Mapping the World from the air
new technologies and products

Jan Sirotek, 28.10.2010
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• 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
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
BLOM’s philosophy

- 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)
True orthophoto
Photogrammetric mapping
3D city models and visualisation
LIDAR

• 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)

Altitude

Points / m²

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 50,000km² p.a. (resolution 10cm)
Camera system
Oblique images

- 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

Over 1.500 cities
Over 100 000 km$^2$
Thermography

• Most modern thermal camera DigiTHERM developed specially for aerial photography purposes

• Thermal resolution 0.05K and standard range of temperatures is -40°C to 120°C.

• Uncooled microbolometer FPA-detector with resolution of 640x480 pixels

• Direct connection to GPS/IMU enables direct georeferencing of thermal images without necessity of GCPs measurement
Thermography - parameters

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

<table>
<thead>
<tr>
<th>Spectrometer</th>
<th>Spectral Region (µm)</th>
<th>Bandwidth (µm)</th>
<th>Band Number</th>
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</thead>
<tbody>
<tr>
<td>Visible -NIR</td>
<td>0,433 - 0,833</td>
<td>0,02</td>
<td>20</td>
</tr>
<tr>
<td>Middle IR</td>
<td>1,150 - 1,550</td>
<td>0,05</td>
<td>8</td>
</tr>
<tr>
<td>Middle IR</td>
<td>2,000 - 2,500</td>
<td>0,008</td>
<td>64</td>
</tr>
<tr>
<td>Thermal IR</td>
<td>8,200 - 12,70</td>
<td>0,4</td>
<td>10</td>
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</tbody>
</table>

Ground pixel resolution 0.20 x 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

System Design

Specialized company: Blom Environmental Coastal Surveys (BECS)
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
Transmission Lines
- Unique geo-server
- Over 1,500 cities
- Over 100,000 sq.km
Supported platforms

<table>
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<tr>
<th>Supported platforms</th>
<th>A.P.I.</th>
<th>S.D.K.</th>
<th>Plug-ins</th>
</tr>
</thead>
<tbody>
<tr>
<td>PC: Local / Internet</td>
<td><img src="java.png" alt="Java" /> <img src="html.png" alt="HTML" /></td>
<td><img src="symbian.png" alt="Symbian" /> <img src="android.png" alt="Android" /></td>
<td><img src="microstation.png" alt="MicroStation" /> <img src="intergraph.png" alt="Intergraph" /> <img src="autocad.png" alt="AutoCAD" /> <a href="mapinfo.png">MapInfo</a></td>
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<tr>
<td>Mobile phones: Local / Internet</td>
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<td><img src="iphone.png" alt="iPhone" /> <img src="java.png" alt="Java" /> <img src="playstation.png" alt="PlayStation" /></td>
<td><img src="arcgis.png" alt="ArcGIS" /> <img src="autocad.png" alt="AutoCAD" /> <a href="mapinfo.png">MapInfo</a></td>
</tr>
<tr>
<td>G.I.S.: Local / Internet</td>
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</tbody>
</table>
Plug-ins
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)
- Extensive capacity
- Most modern technology
- Technical experience
- High quality
- Local understanding
- Competitive pricing
Represented in Slovakia through G-BASE

Data  GIS  Solution

BLOM INFORMATION SERVICES

BLOM GEO ENGINEERING SERVICES