

Mario Matthys
3D-Coordinator
Architect and Urban Planner
City of Ghent
Belgium

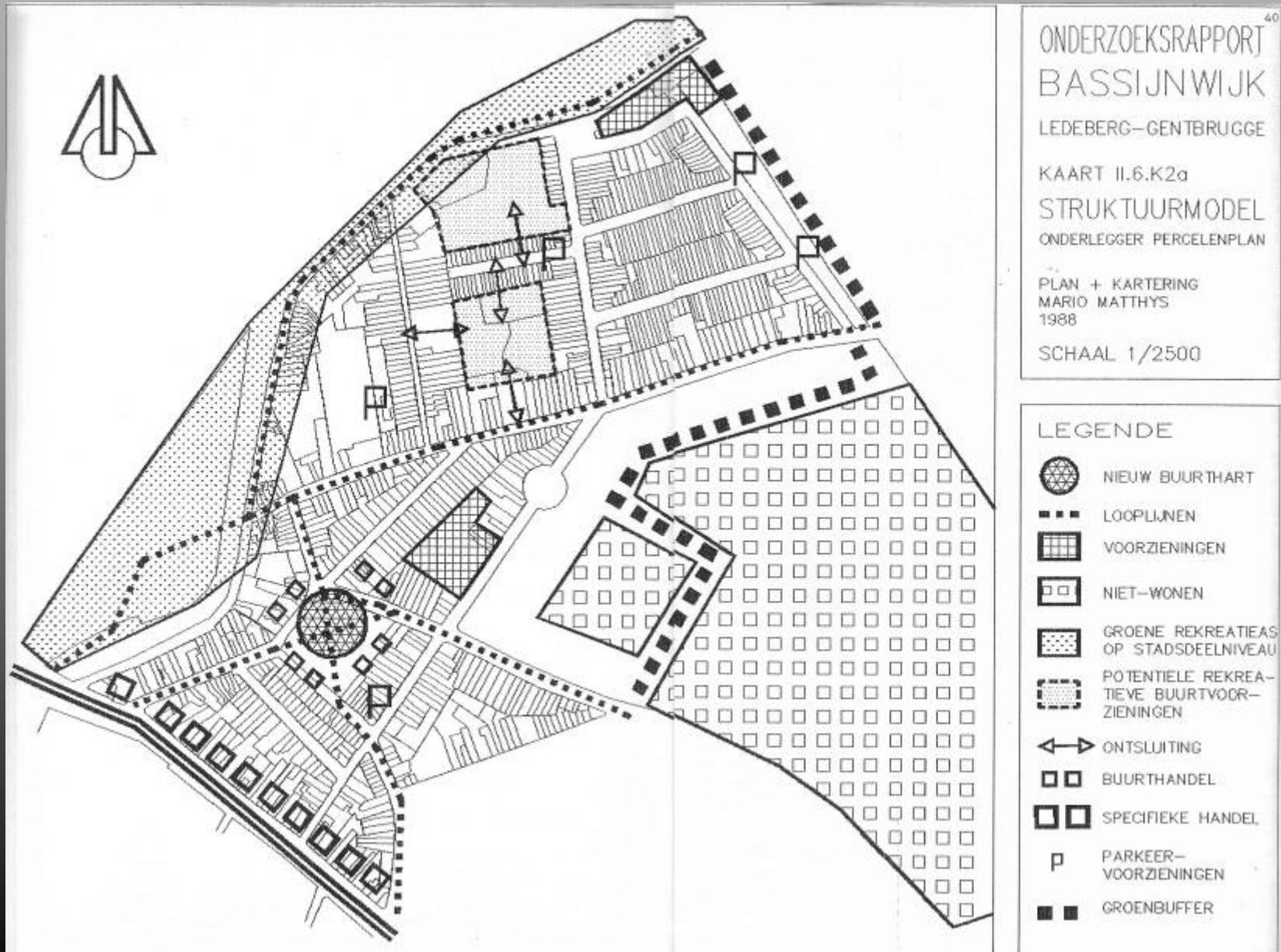
Gent in 3D

"The scale of the universe"

Parallel world
Holism
LOD



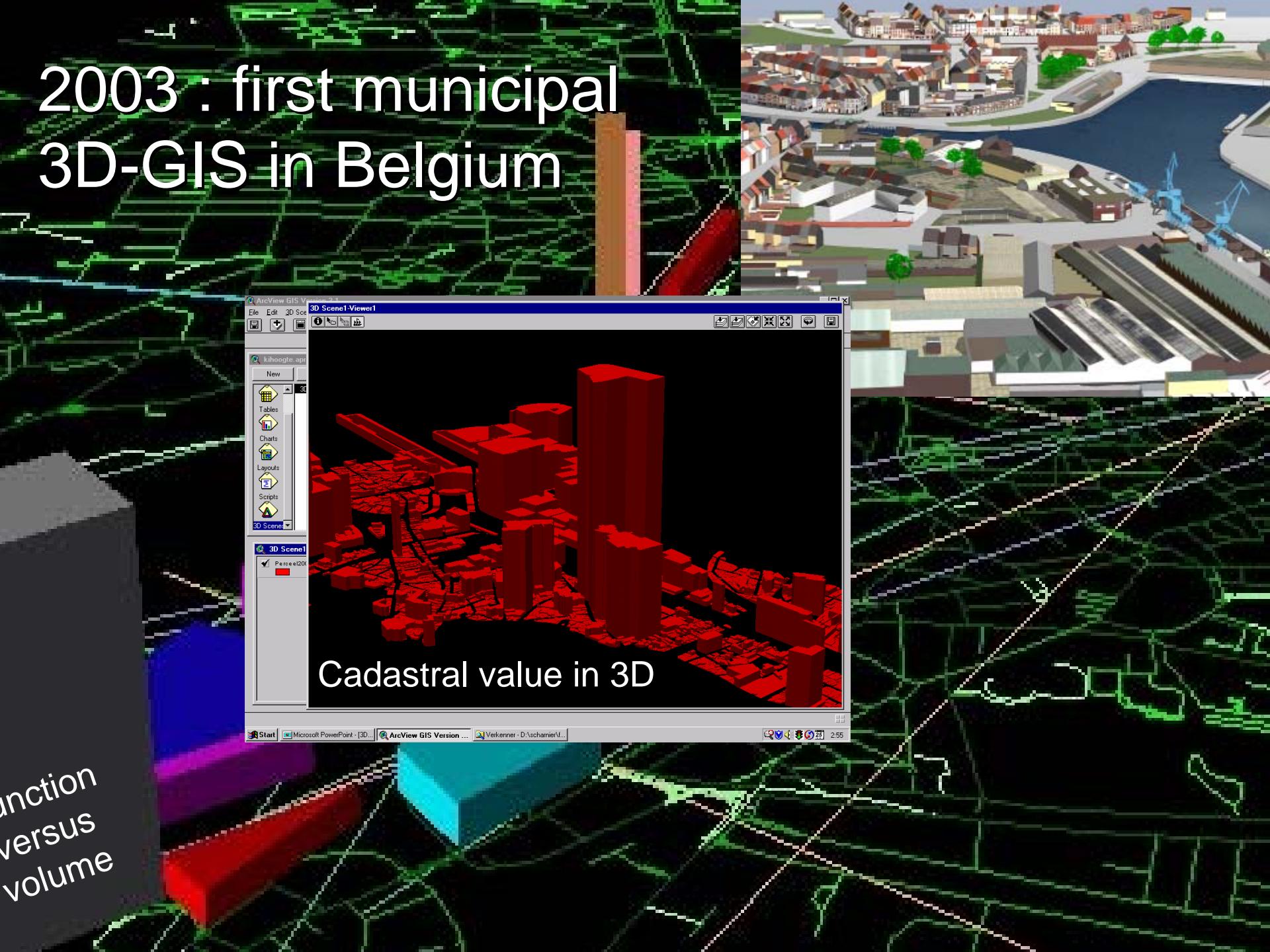
First big scaled digital 3D drawings in Ghent : 1987



2000



2003 : first municipal 3D-GIS in Belgium



unction
versus
volume



Re-opening of the old river Neder-Schelde 2000-2015

4D... project development
Different alternatives in 3D
in the planning and design process

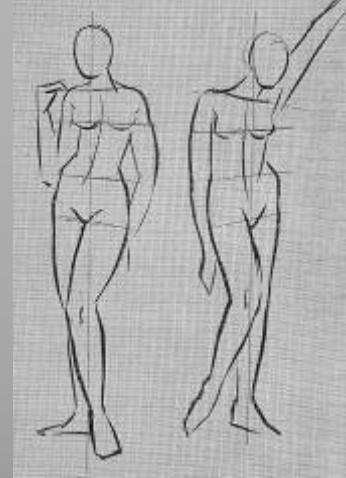
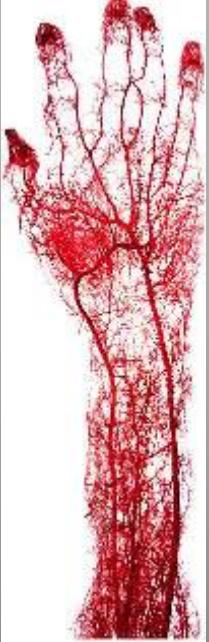


"A holistic view on multi-dimensional city-modelling
is needed for increased success rates"



holistic
project





Goals

“Ghent in 3D”

1. Spatial research and analyses
2. Designing and planning
3. Evaluation and collaboration
4. Communication



*First Belgian
Geospatial Award 2013*



Realisation in real world



| | | | | |
|-------------|-------------------------|--|---|---|
| 1991 GIS | 1996 Virtual Reality | 2008 First municipal 3D-coordinator | 2014 Crowdsourcing Open data Exchange 3D-drawings 3D ambassador in each district Everyone designer | Co-creation Story's in 3D Movement and animation, noise Time-space |
|-------------|-------------------------|--|---|---|

1988
CAD

Start digitizing

2003
3D-GIS

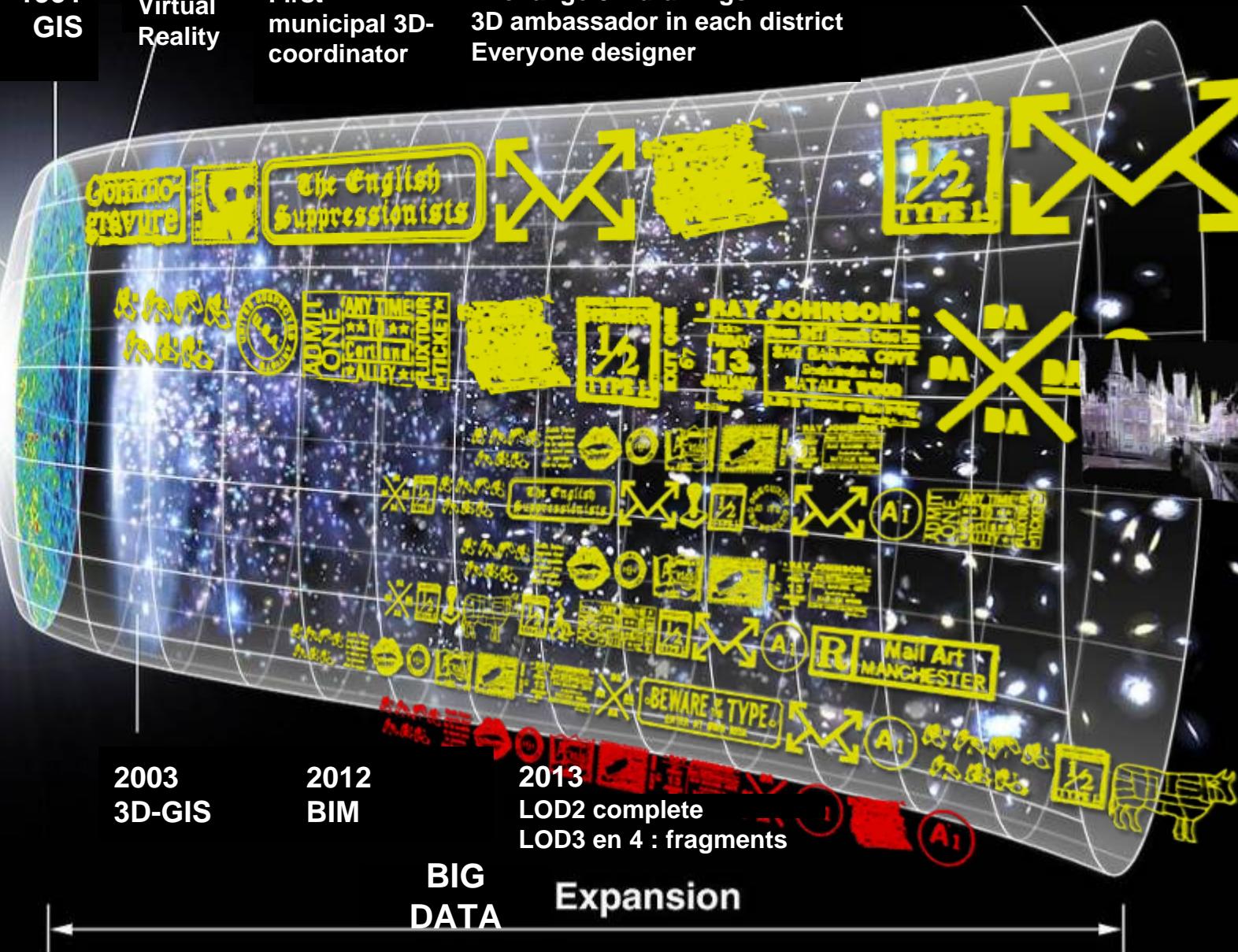
2012
BIM

2013
LOD2 complete
LOD3 en 4 : fragments

BIG
DATA

Expansion

Where will we be within 50 year in 2038 ?

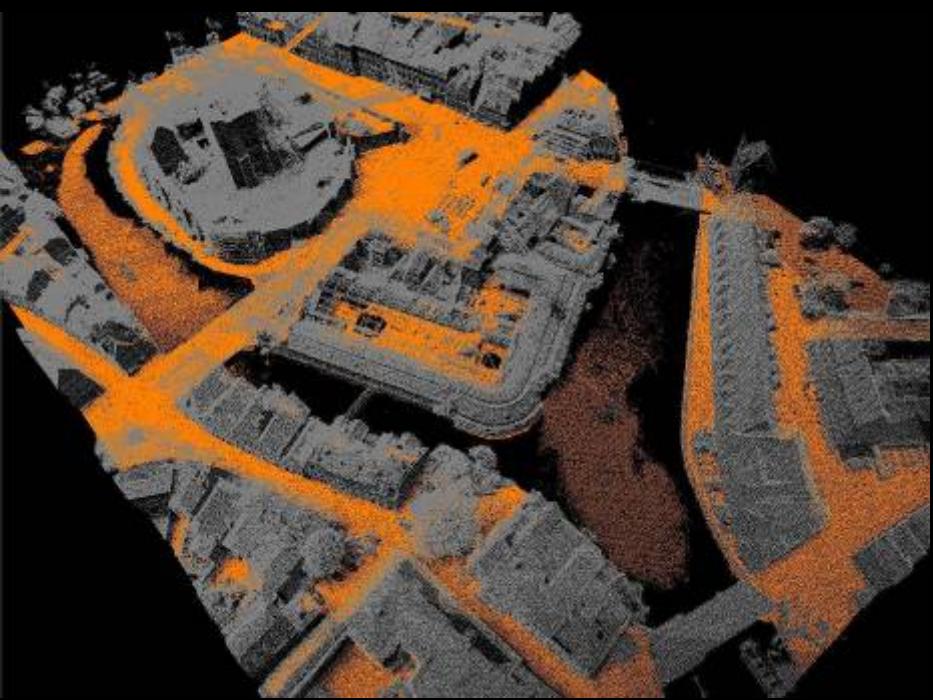
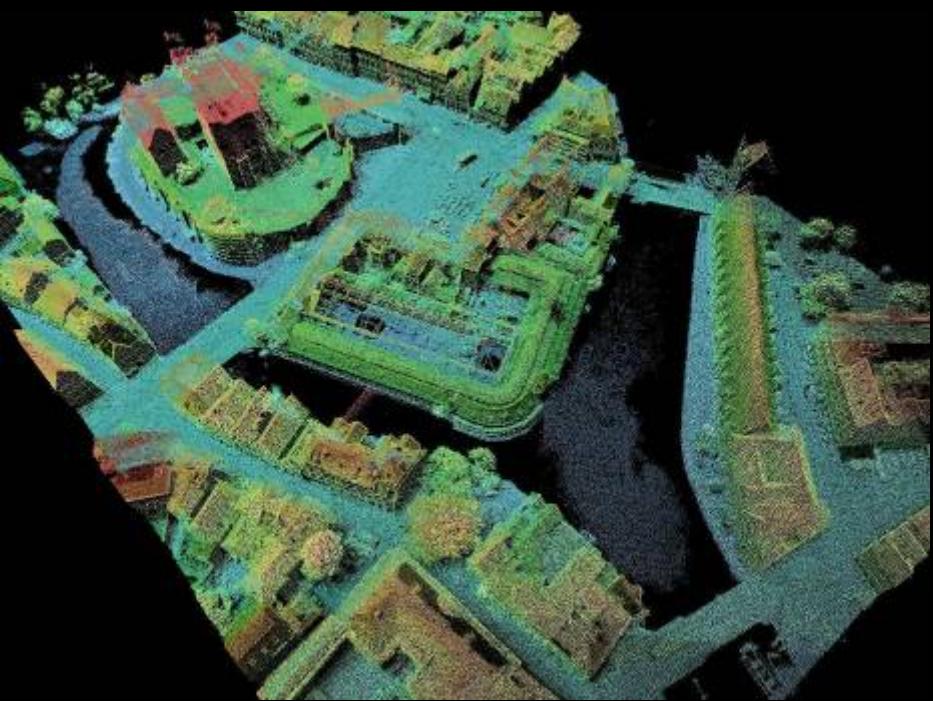


