THE DRIVER+ ADVANCED CRISIS MANAGEMENT CONFERENCE
February 19, 2020, Brussels

driver+
Driving Innovation in Crisis Management
for European Resilience

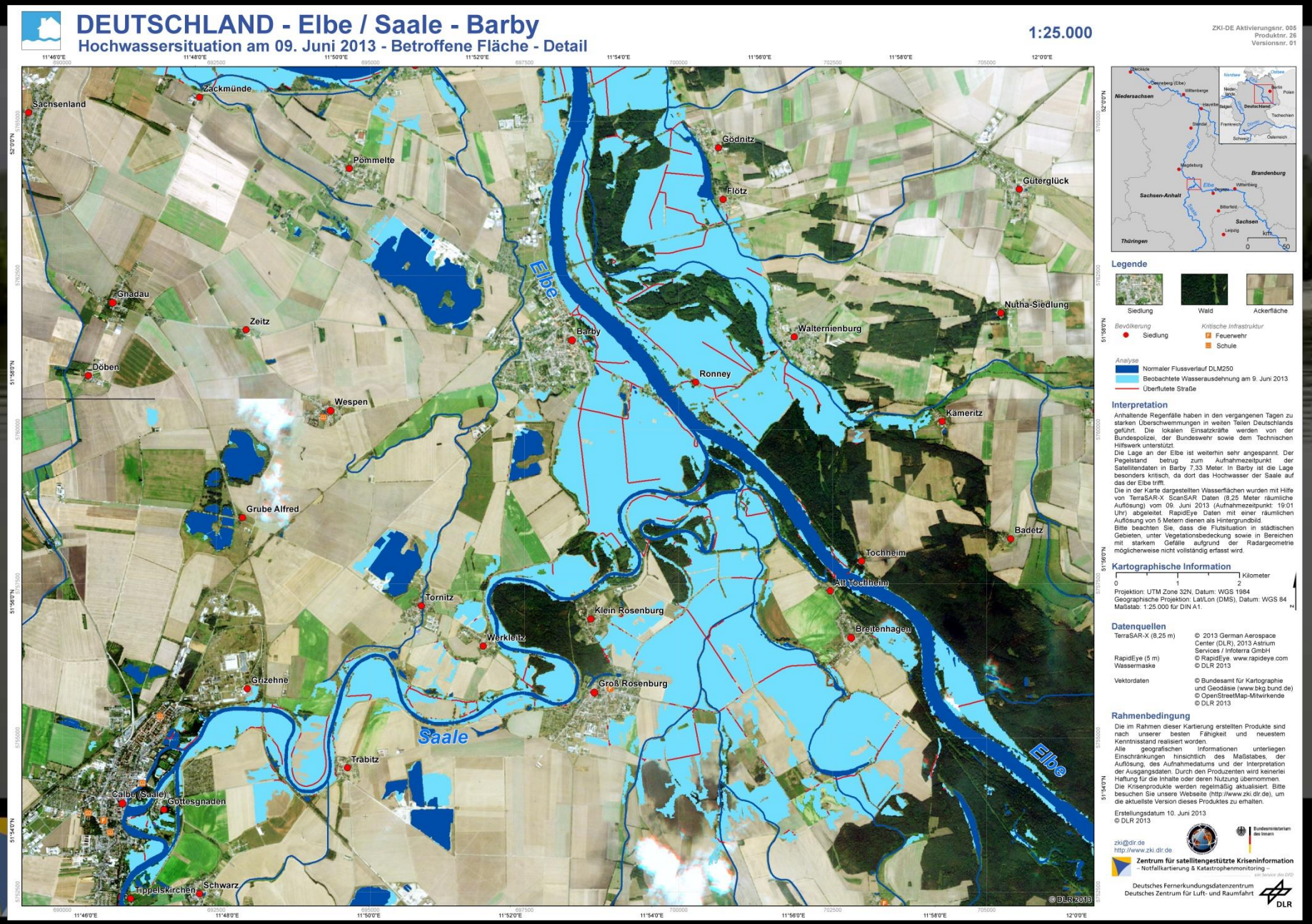
NEXT GENERATION EMERGENCY MAPPING

Konstanze Lechner, German Aerospace Center (DLR)

