



**BLOM**  
IMAGING THE WORLD



# Mapping the World from the air new technologies and products

Jan Sirotek, 28.10.2010



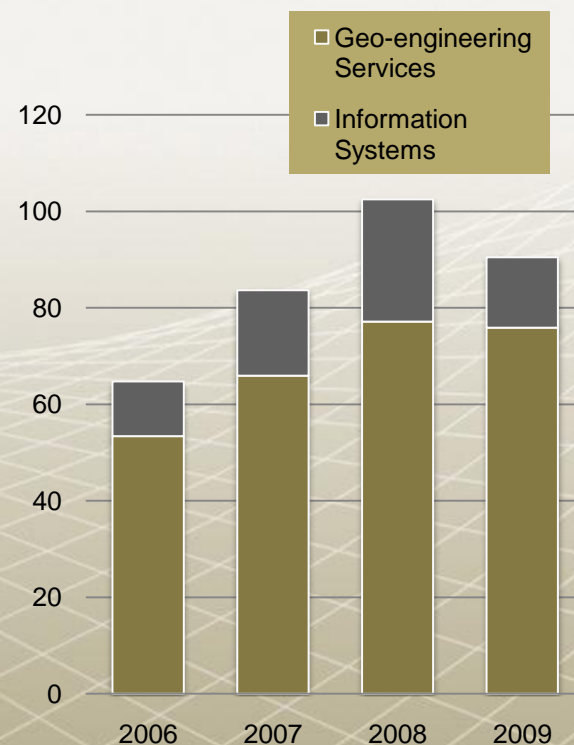


- Who is Blom?
- Products and services
- Technologies
- Special applications
- BLOM Urbex

# Who is BLOM?

- The largest company in Europe
- Headquarters in Oslo, Norway
- Company listed at stock exchange – Oslo (BLO)
- 32 companies in 24 countries
- Over 1.200 employees
- Two main areas
  - BLOM Geo-engineering services
  - BLOM Information services
- In 2009 turnover 90,5 M EUR, EBITDA 11,3 M EUR

**Turnover 2006 -  
2009 (mil. EUR)**



# Data capturing: Extensive human and technical resources

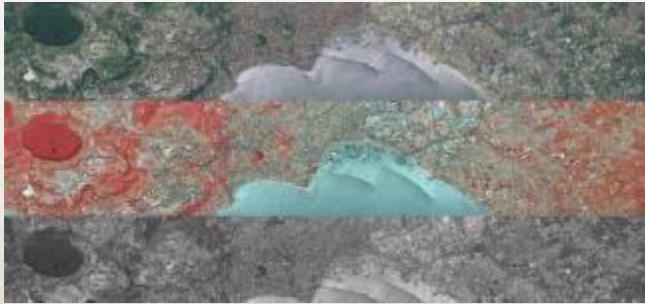


## 32 offices in 24 countries:

- Norway, Sweden, Denmark, Finland
- UK
- Spain, Portugal
- France, Germany, Netherlands
- Czech Republic, Poland, Hungary
- Romania, Bulgaria, Moldova
- Serbia, Montenegro, Albania, Kosovo
- Ukraine
- KSA, Azerbaijan, Mongolia



# Technical equipment



- 18 own aircrafts equipped for aerial photography
- 14 leased aircrafts, 4 leased helicopters
- 10 most modern large format VEXCEL Ultracam digital cameras
- Leica ADSL40 sensors
- 5 LIDAR systems
- 5 special TopEye LIDAR systems
- Bathymetrical scanner HAWKEYE
- Multispectral scanner MIVIS
- Thermal camera
- GPS, total stations, terrestrial scanners

# Products and services

- Information systems



- Geo-engineering services



# Products and services

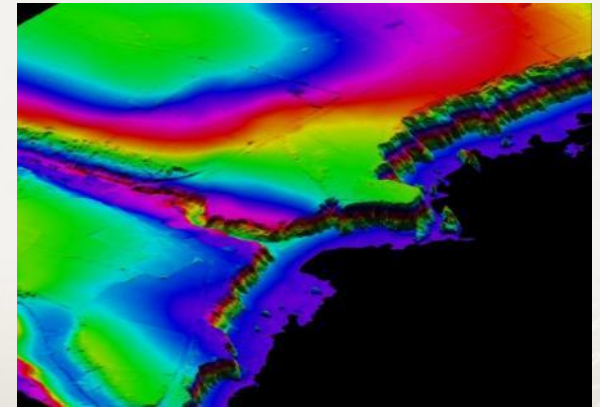
## Aerial photography



## Vector maps



## Digital terrain models



## Orthophotomaps



## Oblique images



## 3D models





- Strong **technical, human and financial resources** for realization of large international projects
- Wide spectrum of **mapping and geographical services** fulfilling both local and international standards
- **Taylor made** solutions
- Willingness to provide **top quality**, well structured geo-data suitable for GIS analysis and support of decisions
- We focus on **customer needs** and we adopt our solutions and services to them. We use for that all our resources including many experienced **engineers, aircrafts, helicopters, cameras, laser scanners** and **computer** and **surveying equipment**
- Our approach allows us to offer **full range of data and services for GIS** projects of both local and international scale

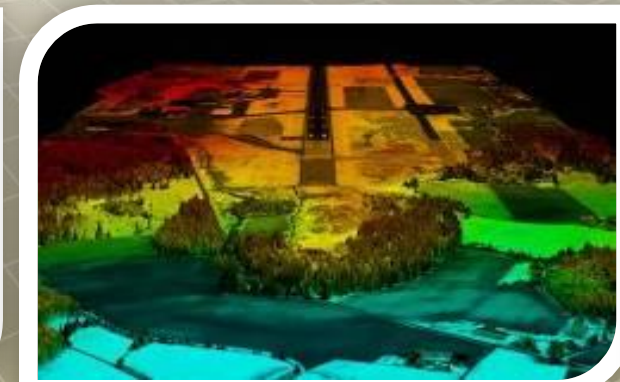
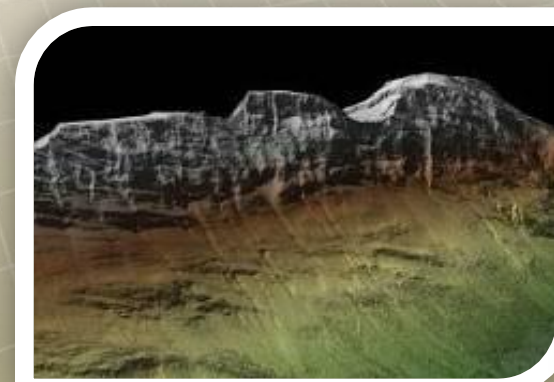


# References

- Thousands of realized projects worldwide during more than 50 years
- Experience with different CAD/GIS/IT platforms
- Largest geo-database in Europe (BlomURBEX)
- Since 2009 in CEE



# Aircrafts and Technology



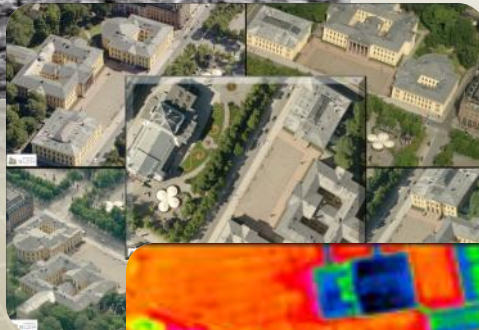
# Different sensors



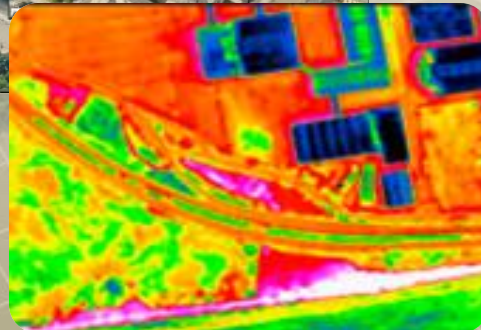
- Aerial photography



- LIDAR



- Oblique images



- Thermography

# European coverage



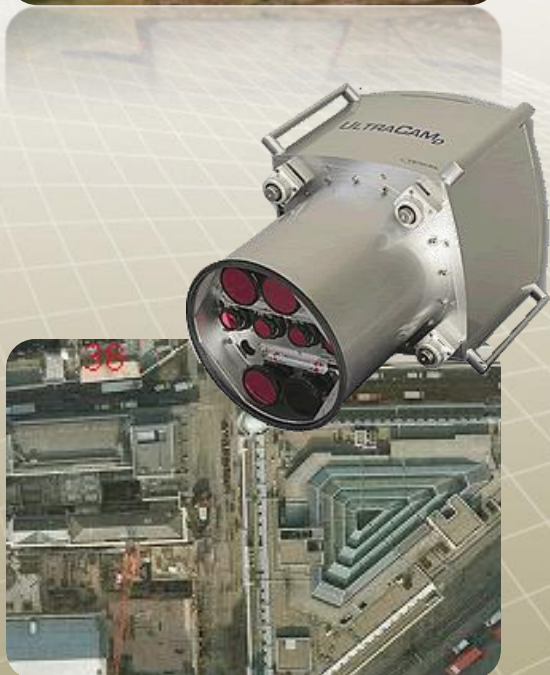
3 hours from base  
at any place in  
Europe



# Aerial photography

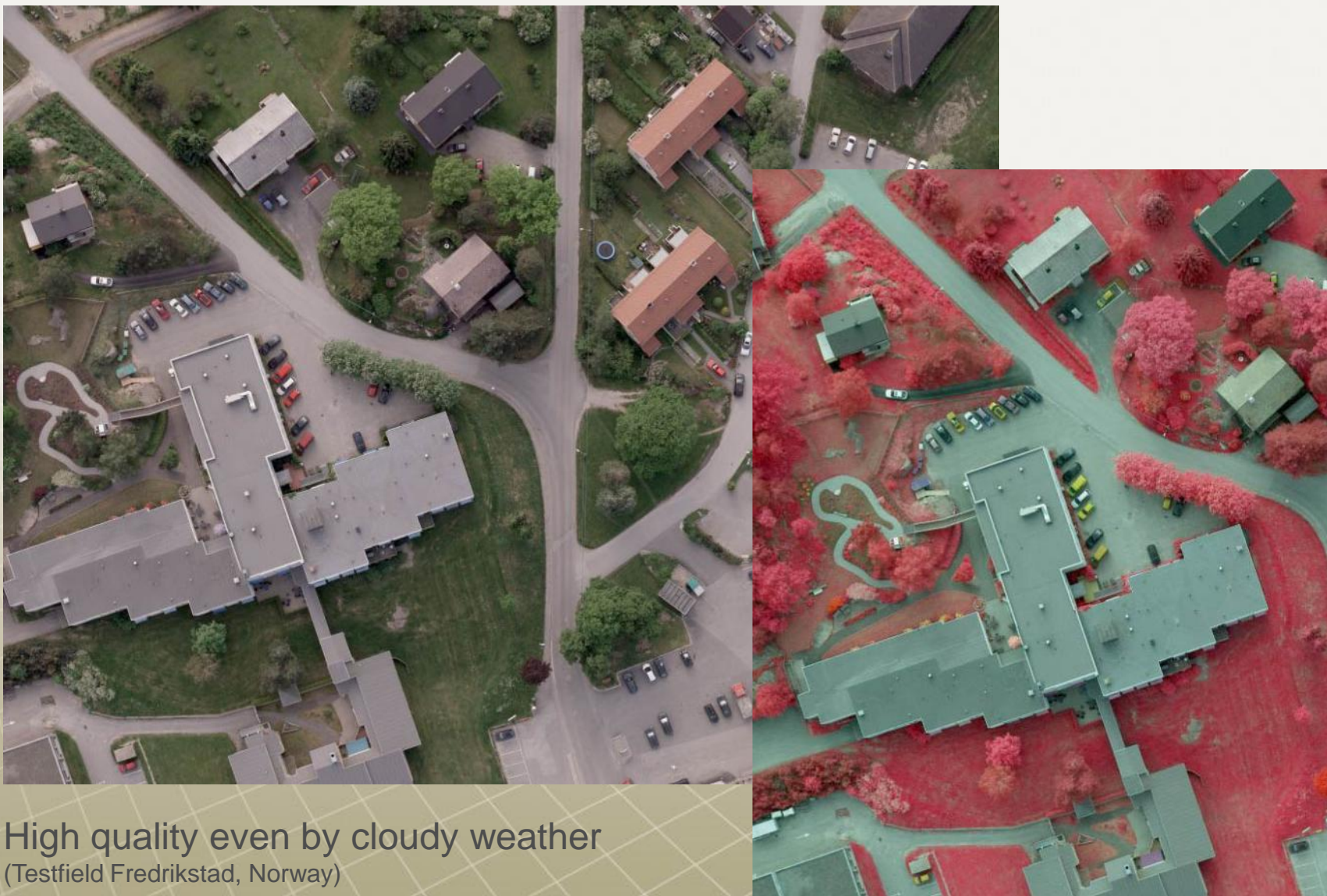


- Aerial images with high resolution up to 3 cm/pixel
- Largest capacity in Europe
  - 10 large format digital cameras
  - Over 2.000 flight hours per year