LIDAR : Airborne

DHM 2003 and 2013

Digital Height Model Flanders

- City of Ghent
 - Phase 1
 - Helicoptre
 - July 2009
 - Inner city
- Flanders (AGIV)
- Phase 2
 - Airplane
 - 2013
 - The full city



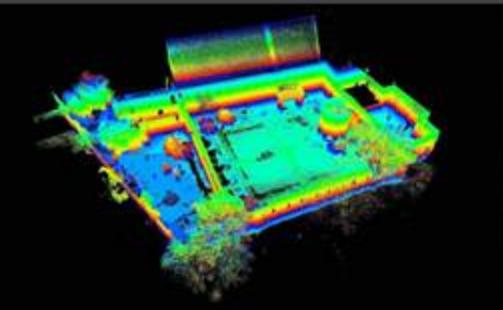
3D-SCANNER : Terrestrial



Ghent was the first City in Belgium
With a 3D-scanner in 2010

Integration





Sint-Baafsabdij

Street



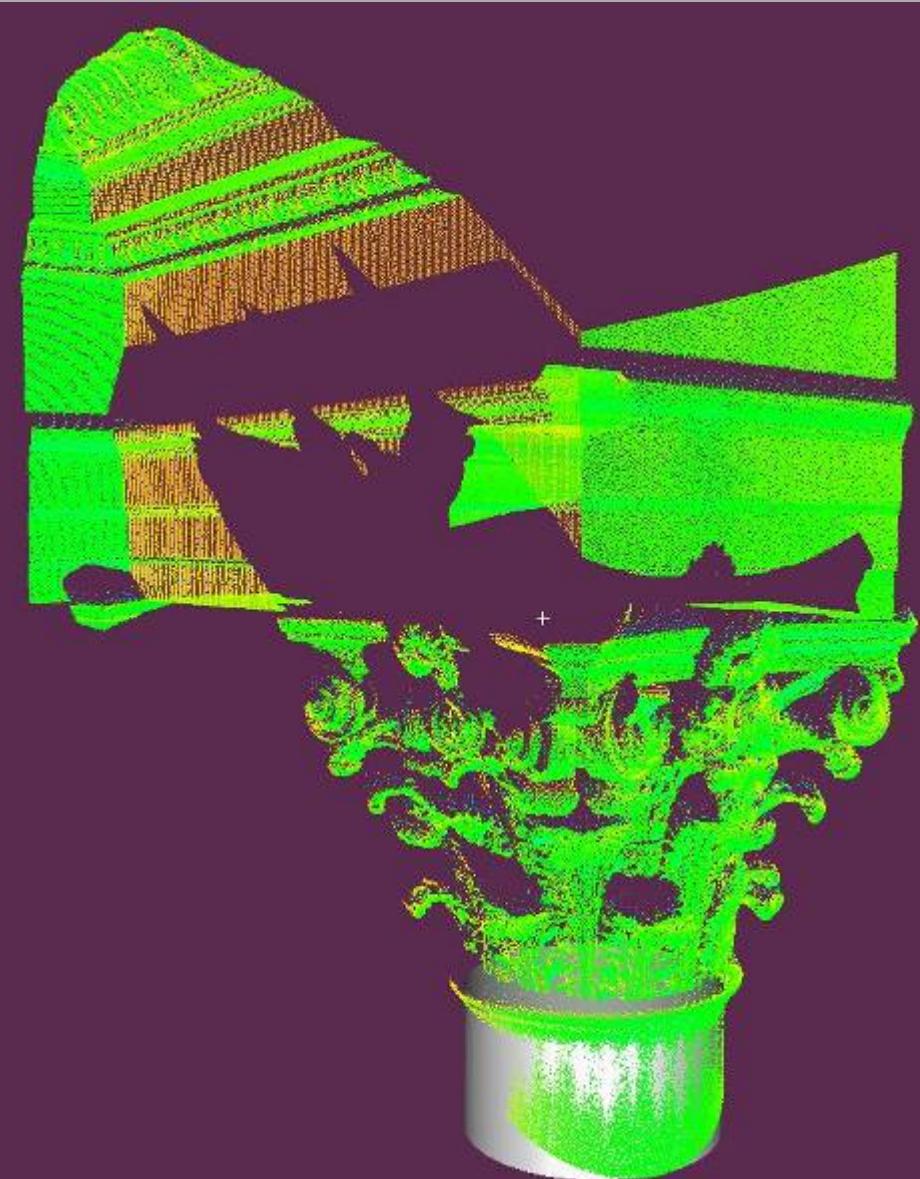


Interior

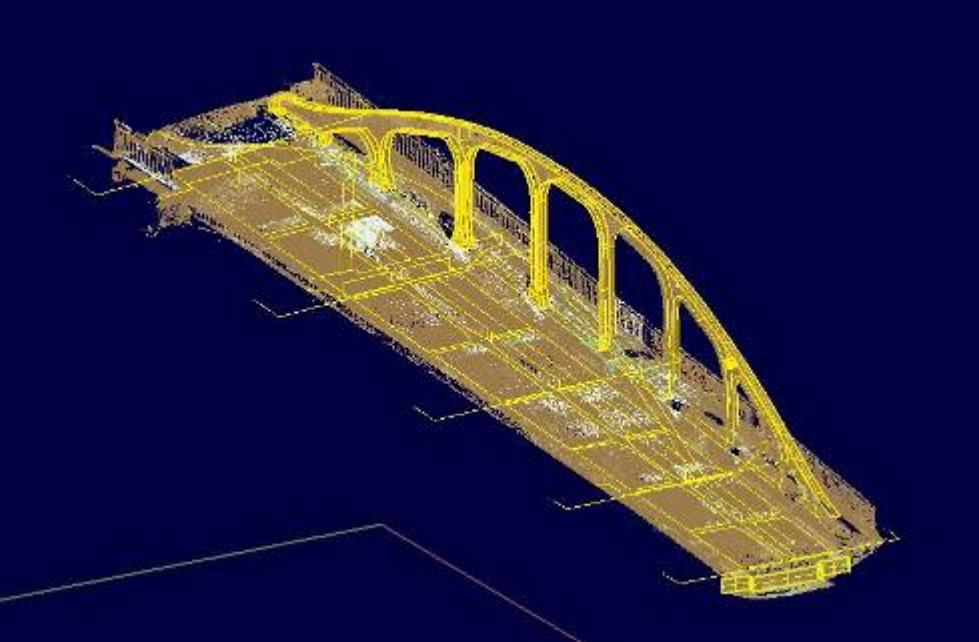
Belfort: interior exterior



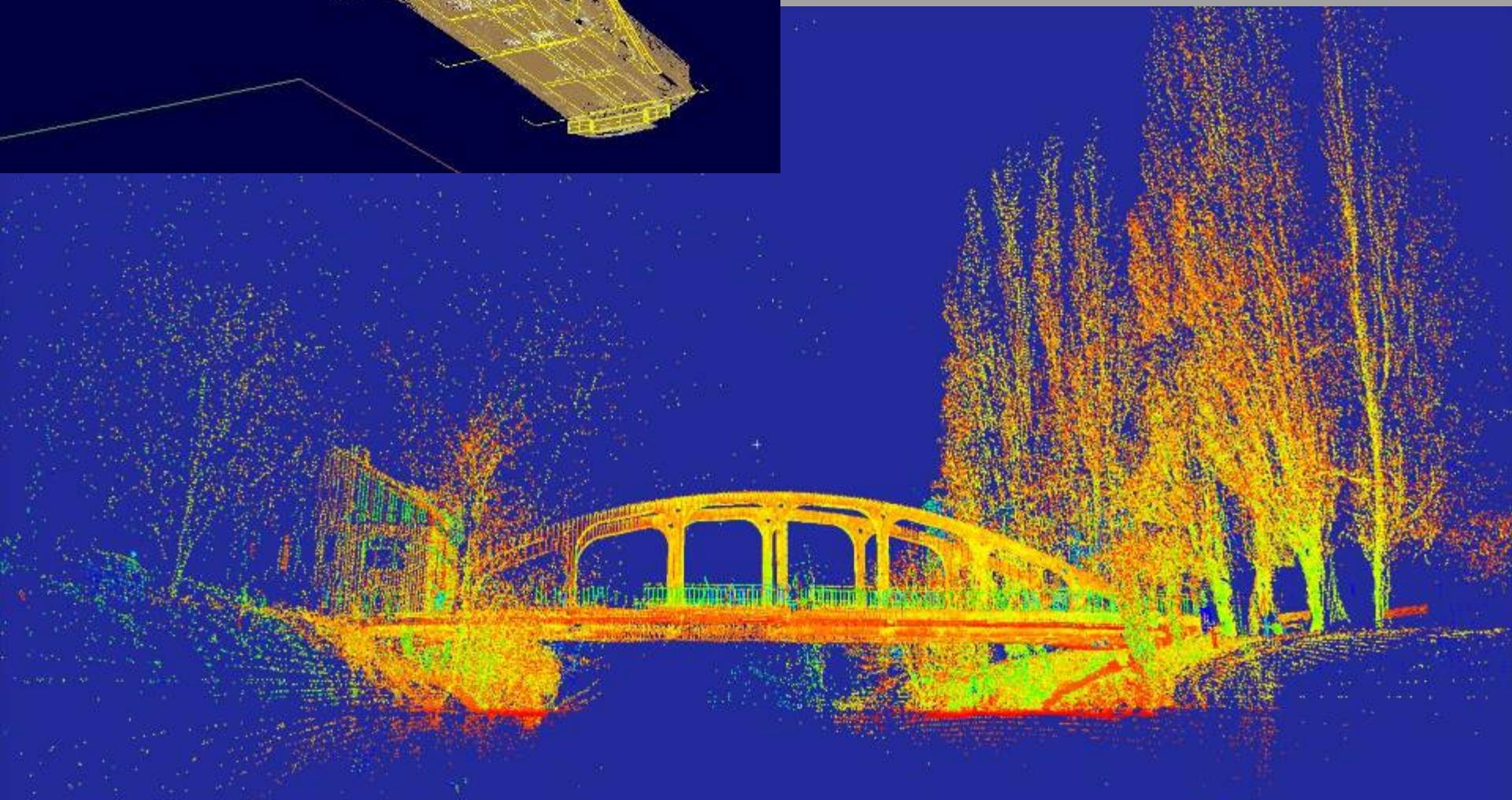
Details







Pontbrug Drongen

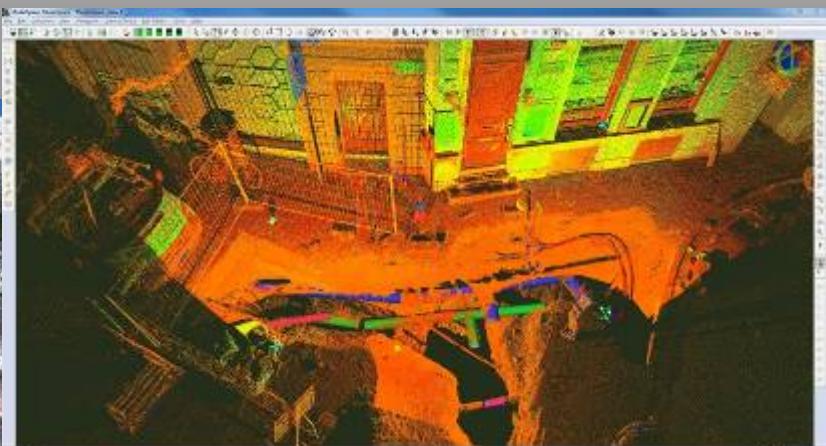
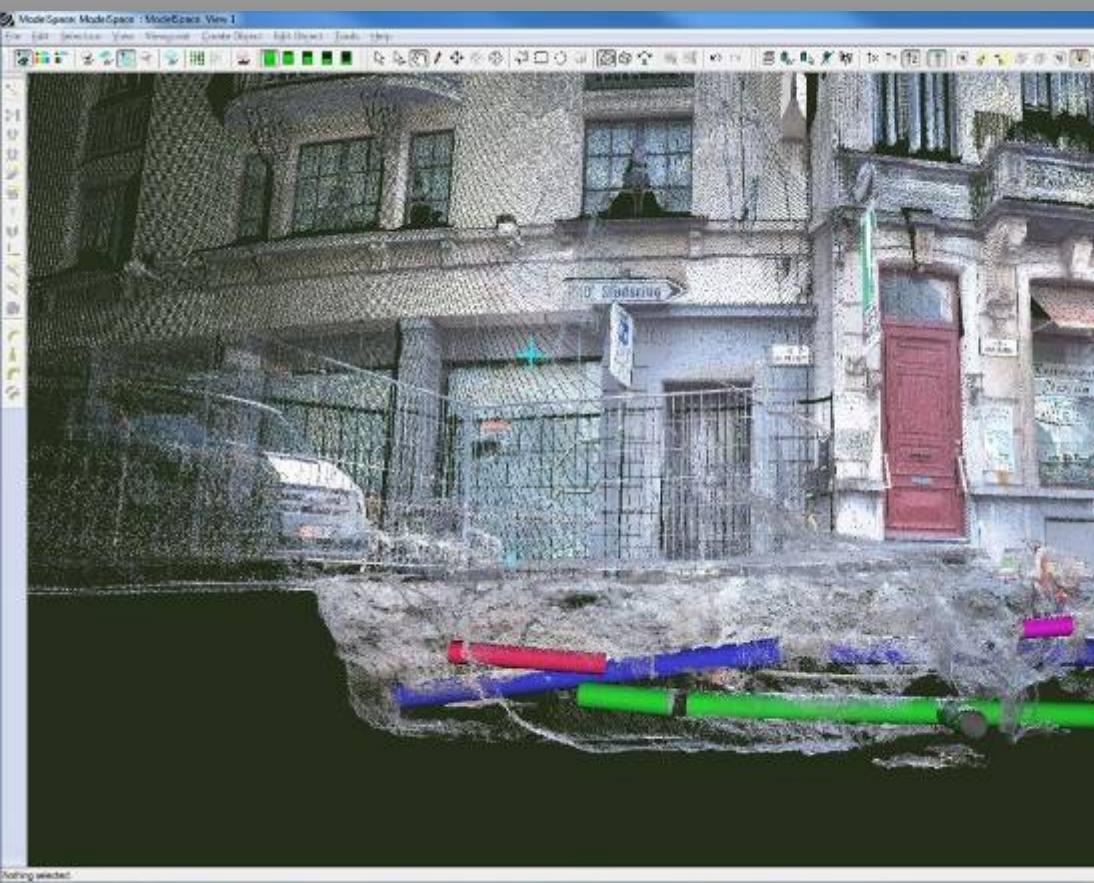


