalRegistrationNumber	<null>
ParticularPassage	No particular passage
RoadWithSeparatedCarria...	False
XYExtraInfo	f30-31_B3_09
ZExtraInfo	f30-31_B3_09
AccessExitNumber	Not Applicable
RoadWidthClass	2
TGID	{91BC7A82-7CC5-49D6-B
SHAPE_Length	255,005423

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The result

- Roads:
  - Up to date Ref road data (4 years old max)
  - Gen data are synchronised with the Ref road data (the whole country will be covered next year)

Field	Value
Ojectid	10603
Shape	Polyline
TGID	{55BF1710-DABB-4E3E-B2
ModificationDate	3/08/2011
Bank	No Embankment/Cut/Dyke
Lev	0
Fictitious	False
RoadWidthClass	2
TrafficLanesNumber	1
RoadSurfaceType	Solid
RoadInBadCondition	False
OperationalState	Operational
RoadStatus	Connecting road
NationalRegistrationNumber	0
ParticularPassage	No particular passage
RoadWithSeparatedCarria...	False
AccessExitNumber	999
TGID_SmallRoundabout	<null>
TGID_LargeRoundabout	<null>
SHAPE_Length	300,463951

Field	Value
ObjectId	9698
Shape	Polyline
XYOrigin	480
ZOrigin	480
ModificationDate	4/04/2011 13:01:33
Fictitious	False
RoadWidth	7
TrafficLanesNumber	1
RoadSurfaceType	Solid
RoadInBadCondition	False
OperationalState	Operational
RoadStatus	Connecting road
NationalRegistrationNumber	<null>
ParticularPassage	No particular passage
RoadWithSeparatedCarria...	False
XYExtraInfo	f30-31_B3_09
ZExtraInfo	f30-31_B3_09
AccessExitNumber	Not Applicable
RoadWidthClass	2
TGID	{91BC7A82-7CC5-49D6-B
SHAPE_Length	255,005423

NATIONAAL GEOGRAFISCH INSTITUUT
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The result

- Buildings:
  - Up to date Ref buildings (4 years old max)

- Gen data are synchronised with the Ref building data (the whole country will be covered next year)

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The future

- Next update cycle will be much easier
  - For the reference data (1:10K):
    - Roads and buildings data are 4 years old max (instead of 15 for the oldest one before the last update)
    - We will simplify the model and try to make the update processes more efficient.

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The future

- Next update cycle will be much easier
  - For the generalised data (1:50K):
    - Reference data modification tables + updates filter application

OID '	GETID	TGID	FEATURECLASS	CHANGETYPE	CHANGEINFO
10350	532701_R_CMT_01102009	{094D6E61-3A6A-44AF-892F-3EEA979940C6}	RO_RoadSegment	M	TRAFFICLANESNUMBER
10349	532701_R_CMT_01102009	{094D6E61-3A6A-44AF-892F-3EEA979940C6}	RO_RoadSegment	M	ROADWIDTH
10348	532701_R_CMT_01102009	{094D6E61-3A6A-44AF-892F-3EEA979940C6}	RO_RoadSegment	M	MODIFICATIONDATE
13949	532701_R_CMT_01102009	{094EB511-5399-4C0B-9ADB-13E970C5D396}	RO_RoadSegment	D	
10819	532701_R_CMT_01102009	{0956D586-8CFE-49C5-95BB-7839D2BCE863}	RO_RoadSegment	M	SHAPE
10818	532701_R_CMT_01102009	{0956D586-8CFE-49C5-95BB-7839D2BCE863}	RO_RoadSegment	M	TRAFFICLANESNUMBER
13808	532701_R_CMT_01102009	{09573CEA-C21B-477F-8564-2137F6FDC7DA}	RO_RoadSegment	D	
873	522702_R_CMT_16092009	{096A7A9F-34F5-4E5C-83EA-E3DD5EAA7595}	RO_RoadSegment	M	MODIFICATIONDATE
875	522702_R_CMT_16092009	{096A7A9F-34F5-4E5C-83EA-E3DD5EAA7595}	RO_RoadSegment	M	TRAFFICLANESNUMBER
874	522702_R_CMT_16092009	{096A7A9F-34F5-4E5C-83EA-E3DD5EAA7595}	RO_RoadSegment	M	ROADWIDTH
707	522702_R_CMT_16092009	{096FDB92-C7D1-42C8-ACA5-47515762FC0B}	RO_PathSegment	D	
14087	532701_R_CMT_01102009	{098A1BE9-46F1-48E8-AC8C-F830AAE3F8C0}	RO_RoadSegment	D	
5625	532701_R_CMT_01102009	{0991EC46-5B61-4176-968F-A64CCDD14889}	RO_PathSegment	A	
5458	532701_R_CMT_01102009	{0992740A-4E10-4EDB-9838-ABA432B306B3}	RO_OrdinaryRoadSurface	M	SHAPE
7632	532701_R_CMT_01102009	{0999752D-654F-41B7-B73D-A056F19E57C7}	RO_RoadSegment	A	
9872	532701_R_CMT_01102009	{09AA4754-F1D5-4ACB-8509-3244299C8963}	RO_RoadSegment	M	TRAFFICLANESNUMBER
9713	532701_R_CMT_01102009	{09AC8B91-982F-40A0-A1F1-F4284A054FDC}	RO_RoadSegment	M	SHAPE
9712	532701_R_CMT_01102009	{09AC8B91-982F-40A0-A1F1-F4284A054FDC}	RO_RoadSegment	M	TRAFFICLANESNUMBER
9710	532701_R_CMT_01102009	{09AC8B91-982F-40A0-A1F1-F4284A054FDC}	RO_RoadSegment	M	MODIFICATIONDATE
9711	532701_R_CMT_01102009	{09AC8B91-982F-40A0-A1F1-F4284A054FDC}	RO_RoadSegment	M	ROADWIDTH
2036	522702_R_CMT_16092009	{09C1910B-FB35-43F7-BBF1-671CD733A383}	RO_RoadSegment	M	ROADWIDTH

