JRC
EUROPEAN COMMISSION

Z_GIS

Validation of geo-information products for crisis management

Second international workshop
JRC Ispra, 12-13 October 2010

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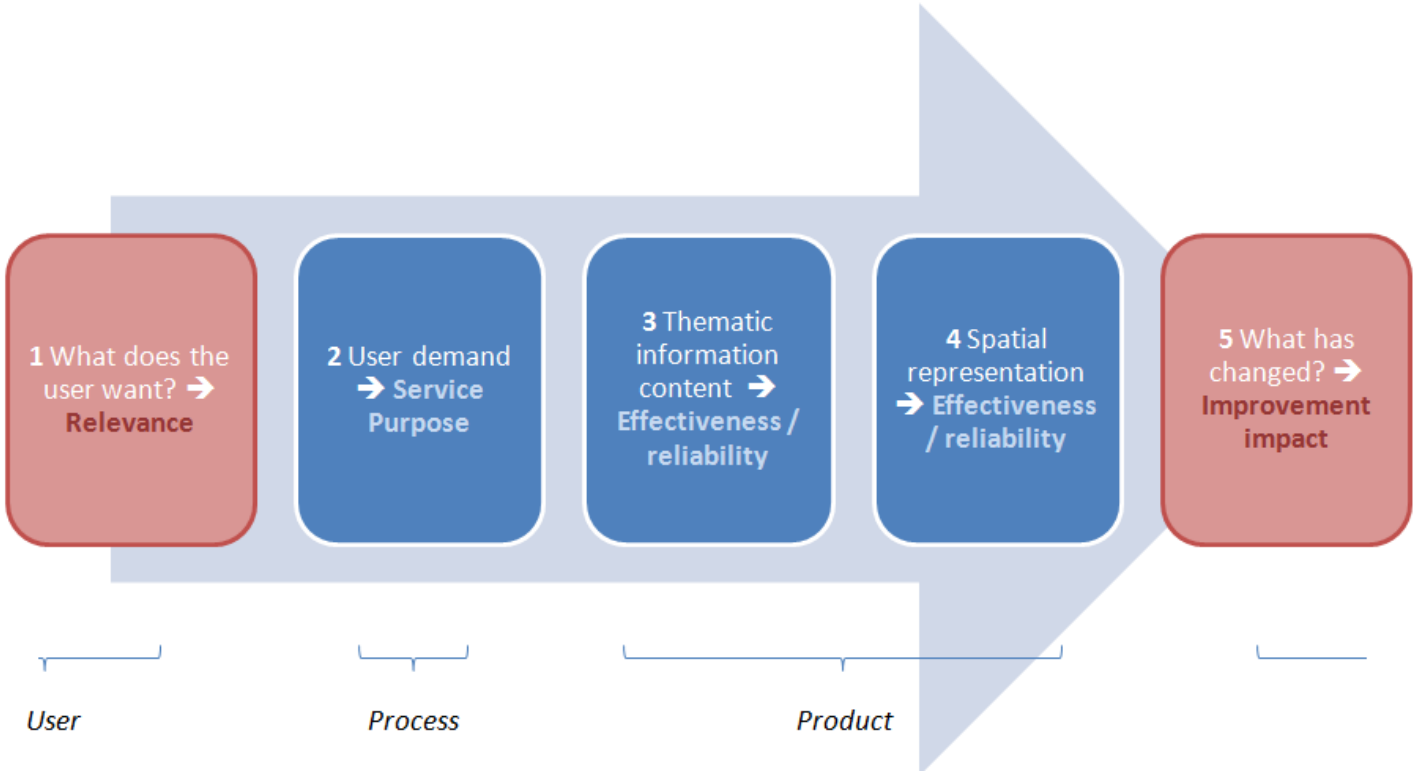
What is a ‘validated’ service/product?

A validated product/service should withstand criticism or objections of the user. Furthermore it should be proven sound, robust and correctly derived. The key questions to be answered in validation can thus be framed as:

- Are we doing the right thing? I.e. is the product/service **relevant** to the user?
- Are we doing the right thing right? Is our product/service **sound, effective, robust**?