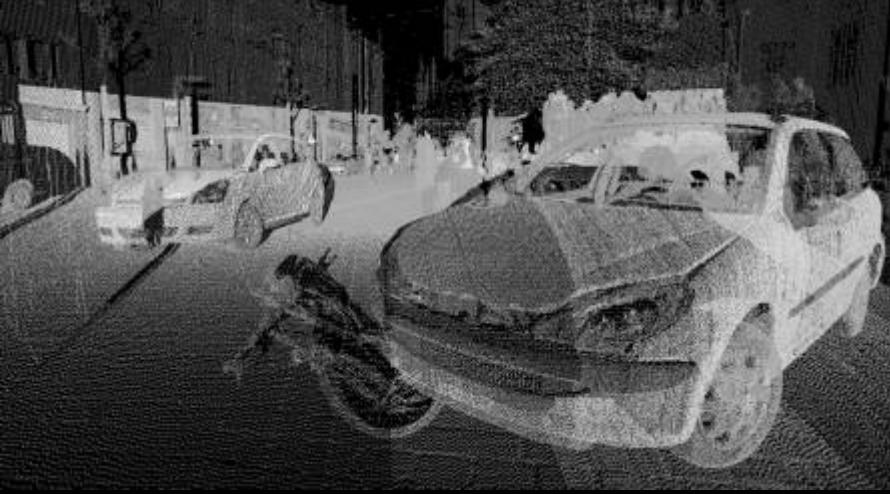
Archeology : E.Braunplein



the underground

- Soil
- Infrastructure

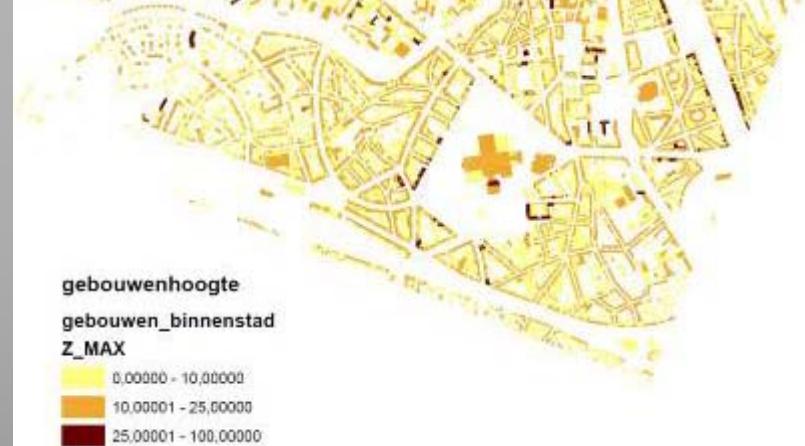


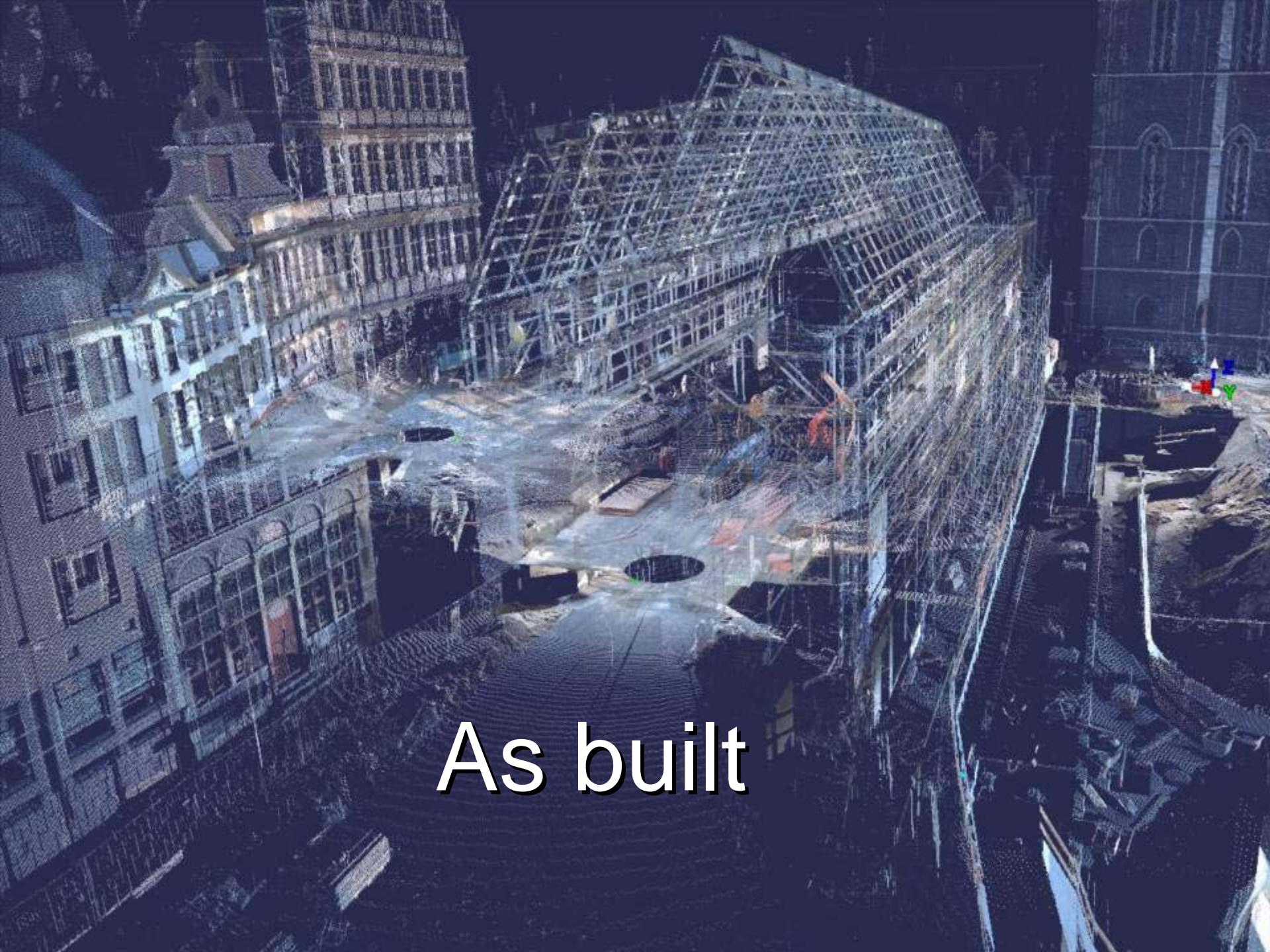


CRIME UNIT FEDERAL POLICE

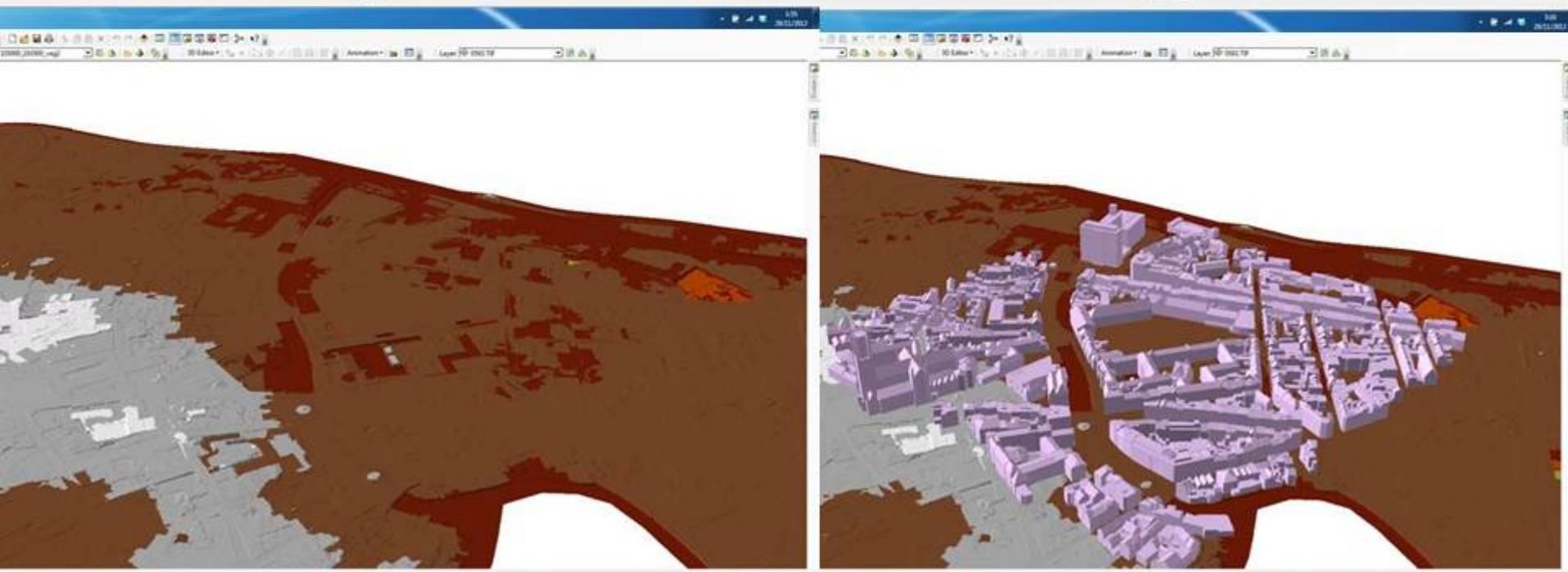
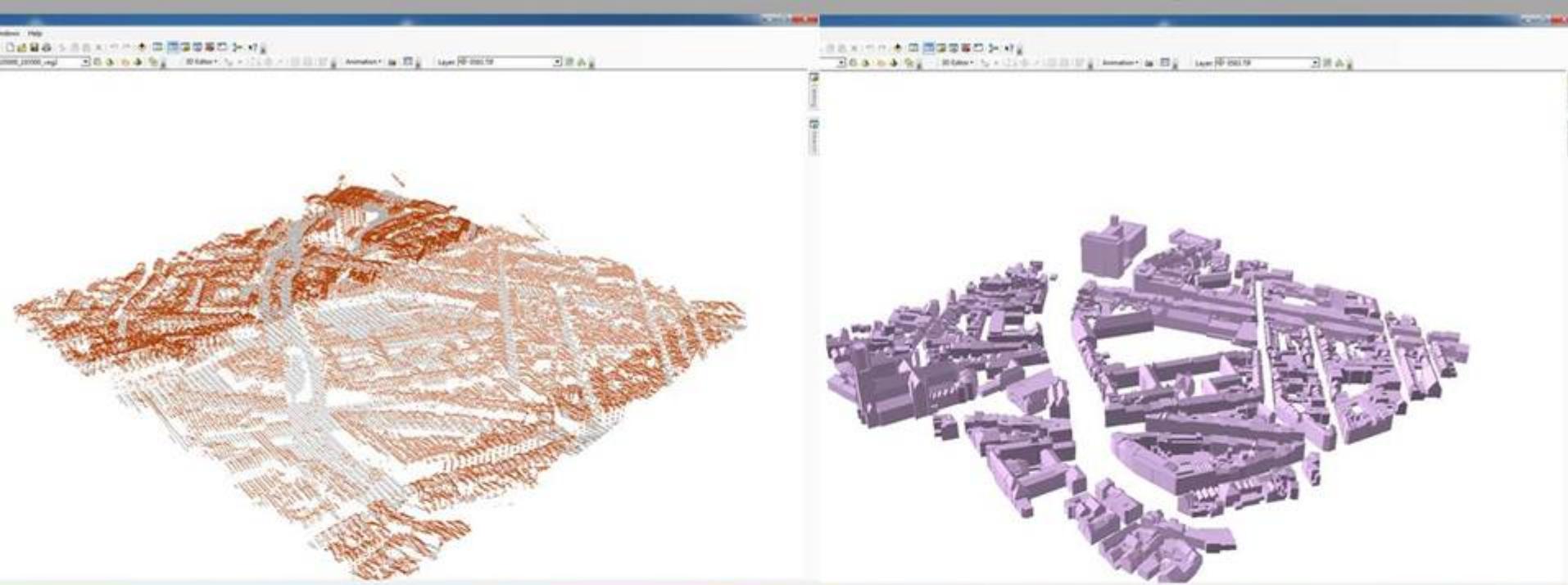


Fire service

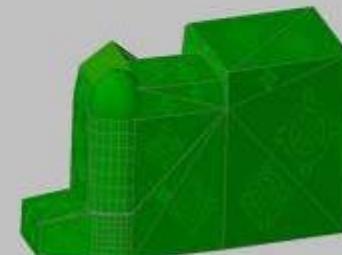
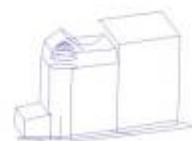




As built

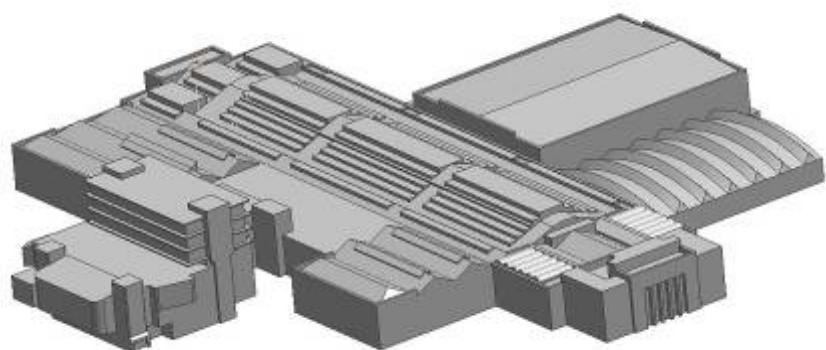
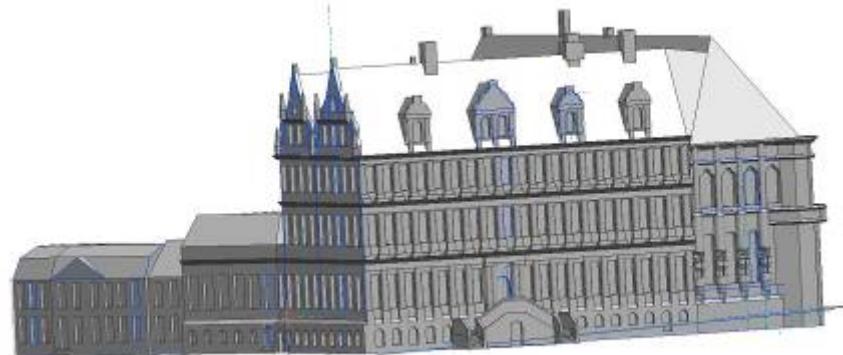
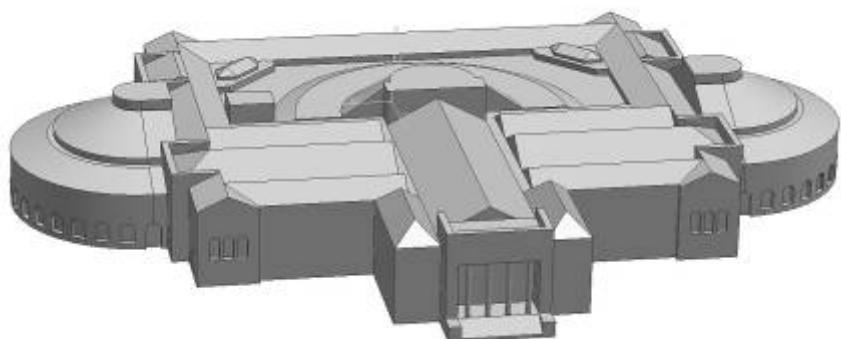


Vectorisation

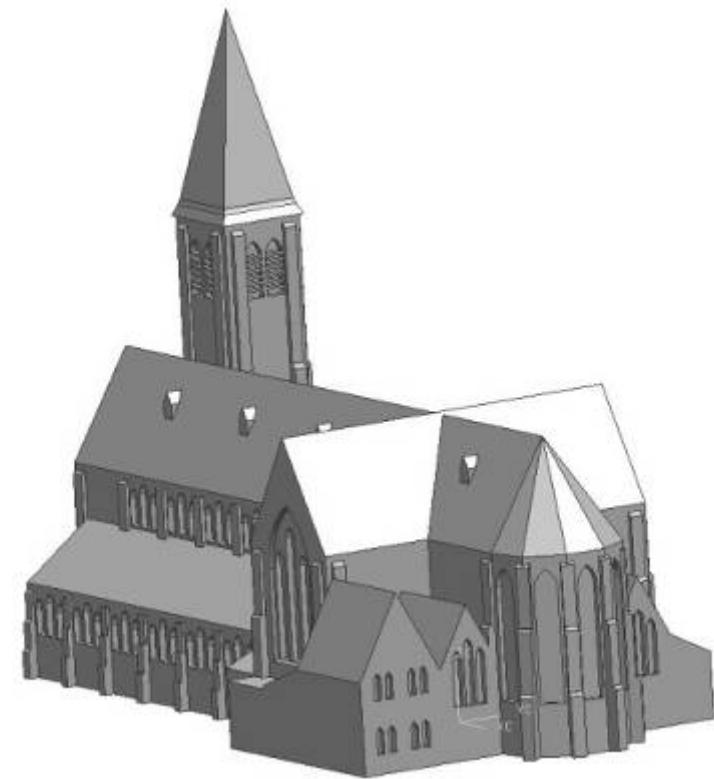
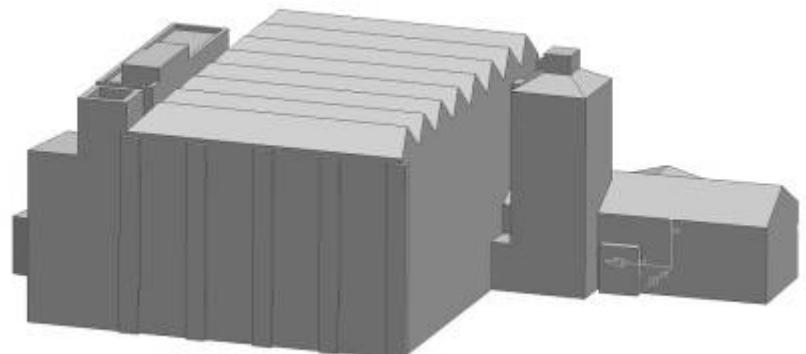


- Autocad
- Sketchup (pro)
- 3D-studio-max
- VR4max
- Civil 3D
- Revit
- Arcview
- Arcscène
- Pointtools
- Cyclone
- Rhino...



