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# AMPERE

## Electrical asset mapping in emerging countries worldwide using Galileo and Copernicus

User Consultation Platform

Marco Nisi

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# Outline



- Context: access to electricity worldwide
- The need for network asset mapping in emerging countries
- AMPERE Requirements and System Concepts
  - Galileo: HAS/ PPP for simplified operations in asset mapping
  - Copernicus: Urban Planning and Monitoring



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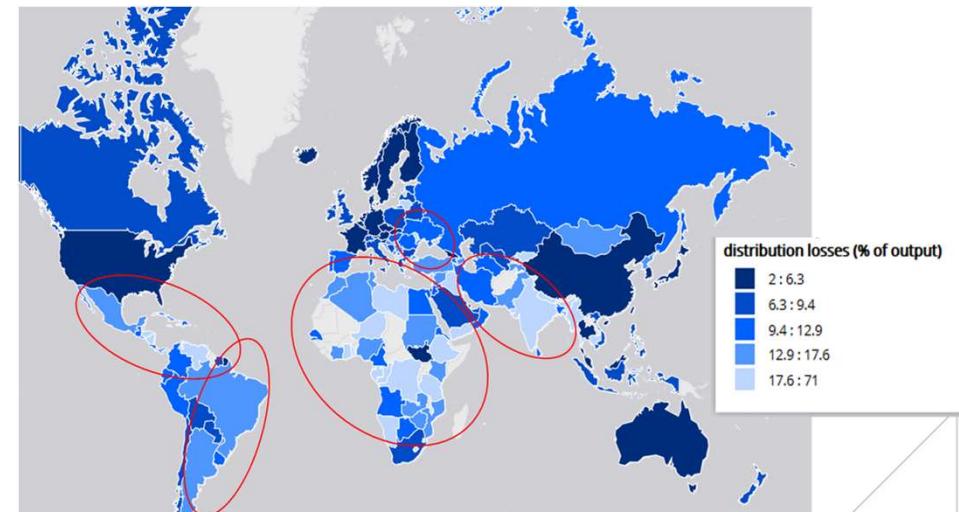
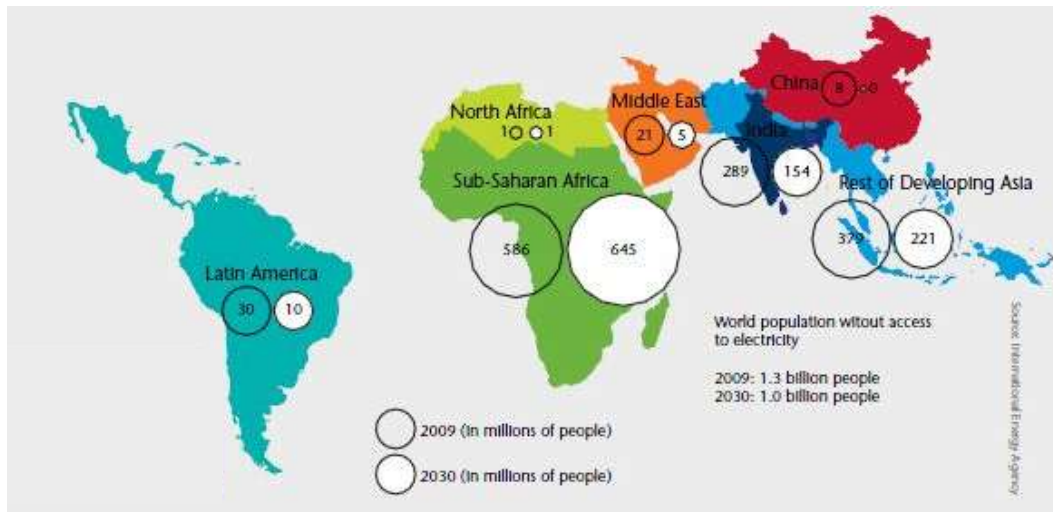
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# Context: Access to electricity worldwide



Despite advances in overall global electrification rates, access to electricity for all is still far from achieved. The International Energy Agency (IEA) estimates that **more than 1 billion people are without access to electricity**, representing 17% of the global population.

Also, the geographic areas which are more affected by **electric energy losses** are those including “developing countries”:

- ✓ Central and Southern America
- ✓ Africa
- ✓ East Europe
- ✓ Middle east and South Asia





# The need for asset mapping in emerging countries



As an example, AMPERE consortium is analysing and proposing a mapping solution for electrical network in Santo Domingo, where one big problem is still constituted by power and phone lines, which are still mostly aerial, making the area somehow precarious, potentially dangerous and chaotic, taking away from the simple beauty of it.