What is the process?
Quality issues



VALgEO 2010 Sessions

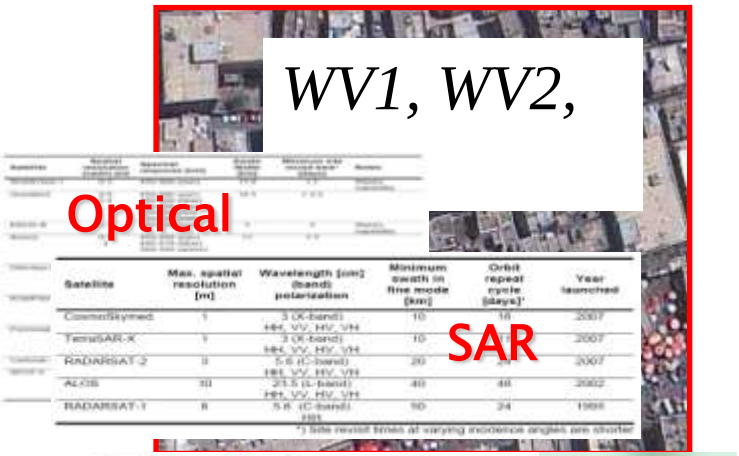
- VALIDATION OF CRISIS GEO-INFORMATION FOLLOWING THE DISASTERS OF 2010
- BEST PRACTICES IN VALIDATION AND QUALITY ASSESSMENT OF RAPID CRISIS GEO-INFORMATION
- VALIDATION AND QUALITY CONTROL OF NEW WEB-BASED SOURCE, SOCIAL NETWORKING AND CROWD- SOURCING TOOLS FOR MAPPING OF CRISIS INFORMATION
- READABILITY OF CRISIS INFORMATION: IMPLEMENTATION AND EVALUATION OF METHODS OF DYNAMIC CARTOGRAPHIC VISUALIZATION

Why Validation?

- Increasing availability of relevant Data Sources, Services and Technologies

Yesterday

Today



Tomorrow

Where is the Knowledge we have Lost in Information?

Sanjana Hattotuwa (2010)

The validation protocol sections

- ✓ **Reliability of information content**
- ✓ **Consistency of information support**
- ✓ **Usability of the product**
- ✓ **Efficiency of the service**

Reliability of information content

- ✓**Reliability of information content**
- ✓Consistency of information support
- ✓Usability of the product
- ✓Efficiency of the service

Is the information content free of errors, complete, i.e. **close to the "truth"?**

Need of reference data

Attribute examples

- Thematic accuracy
- Positional accuracy
- Semantic definition of information content
- Time gap
- Credibility of source/provider
- …

Consistency of information support

✓Reliability of information content

✓Consistency of information support

✓Usability of the product

✓Efficiency of the service

Is the product **(structure) coherent and consistent?**

No need of reference data

Attribute examples:

- Positional consistency across features
- Time gap across features
- Consistency between map and legend symbols
- Topological consistency (datasets)
- Attributes consistency (datasets)
- …

Usability of the product

✓Reliability of information content

✓Consistency of information support

✓**Usability of the product**

✓Efficiency of the service

Is the product useful and informative, i.e. will the user be able to **get the information contained** in the product?

Attribute examples:

- Coverage of the area of interest
- Presence and pertinence of cartographic elements
  - Overview map, Scale…
- Readability
- Media Used
- Constraints to distribution
- …