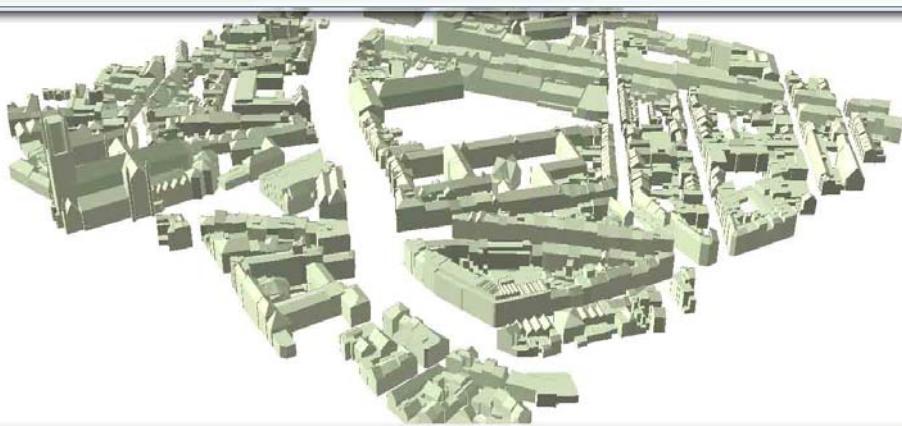


LOD 3 (Level Of Detail)



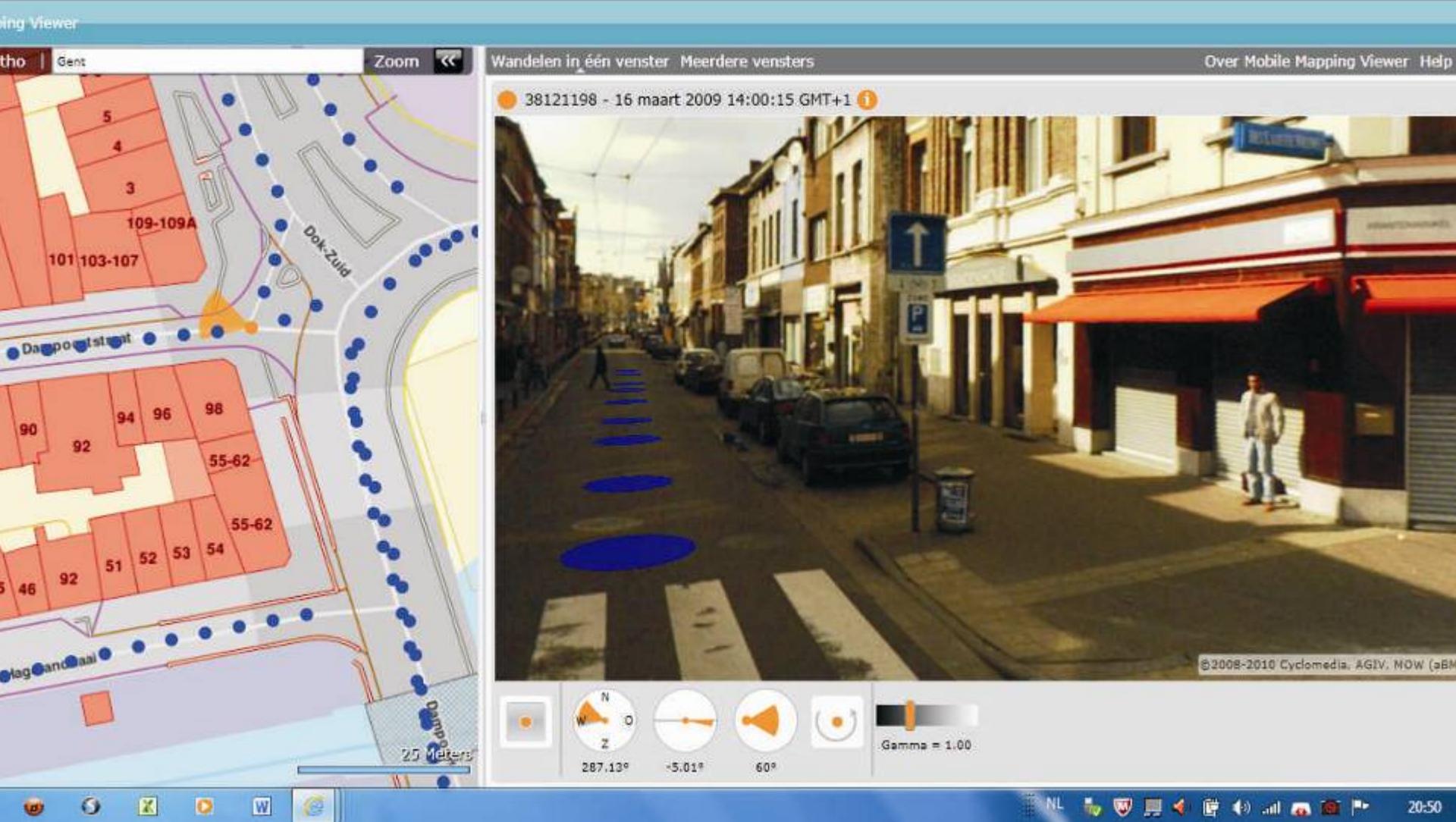


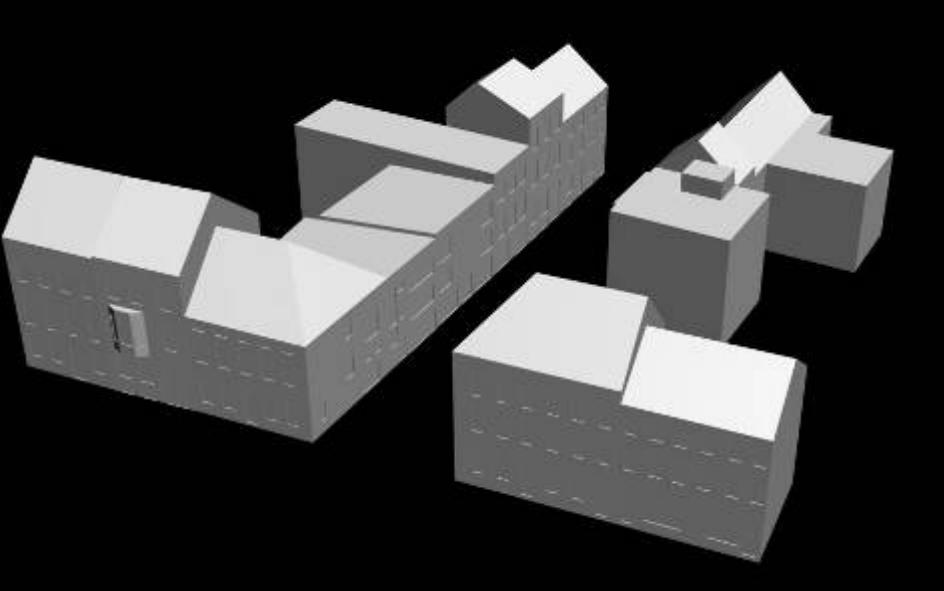
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|---------|-----------|--------|-------|----------|-----------|-----------|------------|-----------|---------|----------|--------------|--------------|----------|----------|----------|------------|------------|------------|-----------|-----------|-----------|
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| 0.70476 | CD | | 0 | 15.11485 | 7.717 | 20.95633 | 7.717 | 1 | 0 | 0 | 105050.07182 | 193530.27001 | 0 | 0.545445 | 0.520113 | 0 | 24.09248 | 20.35351 | LiDAR | 9999 | 23.10.200 |
| 0.70476 | CD | | 0 | 16.37548 | 7.717 | 24.09248 | 7.717 | 1 | 1 | 0 | 105050.07182 | 193530.27005 | 0 | -0.41728 | 0.95678 | 0 | 24.09248 | 20.35351 | LiDAR | 9999 | 23.10.200 |
| 0.70476 | CD | | 0 | 16.37548 | 7.717 | 24.09248 | 7.717 | 1 | 2 | 0 | 105050.08652 | 193534.54888 | 0 | -0.41728 | 0.95679 | 0 | 24.09248 | 20.35351 | LiDAR | 9999 | 23.10.200 |
| 0.70476 | CD | | 0 | 15.23953 | 7.717 | 20.95633 | 7.717 | 1 | 3 | 0 | 105052.25394 | 193532.78921 | 0 | -0.91015 | -0.41429 | 0 | 24.09248 | 20.35351 | LiDAR | 9999 | 23.10.200 |



Mobile mapping : AGIV

Agency Geo Information Flanders





LOD 3

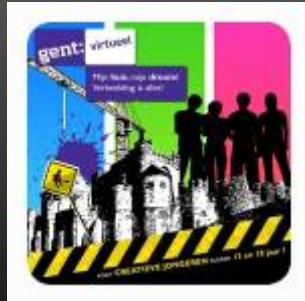


Competition for kids

My house, my dream

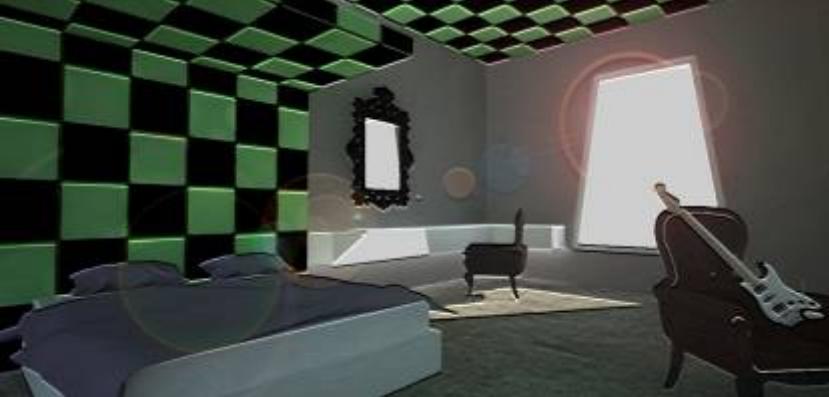
“mijn huis mijn droom”

On youtube





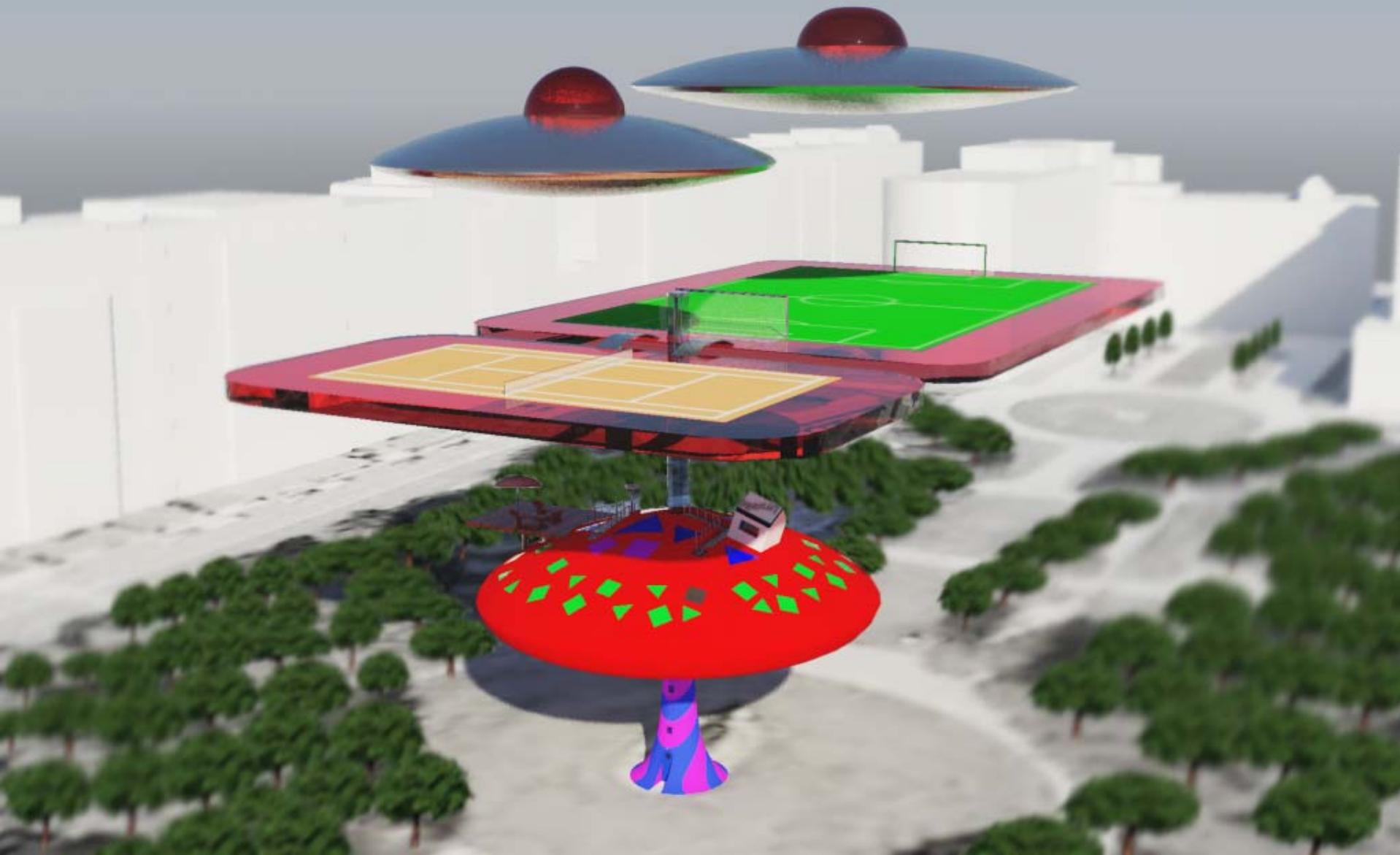




My house, my dream

“Gent in 3D” - Stad Gent 2011





gent:

virtueel

Richtlijn 3D-bouwtekeningen

Stad Gent

Versie 1.0



Guideline
exchange
3D-
drawings

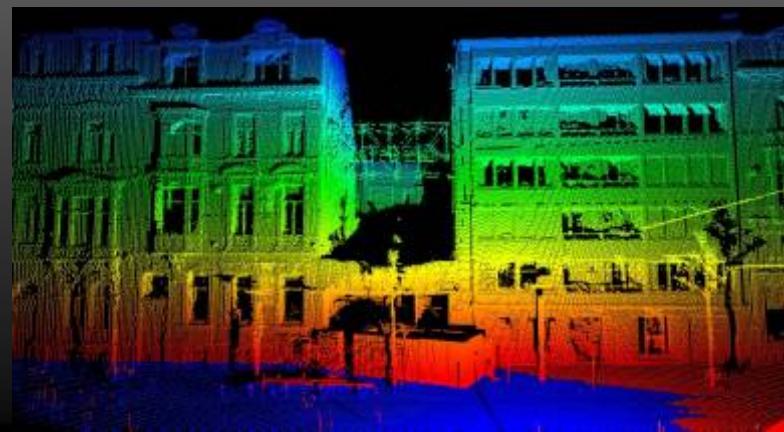


Chaos





Integration





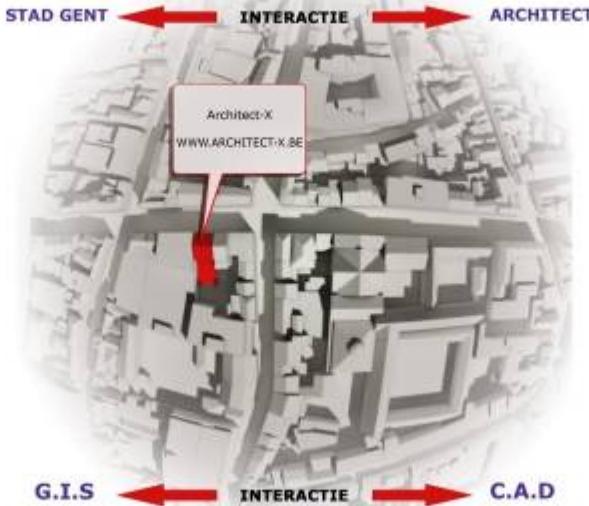
WELKE EXTRAE DATA STELT DE STAD GENT AAN DE ARCHITECT TER BESCHIKKING ?