Record: 0 Show: All Selected Records (of 14140) Options

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The future

- Next update cycle will be much easier
  - For the generalised data (1:50K):
    - Reference data modification tables + updates filter application
    - Generalization tools for the buildings are more efficient and we go on working on them

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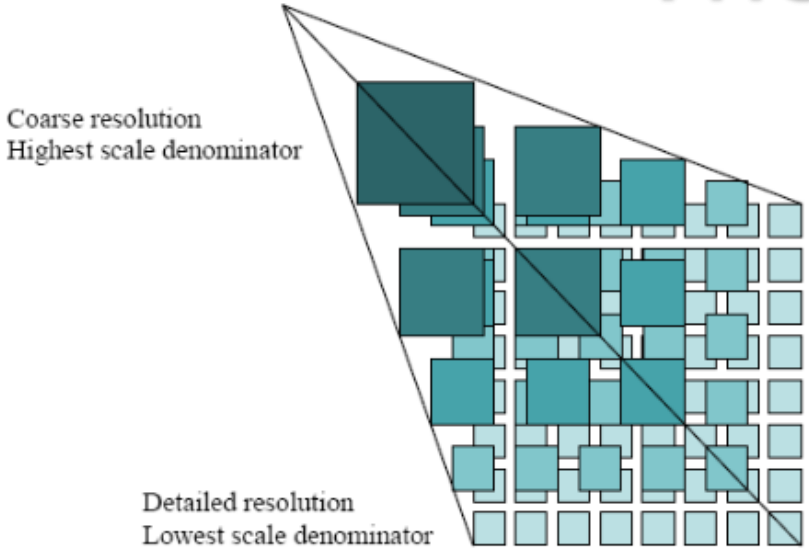
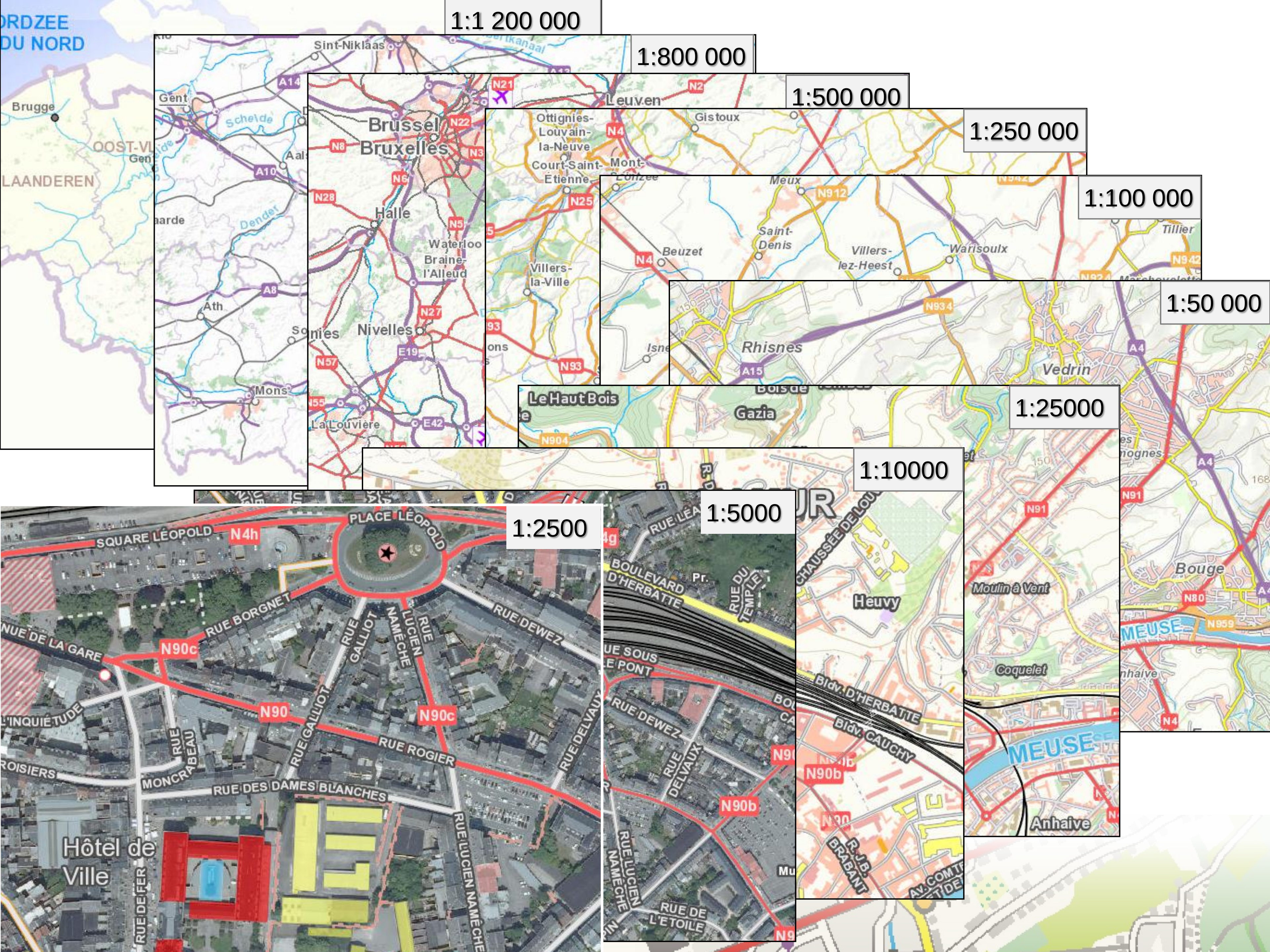
The future

- CartoWeb



  - Updated data will soon be published through a web service displaying maps at 10 levels of resolution.
  - Displayed data: 1:10K, 1:50K and 1:250K data



1:1 200 000
1:800 000
1:500 000
1:250 000
1:100 000
1:50 000
1:25000
1:10000
1:5000
1:2500
DU NORD
Brugge
Gent