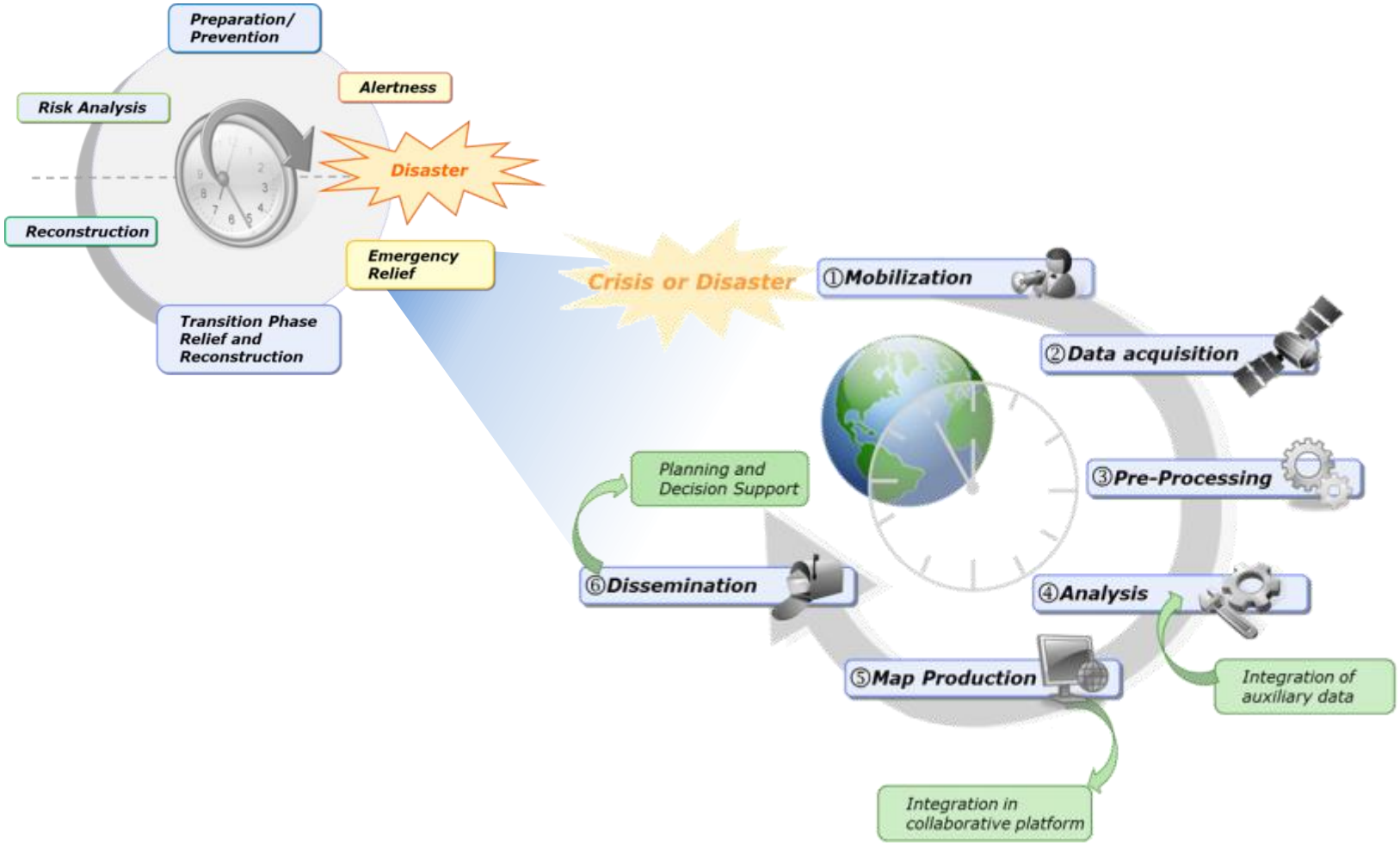
ZKI by DFD/DLR
Center for Satellite Based Crisis Information
– Emergency Mapping & Disaster Monitoring –
a service of DFD