- Usage
  - RGB/CIR orthophoto processing
  - Digital models (DTM, 3D City)
  - Update of map data
  - Mapping accuracy up to 14 cm in position

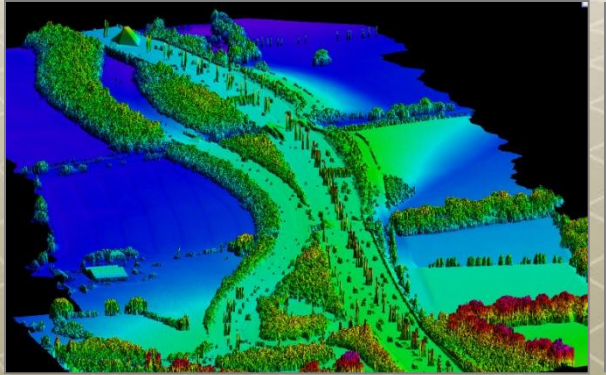
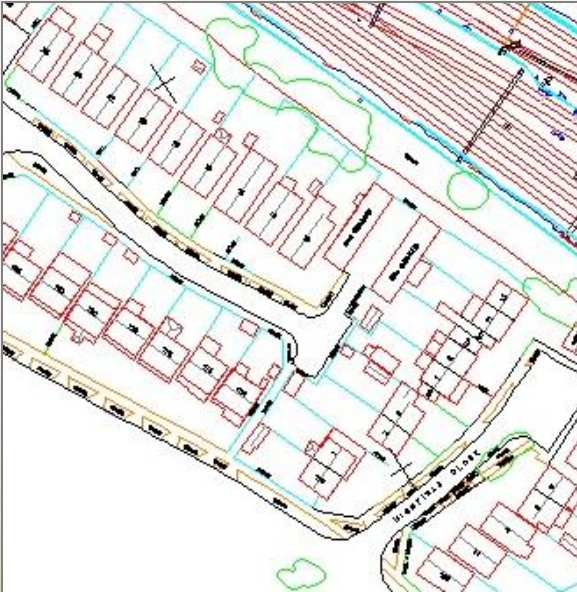
# Aerial images RGB/CIR



High quality even by cloudy weather  
(Testfield Fredrikstad, Norway)



# Photogrammetric mapping





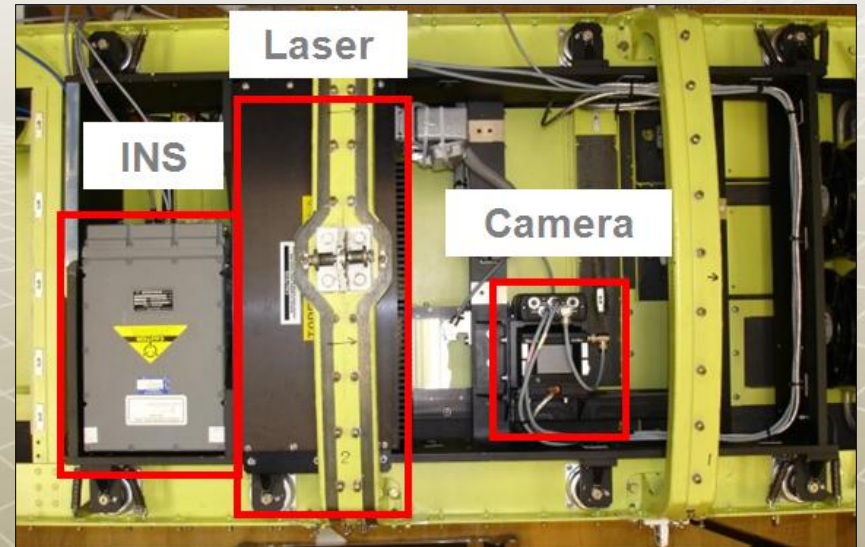
# 3D city models and visualisation





- Laser scanning
- Both fixed and rotor wing
  - 6 aircraft based sensors
  - 5 helicopter based sensors
- Digital terrain and surface models
- High resolution up to 30 points per sq.m
- High accuracy up to 20 mm in height

# LIDAR



ALTM GEMINI

TOPEYE

# Aircraft or helicopter

## Helicopter:

- Low altitude < 1'000 m
- High accuracy in height 2-10 cm
- Corridors (roads, powerlines)
- Small or mid sized areas, flight line FL < 10-20 km

## Aircraft:

- High altitude 750-3000 m
- Accuracy 5-50 cm
- Large areas
- Remote localities, ferry flights

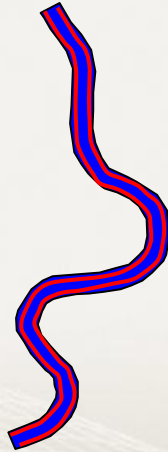


# Aircraft x Helicopter

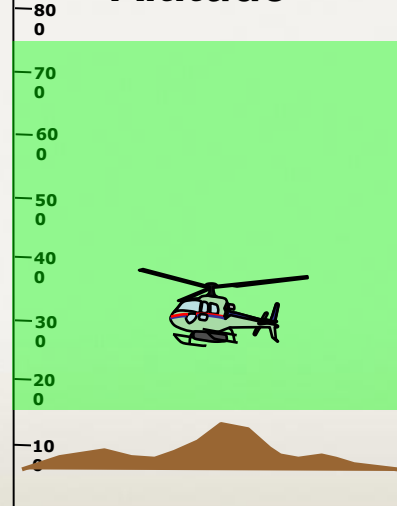
RW (Helicopter)



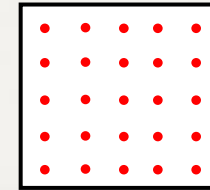
Flight lines



Altitude



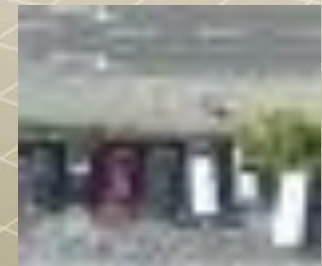
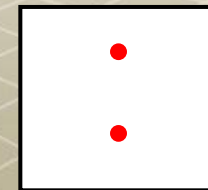
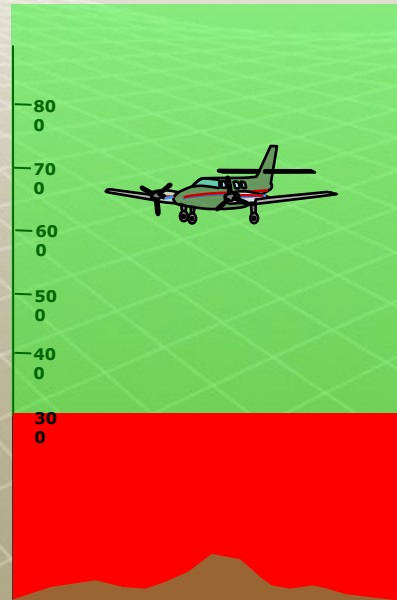
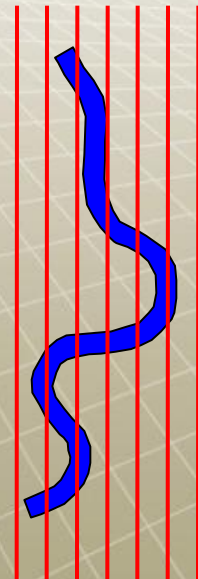
Points / m<sup>2</sup>



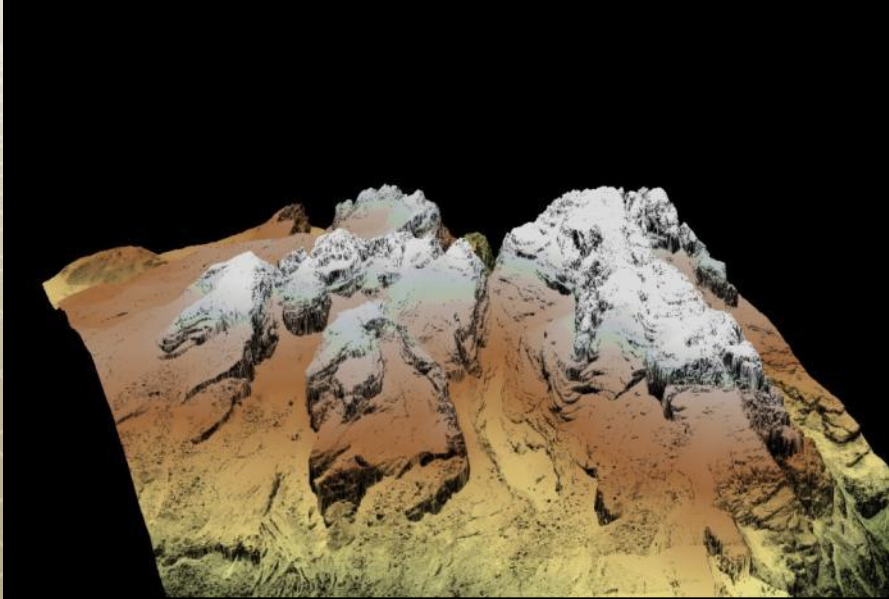
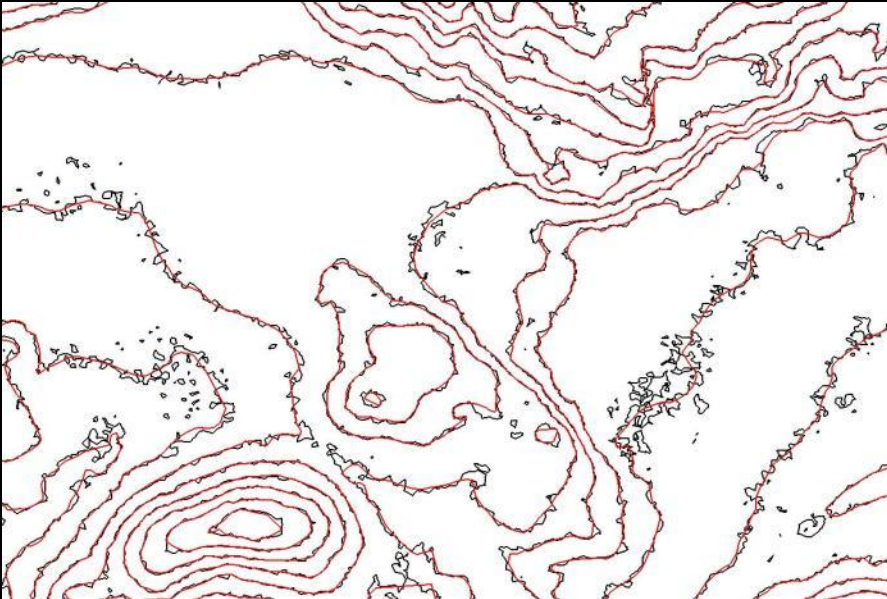
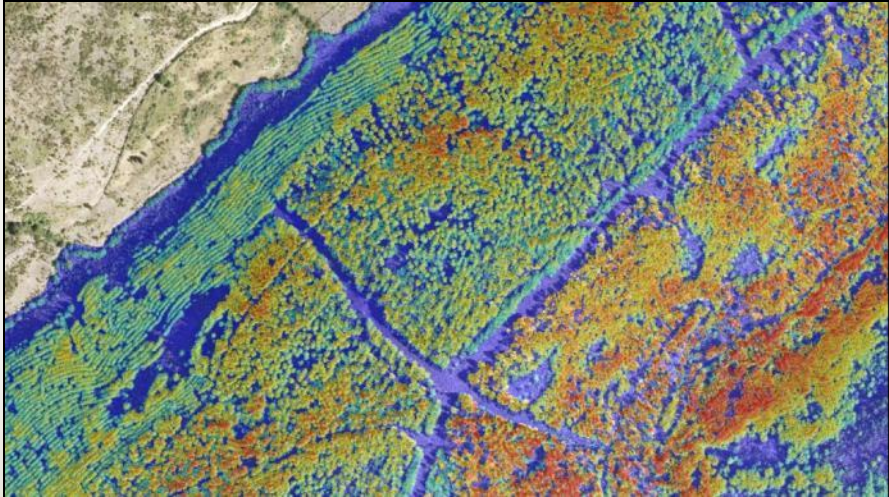
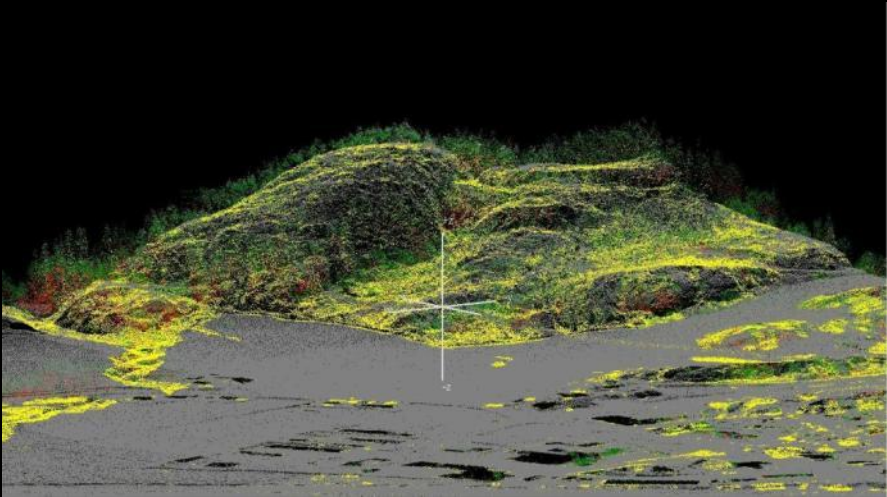
Camera resolution  
GSD



