GEOSS Architecture for the use of Remote Sensing Products in Disaster Management and Risk Assessment *(GA.4.D)*

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ESTO
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CEOS
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GEO
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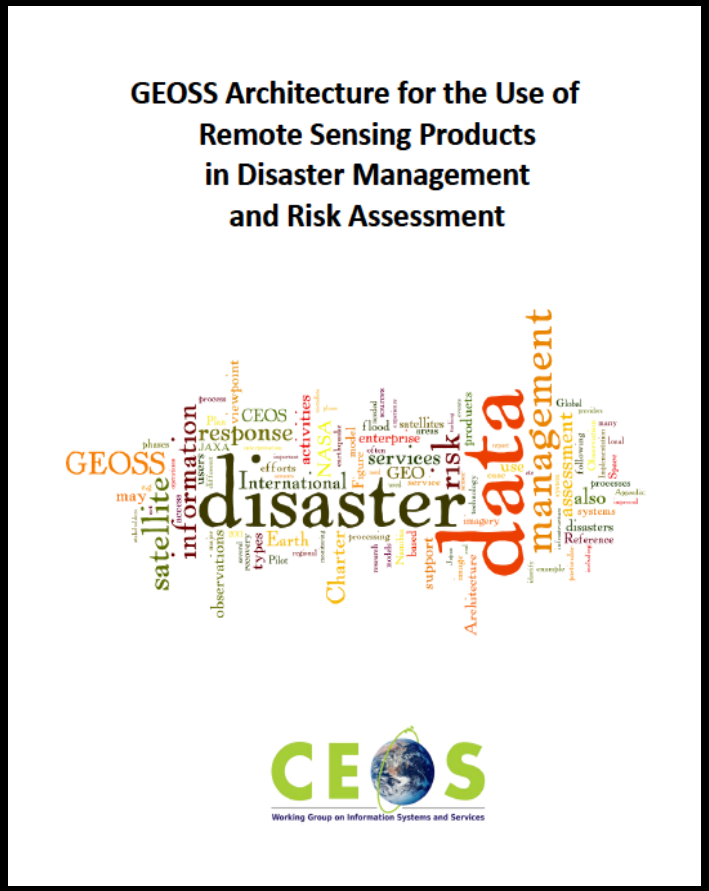
GA.4.D Objectives

- Boost effectiveness, efficiency of satellite observation support to disaster management
  - Get beyond *ad hoc* arrangements
- *New suppliers:* clarify how to contribute data & services
- *New users:* clarify how to tap into these data & services
- *Planners:* clarify what resources are
  - Shared · Missing · Interdependent · Isolated
- Provide a precise, common understanding of processes, information & computing resources, and user needs
- Establish partnerships, standards, shared vocabulary, etc., in advance of disaster events

GA.4.D version1.0

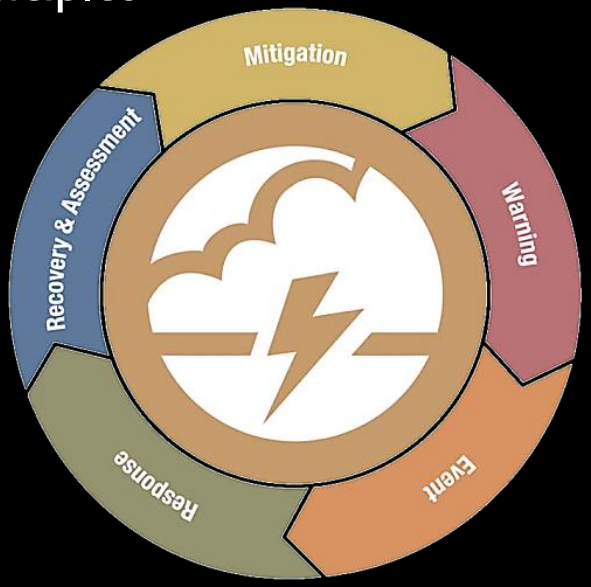
- Arch. Document released Dec. 2013
  - review by CEOS, UN-SPIDER, others