Efficiency of the service

✓Reliability of information content

✓Consistency of information support

✓Usability of the product

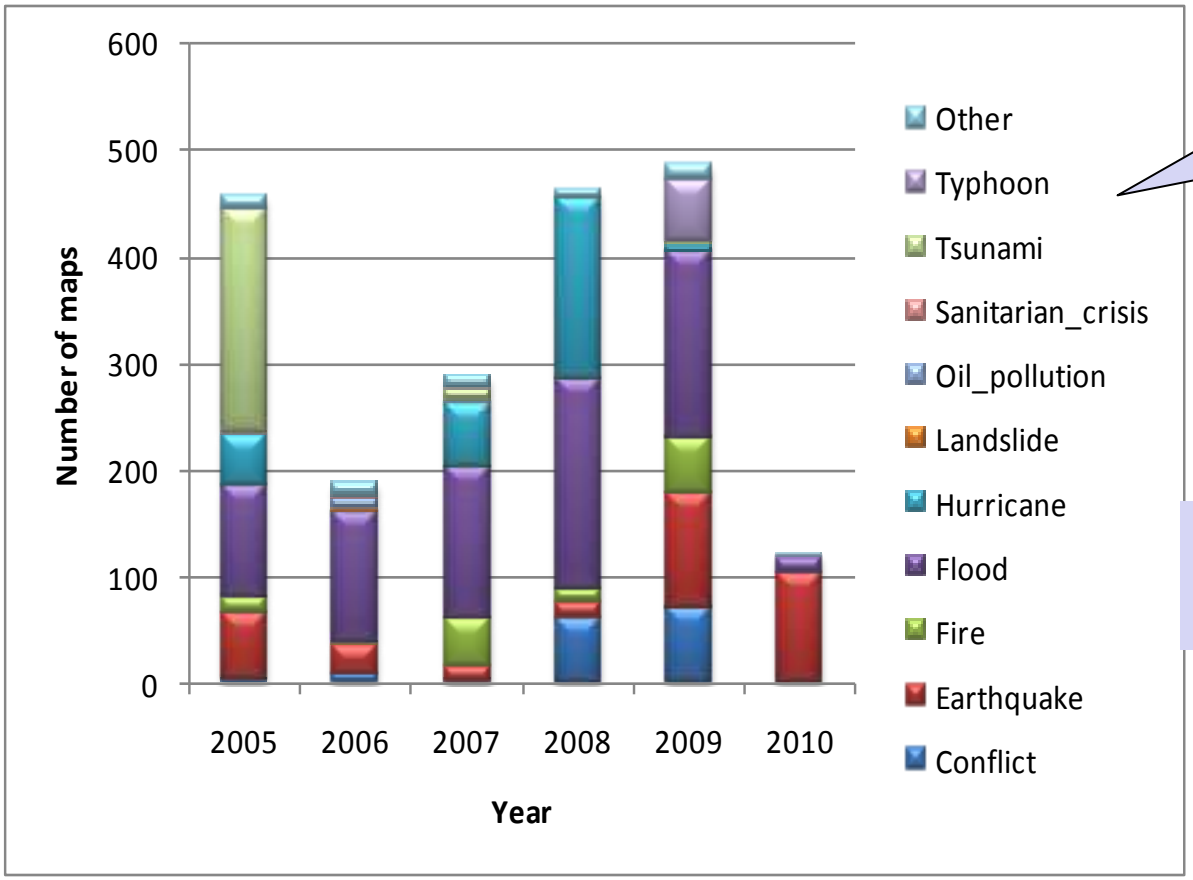
✓**Efficiency of the service**

Will the service infrastructure be able to **correctly deliver the product**?

- **Attributes**
- Delivery time
- Delivery cost
- Technical support
- Frequency of update
- Integrity

Crisis Maps production during 2005-2010

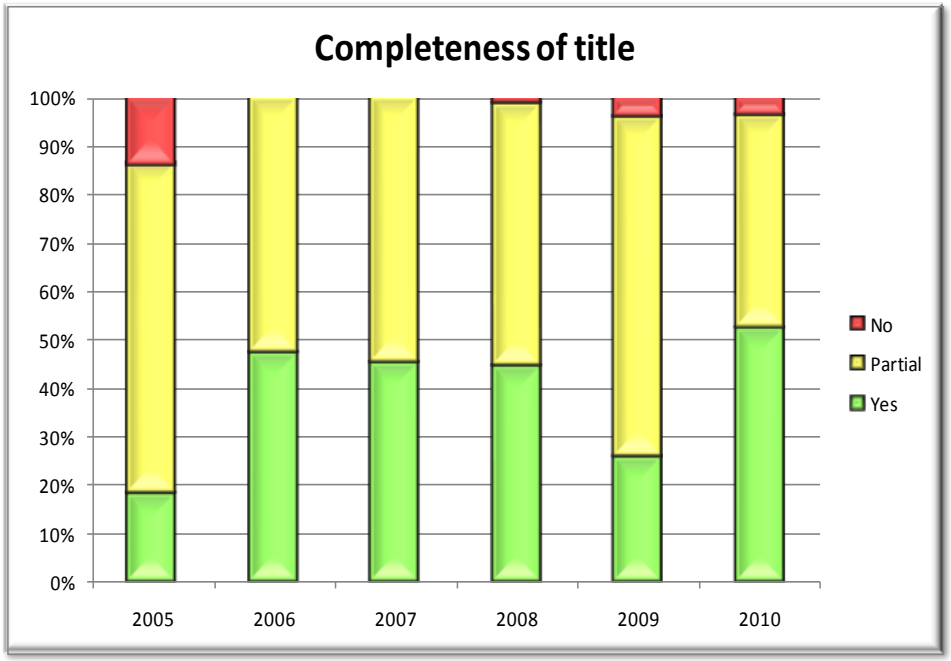
The crisis map production from the Indonesian Tsunami of December 2004 up to the Haiti earthquake of January 2010 has been considered and classified by year and type of event.