- GRB (Grootstichting referentiestand) van de omgeving van de bouwlocatie (20 meter rond het perceel)
- 3D model van de gebouwen aan de bouwplaats (50 meter rond de bouwplaats)
- LOD3 (referentie) niet texturen; stadsraad zonder texturen
- De geopositivemerkken zijn ingepast zonder morfologische detaillering van de gevels.
- Er zijn geen (gevel)deuren voorzien. De deurenpartijen zijn gegenereerd, dit wil zeggen dat deurkapellen, schuiven en andere kleineren openingen zijn toegevoegd.
- Kleinee achtergeledingen zijn eveneens weggelaten.
- Straatrichting is niet aanwezig.
- 2D-kaart van het bouwterrein (vermindert 1 reuze; nauwkeurigheid 1 cm op 50 m afstand, noord boven)
- Een set van standaardmerken voor gevel en dak (vmt te genereren)
- Het referentieniveau van de aangrenzende gebouwen is Lambert72, 8-punt van de tekening niet als eenheid (1 meter, noord, relatieve Lamberti-coördinatenreferentie)



WELKE EXTRAE SERVICE BIEDT DE STAD GENT?

- de architect mag gedurende 1 jaar gebruik maken van de "3D-C.A.V.E." (Computer Aided Virtual Environment)
- expertise in Rapid prototyping (3D printing)
- toelop interactieve 3D-wereldsaga van de stad (link naar website van architect)
- expertise tot 50 meter rond de bouwplaats van Stedebouwruimte ambtenaar gebruik maken van 3D-bestanden tot in 3D-stadsmodel
- expertise in 3D-dekken : advies & gebruik 3D-data en impressie in 3D-model



WELKE DATA STELT DE ARCHITECT AAN DE STAD GENT TER BESCHIKKING ?

Een vectorleid 3D-model dat betrekking heeft op een bouwomgeving.
De aangevoerde dataset is softwareexternaandig.



TECHNISCHE SPECIFICATIES VAN HET 3D MODEL ?

Het voorbereid 3D-model van de architect zal worden geïmplementeerd in het stadsmodel. Diverse opties zijn mogelijk.

| Paramet | UVW | Bestand | Opmerking |
|---------|---------|---------------------|--------------------------------|
| mat | ja | bestanden toewegen* | ex. render pluggins vereisen |
| 3ds | ja | bestanden toewegen* | beperkt tot 3ds polygoen |
| obj | ja | (in obj bestand) | werkt 7 of vroeger |
| dwg/dxf | beperkt | bestanden toewegen* | www & materialen gaan verloren |
| stl | ja | bestanden toewegen* | |
| dwf | ja | (in dwf bestand) | |

* texturenbestanden met gepaste resolutie moeten toevoegen.: .jpg/.png/.gif...

Detaillering: less is more! Maak wel zo weinig mogelijk data van zo duurbaar mogelijk te gebruiken van de gebouwen (zie ook de C.A.V.E.).
maximaal LOD3 (perceel en dakenbeschrijvingen en dauren, hoeken, etc. omsluiten).

Gedetailleerd 3D-lichtwerk en andere kleine, niet morfologisch bepalende geometrie vermijden. Alternatief: [zie fig. X (UCD model)] een gedetailleerde afbeelding van de gevel kan wel het schrijfwerk en andere details weergeven zonder veelvoorkomende data te bevatteerd (fig. 10).

Wat you see is what you get: bestanden purgeren! Lega layers, niet geblokkeerde blokken & geometrie, etc. uit het model verwijderen.

Modellingsgeschriften:

Il orientatie: noorden = positieve Y-as

Il posisie: Lontitatuuden en breedte: noordwest (x,y,z) uit 3D-wereld

Il hoogte: hoogte van de gebouwen ten opzichte van de stad

Il layerv: vrl te zetten, bij voorkeur materiaalnamen

Il geest omgeving, enkel model binnen beperpen

Il belichting, camera en specifieke render pluggins vermijden











Datastructure → Citygml

Untitled - ArcScene - ArcView

File Edit View Bookmarks Selection Geoprocessing Customize Windows Help

Layer:

Table of Contents

Scene layers

000078_pz_2dcw

Table

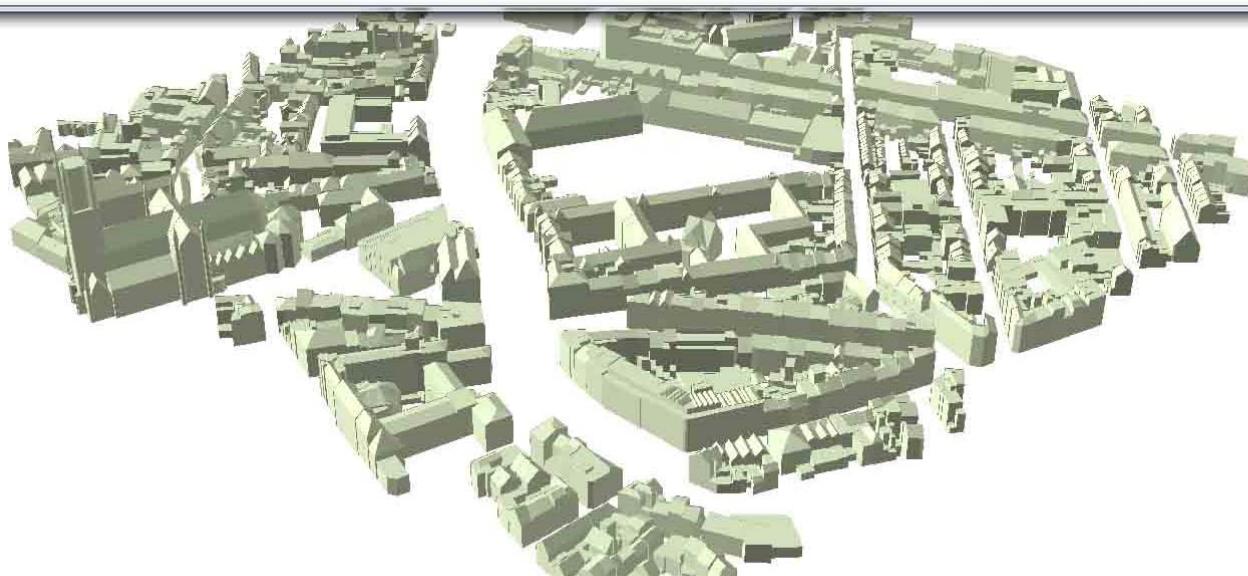
000078_pz_2dcw

FID Shape NUMBER IDN MODIFIED REC STATE EST ERROR METHOD Z MIN Z MAX Z MIN ASL Z MAX ASL Z GRND ASL FACETYPE FACED FACEINV LOCATION X LOCATION Y NORMAL H NORMAL X NORMAL Y NORMAL Z MEAS H ASL EAVS H ASL REASON UPD ROOFTYPE DATE

| FID | Shape * | NUMBER | IDN | MODIFIED | REC STATE | EST ERROR | METHOD | Z MIN | Z MAX | Z MIN ASL | Z MAX ASL | Z GRND ASL | FACETYPE | FACED | FACEINV | LOCATION X | LOCATION Y | NORMAL H | NORMAL X | NORMAL Y | NORMAL Z | MEAS H ASL | EAVS H ASL | REASON UPD | ROOFTYPE | DATE | |
|-----|------------|--------|------|----------|-----------|-----------|--------|-------|----------|-----------|-----------|------------|----------|-------|---------|--------------|--------------|--------------|----------|----------|----------|------------|------------|------------|----------|-----------|-----------|
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(0 out of 17912 Selected)

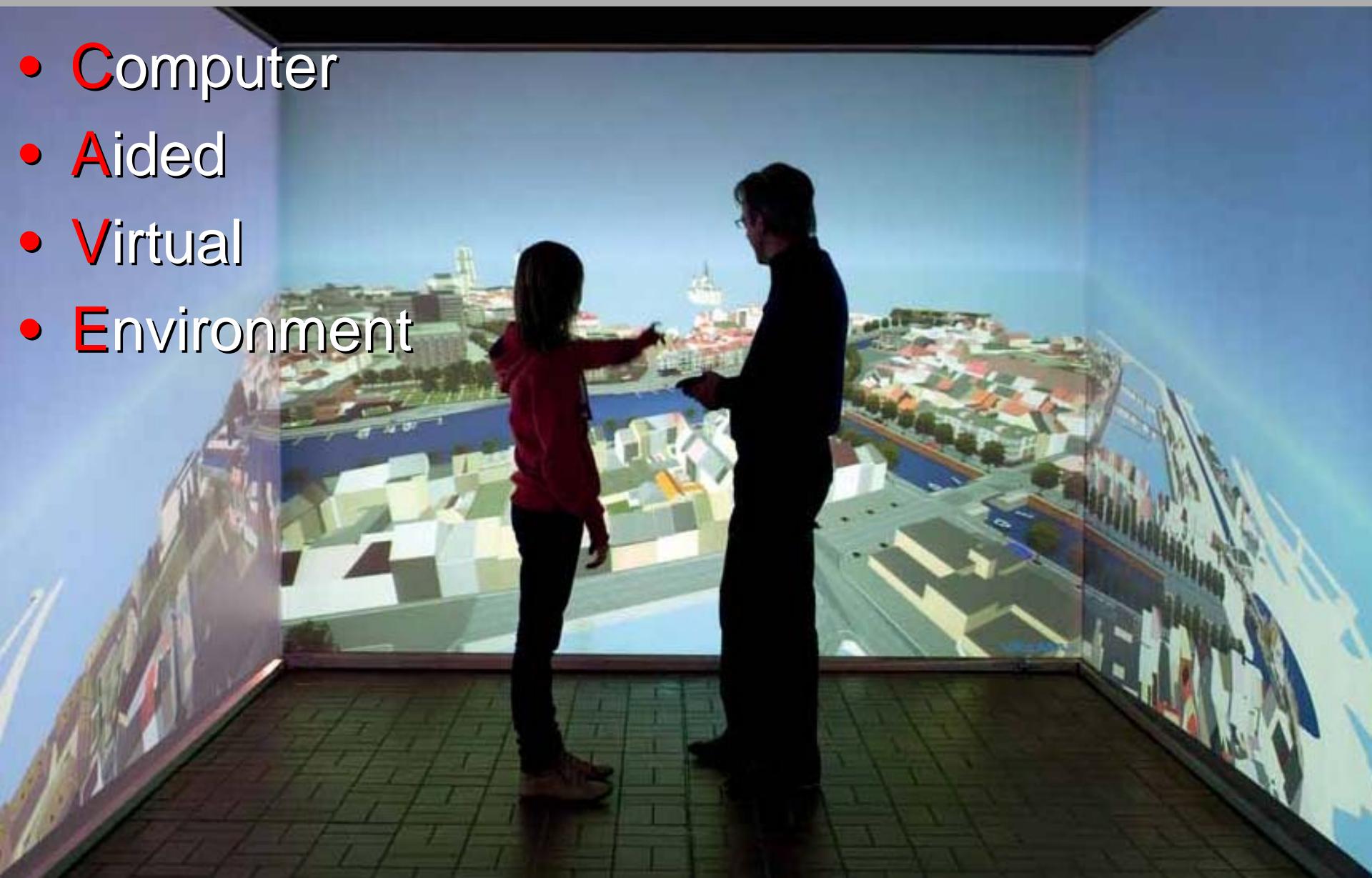
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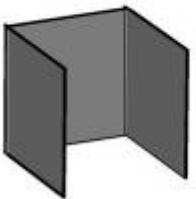
3D-C.A.V.E.

- Computer
- Aided
- Virtual
- Environment



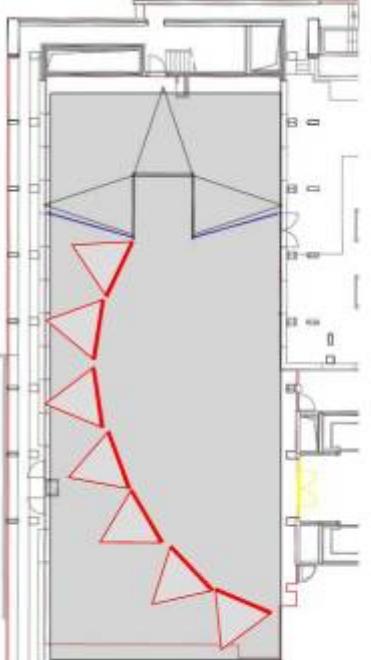


EFRO

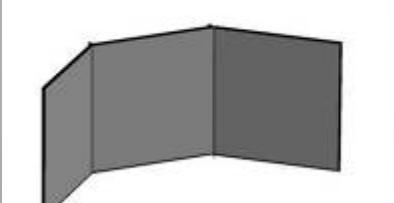


3D-C.A.V.E.
+ 30 m videowall

Gent in 3D

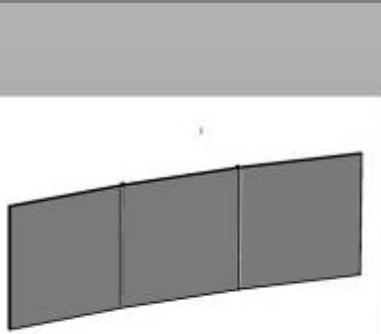
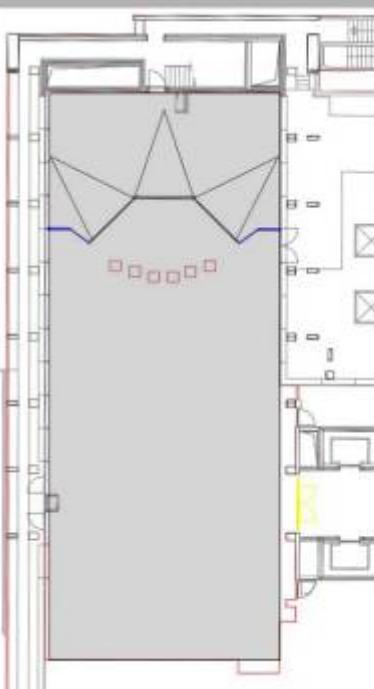


Hybrid Digital Environment



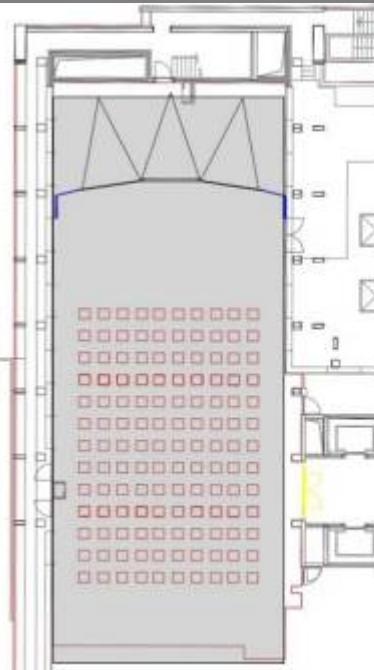
Geknikt
30 pers.