DLR

Current Satellite based Emergency Mapping



Next Generation Emergency Mapping – Development at all stages



Disastermapping by UAV Nepal Earthquake 2015

- Videos
- Information on Damages
- 3D-Models

Credit: pix4D/DLR

UAV

Helicopter cameras, High-altitude pseudo-satellites (HAPS),…

4K-Camera-System

RGB aerial imagery

Water probabilities

Water mask

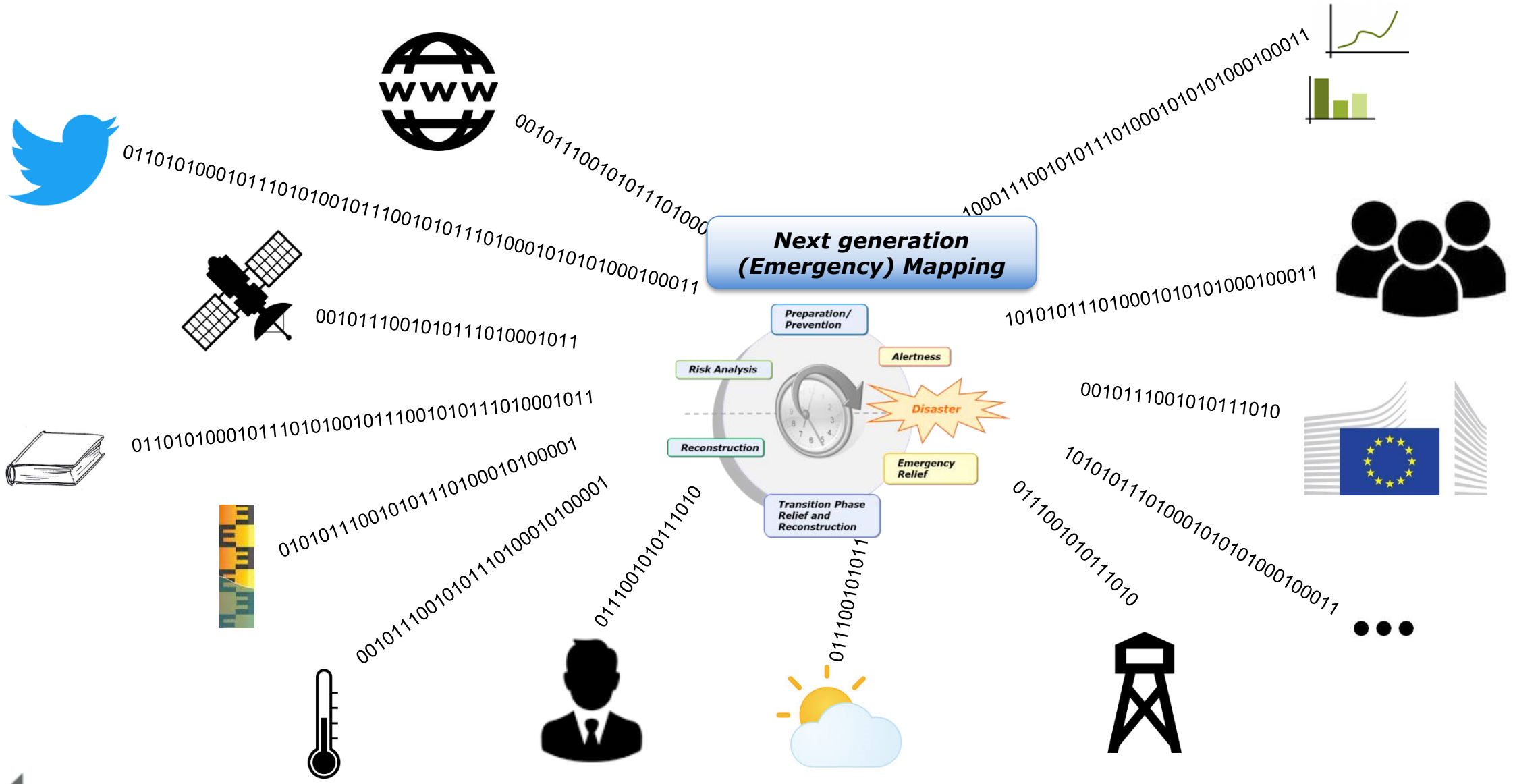
Source: ESA

Our digital environment has become a part of our habitat.

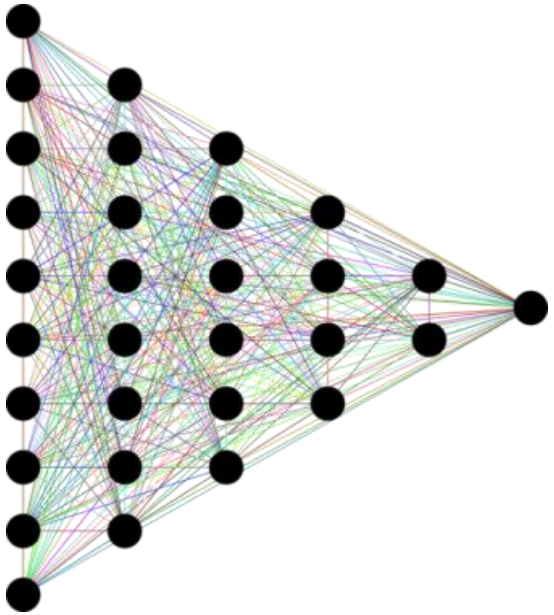
We are digitizing core elements of our every-day-life, such as general information access, media, news, press, science, literature, art (audio/visual), industry, sensors, devices, working environments, leisure… and connect everything though the Internet!

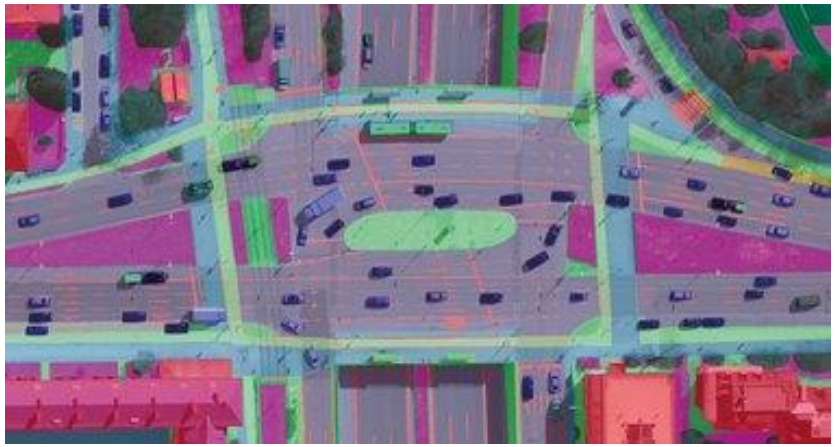
image credit: doyoutrustthiscomputer.org