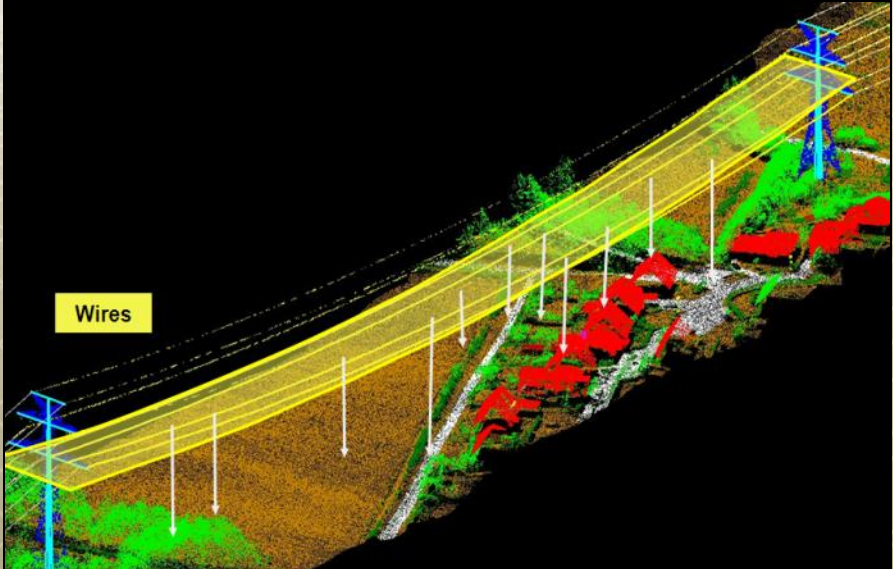
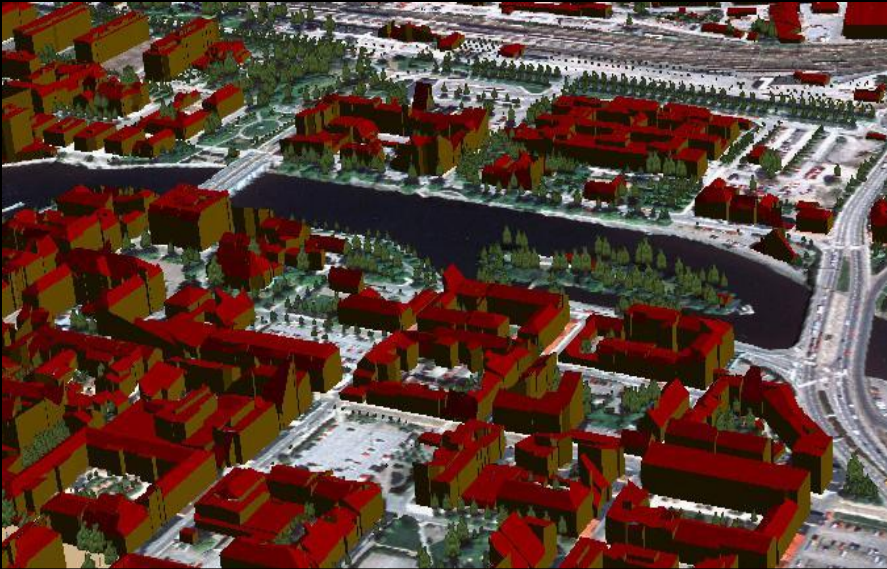
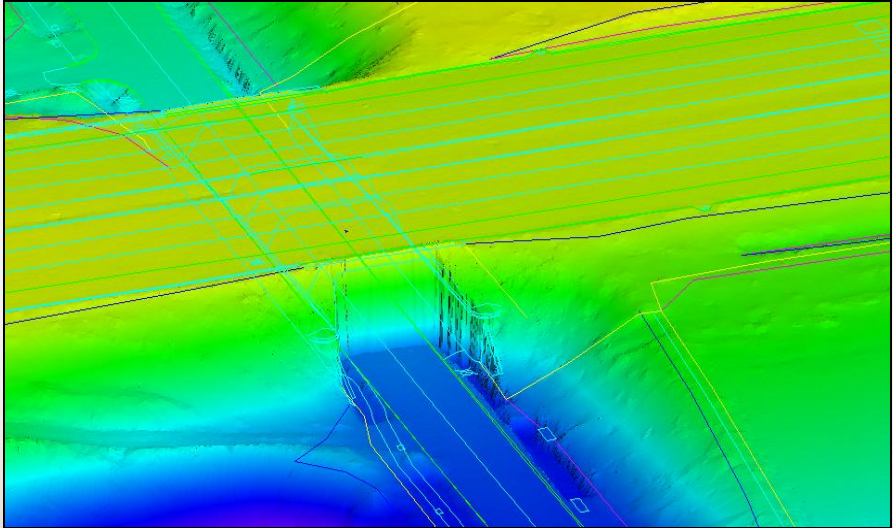
FW (Aircraft)



# LIDAR - aircraft applications



# LIDAR - helicopter applications



# Oblique images



- Exclusive contract with Pictometry® for Europe until 2015
- 15 Pictometry® systems based on 5 cameras
- Angle ca 40°
- Each object visible from 12-20 views
- Flexible fleet only for oblique images purposes
- Year capacity 50,000km<sup>2</sup> p.a. (resolution 10cm)



# Camera system

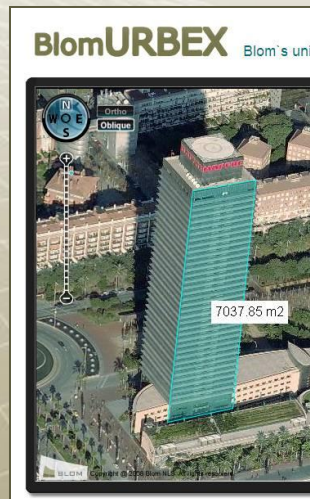
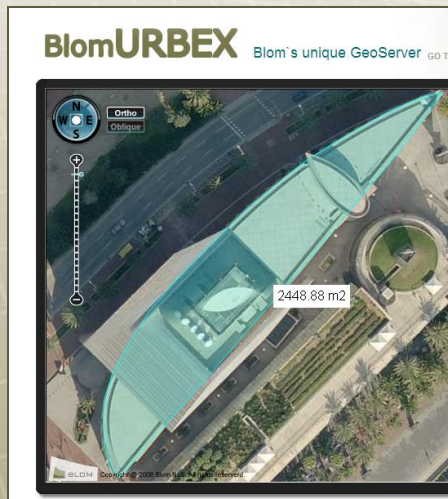


- Images normally captured with 10 cm resolution (3 000 feet flying height)
- Overlap between vertical images normally 60%
- Corner coordinates, exterior and interior orientation parameters available for all images
- DTM included in images
  - DTM from external sources
  - Accuracy of measurements in obliques will vary with quality of DTM
- Orthophoto in library rectified using existing DTM

# Oblique images

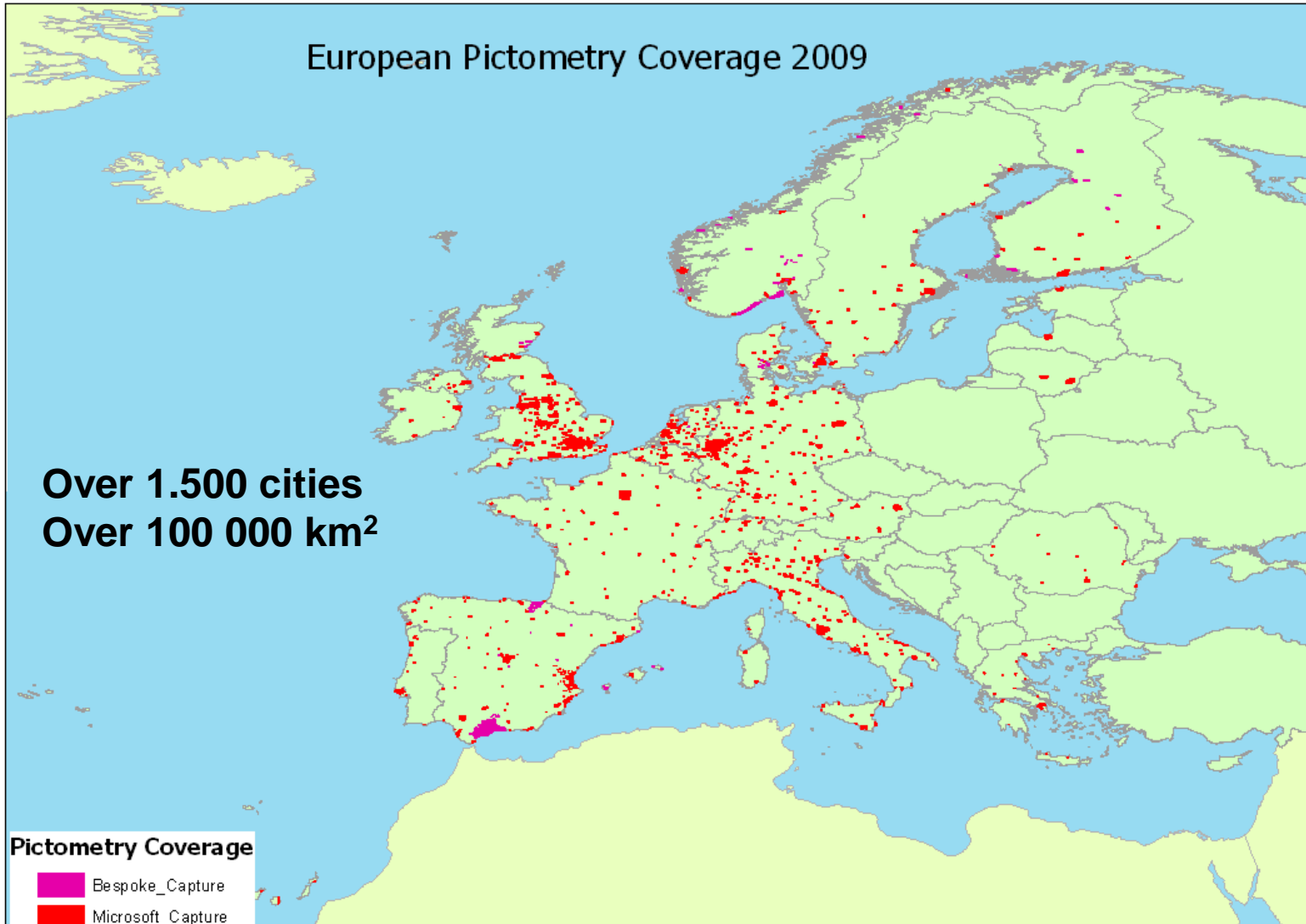


# Measurements



- Coordinates
- Distances
- Areas
- Bearings

# European coverage

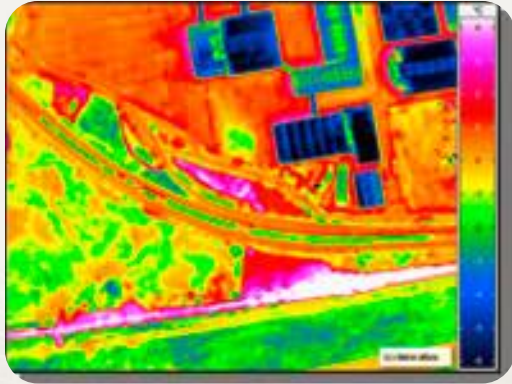


# Thermography

- Most modern thermal camera DigiTHERM developed specially for aerial photography purposes
- Thermal resolution 0.05K and standard range of temperatures is  $-40^{\circ}\text{C}$  to  $120^{\circ}\text{C}$ .
- Uncooled microbolometer FPA-detector with resolution of  $640 \times 480$  pixels
- Direct connection to GPS/IMU enables direct georeferencing of thermal images without necessity of GCPs measurement