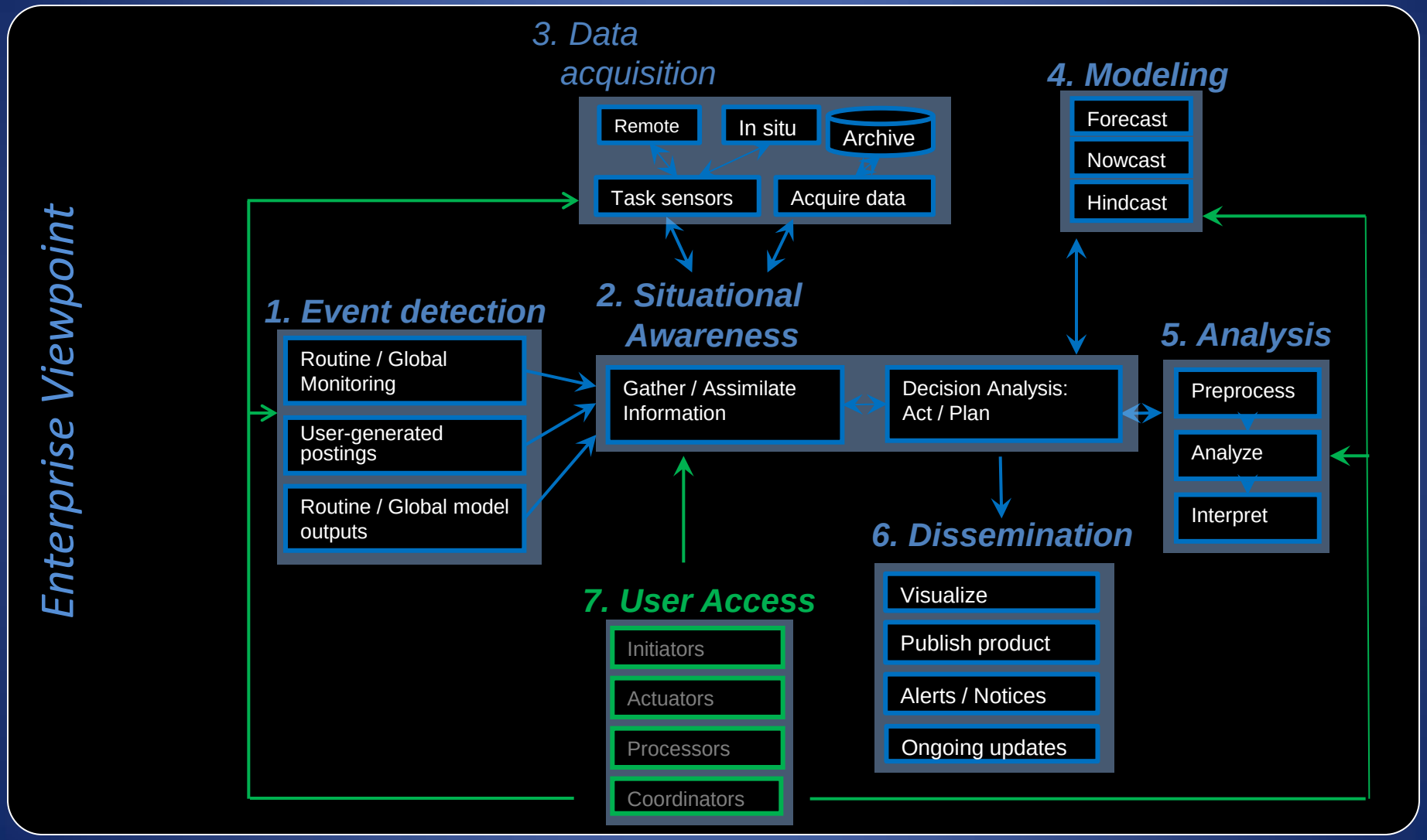
Scope, purpose, structure

Enterprise Viewpoint

- Scope & purpose based on
  - GEO Task DI-01 · GEOSS Strategic Targets
- Consistent with GEOSS principles
  - System of Systems · Data Sharing Principles
  - Interoperability Arrangements
- Lifecycle phases
  - Mitigation · Warning
  - Response · Recovery
- Hazard types
  - Flooding · Earthquakes · Volcanoes
  - Drought · Windstorms · Landslides
  - Wildfires · Tsunamis



Activities (business processes)



Applying the Information & Computation views

Information needs by disaster type and phase

	Warning	Response	Recovery	Mitigation
Wildfire				
Windstor				
Flood				
Landslide				
Tsunami				
Volcano				
Earthquak				
Drought				

Computing needs by disaster type and phase

	Warning	Response	Recovery	Mitigation
Wildfire	*Predict rainfall, humidity, winds; assess ecological conditions (e.g., soil humidity)*	*Locate and assess impacts using before / after imagery.* *Optimize response / relief dispatch* *Provide essential public information, targeted by location*	*Assess damage locations and extent; estimate rebuilding / recovery costs.* *Review and improve information technology and communications preparedness.*	*Compute (fire / flood / landslide, …) risks from long-term trends & generate risk maps.* *Simulate effects of revised land-use policies and/or building codes.* *Improve modeling, prediction, sensing, and assessment capabilities*
Windstorm	*Predict storm activity vs. settlements & infrastructure*			
Flood	*Assess / predict cumulative rainfall, flow, flooding; assess storm surge extent under various scenarios; overlay w/ infrastructure, settlements to pinpoint risks*			
Landslide				
Tsunami	*Predict coastal surge areas from offshore seismic events; provide location-specific, real time guidance*			
Volcano	*Process SAR observations to detect deformations. Estimate strain rates from satellite observation time series.*			
Earthquake				
Drought	*Detect / predict seasonal weather anomalies; overlay w/ populations to initiate relief aid*			