Fusion of heterogeneous data source: EO, web based, governmental,…

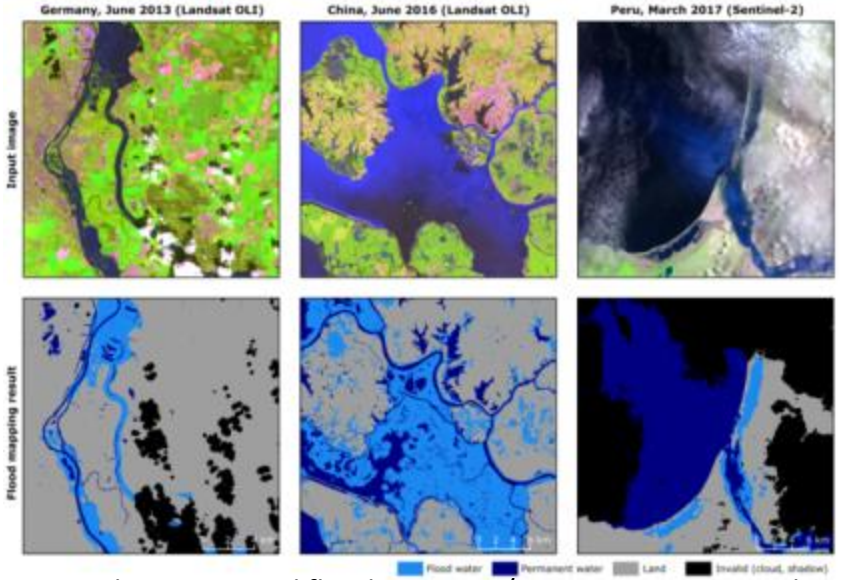


Machine/Deep learning, Big Data Techniques





Example: Automated segmentation of traffic related objects in aerial images



Example: Automated flood mapping / monitoring in optical satellite images

Cloud Computing

SENTINEL Hub by SINERGISE

esa

Copernicus Europe's eyes on Earth

CREODIAS

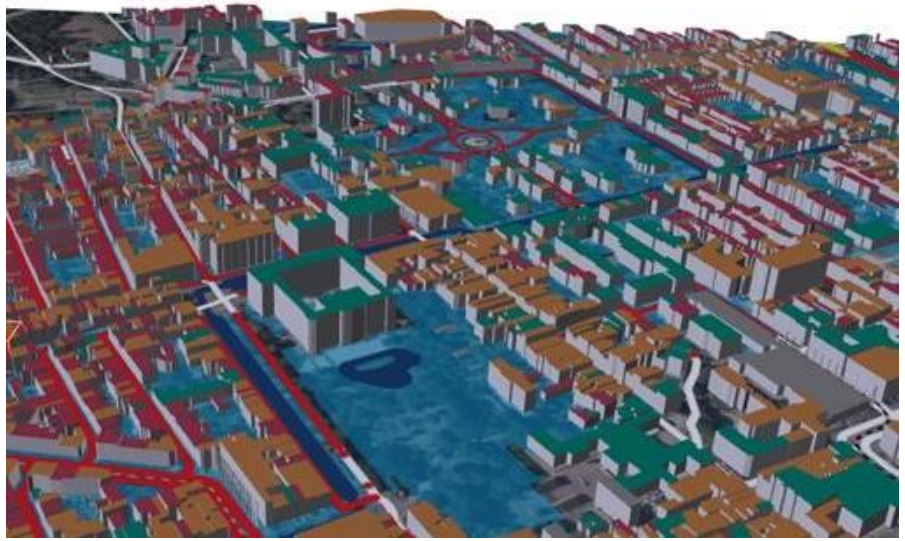
WWW.CREODIAS.EU

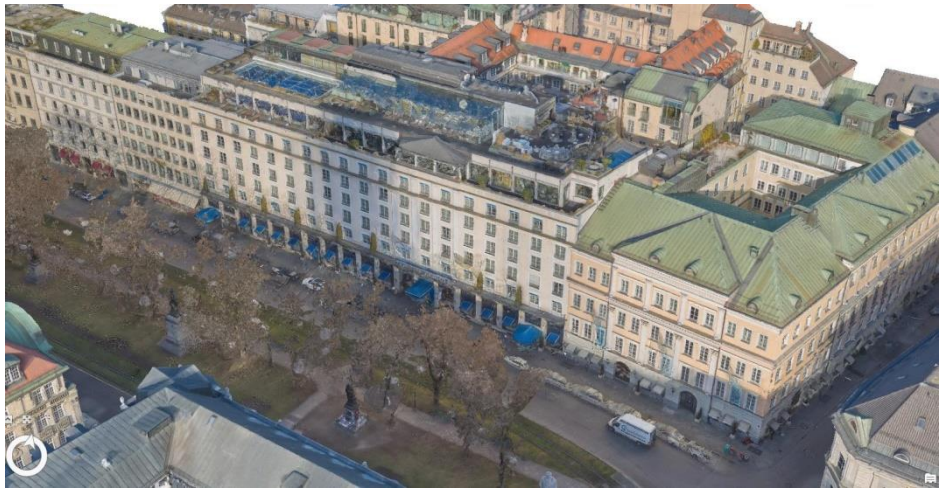
tep thematic exploitation platform

Credit: pixabay.com / DLR (IMF/DFD)