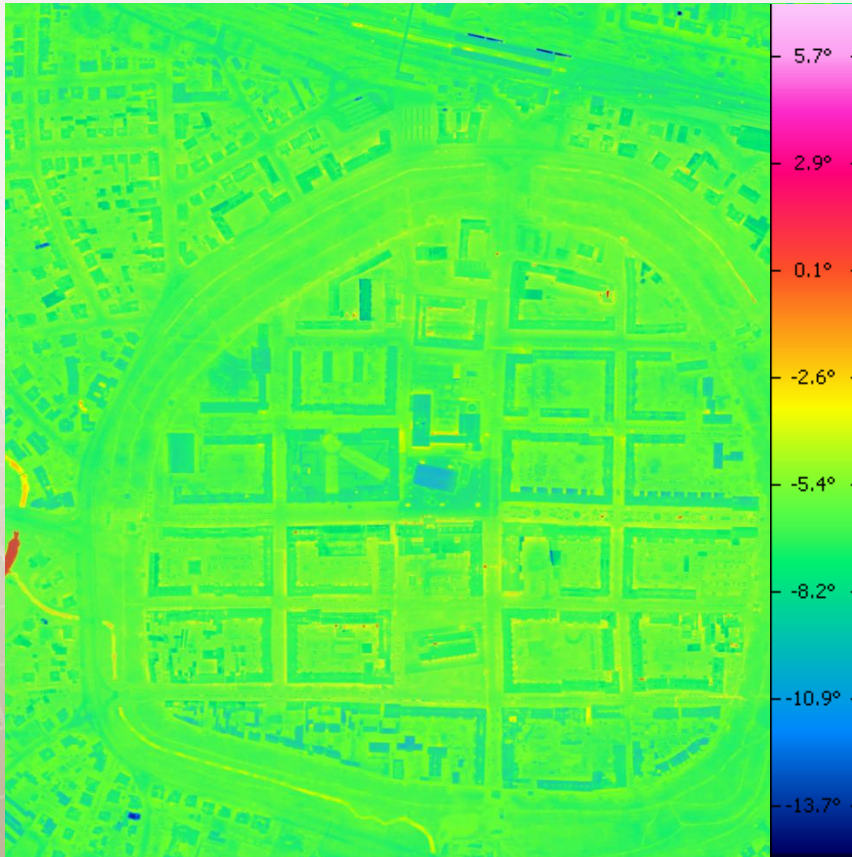
# Thermography - parameters



- Spectral resolution 7.5 ... 14  $\mu\text{m}$
- Pixel size 25  $\mu\text{m}$
- Sensor head size 16 x 12 mm
- Thermal range  $-40^{\circ}\text{C}$  to  $120^{\circ}\text{C}$
- Thermal resolution NETD < 50 mK
- Accuracy: +/- 1.5 K ( $0^{\circ}\text{C}$  ...  $100^{\circ}\text{C}$ ) else +/- 2 K
- 16 bit dynamic color scale
- Frequency 60 Hz / frequency of data storage 6 Hz
- Horizontal accuracy up to 30 cm

**DIGI THERM**

# Thermography - applications



- Thermal orthophoto
- Thermal mapping of municipalities
- Detection of isolation damages
- Detection of danger reactions or fires on waste dumps
- Detection of pipes and leaks
- Animals monitoring



# Multispectral scanner

## Multispectral Infrared and Visible Imaging Spectrometer



Airborne hyperspectral scanner composed of 4 spectrometers recording 102 spectral bands:

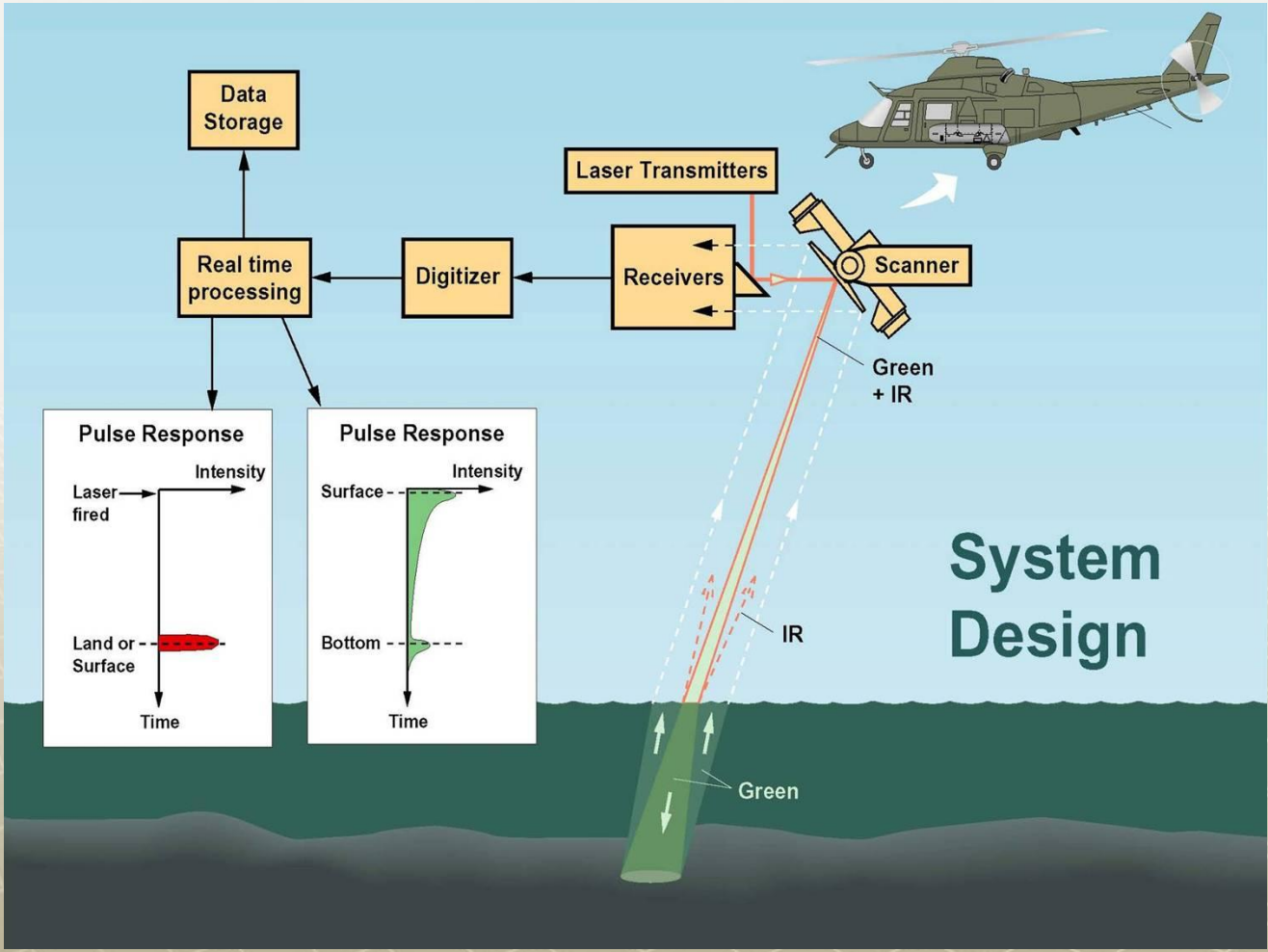
Spectrometer Number	Spectral Region ( $\mu\text{m}$ )	Bandwidth ( $\mu\text{m}$ )	Band
Visible -NIR	0,433 - 0,833	0,02	20
Middle IR	1,150 - 1,550	0,05	8
Middle IR	2,000 - 2,500	0,008	64
Thermal IR	8,200 - 12,70	0,4	10

Ground pixel resolution  $0.20 \times \text{Altitude}$  (in metres)



The instrument is an imaging spectrometer, whose bands have been chosen to meet research needs enabling advanced applications in scientific fields involved in environmental **remote sensing**, like Botanic, Agronomy, Geology, Geomorphology, Pedology, Hydrology, Oceanography, Atmospheric Sciences.

# HawkEye II - Bathymetry

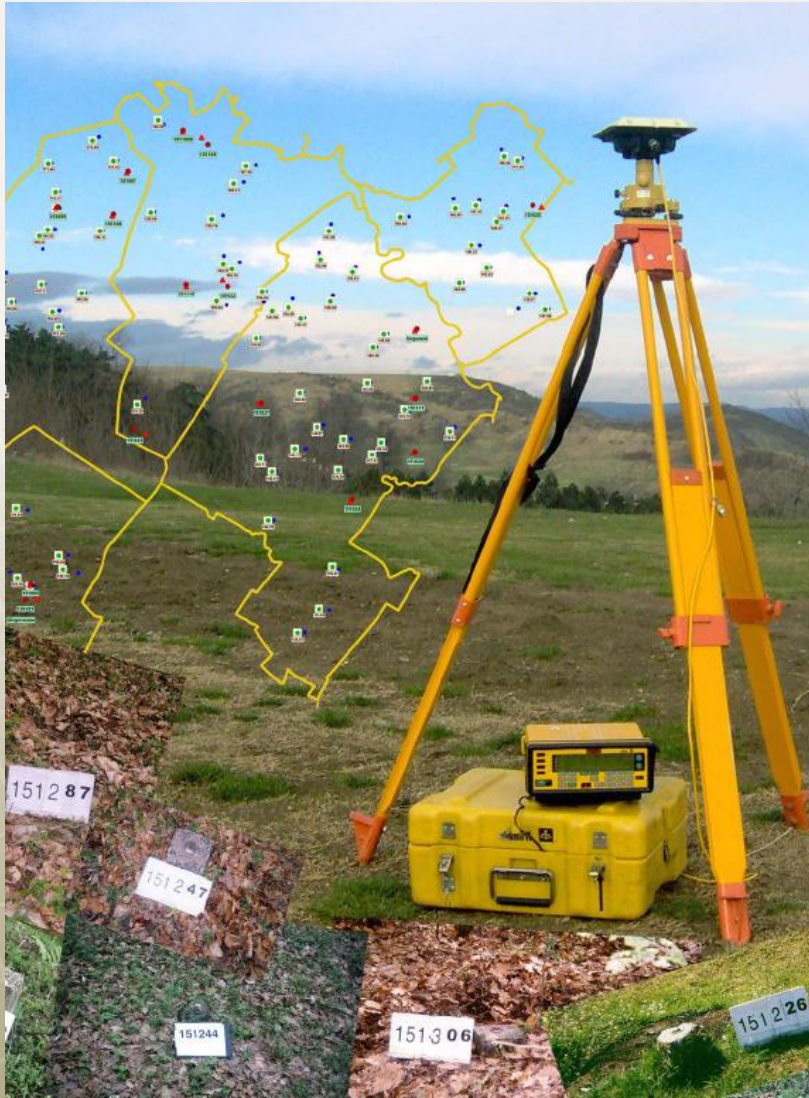


Specialized company: Blom Environmental Coastal Surveys (BECS)