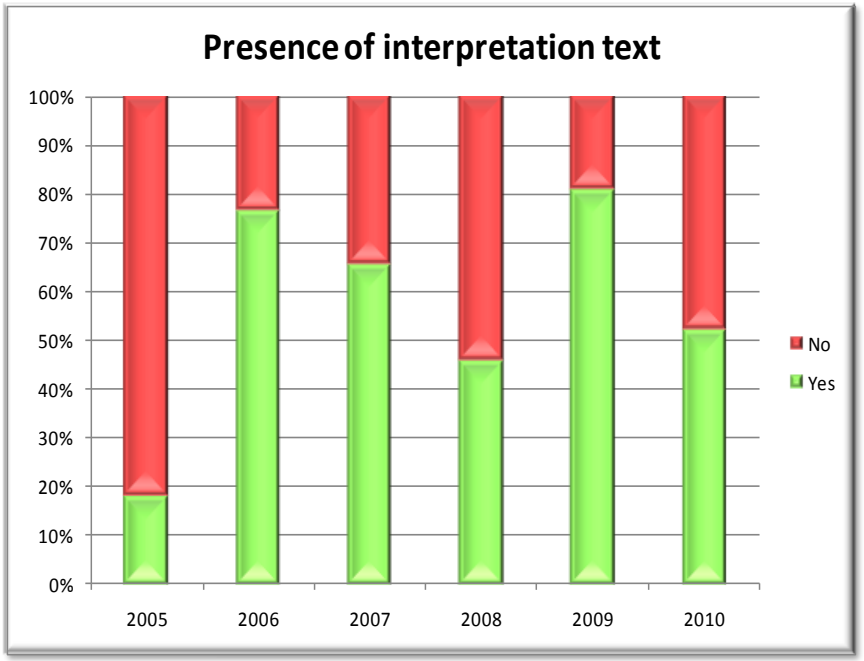


Total population of 2009 maps

Sample of 255 maps Randomly extracted

Main information regarding the event





Out of the 255 maps sample:

- **in 60% of cases the information included in the title is not complete**
- **in 50% of them the interpretation text is missing**


218252
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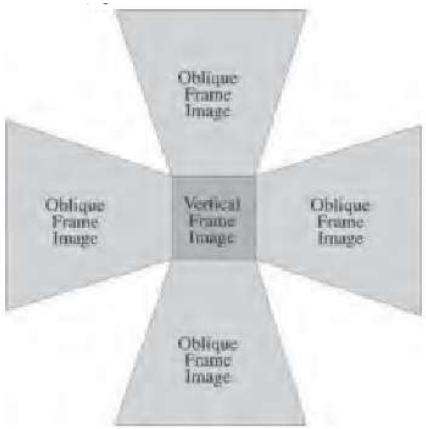
217275