Gent in 3D



Videowall
200 pers.

Gent in 3D

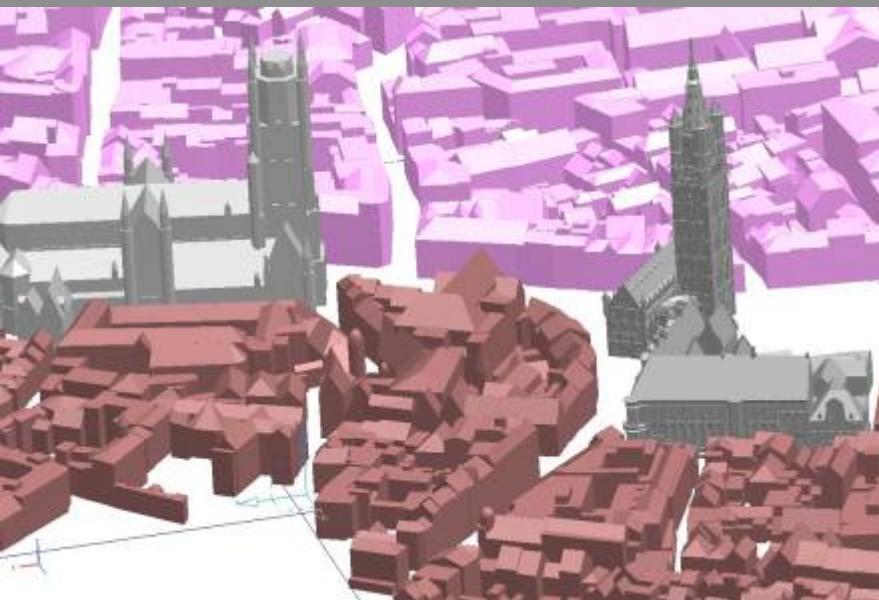


Multi-media-wall
32 x 2,4 meter mobiel !



3D-PRINTING

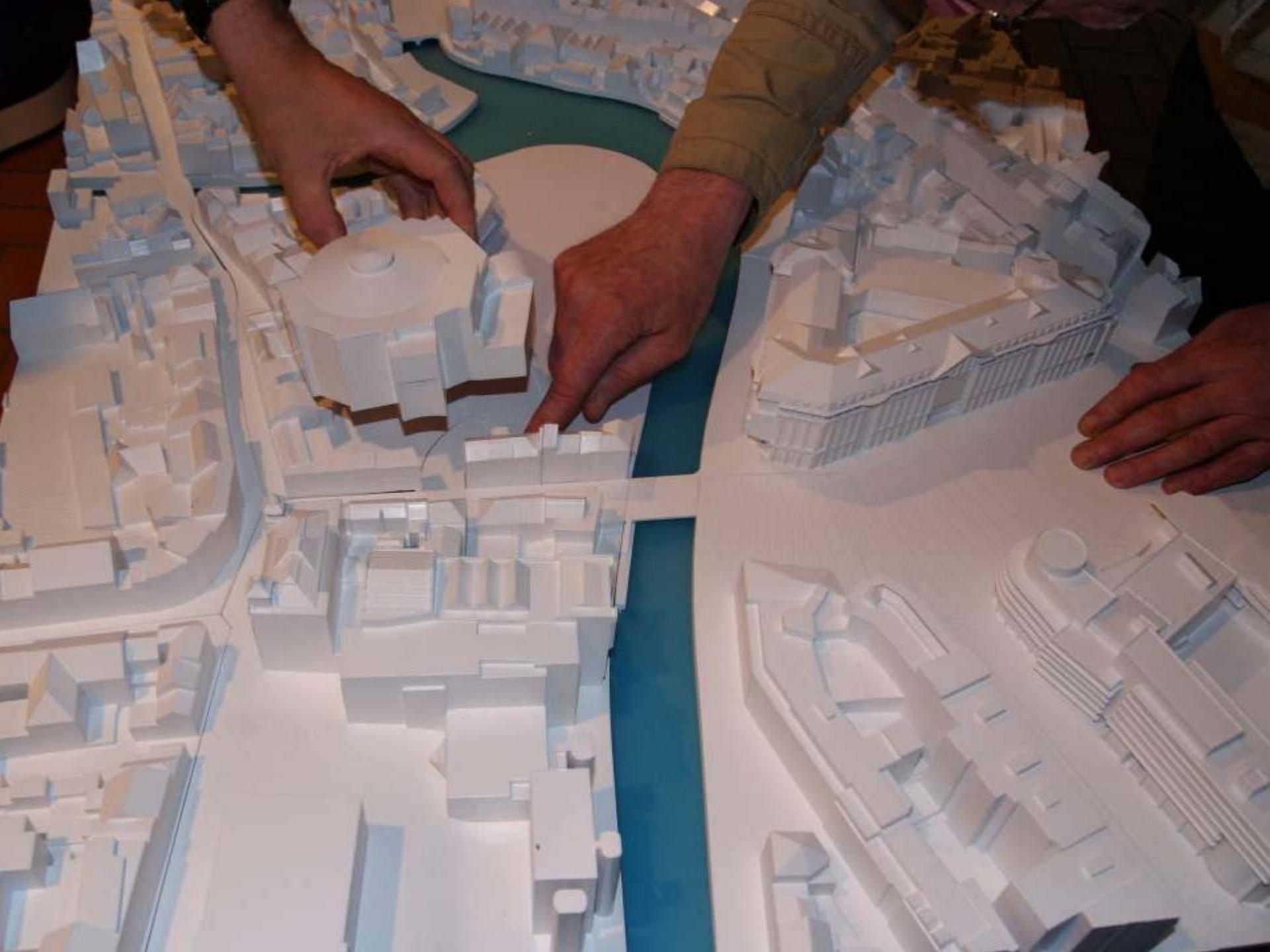
Rapid prototyping





3D-printed model
City museum 2010
Inner city 14 km²
 $3,5 \times 4,3$ m
Scale 1/1000

Was (is ?) the biggest 3D-printed city model in Belgium





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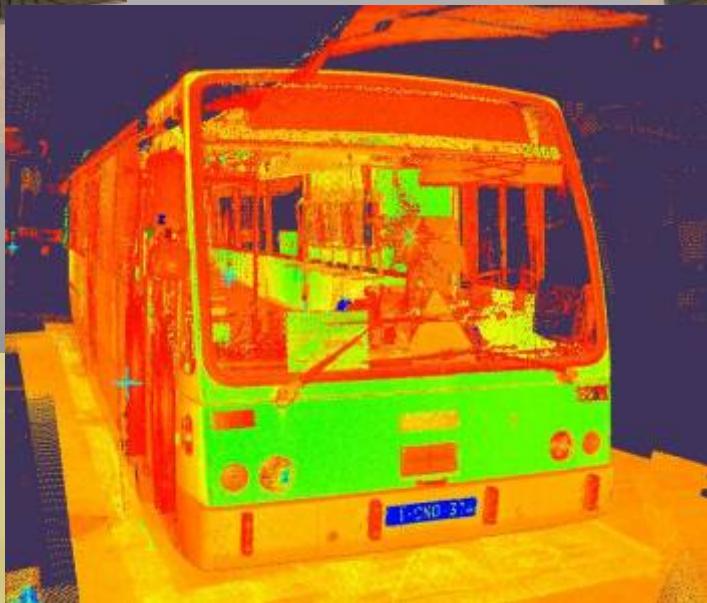
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No design skills required.

Create Anything
Use Cube Invent (or other software) to design your creation.

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3 FREE CARTRIDGES
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3D-mobile



Gent in 3D

Gent in 3D





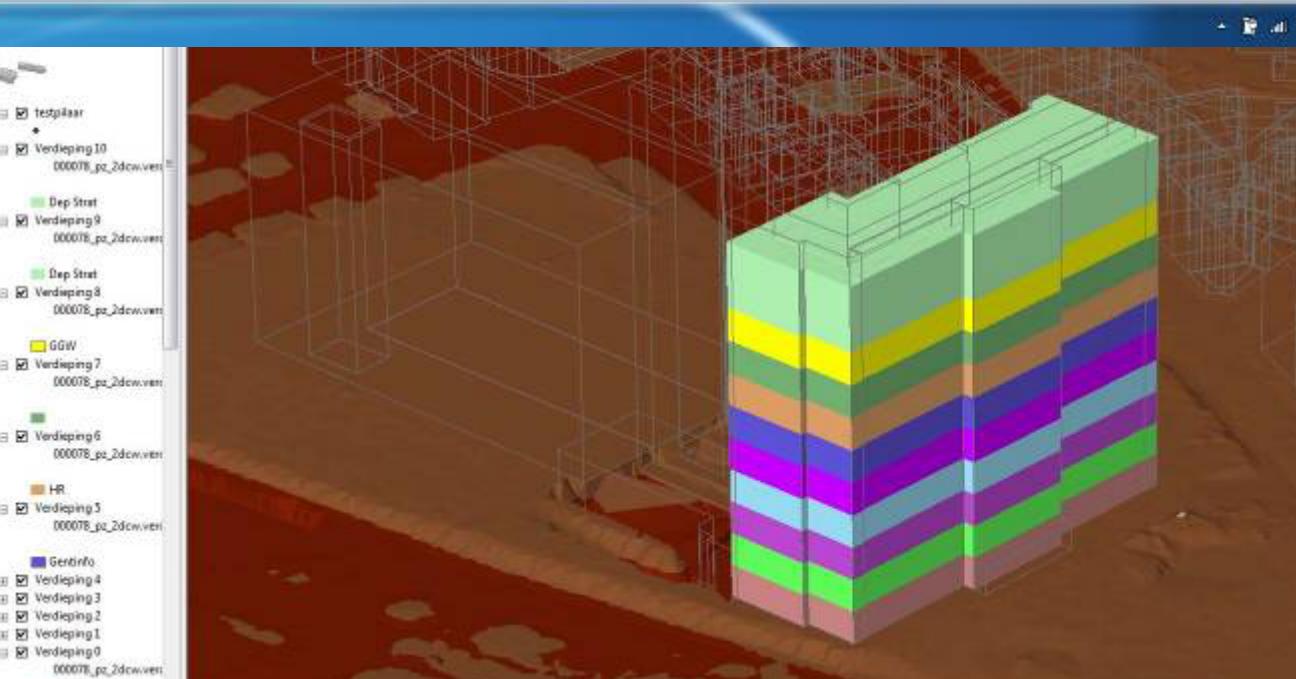
3D-G.I.S.

Functions In 3D

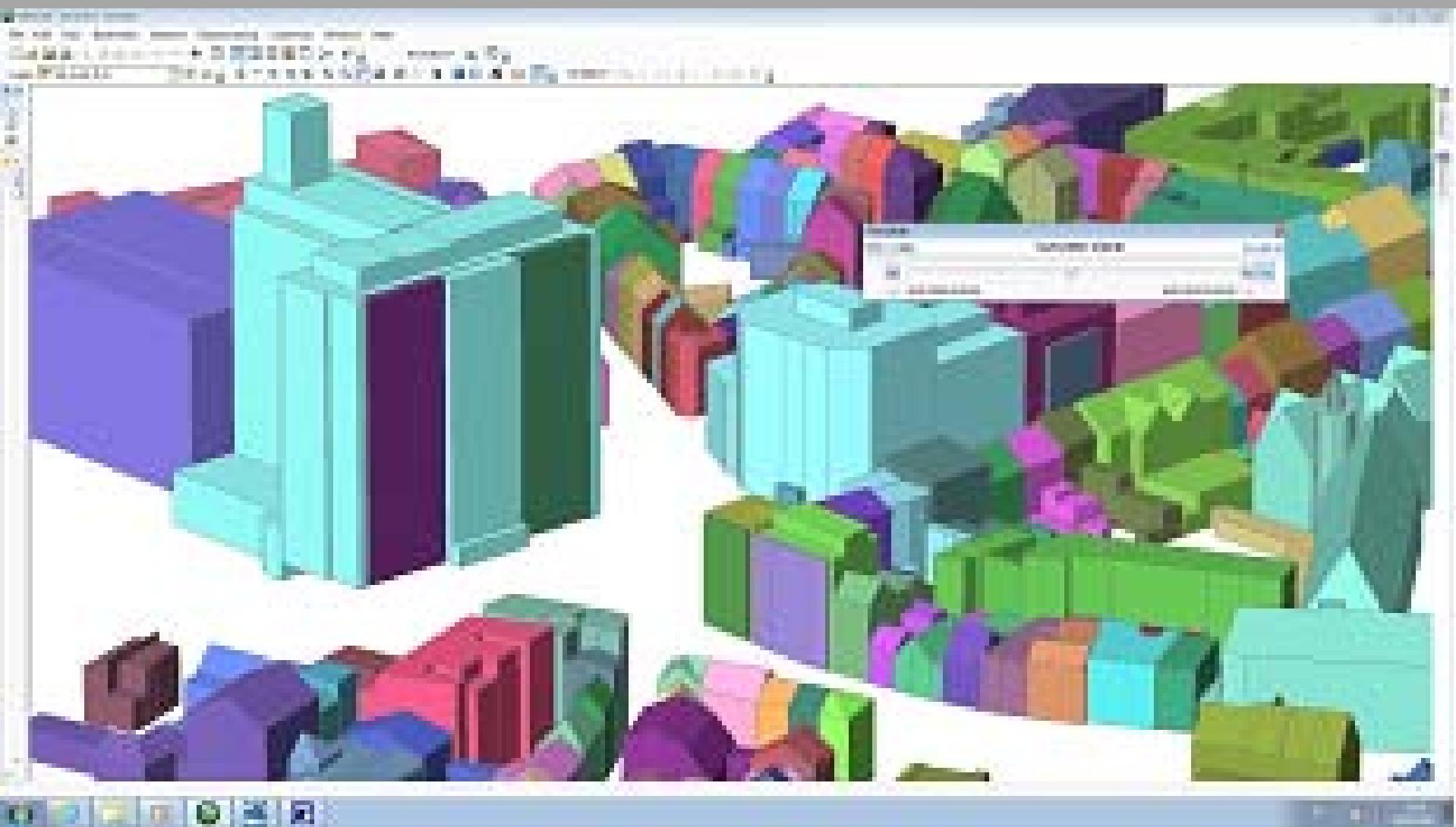
Stedebouwkundige Survey
Stad Gent

nota 1 :

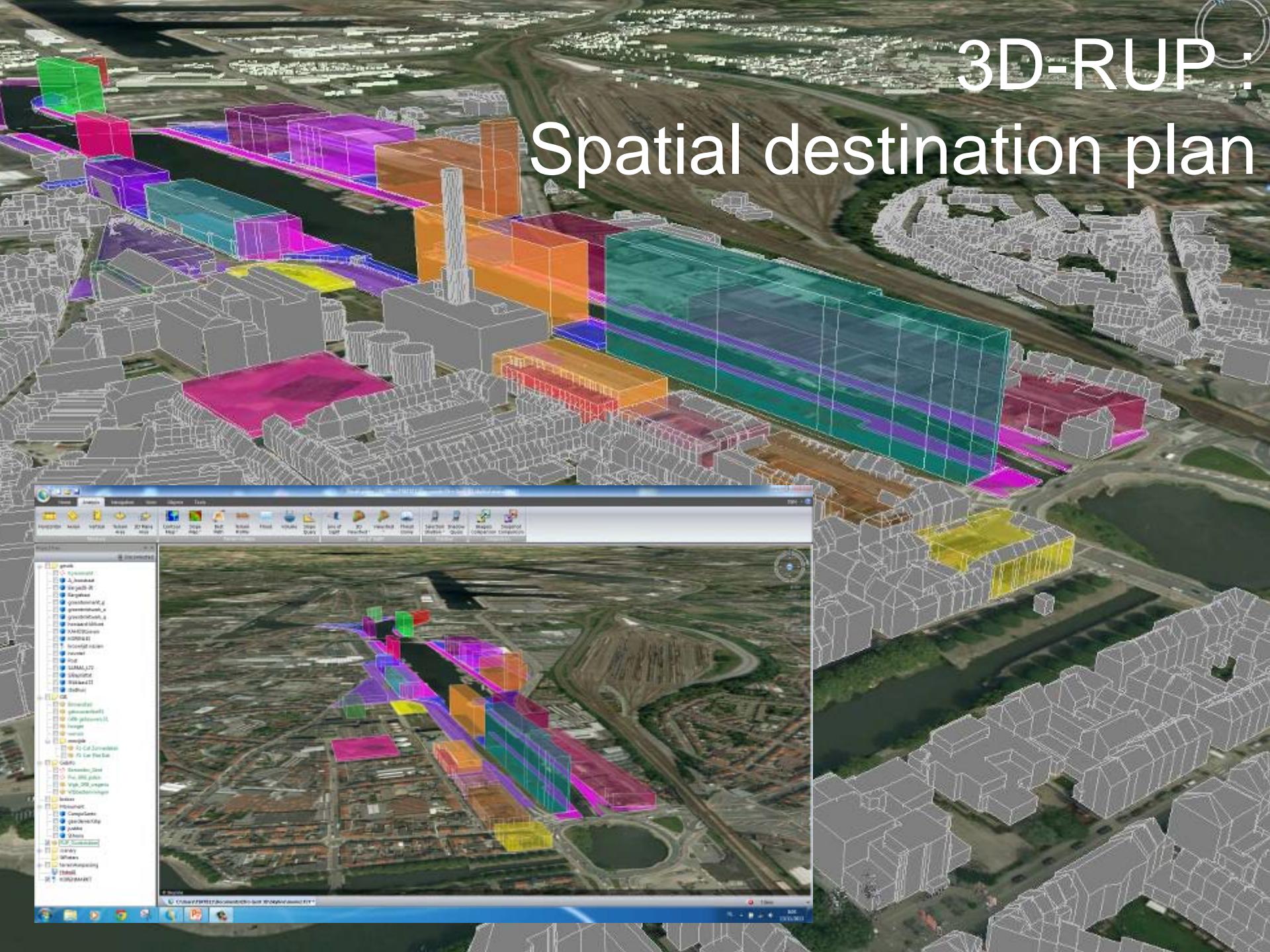
handleiding voor de karteerder



3D-G.I.S.