# HawkEye II - Bathymetry

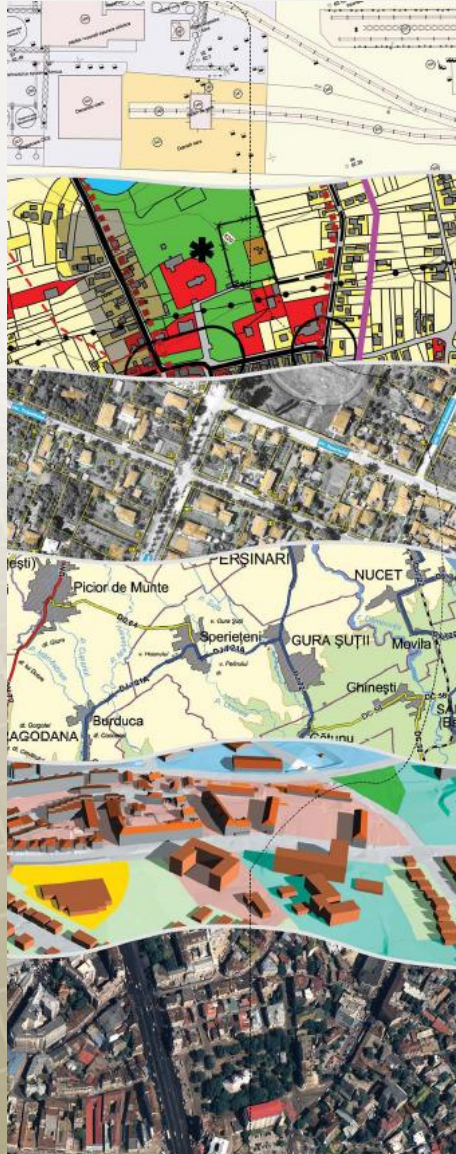


# Surveying works



- Entire area of geodesy
  - GPS
  - Mapping
  - Engineering survey
  - Setting out
  - Cadastre services
  - Terrestrial laserscanning
  - Volume calculations

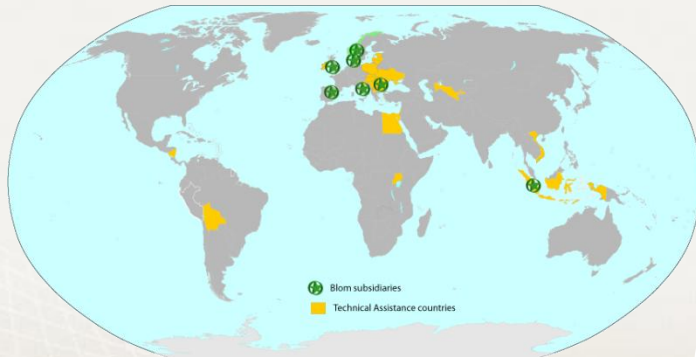
# Data processing



- Complex spectre pf services
  - Scanning
  - Vectorising
  - Digitizing
  - Data migration
- Large capacity
- Experience in cadastre and with standards for technical maps
- Experience with all CAD/GIS platforms

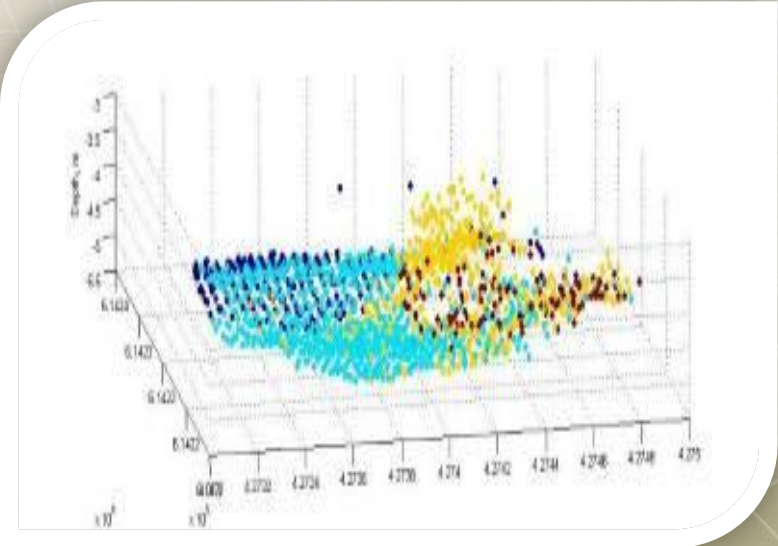
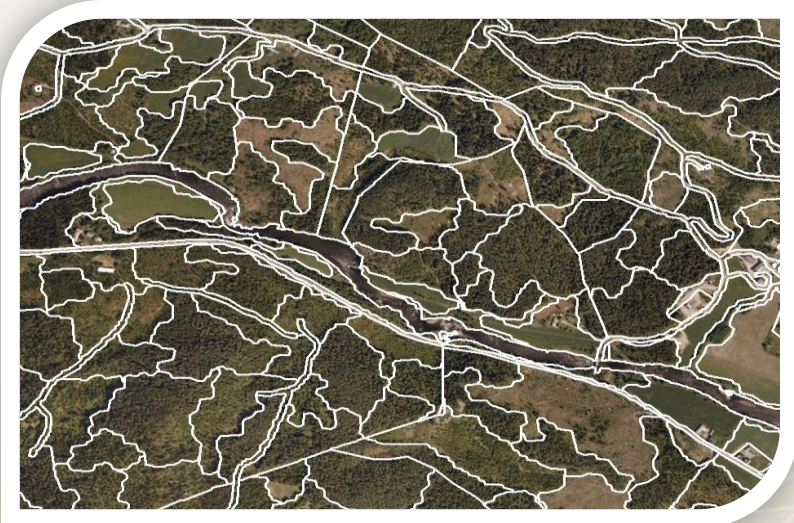


# International consultancy

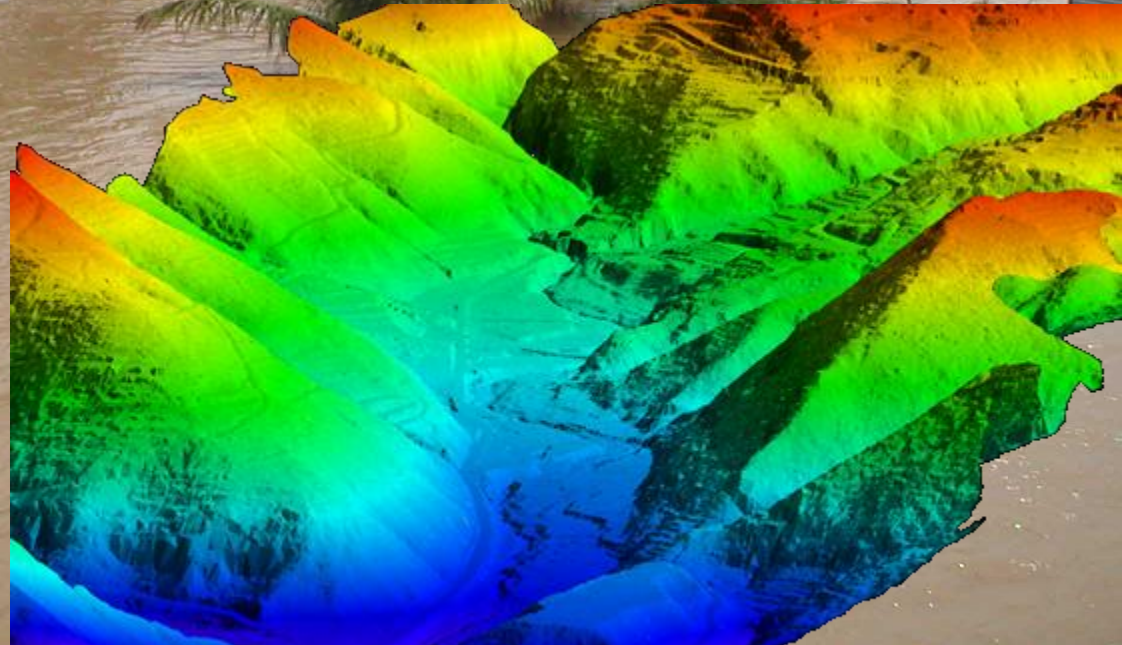
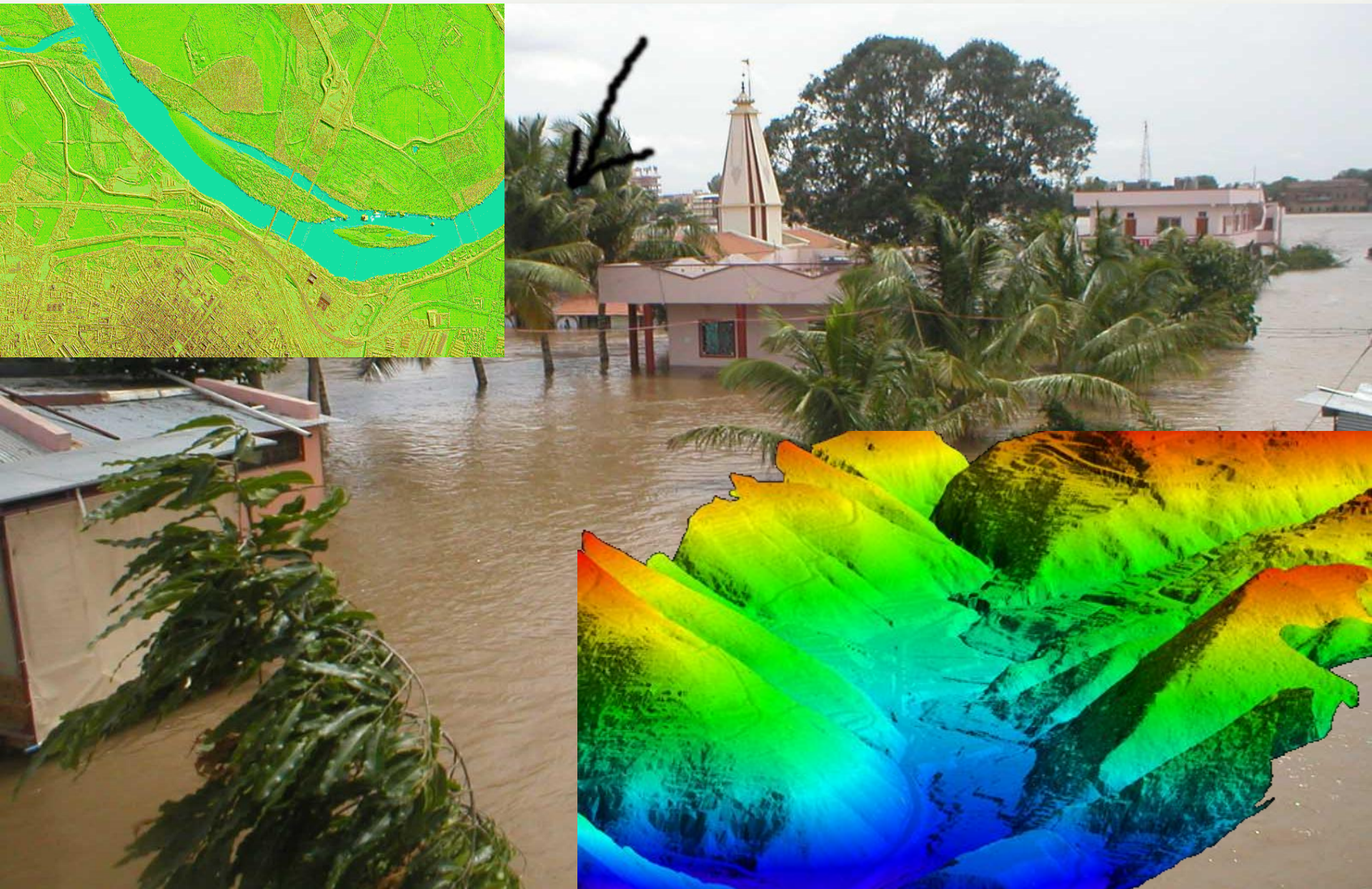


- Different fundings
  - EU PHARE a TACIS
  - World Bank
  - EBRD
  - American Development Bank
  - SIDA, NORAD, NDF
  - EU structural funds