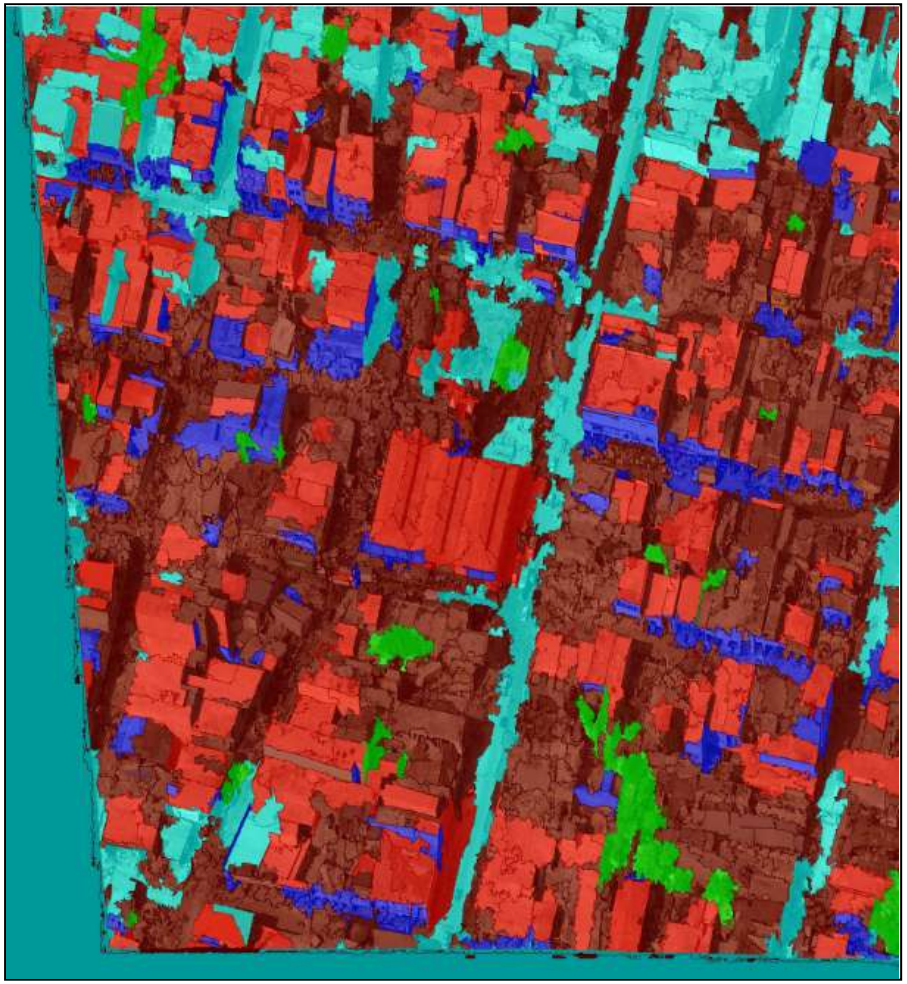
PICTOMETRY
BASICS OF THE SYSTEM

- 5 digital cameras (1 nadir, 4 oblique)
- GSD 15cm (nadir images, flying height ca. 1000m)
- 30% nadir overlap for orthophoto, 60% for stereo
- How to extract information? Even visual assessment has limitations.



