

Satellite remote sensing and recovery: the CEOS Recovery Observatory, a short overview Catherine Proy, Steven Hosford, Patrice Benarroche, CNES

Hurricane Katrina
2005



Deepwater Horizon
2009



Indonesian Tsunami
2004



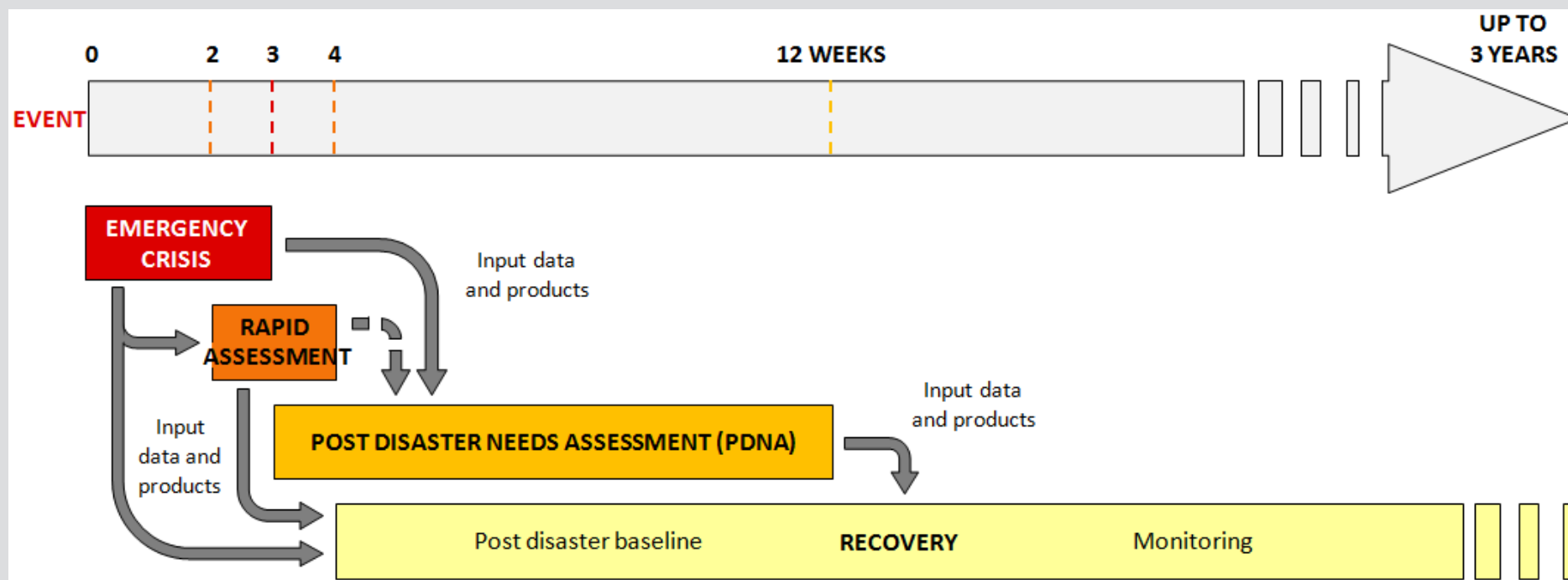
Haiti Earthquake
2010

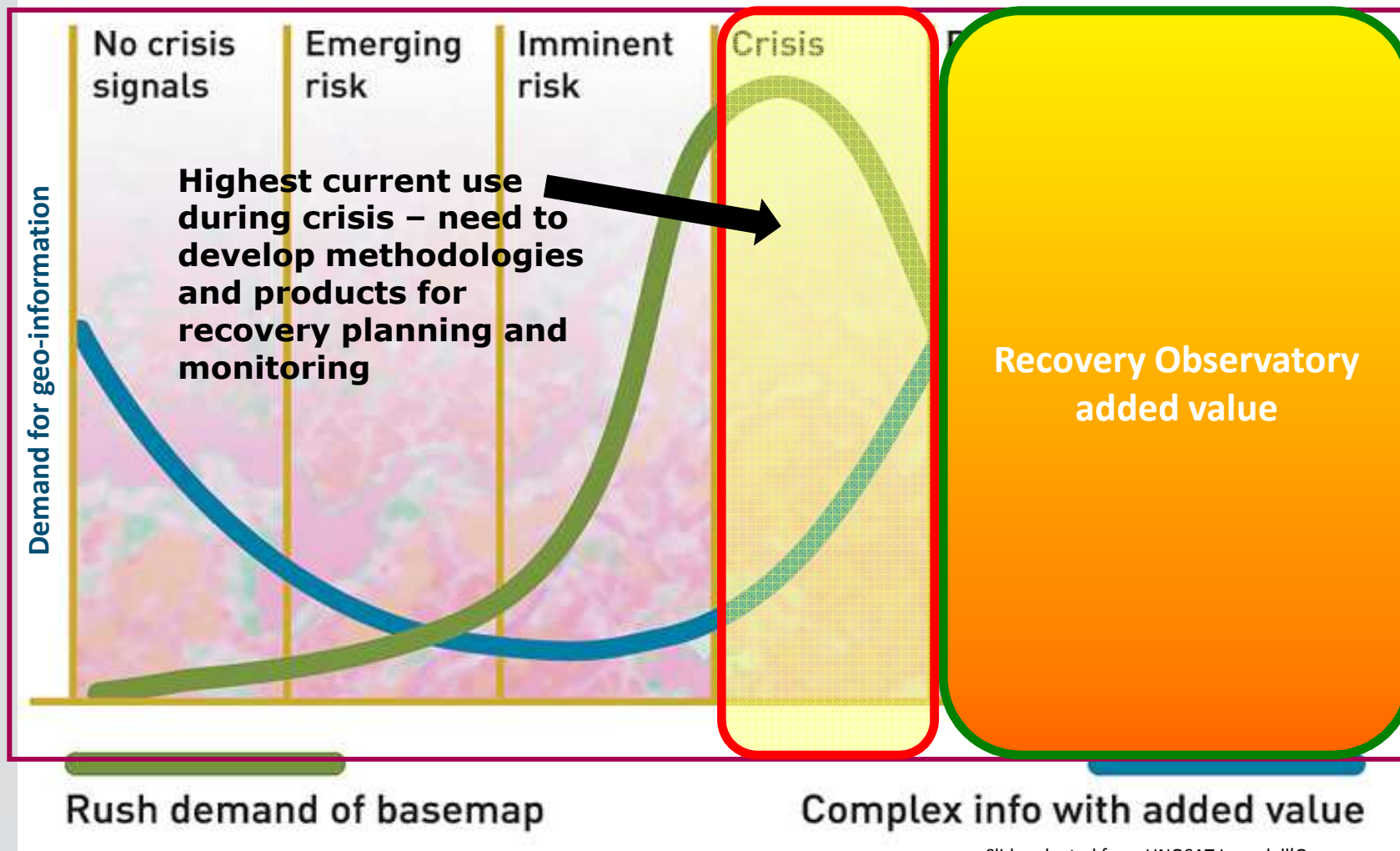


Tohoku Tsunami
2011

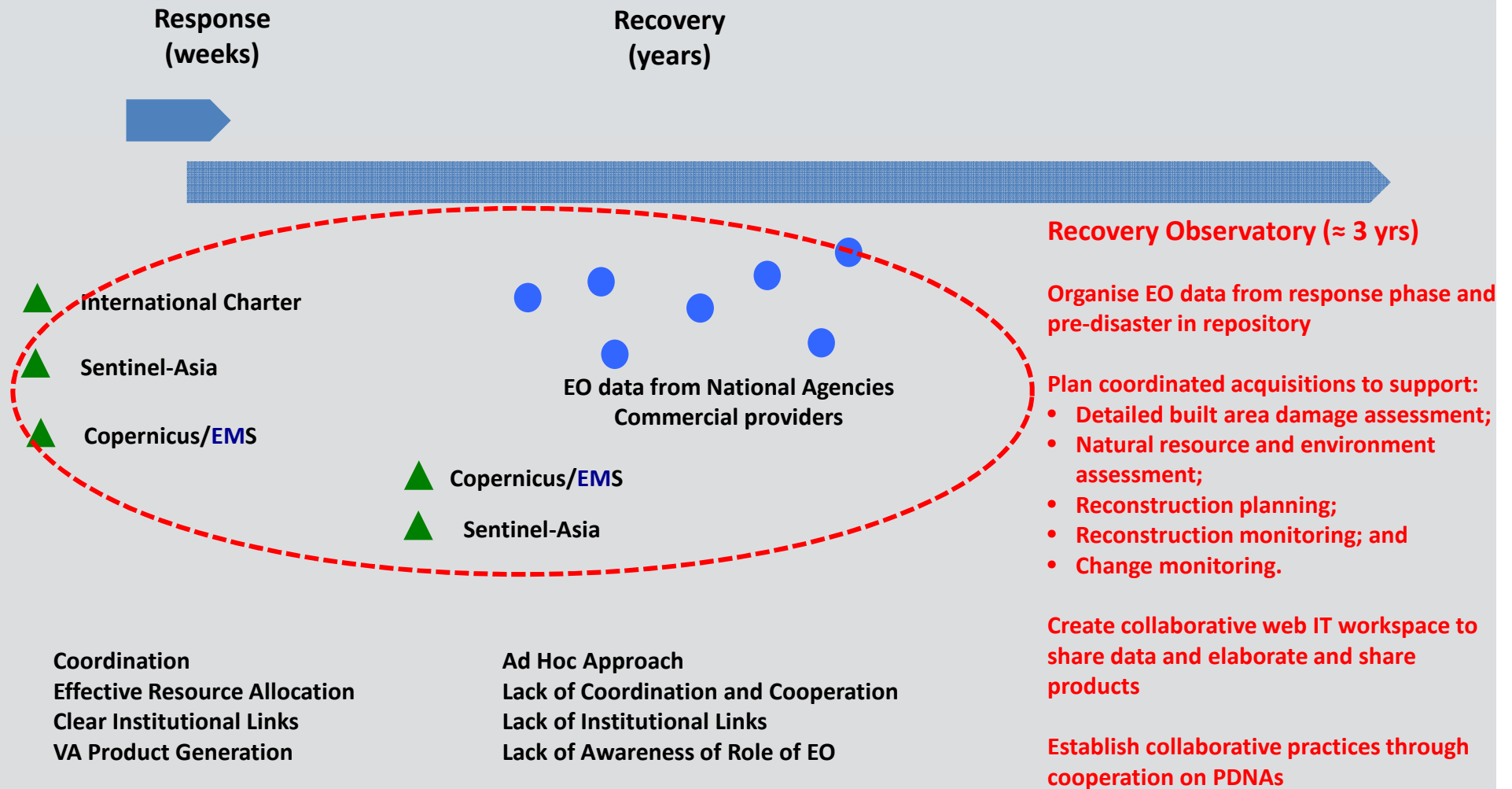


Rapid Assessment vs Recovery Planning and Monitoring





Slide adapted from UNOSAT Luca dell'Oro



Collection of images and maps at several scales



Overview area

Mid-scale products from Sentinel data at 10m resolution

- Change in landcover, open spaces
- Loss of vegetation
- Vegetation re-growth
