ISPRS / EuroSDR Workshop on "Oblique aerial cameras – sensors and data processing"
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Oblique aerial imagery in the praxis: applications and challenges

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Outline

- Introduction on TM/AVT
- Demand in the market
- Requirements analysis
- Applications
- Challenges and open issues
- Conclusions

Vermessung AVT-ZT-GmbH

- **Vermessung AVT GmbH**
  - Mapping company founded in **1970**, head-office in **Imst**, (Tirol, Austria), about 70 employees
  - Activities: cadaster, topography, geodesy, **photogrammetry**, aerial and terrestrial laser scanning, geoinformation
- **Terra Messflug**
  - 100% subsidiary of Vermessung AVT
  - Focused in nadir and oblique **aerial digital image acquisition and processing**
    - Aircraft: **Cessna T303**
    - Optical sensor: **UltraCam Eagle Mark2, UltraCam Osprey Prime**

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Introduction

- AVT in oblique market since 2015
- Small, medium and large projects in EU
- **GEOBLy** project in collaboration with FBK (Trento, Italy) for:
  - Investigations on sensor geometries, image orientation and 3D surface reconstruction
  - Design and implementation of ad-hoc tool for mapping in oblique images.

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Introduction

- **VOLTA** EU Marie Skłodowska--Curie RISE project:
  - Know-how and experience exchange in the field of geospatial data production, investigation and usage between universities, research centres, sensor producers, service providers and mapping agencies
  - Topics:

Aerial oblique imagery

  - Automatic metric information from images
  - Fusion of heterogeneous data coming from various sensors
  - 2D and 3D geospatial data segmentation
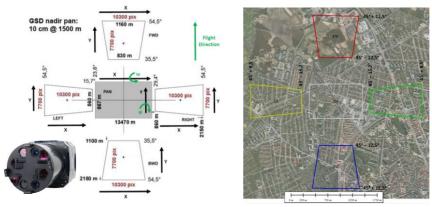 - Processing of large geospatial datasets in the Cloud

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Equipment and software

Aerial oblique camera: Vexcel Ultracam Osprey Mark3p

Focal length: 80mm (nadir) 120 mm (oblique)
Oblique sensors tilt: 45°
Image size: 13,470 x 8,670 pixels (nadir), 10,300 x 7,700 pixels (oblique)

SW: UltraMap, Inpho Match-AT, nFRAMES SURE, Geobly, OrbitGT

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Selection of results (Imst)

Generation of point clouds using only nadir images (N) and nadir + oblique images (N+O).

The qualitative comparison of the point clouds and derived automatic models highlights the **significant improvement** on the reconstruction of the building façades and roof structures when the oblique images are added.

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Selection of results (Bergamo)

Bergamo, N point cloud ISPRS / EuroSDR Workshop Oblique Aerial Cameras
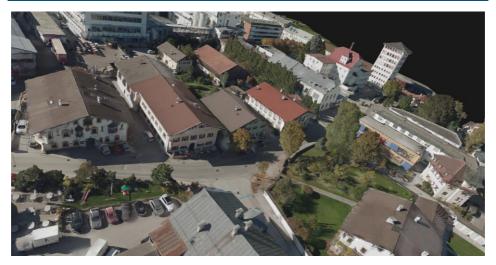
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Selection of results

Bergamo, N+O point cloud

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Selection of projects (Kundl)

Kundl, textured mesh

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Customers & Demands

Image quality
Presentation quality
Format of delivery
Integration
Scopes
Orientation quality

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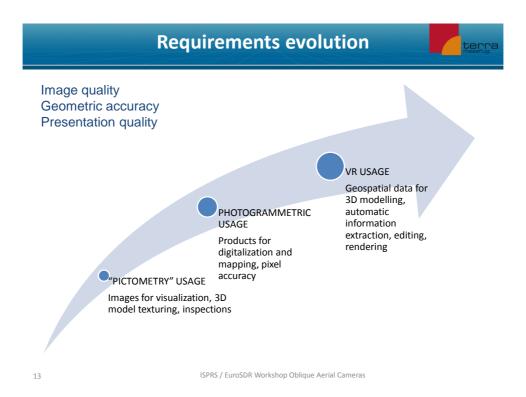## Customers & Demands