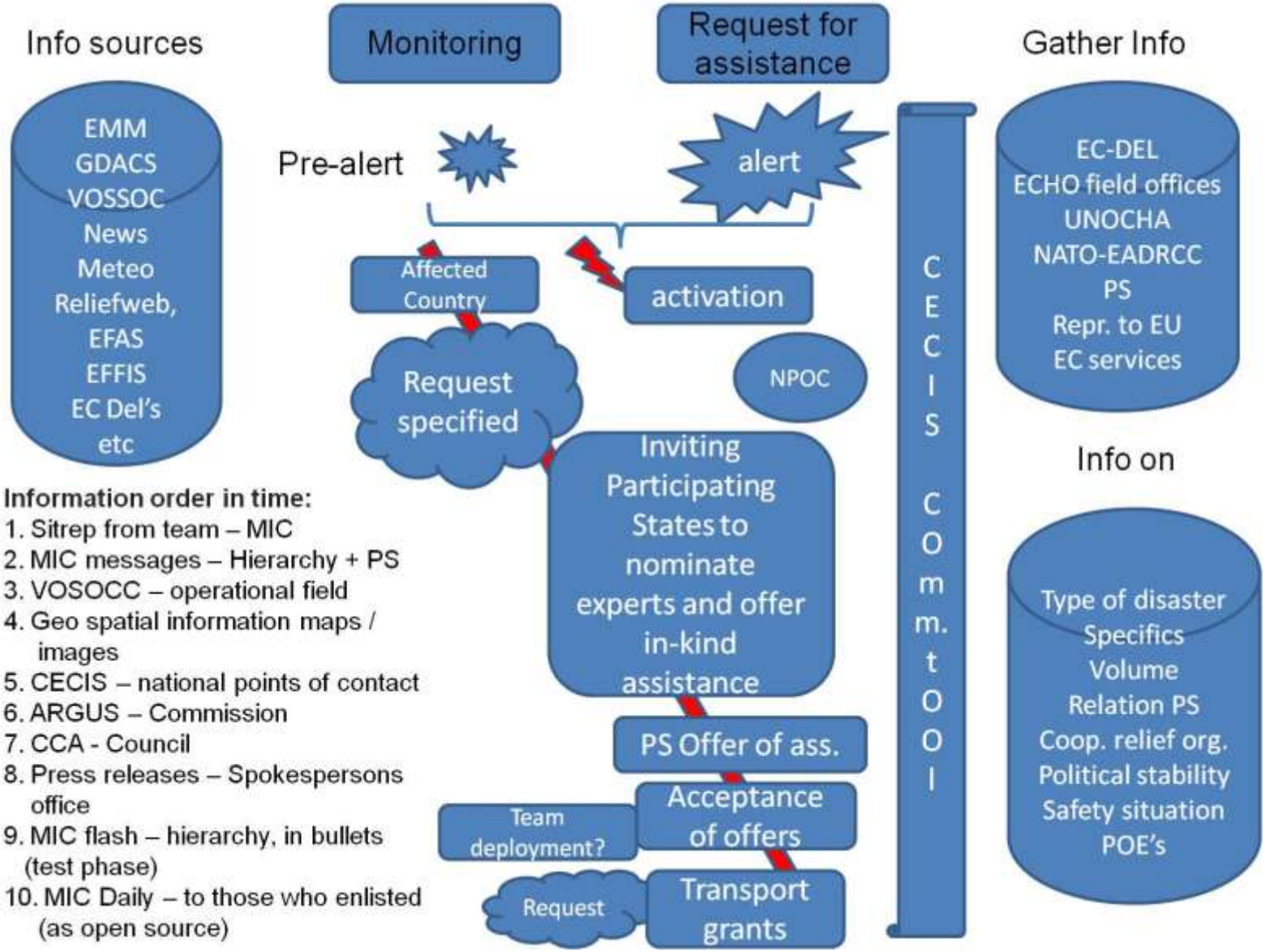
DAMAGE MAPPING RESULTS: WESTERN VIEW EXAMPLE