- Agriculture

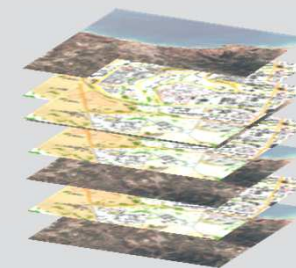
Update frequency:
every 10 days to 6 months

Urban zooms

Large scale products from very high resolution data

- Buildings
- Infrastructure
- Camps

Update frequency:
every 2 to 4 months



- **Demonstrate in a high-profile context the value of using satellite Earth Observations to support Recovery from a major disaster:**
 - near-term (e.g. baseline for recovery); and
 - long-term (e.g. major recovery planning and monitoring, estimated to be about 3 years).
- **Work with the recovery community to define a sustainable vision for increased use of satellite Earth observations in support of recovery.**
- Establish institutional relationships between CEOS and stakeholders from the international recovery community.
- Foster innovation around high-technology applications to support recovery.

- Create an easy to access, interactive forum for recovery users to access data and information products, exchange on results and objectives, and generally better understand how EO can support long-term recovery planning and monitoring;
- Serve as a focal point for satellite image experts and local specialists to better serve the region and answer local needs effectively;
- A source of shared value to foster the development of tailor-made information;
- A link to mobilize public institutions and stakeholders around recovery goals.