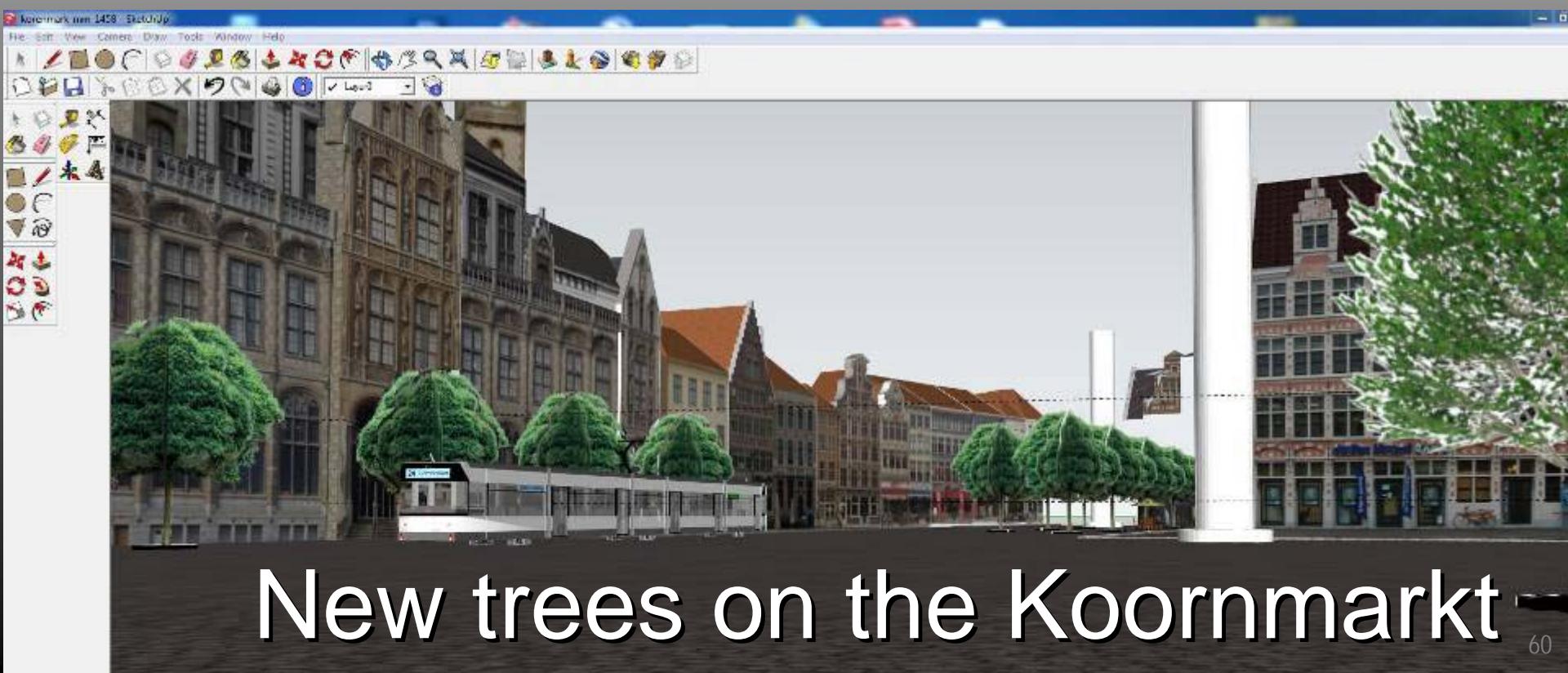


3D-RUP : Spatial destination plan





Street furniture



New trees on the Koornmarkt

Wind simulation





Gravensteen

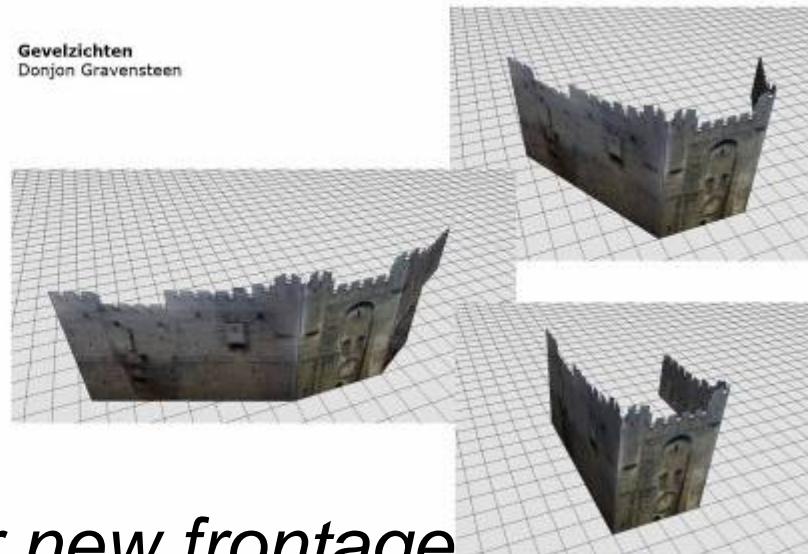
"Gent in 3D" 2009



Bestaande gevels
Donjon Gravensteen



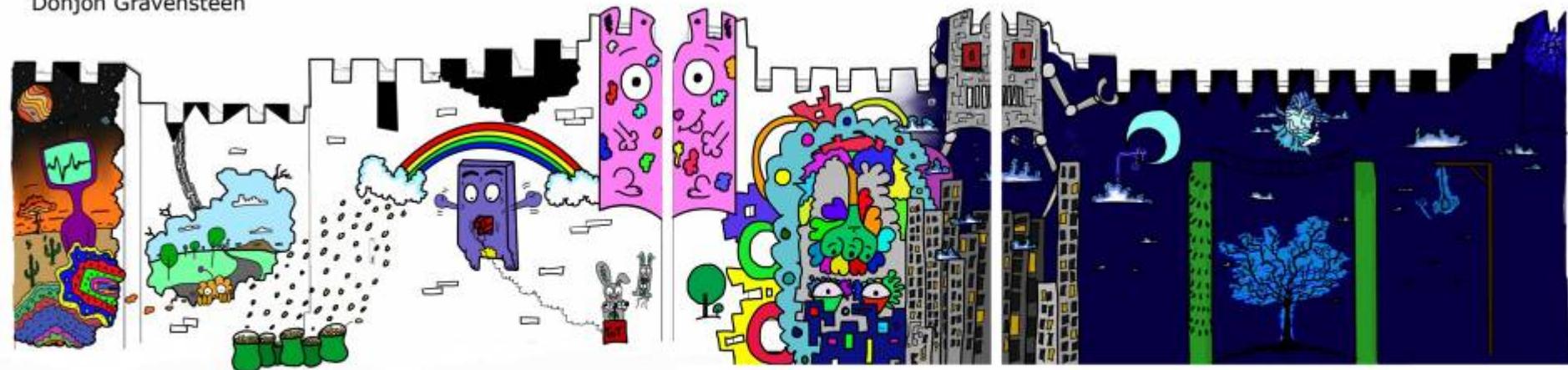
Gevelzichten
Donjon Gravensteen



Ontwerp hier jouw gevels

Donjon Gravensteen

Competition for new frontage



Opgelet : je kan enkel 3 zijden van de Donjon ontwerpen. Dat is het grote gebo!

Als je op straat loopt zie je wisselende perspectieven achter de kantels

De onderkant is dus niet altijd even goed zichtbaar. De onderste lijn op de tekening is daarom een de laagering....

Light festival – jan 2012 : 500.000 visitors





Light-infrastructure



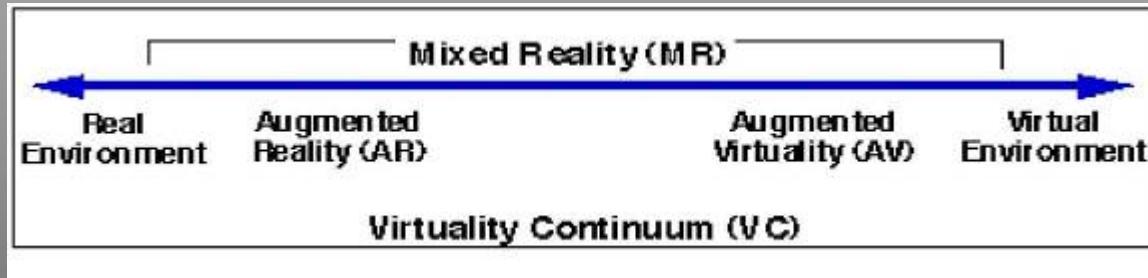
Augmented Virtuality

Webcam on the top of our building

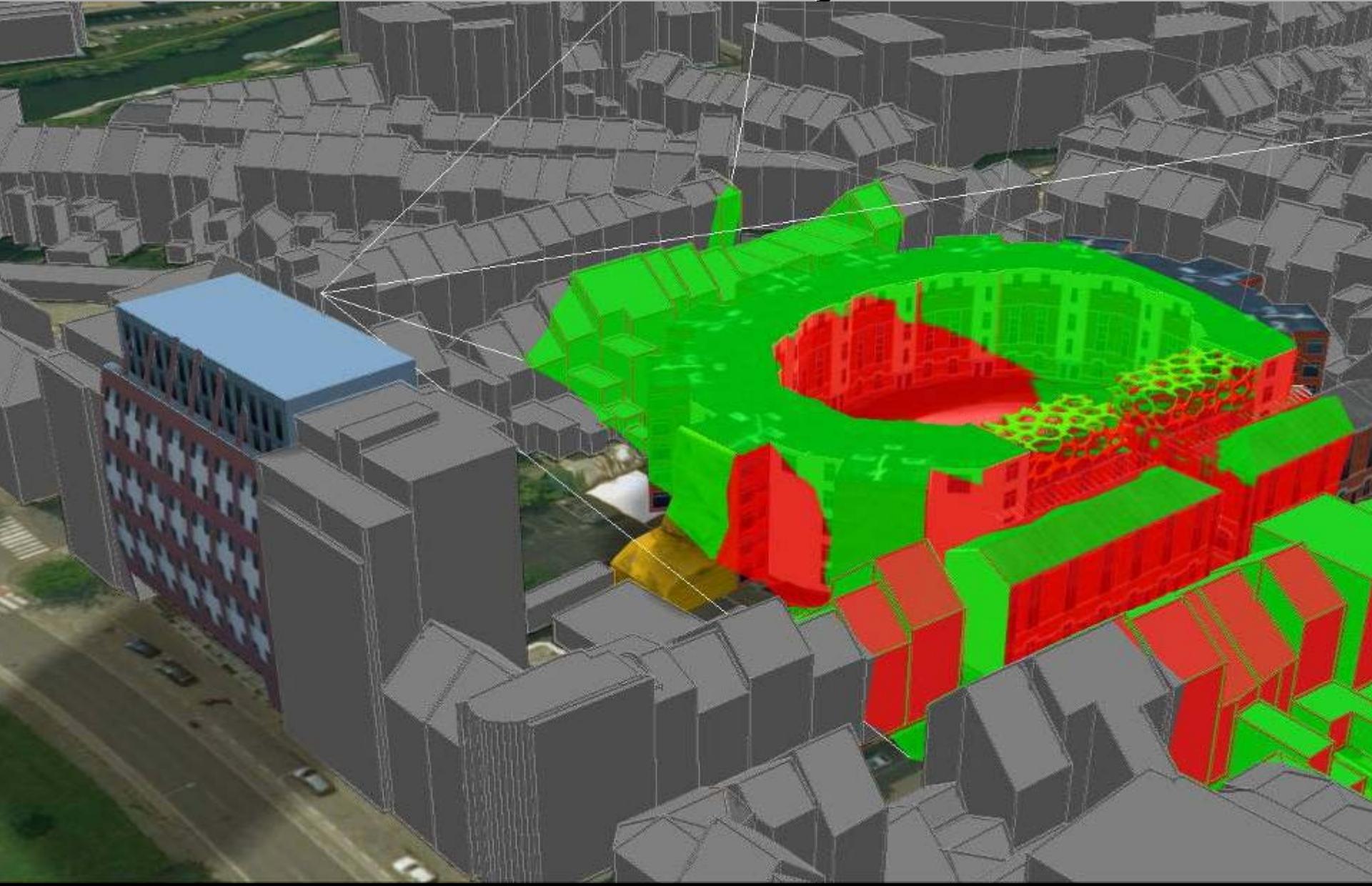


Augmented virtuality

Including sounds



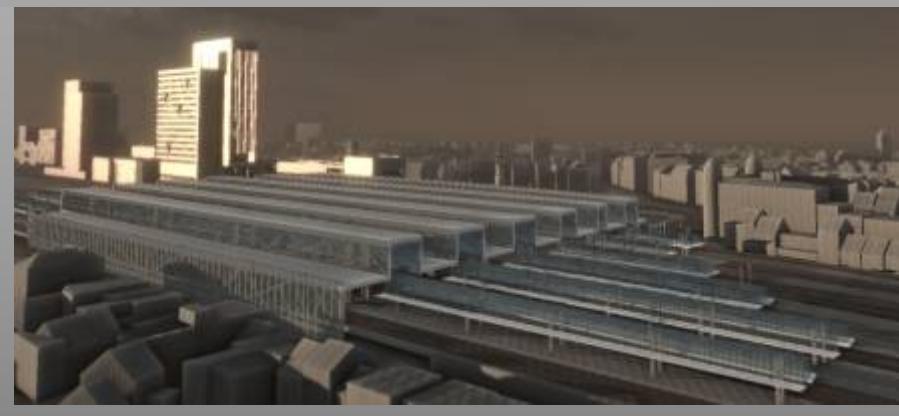
Visibility





een
envoudig
en binnenstad
en stadsrand
en stadsrand da
volgens hoogte
met details
n
innenstad
nd
onder 1-GEBOUW

ATER



Youtube :
“Van 3D-scanning tot 3D-GAMING”