Sint-Niklaas
Scheldе
Dender
Ath
Mons
Brussel
Bruxelles
Halle
Waterloo
Braine-l'Alleud
Nivelles
La Louvière
Leuven
Ottignies-Louvain-la-Neuve
Court-Saint-Etienne
Gistoux
Villers-la-Ville
Meux
Saint-Denis
Beuzet
Villers-lez-Heest
Warisoulx
Tillier
Rhisnes
Vedrin
Le Haut Bois
Gazia
Heuvy
Moulin à Vent
Coquelet
Bouge
MEUSE
Anhaive
PLACE LÉOPOLD
SQUARE LÉOPOLD
RUE BORGNET
RUE DEWEZ
RUE GALLIOT
RUE LUCIEN NAMÈCHE
RUE ROGIER
RUE DES DAMES BLANCHES
RUE MONCRABEAU
RUE DELVAUX
RUE DE FER
Hôtel de Ville
BOULEVARD D'HERBATTE
RUE DU TEMPLE
RUE SOUS LE PONT
RUE DE L'ETOILE
Bldv. D'HERBATTE
Bldv. CAUCHY
CHAUSSÉE DE LOUVAIN
N90
N90b
N90c
N4h

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Questions ?

Anne Féchir

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Barcelona

21-22 March 2013