- Ortho image
- Detected damage
- Probability map
- Overlaid on image



Intact roof
Broken roof/ rubble
Intact facade
Bare ground
Vegetation

Example MIC-ECHO Crisis room functioning scheme EU Commission



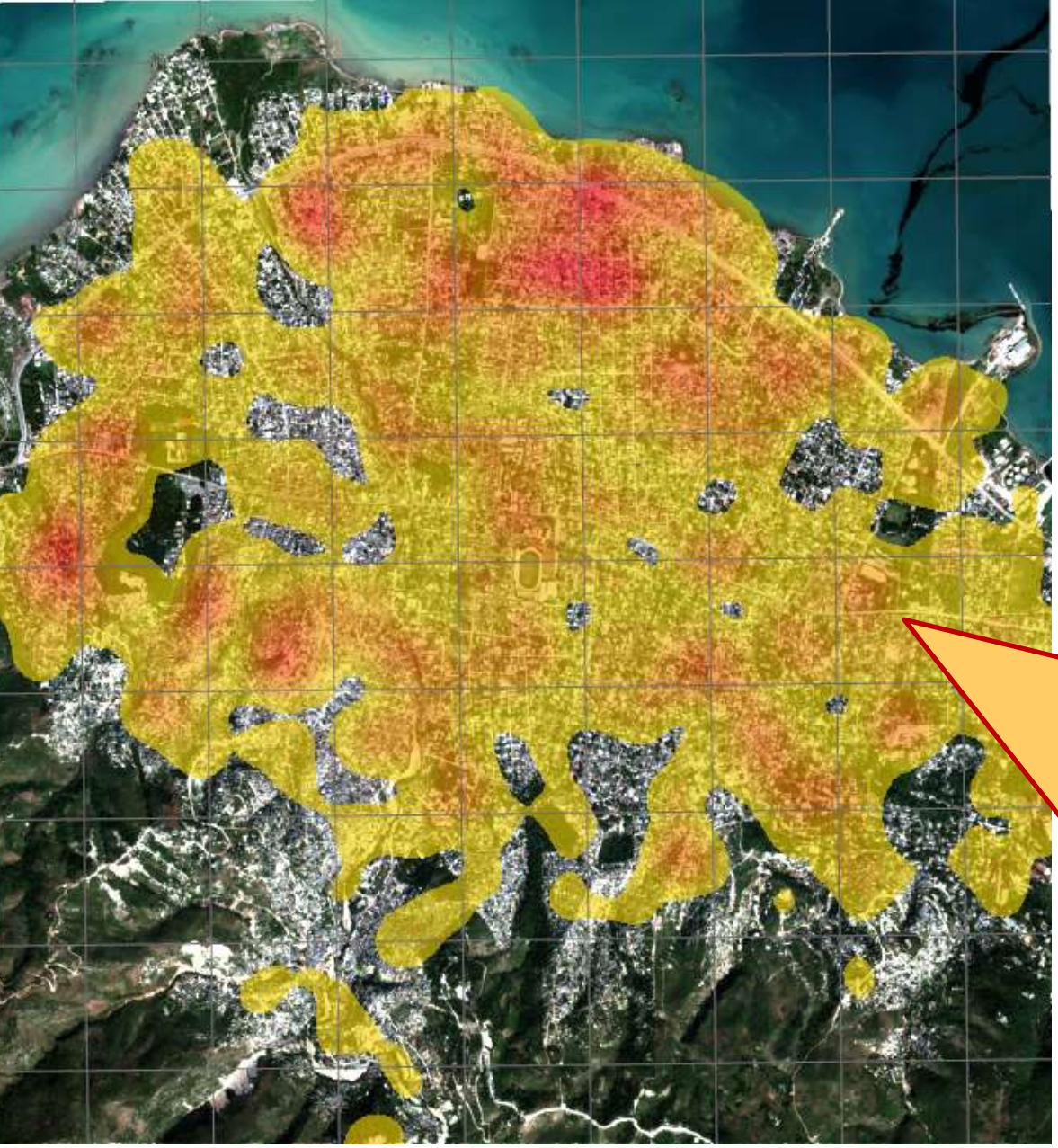
Information order in time:

1. Sitrep from team – MIC
2. MIC messages – Hierarchy + PS
3. VOSOCC – operational field
4. Geo spatial information maps / images
5. CECIS – national points of contact
6. ARGUS – Commission
7. CCA - Council
8. Press releases – Spokespersons office
9. MIC flash – hierarchy, in bullets (test phase)
10. MIC Daily – to those who enlisted (as open source)

Quality labels for rapid geospatial reporting products

- **Proposed quality levels for automated rapid geospatial information products for quick assessment of usability (volume control type):**

Level	Symbol	Quality / reliability	Process characteristics
1		*Very low*	Only remote sensing data used, no further checks, limited data quality
2		*Low*	Known limitations of algorithm
3		*Fair*	Basic check for consistency done
4		*Medium*	Data of high quality, well registered
5		*Moderate*	Validated against independent visual inspection or other automated result
6		*High*	Proven with field based accuracy measures
7		*Very high*	Fully validated product (incorporating user feedback)



Automated RGR product
Damage densities in Carrefour, Haiti

Production time:
- within **12 hrs** after pre-processed data available
- Published **5 days** after earthquake

Purpose:
rapid response and post-disaster assessment

Spatial accuracy: **GE+**
Overall quality level (score 1-7): **4**

Time-Critical Crowdsourcing and Live Crisis Mapping

How to comply with standards ?