3D-GAME ENGINE

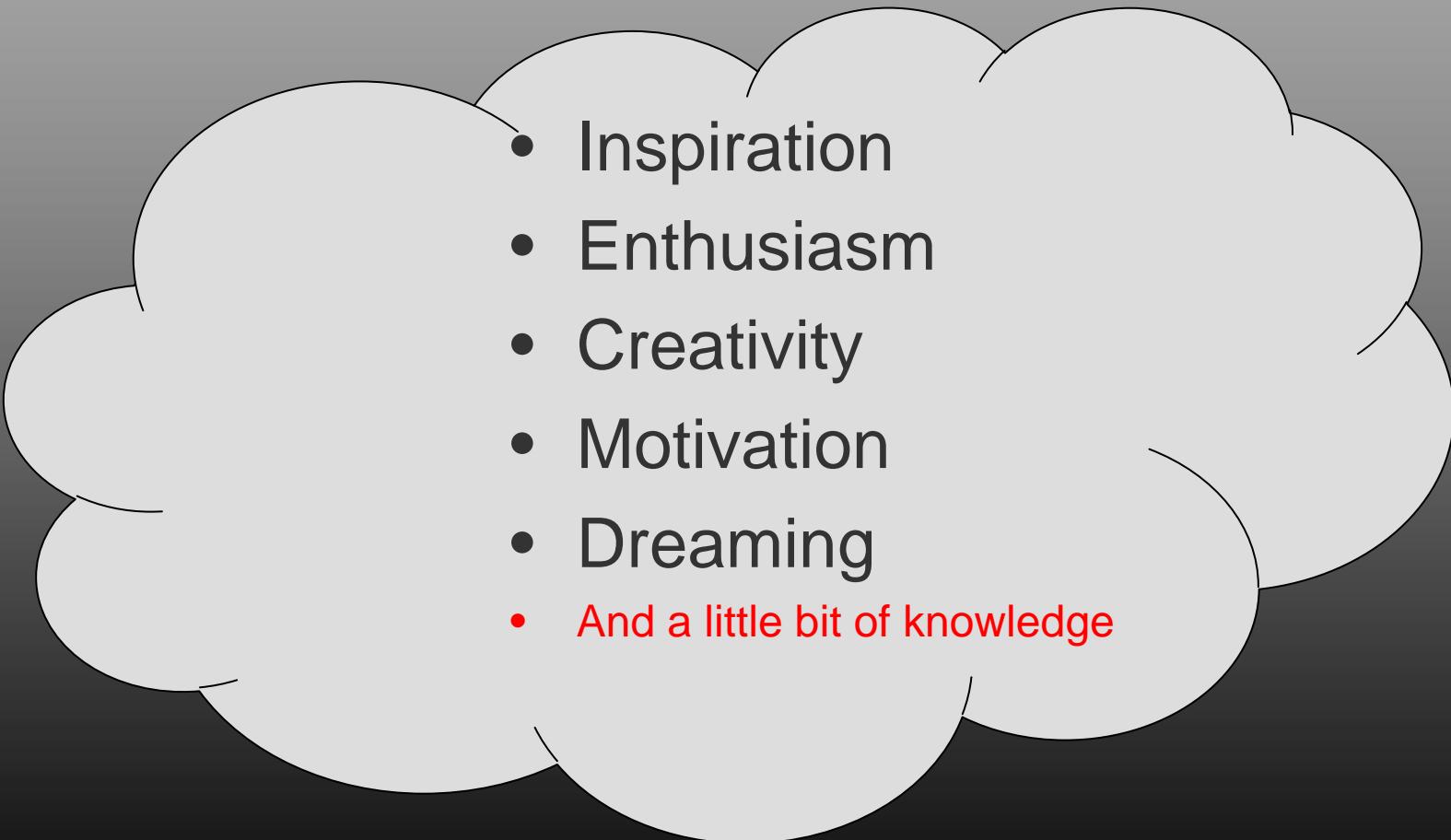


Eye-Tracking in 3D !

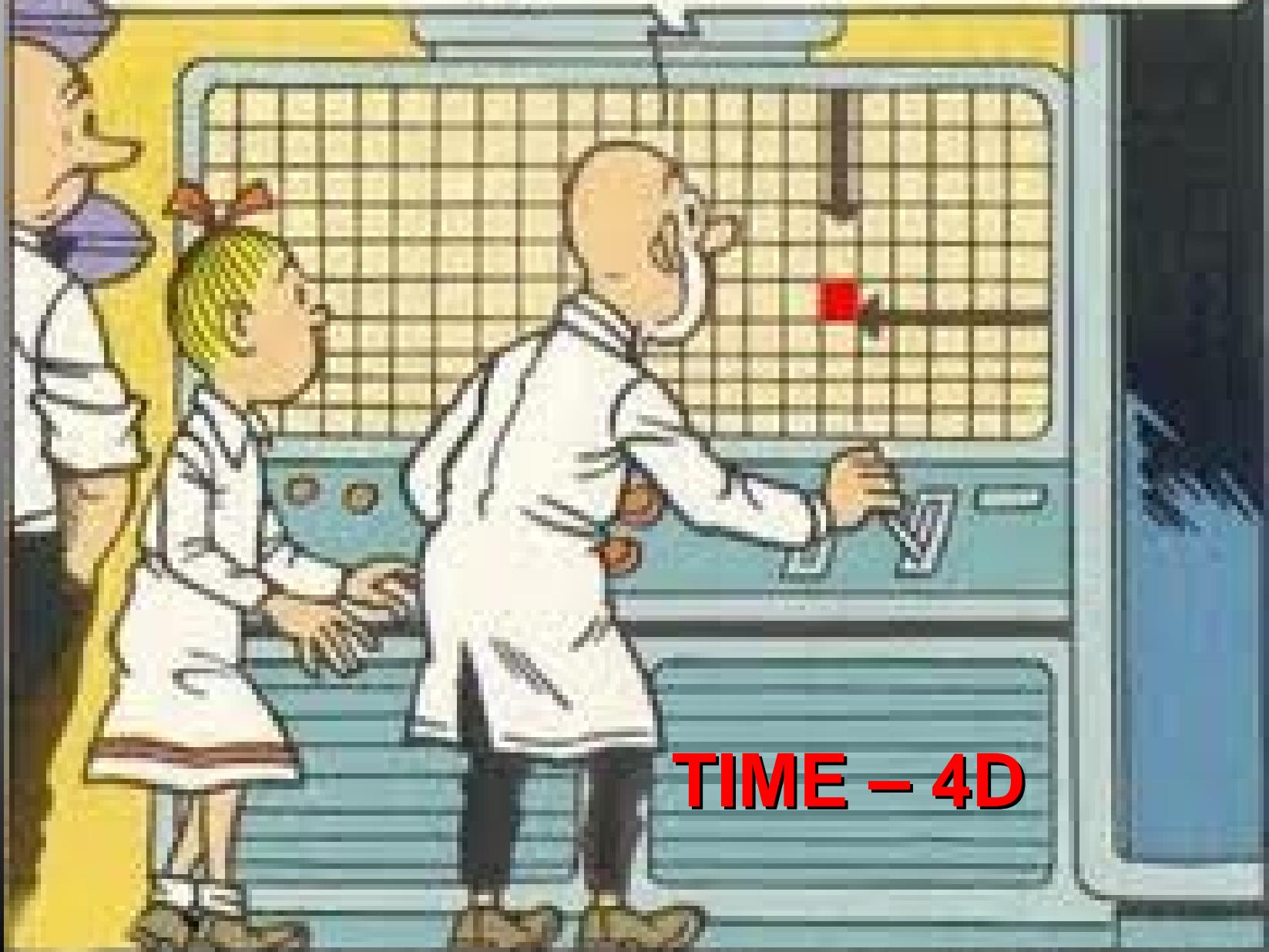




Succes rates : for a digital city in multi dimensions

- 
- Inspiration
 - Enthusiasm
 - Creativity
 - Motivation
 - Dreaming
 - And a little bit of knowledge

Choose your own era...



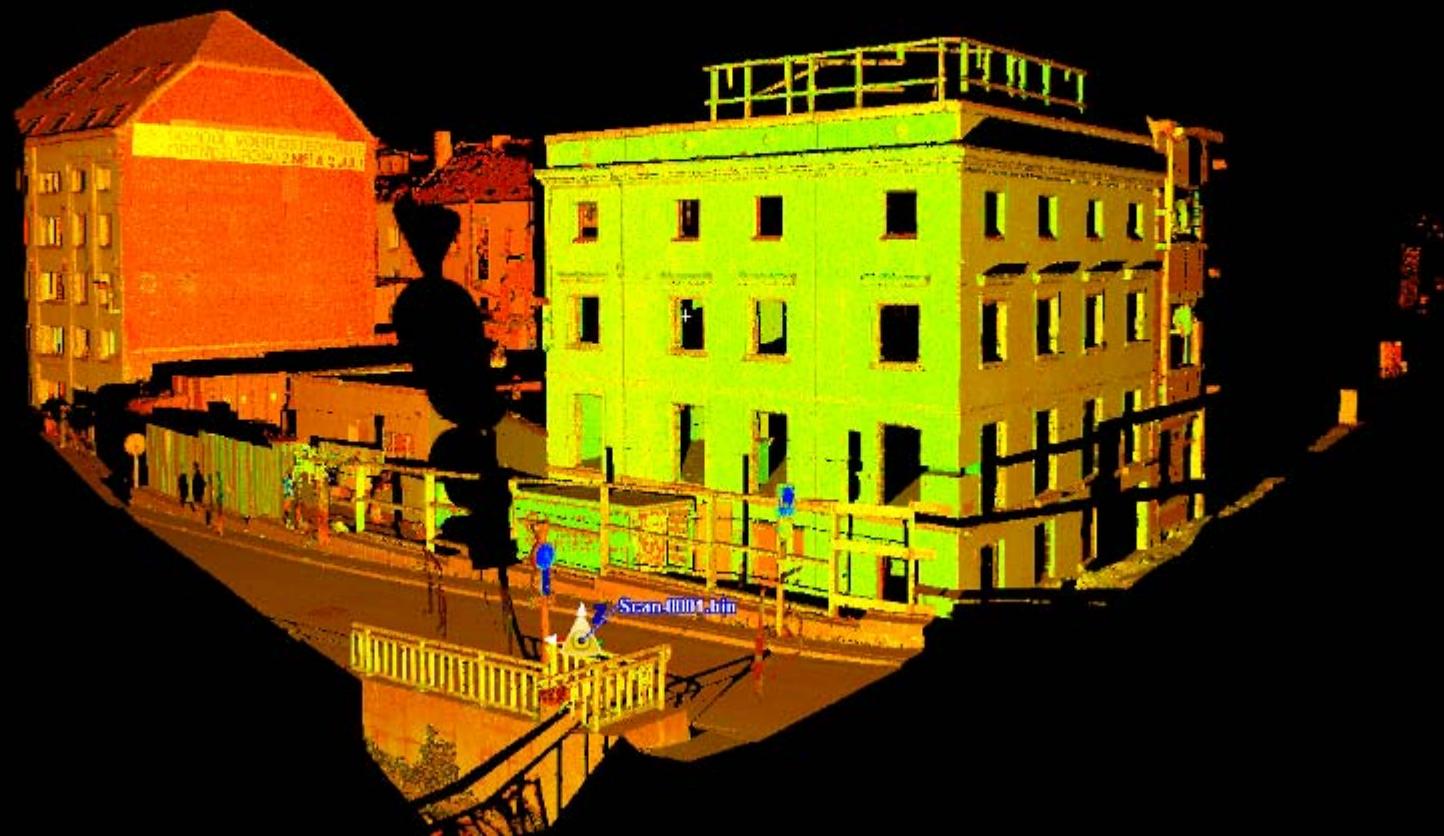


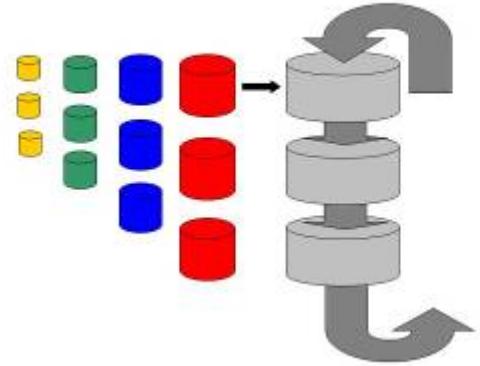
TIME – “Ghent in 4D”



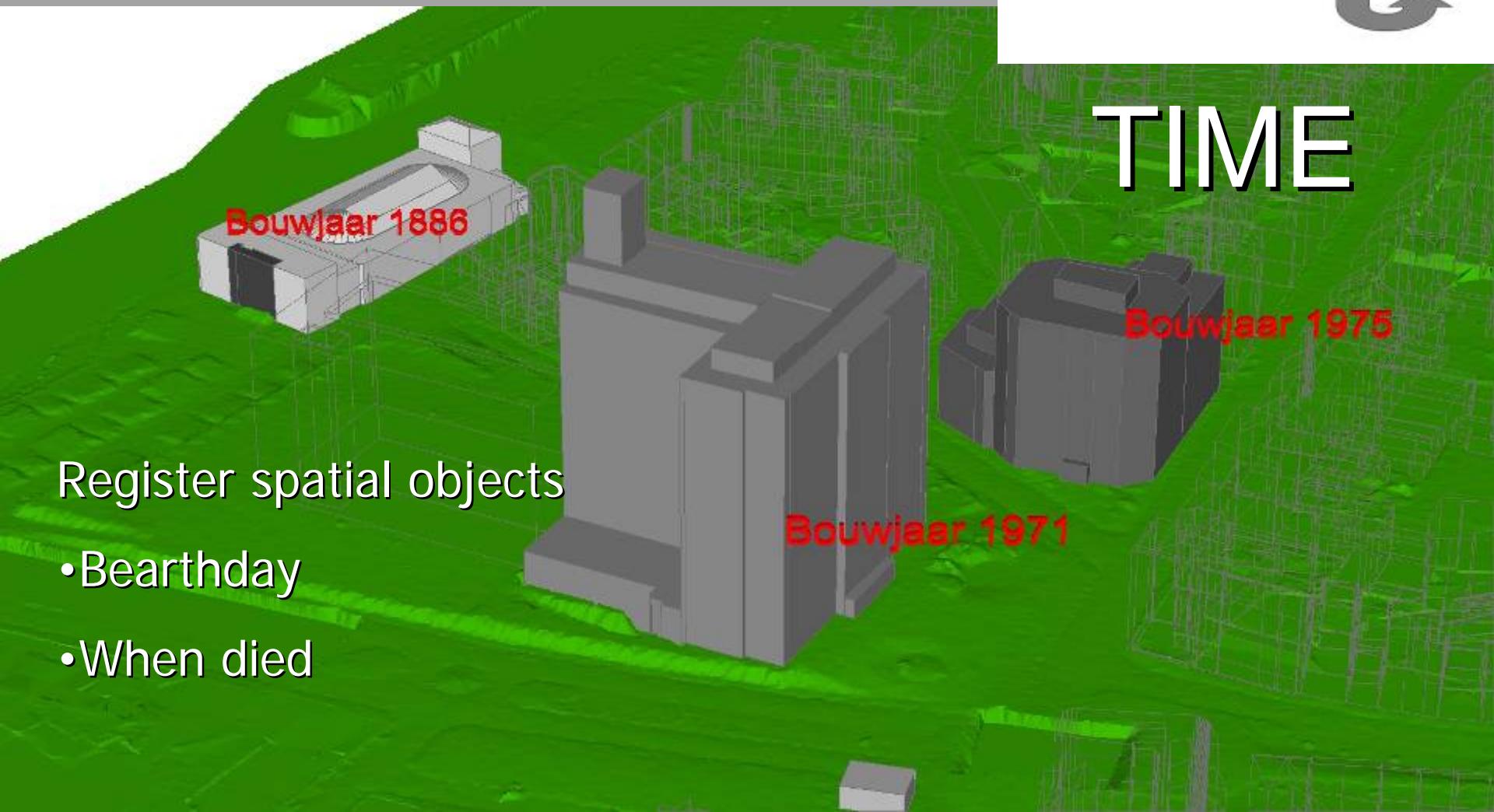


“Back to the future”





3D-buildingregister



Register spatial objects

- Birthdate
- When died

Belfortstraat

- Trees, how big after
 - 5 years
 - 10 years
 - How to cut ?



Crowdsourcing as data-input

- Actualisation
- Augmented quality
- Enthusiasm
- Involvement



A 3D-ambassador

In each district of the city



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