CEOS Space agencies:

CNES – chair (Catherine Proy and Steven Hosford)
ASI (Simona Zoffoli)
DLR (Jens Danzeglocke)
ESA (Ivan Petiteville)
JAXA (Chu Ishida and Nobuyoshi Fujimoto)
NASA (David Green and Stuart Frye)
USGS (TBC)

DRM Stakeholders:

World Bank/GFDRR (Joe Leitmann, Keiko Saito and Tahir Akbar)
UNDP (Chiara Mellucci)
European Commission (Francoise Villette and Peter Spruyt)
UNOSAT (Olivier Vandamme and Einar Bjorgo)

Other partners:

CURBE (University of Cambridge, Emily So)
COPE (University of Copenhagen, Nathan Clarke)

Secretariat support provided by Athena Global (Andrew Eddy)


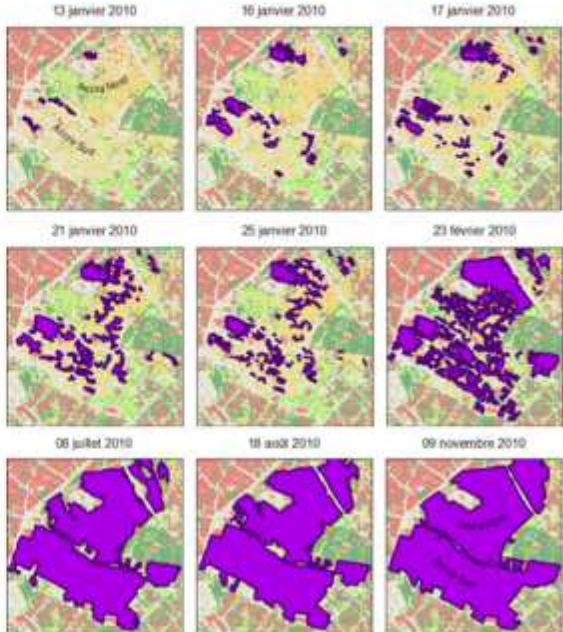
Membership is open to all CEOS agencies with an interest in the RO.

Associate Members are from donors and DRM stakeholders, and value-adding partners.

- National end users (government of affected area with mandate for recovery and reconstruction and other government ministries)
- International humanitarian GOs and NGOs with interest in reconstruction (e.g. IFRC, OCHA)
- International stakeholders with interest in post-disaster needs and recovery/reconstruction financing (e.g. GFDRR, UNDP, EU/Copernicus EMS Risk and Recovery, UNEP)
- Satellite data providers (CEOS agencies, commercial providers)
- Value-added product generators (academia, research institutes, companies, specialised organisations (e.g. UNOSAT))