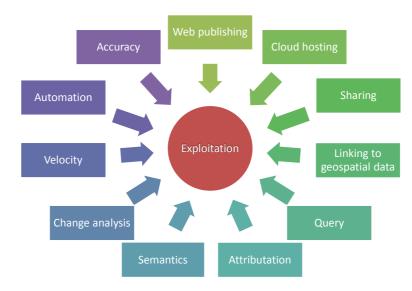| Image quality |
|---|
| Presentation quality |
| Format |
| Integration |
| Scopes |
| Orientation quality |

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Requirements evolution

Image quality
Geometric accuracy
Presentation quality

VR USAGE
Geospatial data for 3D modelling, automatic information extraction, editing, rendering

PHOTOGRAMMETRIC USAGE

Products for digitalization and mapping, pixel accuracy

"PICTOMETRY" USAGE

Images for visualization, 3D model texturing, inspections

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Requirements for Exploitation sw

Accuracy

Web publishing

Cloud hosting

Automation

Sharing

Velocity

Exploitation

Linking to geospatial data

Change analysis

Query

Semantics

Attributation

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What do our clients do with the oblique data

…that they didn't do with their nadir data

Building inspection

- Survey number of floors
- Fire rules control
- Building height measurements
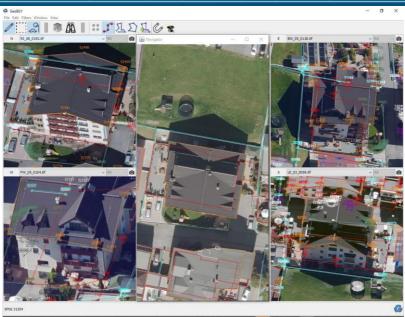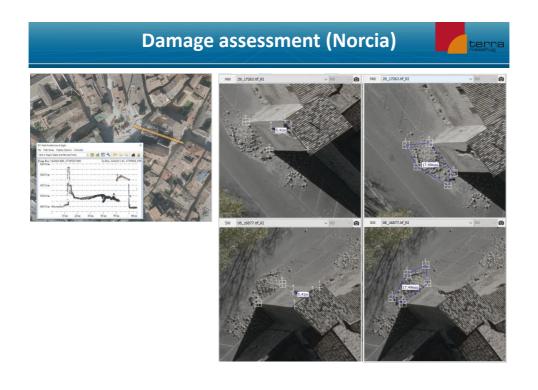- State of building
- Footprint digitalization

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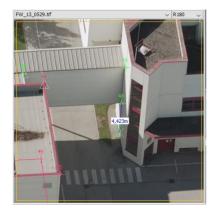ISPRS / EuroSDR Workshop Oblique Aerial Cameras

3D building mapping

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Damage assessment (Norcia)

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Damage assessment (Norcia)

16.10.2017

More applications

Clearance height
measurements

Vertical signal mapping

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More applications

Inspection of power lines and
constructions

Facility management

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More applications

VR integration

Analysis – view sheds, noise pollution, solar potentials

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Challenges - geometry

- Image orientation:
  - High quality in object space
  - Physical model not necessarily complete

- DIM & 3D modelling
  - Modelling of roof borders
    - Combination with other approaches (i.e. mathematic morphology)
  - Visibility and modelling in very narrow streets
    - Integration with other platforms, e.g. mobile mapping systems in very narrow streets
  - Computing optimization

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Challenges – radiometry & exchange

- Level of quality of nadir and oblique images
  - Different levels, but quality of tools for oblique image processing area rapidly increasing
- GIS integration
  - Slow implementation of oblique imagery in conventional GIS
    - Solutions are still basic
    - Stand-alone or simple add-on, lack of integration
    - Expensive
  - Tailored solutions for specific projects
- Full integration for measurement in oblique images
  - Currently stand-alone viewer solutions, image formats partly not transparent
- Integration of mesh & mesh interactions
  - Currently uncoordinated implementation of mesh integration

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Conclusions

- Awareness of oblique imagery potential is growing in private and public entities
- Positive feedback by customers using oblique imagery
  - Cost reduction of field work (mapping)
  - Time reduction (mapping)
  - Different building perspectives
    - Occlusion reduction (min. 6 images for each object)
  - Accessibility to whole area
  - All-time image availability
- Requirements are more demanding but challenging
  - Quality, interaction, sharing

Thank you for your attention!

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