# AMPERE Requirements and System Concepts



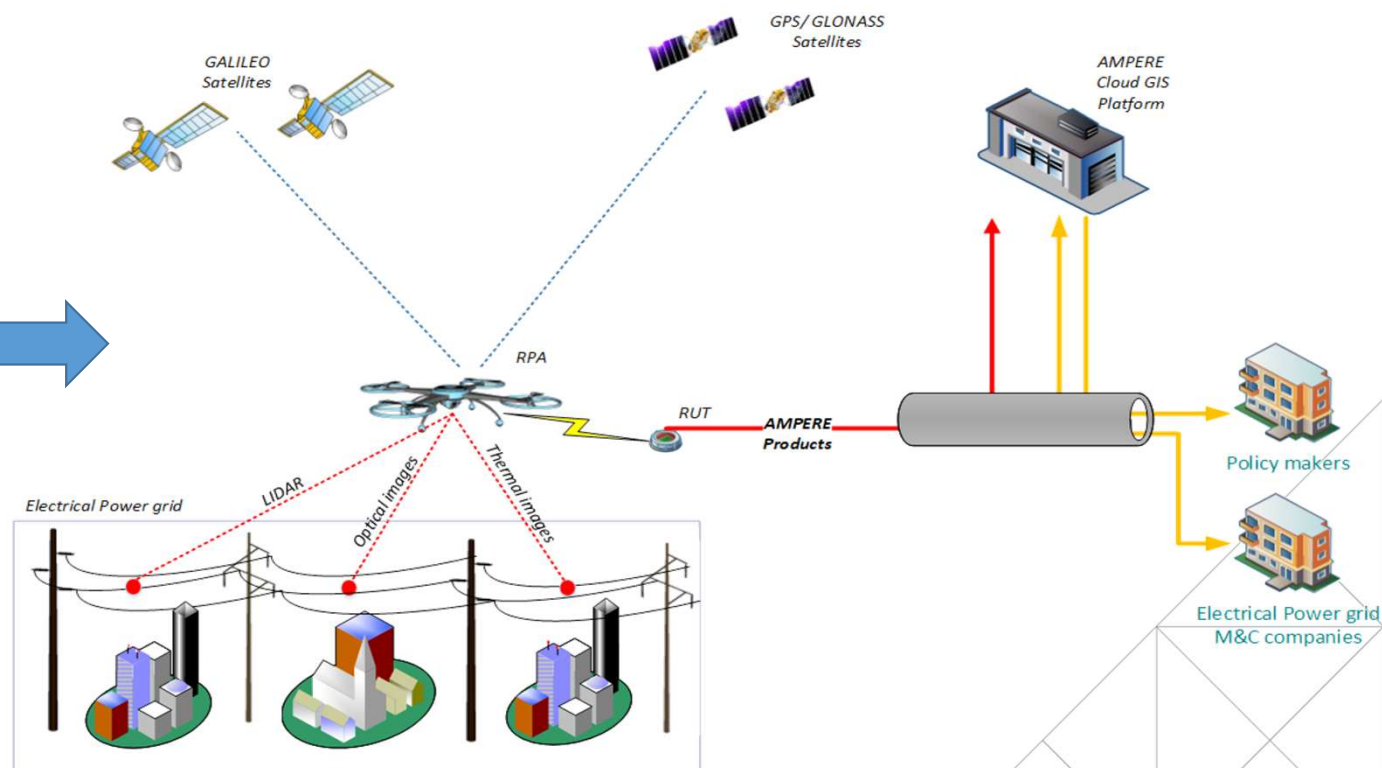
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**AMPERE-D3.1**  
User requirements and ConOps

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# Galileo: PPP/HAS for simplified mapping operations