3D Elevation Model and Visualization

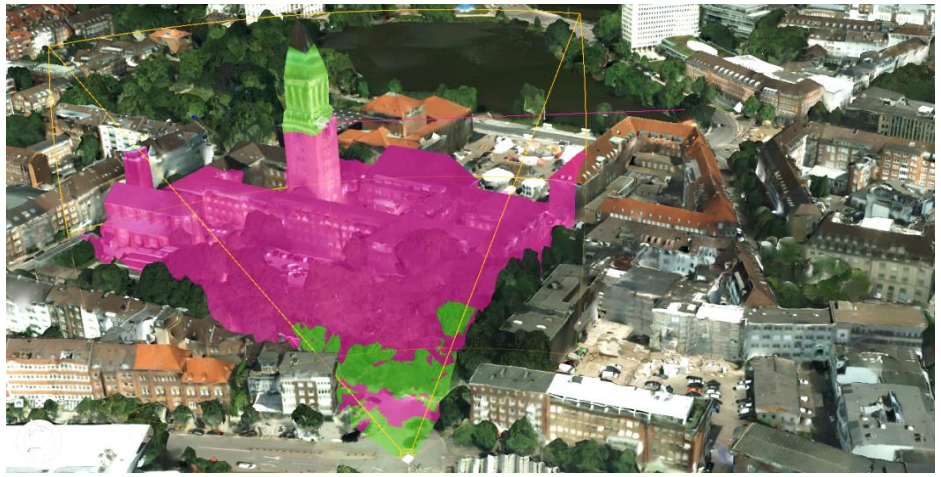
EU DRIVER+ Trial
2019, The Hague





Security Conference
Munich

Field of view analysis
City Hall, Kiel

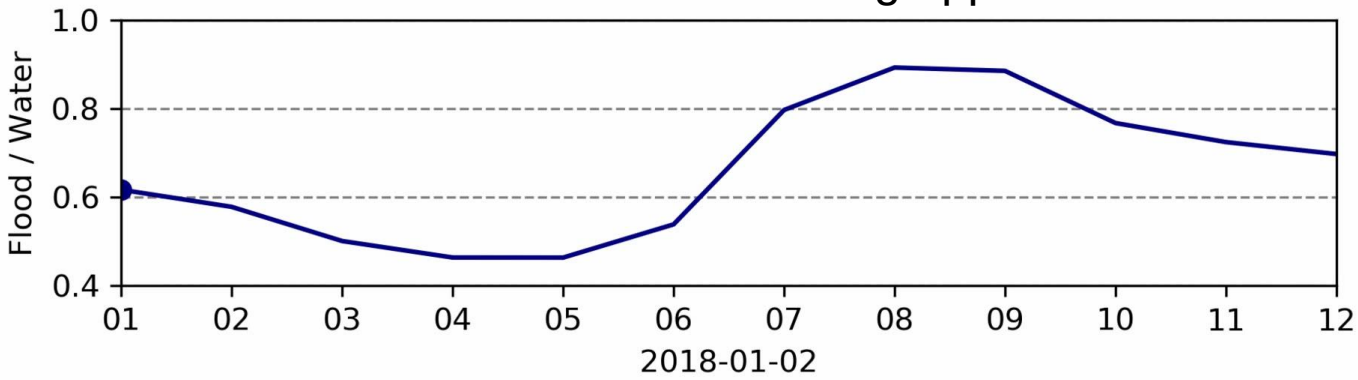


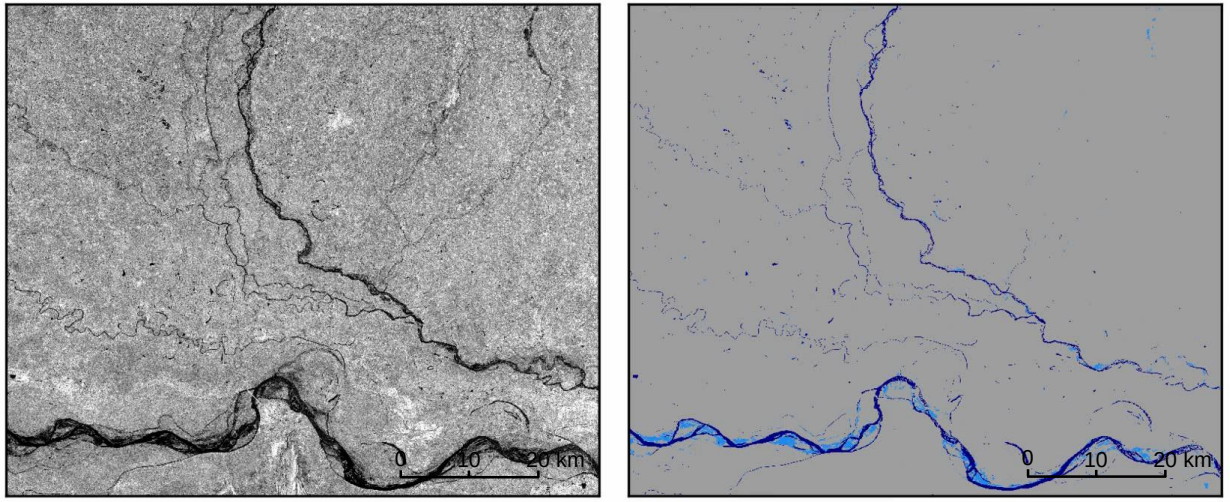