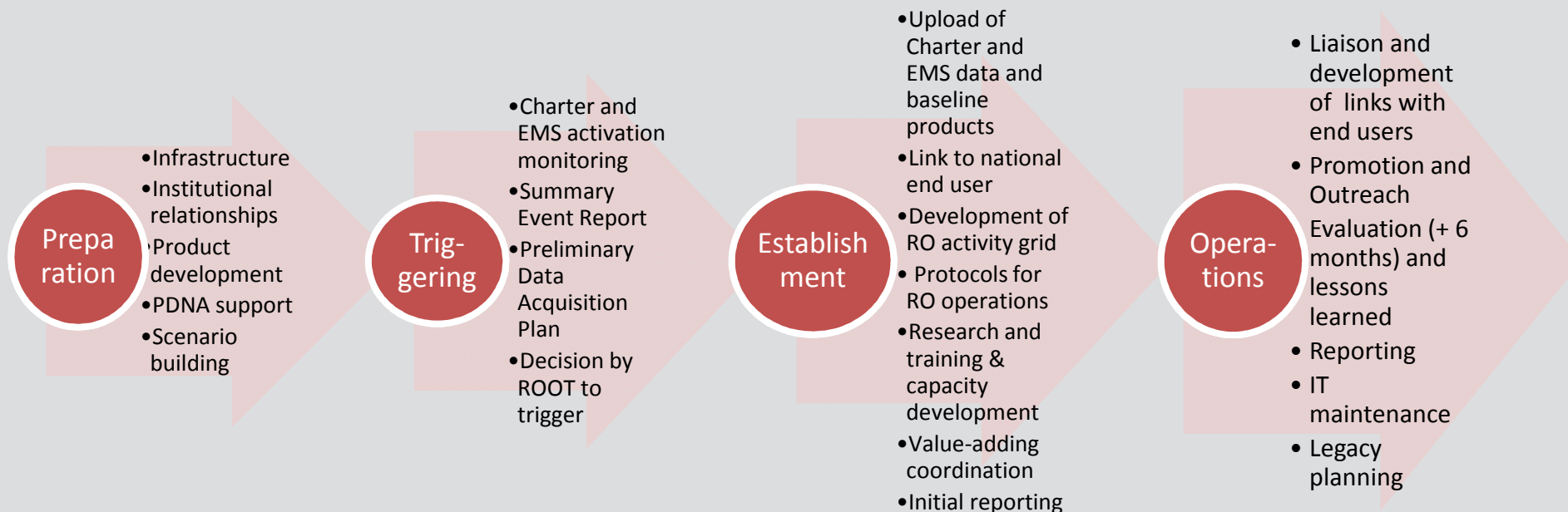
	Baseline mapping	Monitoring
Buildings, shelters	<ul style="list-style-type: none"> • Buildings footprint mapping • Building attributes (roof type, height indication, collapsed or partially collapsed) • Indicate density of damaged buildings • Urban blocks with indication of damage 	<ul style="list-style-type: none"> • Building removal and construction • Change in urban land use, morphology and density • Indicate type of dwelling reconstruction
Camps	<ul style="list-style-type: none"> • Location of spontaneous and organized gathering areas • Location of temporary dwellings • Land use, open spaces 	<ul style="list-style-type: none"> • Camp removal and installation • Tent removal and installation • New land use / open spaces
Transport	<ul style="list-style-type: none"> • Accurate transport network mapping with detailed metadata (type, damage level) • Accessibility analysis • Proximity analysis • Traffic activity analysis 	<ul style="list-style-type: none"> • Rebuilt transport facilities • New transport facilities • Removal of transport facilities • Accessibility analysis • Proximity analysis • Traffic activity analysis
Infrastructures	<ul style="list-style-type: none"> • Mapping of utilities and services infrastructures (administration, education, healthcare, power - water - sanitation facilities...) with detailed metadata (type, level of damage) 	<ul style="list-style-type: none"> • Recovered infrastructures • Infrastructure removal and construction
Environment	<ul style="list-style-type: none"> • Landcover, open spaces • Affected landcover (e.g. burn scar with fire damage severity...) 	<ul style="list-style-type: none"> • Change in landcover, open spaces • Indicate loss of vegetation • Vegetation re-growth
living Topography	<ul style="list-style-type: none"> • Risk analysis (vulnerability to flood, to water run-off risk, to soil erosion...) 	<ul style="list-style-type: none"> • Risk analysis

Examples of products already delivered within recovery work (SERTIT)

Baseline mapping	Monitoring
<ul style="list-style-type: none"> ⇒ Up-to-date topographic map of an affected area ⇒ Detailed event analysis ⇒ Spatial analysis of event ⇒ Specific sites of interest ⇒ Potential hazard map ⇒ Potential settlement sites 	<ul style="list-style-type: none"> ⇒ Development monitoring ⇒ Development analysis comparing the new developments with potential hazards
 <p data-bbox="533 1310 1048 1342">Ex. Vulnerability of buildings to run-off risk</p>	

Data/product selection and metadata display





Recovery Observatory ready for triggering since 1 January, 2015

- collaboration attempted on Cyclone Pam (Vanuatu – see Lessons Learned Report), highlighting possible contradictions between Rapid Assessment and Recovery support;
- possible further collaboration (recovery monitoring product demonstration before RO?) early 2016 to establish operational linkages;
- triggering of the RO after a major event (in 2016);
- evaluation at RO + 6 months;
- lessons learned and sustainability strategy after evaluation of 1st RO

- Significant resources exist within the satellite community to support recovery objectives;
- Some useful applications have already been developed but are not well-known to the User community;
- There is a general lack of awareness of what is possible and how to obtain data and products;
- Perception that satellite work is principally useful for rapid assessments, and lack of understanding of how satellites can contribute over long-term;
- Need for :
 - Improved ‘showcasing’ of results for uptake within the USERS
 - inclusion of resources in recovery planning activities.

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