# Special applications

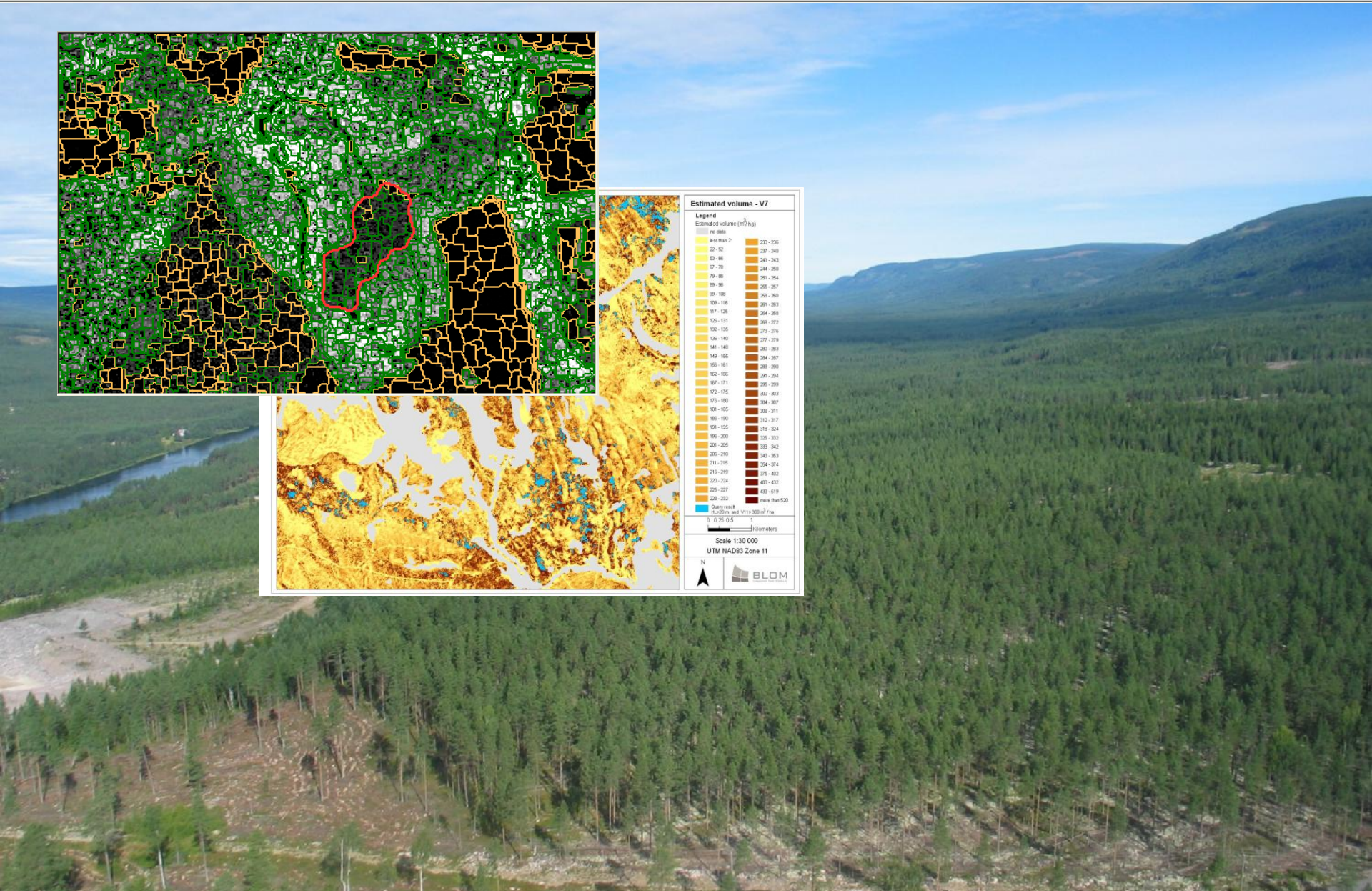
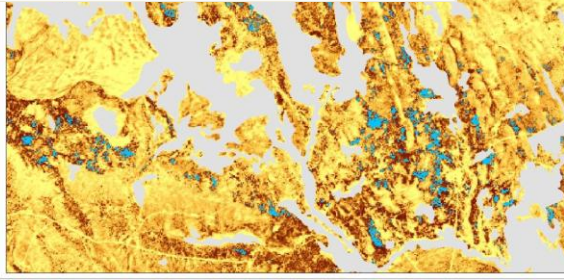
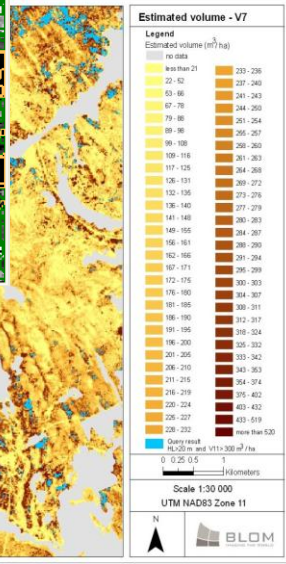
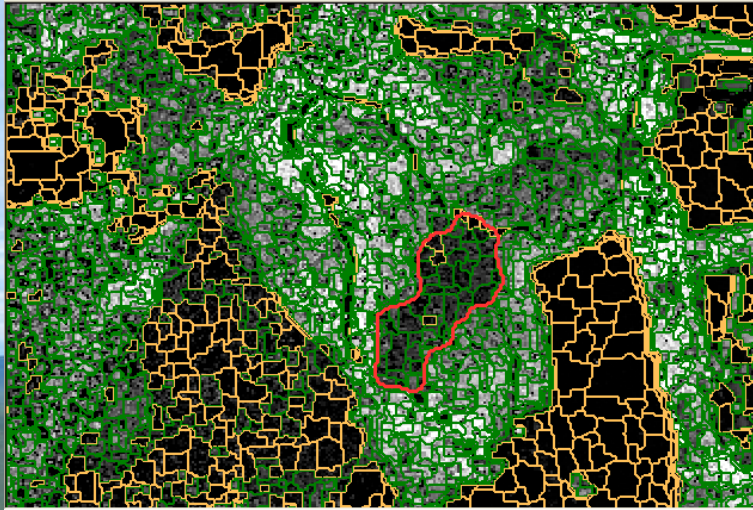