New technologies and architecture viewpoints

Information viewpoint

Data collection:

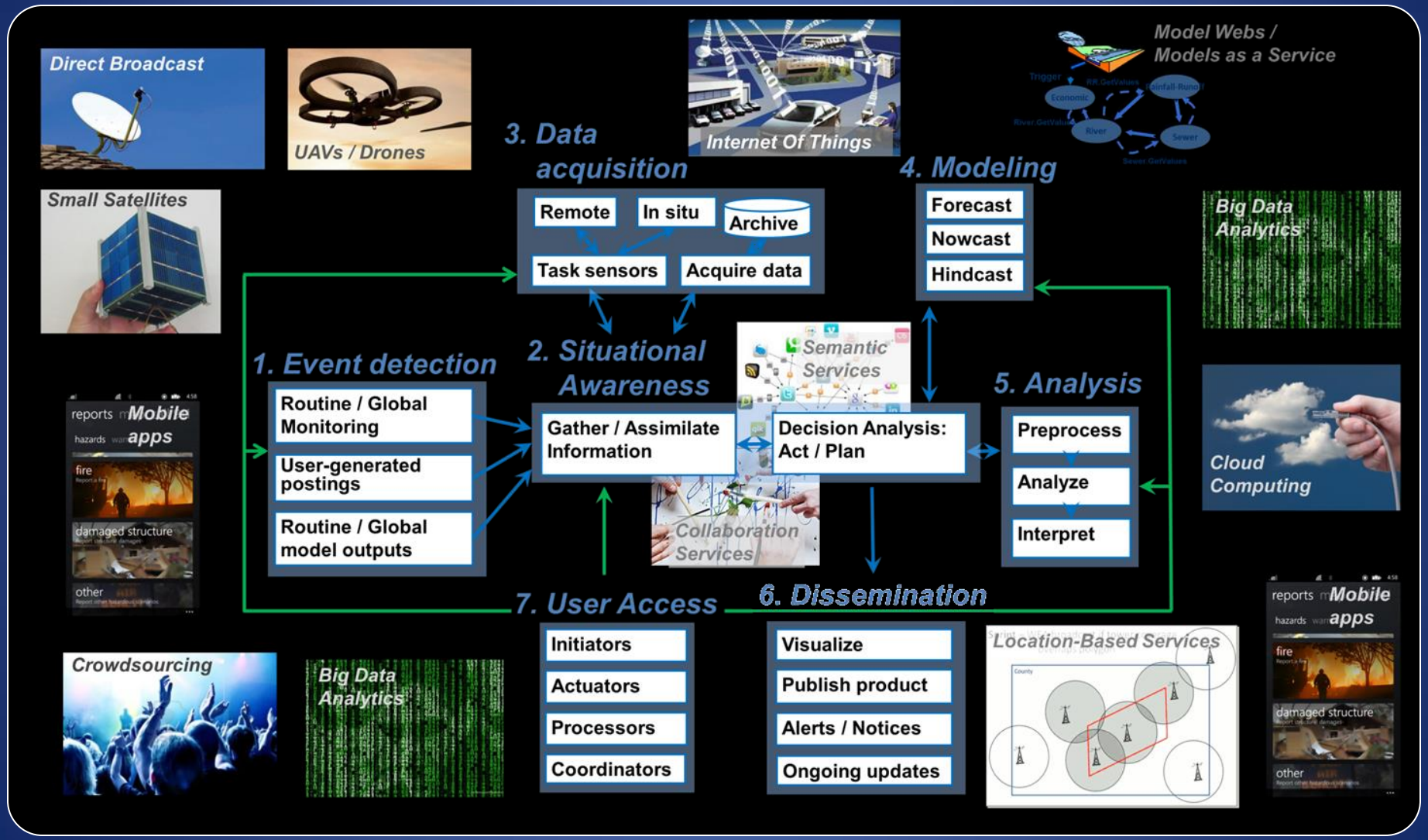
- Small Satellites
- Drones (UAVs)
- Direct Broadcast / Direct Readout
- Mobile devices
- "Internet of Things"
- Crowdsourcing

Computation viewpoint

Data processing:

- Model Webs
- Cloud Computing
- Big Data analytics
- Semantic services
- Mobile devices
- Location-based services
- Collaborative services

Disaster Risk Management Activities and emerging Earth Science Technologies



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Architecture streamlines integration of new technology

- Understand / develop / adapt technologies with greatest likely impacts on disaster management
  - Not "frozen" in current practice
  - Not embracing new toys mindlessly
- Clarify what new analytical or operational capabilities become feasible
  - New Technologies may also allow (or require) changes to the architecture
- Rely on widely-adopted, consensus-based standards
  - Information semantics
  - Data formats
  - Service definitions
  - Software interfaces