EO-Based Products and Services to Support Urban Development Activities

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Outline of Presentation

• Addressing the need for operational urban mapping services for developing countries
• Provide examples of EO-based urban products/service to support the information needs
• Technical Challenges related to operational services
• Concluding Comments
Urban Growth in Developing Countries

- 2.5 billion people or 66% of the global population will be in urban areas by 2050.

- Nearly 90% of the world’s urban population growth will occur in cities in Africa and Asia (Floater and Rode, 2014).
Challenges for Governments

• The challenges faced by governments in developing countries to manage this staggering growth are multi-faceted

• They have to provide certain basic requirements to the population:
  - infrastructure,
  - access to clean water,
  - electricity,
  - sanitation
  - services to the inhabitants in order to avoid urban poverty which will have consequences on the overall development of the country

• The recent ESA IFI tender aims to address these challenges via EO applications for Urban planning
EO Based Solutions for Urban Planning

• EO-Monitoring of unplanned urban sprawl

• Infrastructure Planning:
  o Road network detection
  o Illegal waste site detection and analysis (2D / 3D)
  o Telecommunication network planning

• Risk / Disaster Assessment – for example urban areas located in coastal zones threatened by sea-level rise and storm surges
EO Based Solutions for Urban Planning

- Assessment and monitoring of slums/informal settlements
- Urban pollution:
  - Atmospheric pollutants, noise
  - Propagation Analysis with accurate elevation data
- Urban green area planning
- Derivation of socio-economic estimations

End Users:
Local Authorities, Ministries, Engineering Firms, International Donors-World Bank, KfW, Asia Development Bank, UN agencies-UN Habitat, UNDP, NGOs
Mapping of urban structures according to different criteria:

- Function (living, industry, ...)
- Building density (loose, dense, ...)
- Building type (single, high-rise, ...)
- Building heights (min, max, mean)

Blocks defined by street network

+ 3D Models of important buildings
Worfhlow DSM Generation

Semi-automated, globally applicable workflows for consistent results with production and quality assessment processes.

Base Data → Matching → DSM generation → Product Generation → Final QC

Software: [DLR]
Production: [GAFAG]
Distribution: [GAFAG]
Infrastructure Planning

Analysing Data in

Tools for:
- Monitoring
- Volume Calculation
- Simulation

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Disaster Management
Technical Challenges

• Data availability: clouds, inadequate repetition rates, acquisition conflicts

• Sensor constraints: spatial resolution, accuracy

• Methodological issues: need for further automatisation of processing chains, e.g. Automatic generation of derived products from surface models / stereo data

• User awareness and access to products/services is limited
Concluding Comments - Technical

- Launch of Sentinel-suite of EO data will address some of the technical challenges and provide monitoring capabilities that were previously not possible.

- New VHR Sensors planned: faster revisit rates, higher resolution, better accuracy.

- Improved user access to services via integration of services onto existing Web Platforms, e.g.:
  - Urban TEP (ESA, DLR)
  - PUMA (WB; GISAT)
  - Dissemination via mobile devices.

- Further methodological developments needed for increasing degree of automation.
Concluding Comments

• The use of EO-based urban products are not yet mainstreamed in urban planning in many developing countries

• ESA’s close co-operation with the Banks via arrangements such as Memorandum of Understandings (MoUs) and the recent tender can address this issue

• Envisaged future market for EO Urban data/information