# Flood modelling

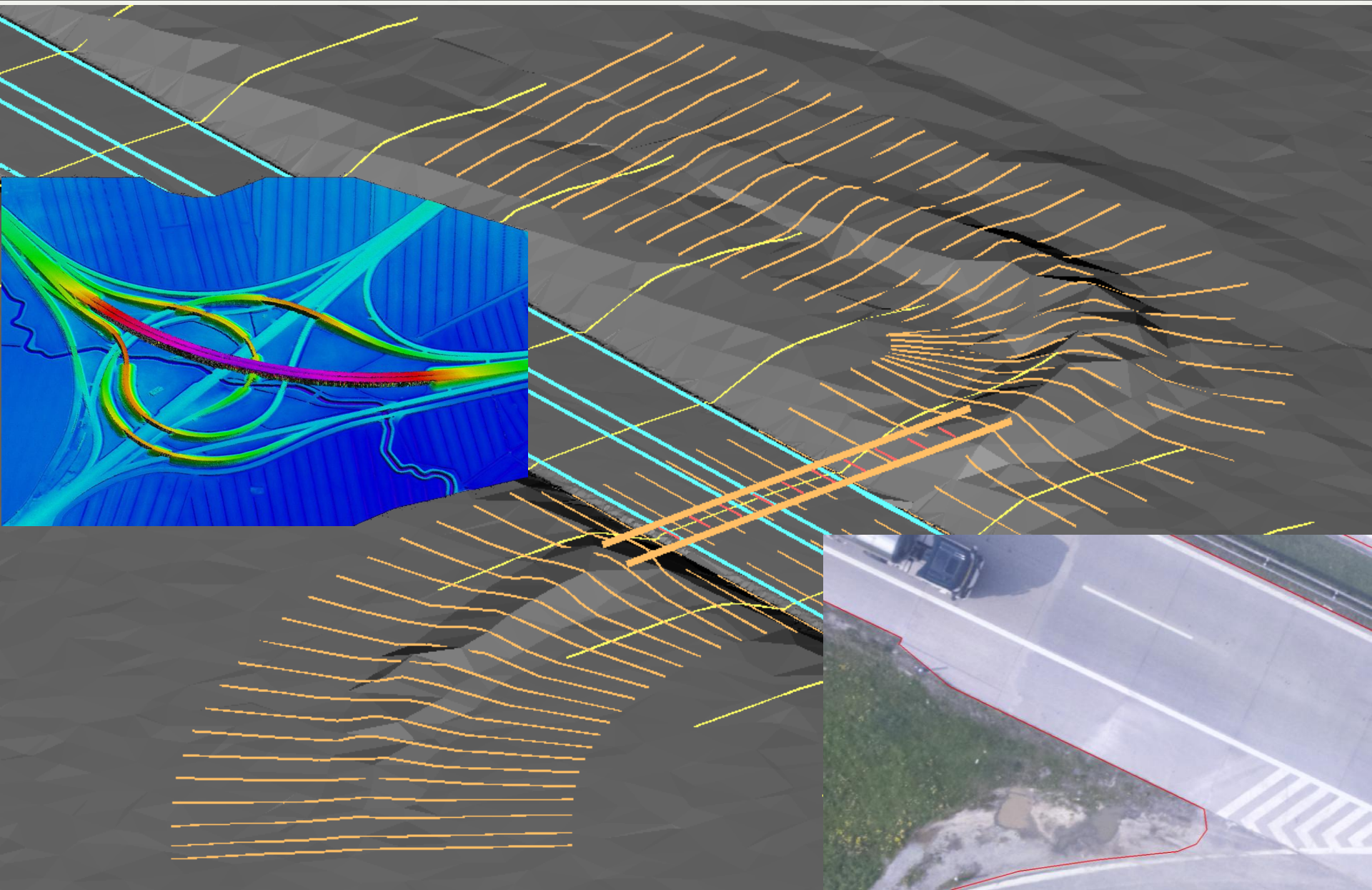




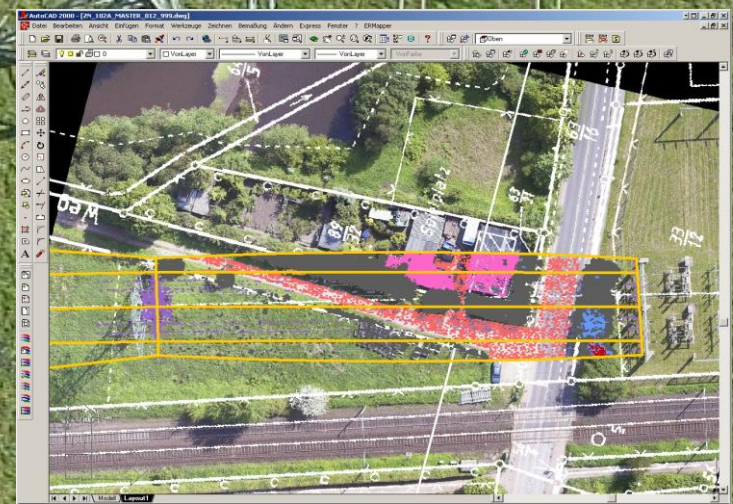
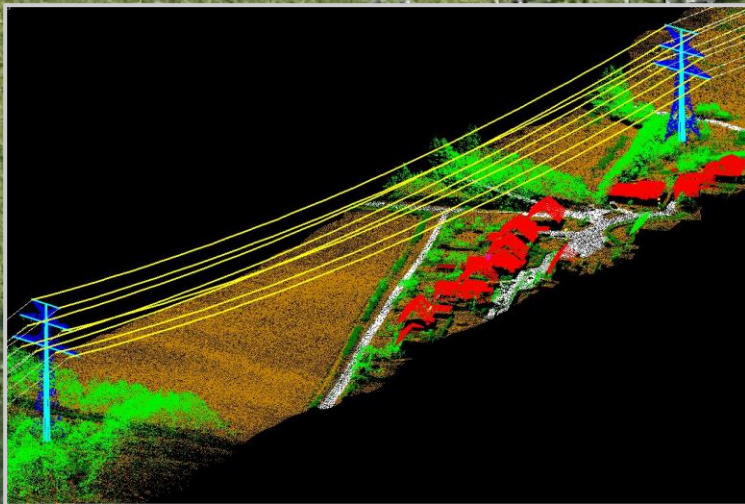
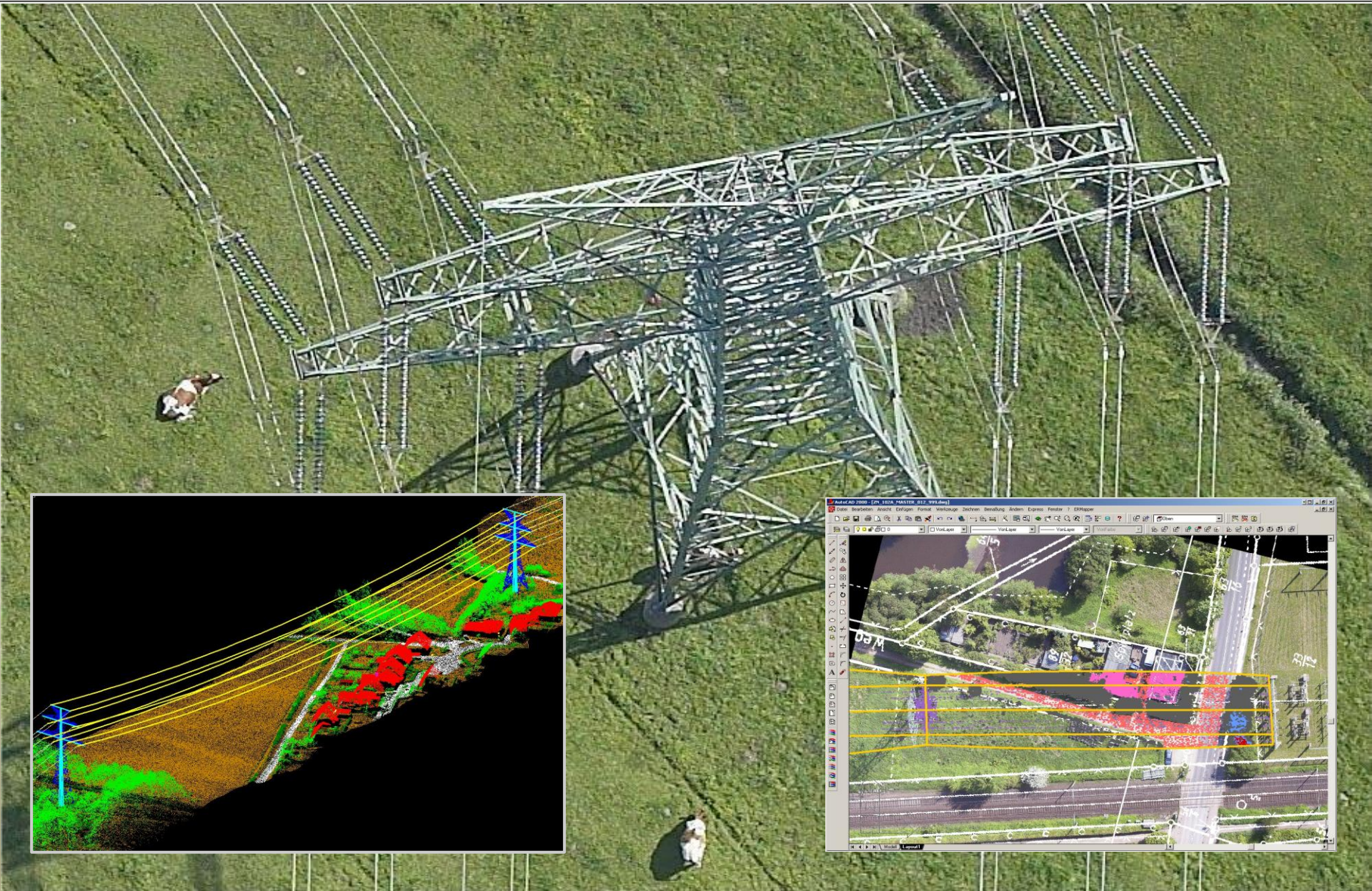
# Forrestry mapping



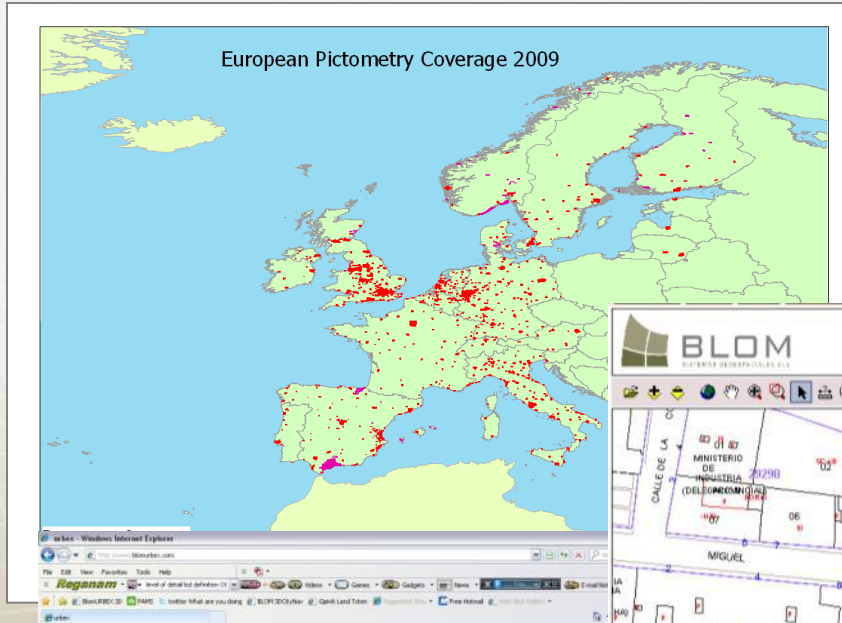
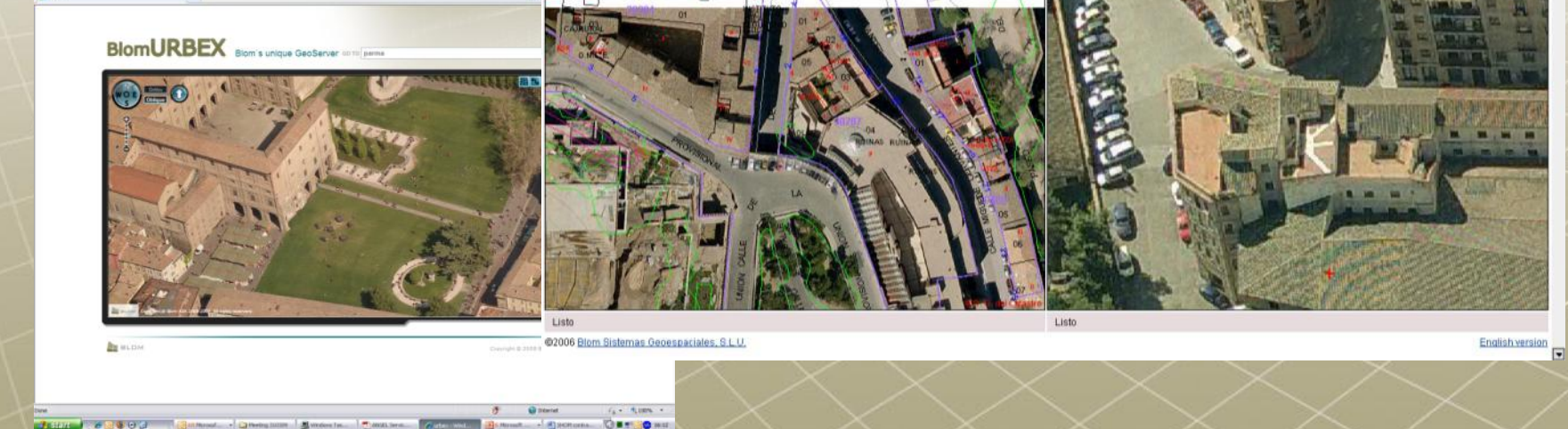
# Roads and Highways



# Transmission Lines



- Unique geo-server
- Over 1.500 cities
- Over 100.000 sq.km

BlomURBEX Blom's unique GeoServer

Ciudad: TOLEDO

Web demostrativa de Pictometry  
Aplicación JavaScript con conexión a Image Web Server de ErMapper y a servicios web desarrollados en .NET.

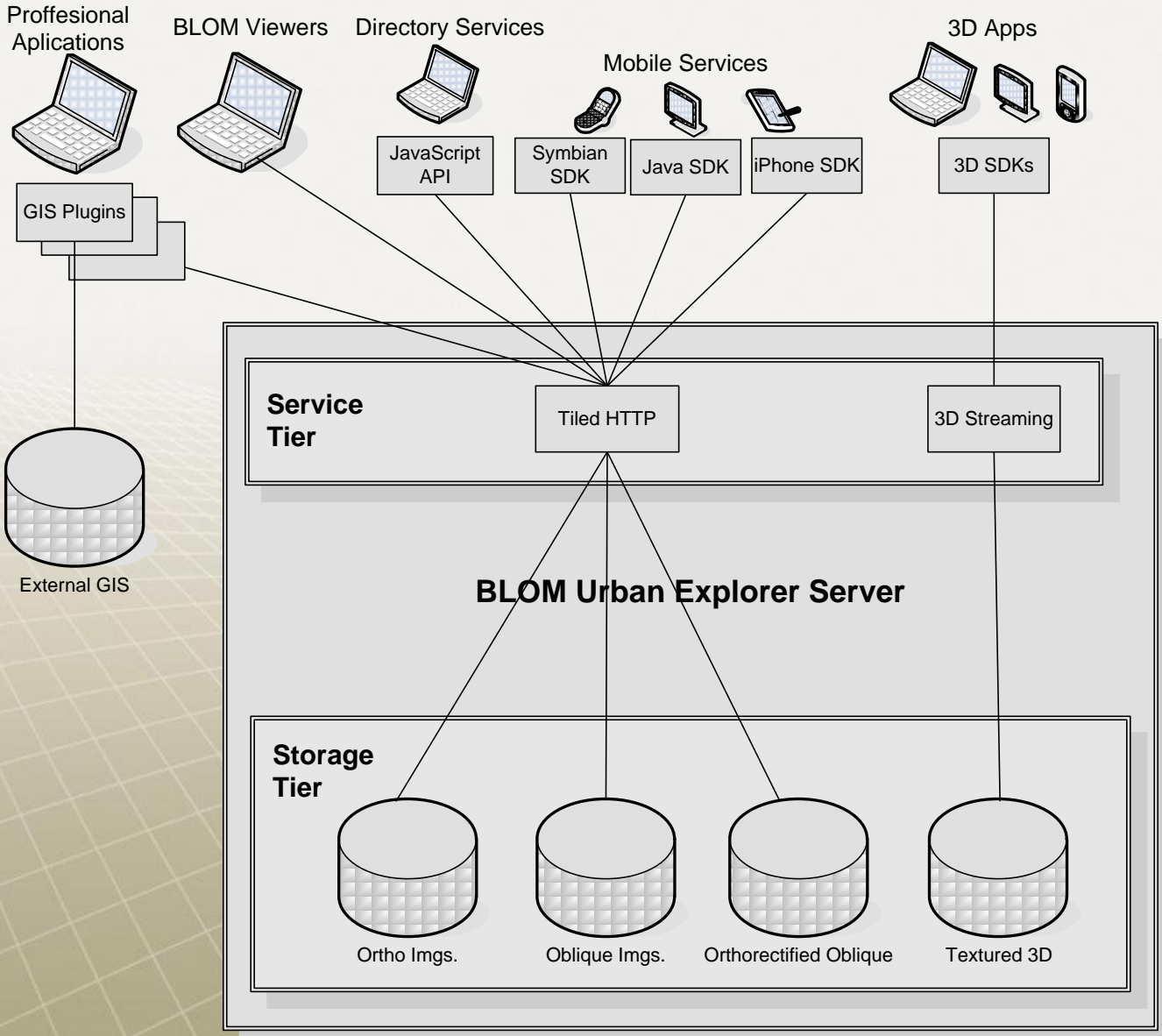
Escala 1: 1000

Zoom por defecto: 1.2 Orientación: Sur

Listo

©2006 Blom Sistemas Geoespaciales, S.L.U.

English version



# Supported platforms

PC:  
Local / Internet

A.P.I.



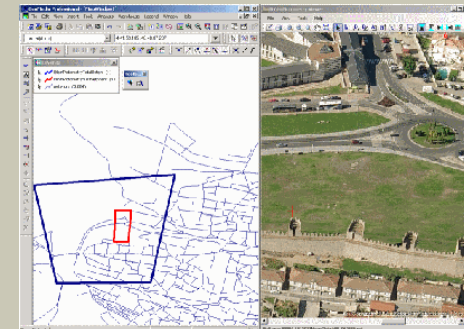
Mobile phones:  
Local / Internet


S.D.K.