Near Real Time 3D Model
Neuschwanstein

Credit: DLR/IMF

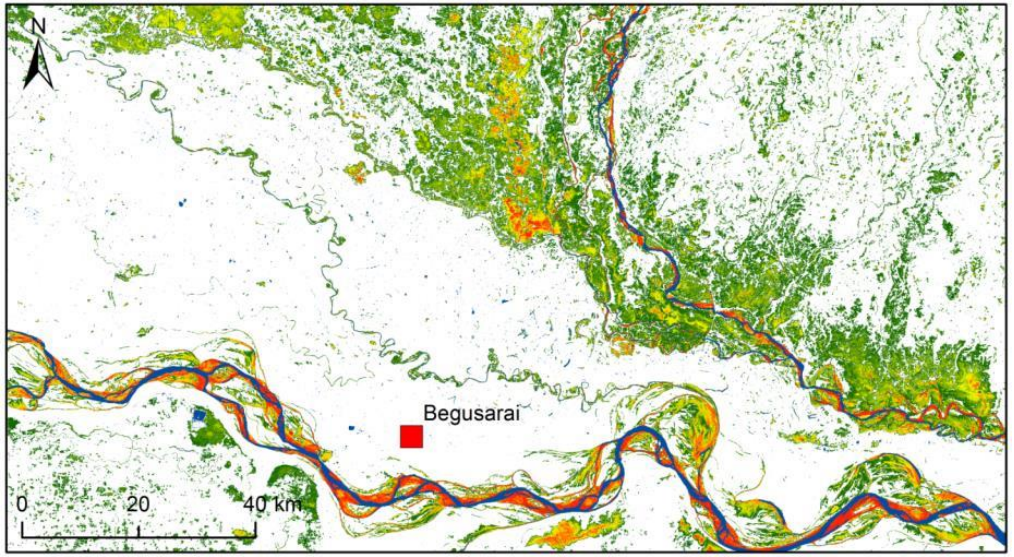
Dynamic data services / permanent monitoring

Multi-sensor flood monitoring application





Total flood duration: Bihar, India



Reference Water Mask

Total Duration [days]