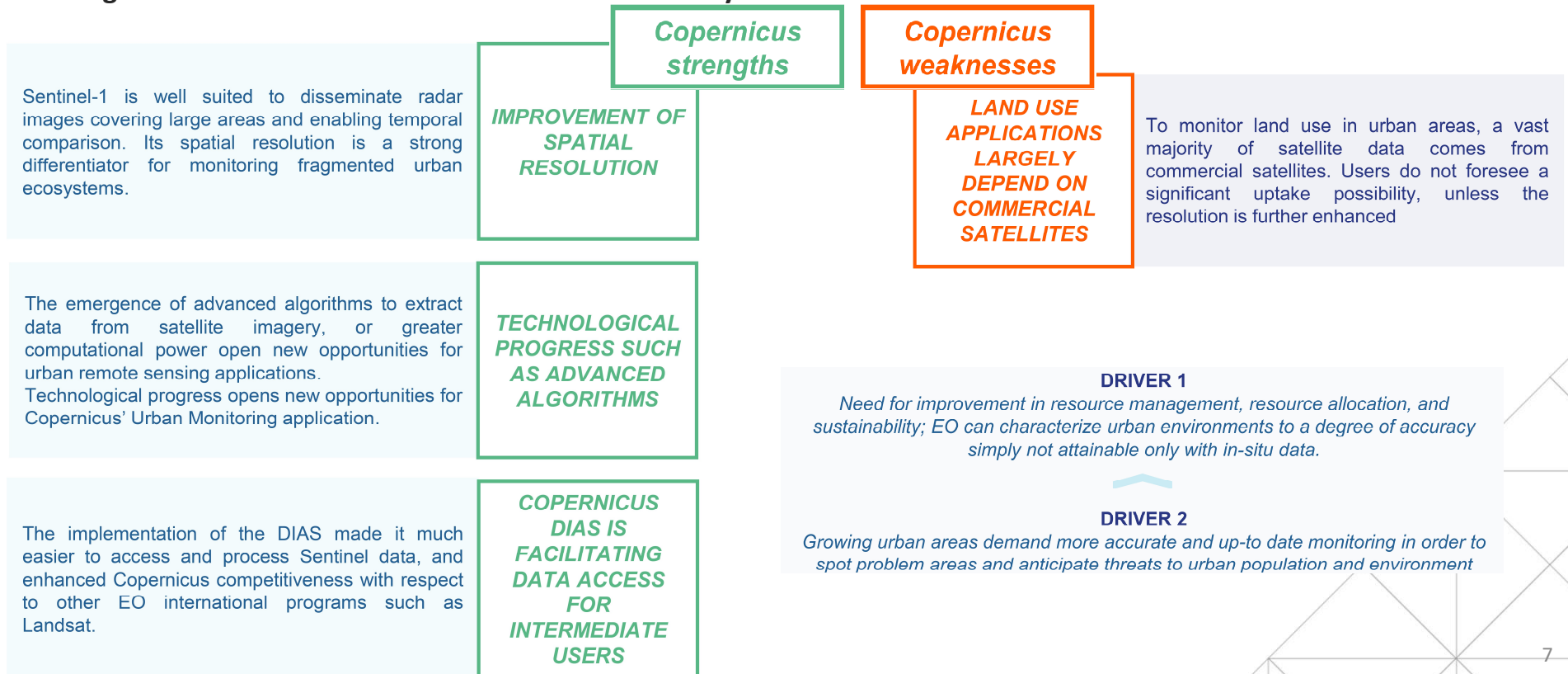


- **AMPERE aims at exploring and exploiting Galileo advanced features -namely, High Accuracy Service (HAS) and E5 AltBOC- as a core element of the added-value asset mapping proposition.**
  - ✓ The nature of **HAS (E6 band)** is fitting very well the requirements of AMPERE, especially due to the re-shaping of the once fee-based accuracy capability to **an open, free-of-charge service delivering around 20 centimeter accuracy**, in lower convergence time. The key of Galileo HAS stands upon the high bandwidth of its E6-B channel, well suited to transmit PPP information, especially relevant for satellite clock corrections, which are not as stable in the medium and long term as the orbits.
  - ✓ Additionally, the use of **E5 AltBOC** pseudo-ranges (which are cm-level precise with maximum multipath effects in the order of 1 m) supports fast ambiguity resolution for carrier phase observations.
- **AMPERE consortium considers Galileo HAS as a solution for both aerial corridor mapping and image reconstruction due to:**
  - ✓ Adequacy of the **accuracy provision** to the application requirements: asset mapping is well served with decimetric accuracy given by PPP - thus, Galileo HAS -, and therefore, differential techniques are an overkill.
  - ✓ **Independence from Ground Based augmentation systems** (i.e. GNSS networks or local stations): this is key in developing countries, where GNSS networks might even be inexistent, and implies lower supporting infrastructure costs and risks.
  - ✓ Reasonable operational conditions: **convergence time in few minutes** fits adequately in RPA operations, where set-up times are around minutes.
  - ✓ **Minimal use or complete avoidance of ground control points**: thanks to the high, PPP-like accuracy, GCP number is much reduced on the achievement of geo-referencing accuracy

# Copernicus: urban planning and monitoring



**Copernicus Market Report , 2019: Copernicus data makes a difference in terms of update and resolution, but faces the challenge of international awareness and data continuity**





# Linking space to user needs



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