G.I.S.:  
Local / Internet

Plug-ins



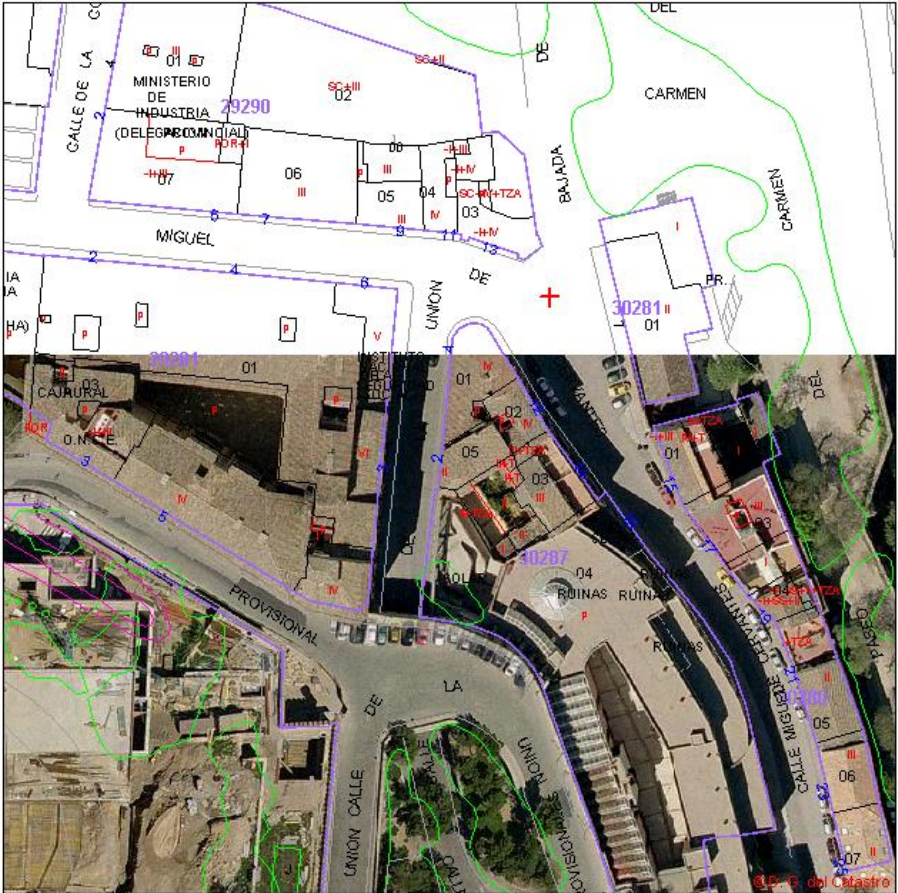



Ciudad: **TOLEDO**

Web demostrativa de Pictometry  
Aplicación JavaScript con conexión a Image Web Server de ErMapper y a servicios web desarrollados en .NET.

Escala 1: 1000

Zoom por defecto: 1:2 | Orientación: Sur





Listo

Listo

Untitled.mxd - ArcMap - ArcInfo

File Edit View Insert Selection Tools Window Help

1:3,880

Layers

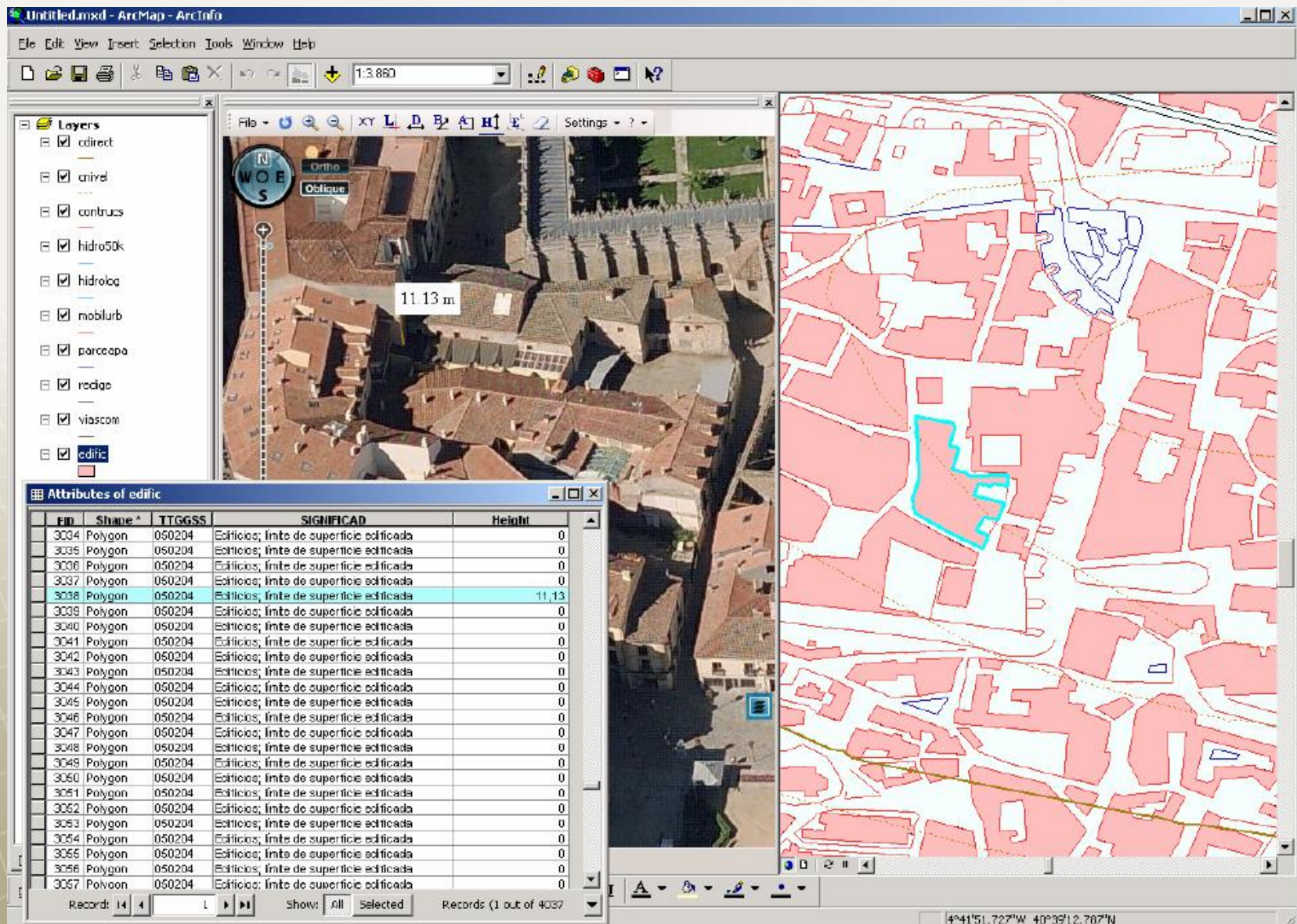
- direct
- anivel
- contrucs
- hidro50k
- hidroba
- nobilurb
- parrocpa
- redcae
- viascom
- edific

Attributes of edific

FID	Shape	TIGGSS	SIGNIFICAD	Height
3034	Polygon	050204	Edificios; límite de superficie edificada	0
3035	Polygon	050204	Edificios; límite de superficie edificada	0
3036	Polygon	050204	Edificios; límite de superficie edificada	0
3037	Polygon	050204	Edificios; límite de superficie edificada	0
3038	Polygon	050204	Edificios; límite de superficie edificada	11,13
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3054	Polygon	050204	Edificios; límite de superficie edificada	0
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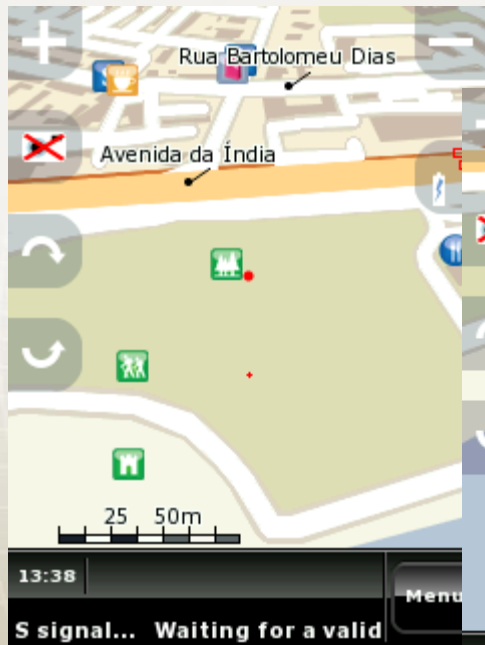
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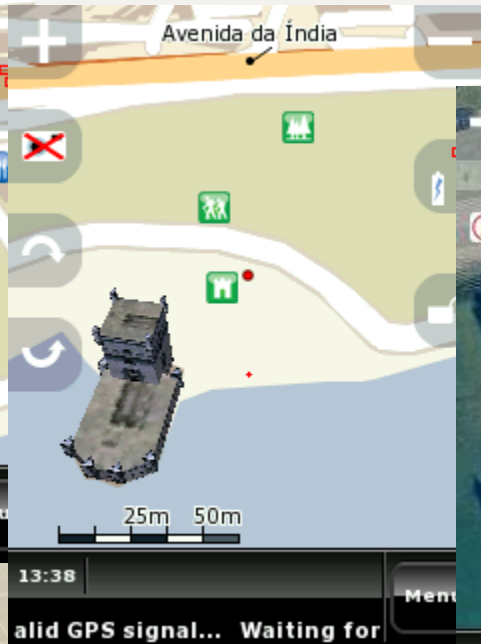




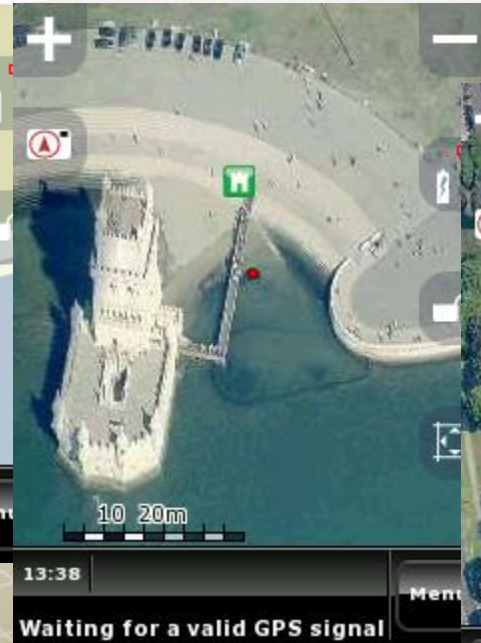
# PhotoNav



Perspective view



Landmarks



Reality view



- Agreement with Tele Atlas to create the largest high-quality 3D collection in the world (?)
- Online access on BlomUrbex
- 200 cities worldwide in 2009
- Complete set of 3D map components (BLOD1, BLOD2, BLOD3, BLOD4)





**BLOM**  
IMAGING THE WORLD

- **Extensive capacity**
- **Most modern technology**
- **Technical experience**
- **High quality**
- **Local understanding**
- **Competitive pricing**





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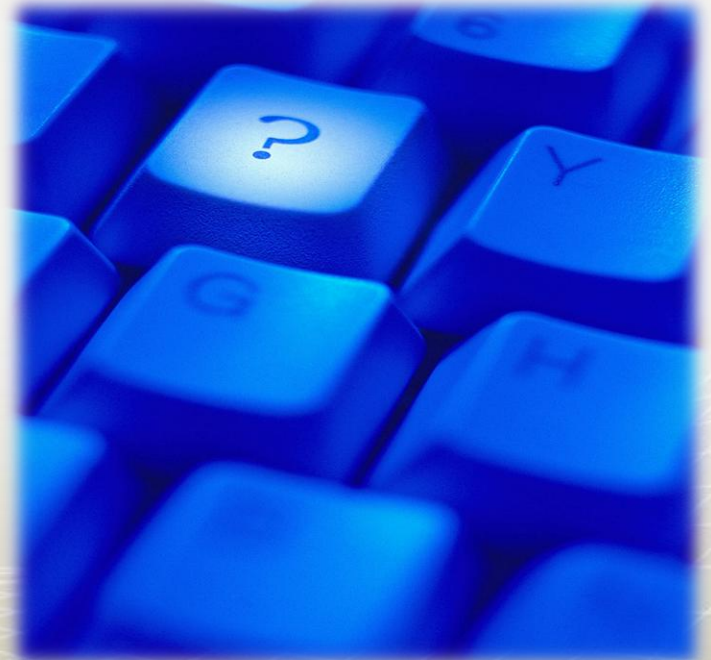
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