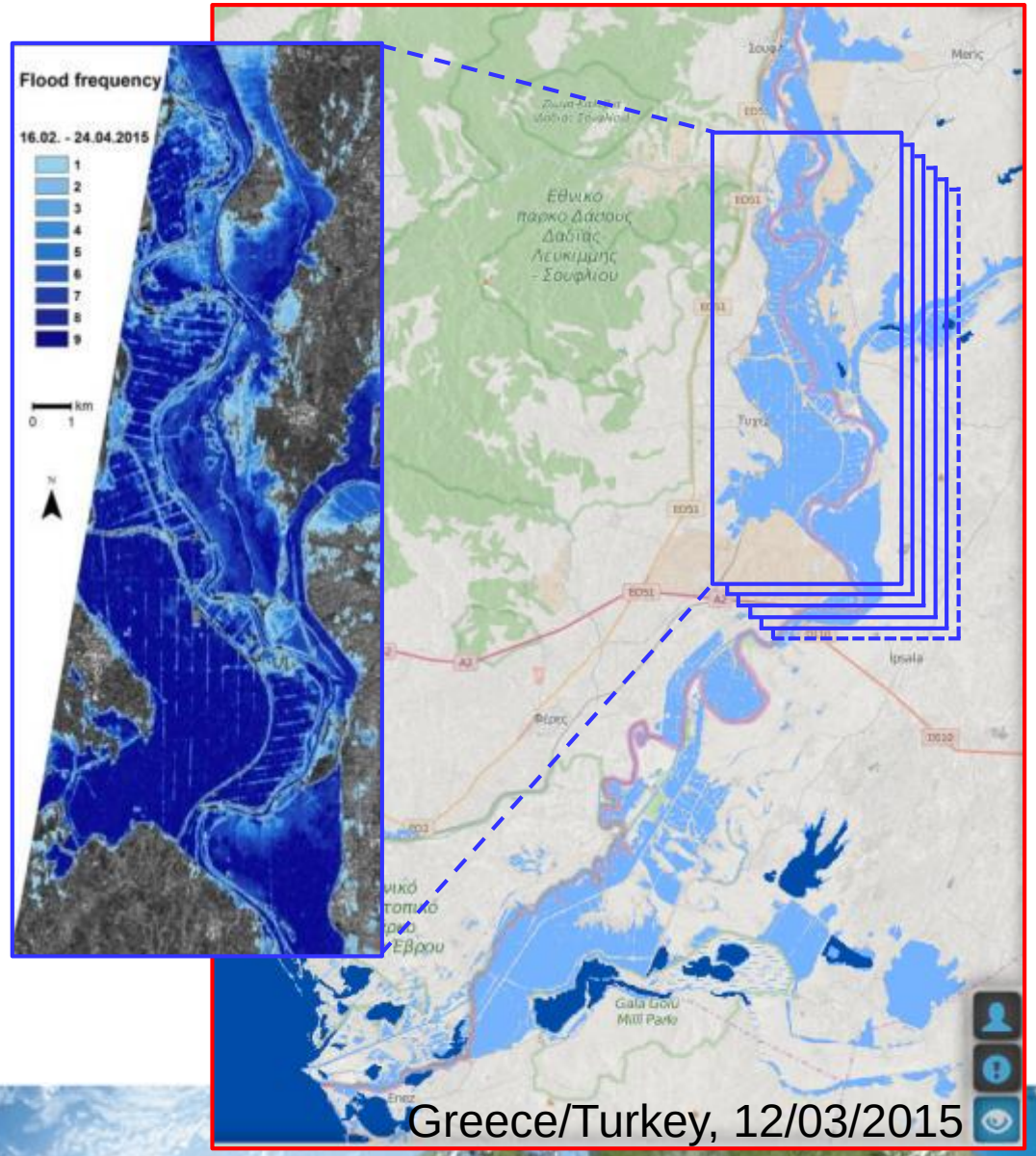
88

1

DLR systematic flood mapping with *Sentinel-1*

Characteristics

- Fully automatic service
- Systematic observation scenario
- Large-scale flood monitoring
- Spatial resolution: ~20x22 m (IW)
- Swath width: 250 km
- Repeat frequency: 6 days (Sentinel-1A/B)
- Revisit frequency: ~2 days (Europe)



Greece/Turkey, 12/03/2015

DRIVER+ Project and Trials

driver+
Driving Innovation in Crisis Management for European Resilience

To develop **a pan-European Test-bed** for Crisis Management capability development

To develop a comprehensive **Portfolio of Crisis Management Solutions**

To facilitate **a shared understanding** in Crisis Management across Europe

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Trials for Testing Innovations in Real Operational Environments

Trial Staff

Solution Providers

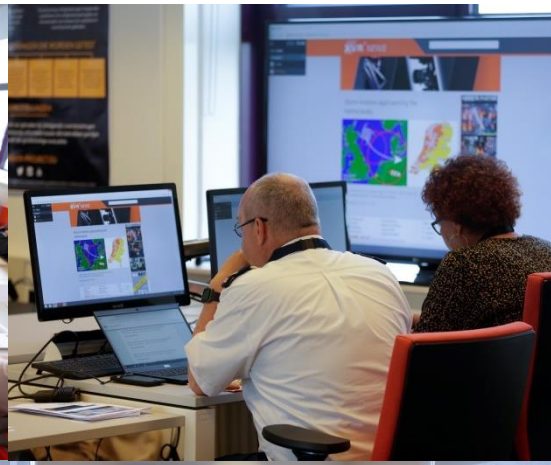
Practitioners

Visiting Guests

Observers

driver+ Consortium Members



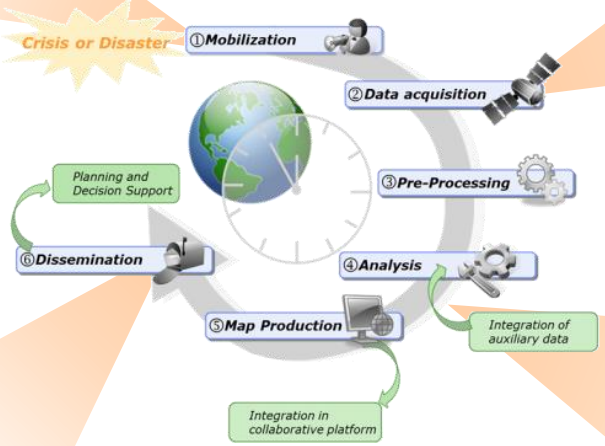
Next Generation Emergency Mapping

Bridging the gap between R&D and operations

- *Closer link to R&D in operational DM/CM*
- *Increase CEMS evolution*

Triggering of Data Acquisition and Mapping

- *Systematic satellite monitoring to pin-point drastic changes or disastrous events*
- *Multi-Source crisis/ disaster indicators*
- *Early Warning Systems*



Future Data Sources

- *Manned/unmanned Airborne Vehicles*
- *Satellite Constellations (Sentinels, Doves/Planet, SAR/OPTIC, Video)*
- *High altitude pseudo satellites (HAPS)*
- *Volunteered Geographic Information (VGI)*
- *Comprehensive Web Harvesting/Crawling*
- *Other data sources*

New ways of Visualisation and Dissemination

- *3D Visualisation*
- *Dynamic Visual Analytics, data fusion and data services*
- *Near Real Time Web Services*
- *APIs*

Innovative Analysis Techniques

- *Machine/Deep Learning*
- *Cloud based dissemination and processing*
- *Data fusion and statistics*
- *Citizen Science and Crowd Sourcing*
- *Global fusion of damage information*

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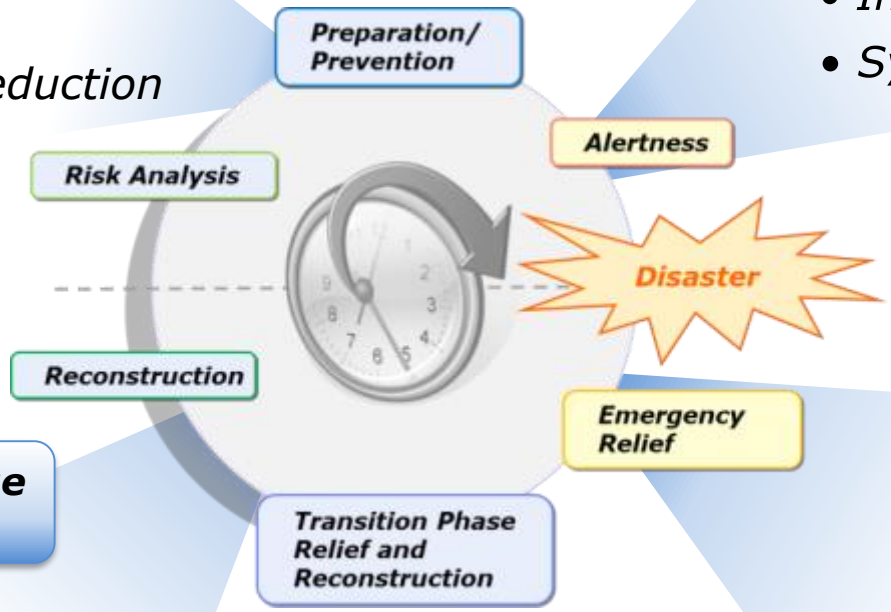
Increase focussing on full Disaster Cycle

Increased use of Earth Observation for Risk Assessment

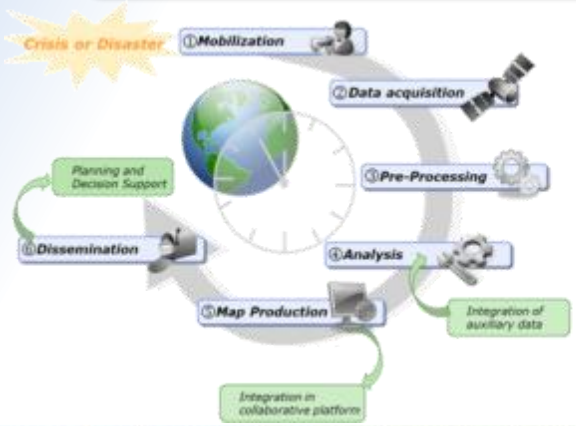
- *Systematic Hazard/Exposure and Vulnerability mapping*
- *Documenting disaster risk reduction (~Sendai reporting)*

Early Warning and Indicators

- *Multi Source Crisis Indicators*
- *Improved link with Early Warning Systems*
- *Systematic Flood Monitoring*



Next generation Emergency Mapping



Geospatially explicit Damage and Loss Assessment

- *Automated Damage Mapping*
- *Semi-automatic geospatial loss estimation*
- *Reconstruction Monitoring*

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Final Thoughts and Outlook

- Mapping of disasters will be **"multi-source" emergency mapping** in future
- **Possibilities will increase**: data availability, cloud systems, big data techniques, AI analysis methods, web sources...
- ...**complexity as** well.
- **Dissemination** will be **more dynamic**: towards services, information flows for situational awareness
- **Focus** not only in response phase (emergency mapping), but increasingly **full disaster cycle**; combine emergency mapping information with other data for addressing the whole disaster cycle
- **Closer link to R&D in operational DM/CM**; institutionalize link *to Horizon Europe Projects*, testbeds, trials, exercises...
- Increase **evolution and 'experimental' elements** in Cop EMS Service


ZKI
by DFD/DLR
THANKS FOR YOUR ATTENTION!
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