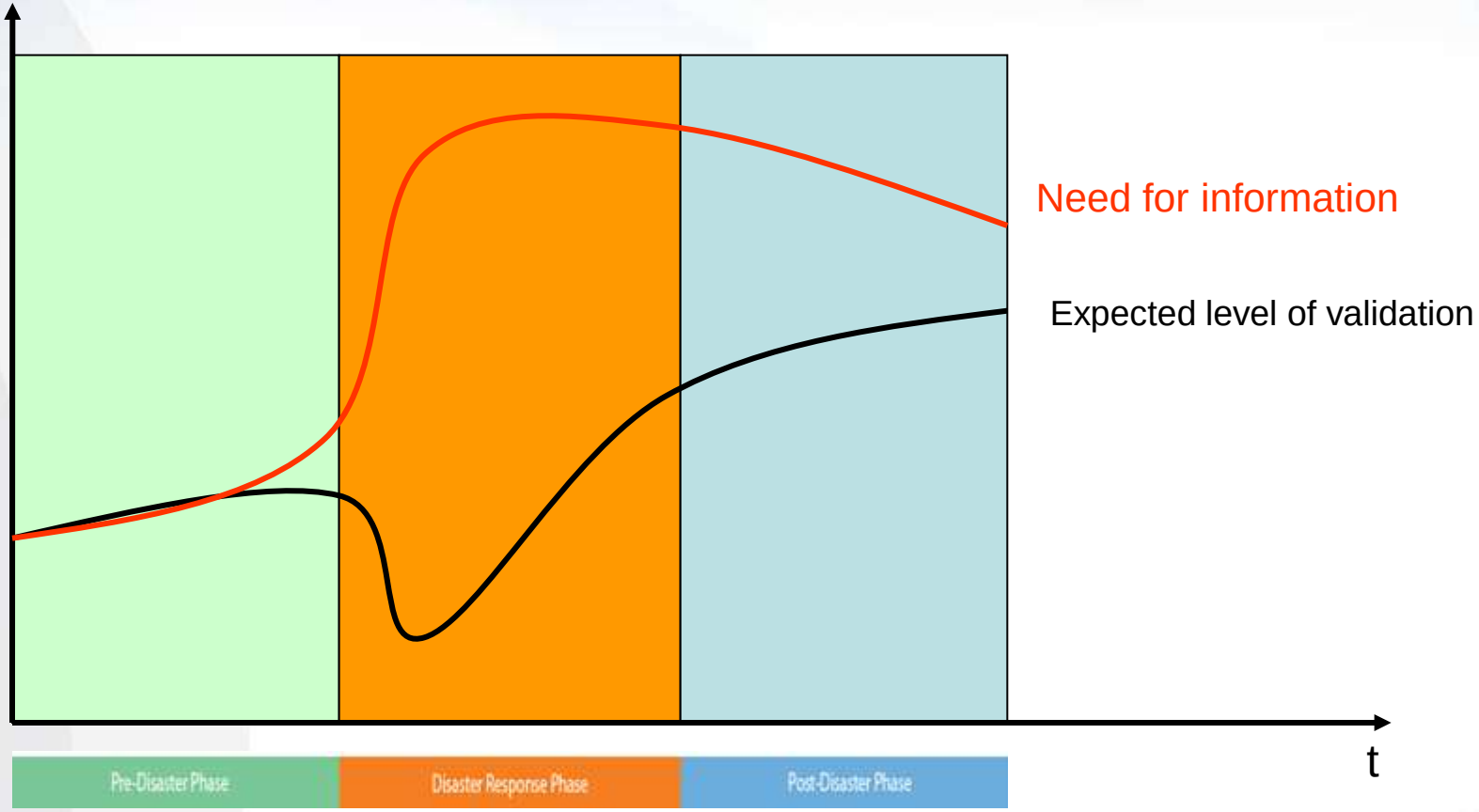
- Normalize the source ?
  - Suggesting best practices ?
  - Integrating capacity building in population preparedness ?
- Filter and aggregate through a back office ?
  - Unique data center and situation room ?
    - ✓ Governance / Independency
  - Interconnected SDI ?
- Is the OSM way the good target (well balanced mix) ?
- GMES ERS under constraint
  - OGC / INSPIRE imposed by the commission rules
  - MGCP-light data model compliant with HOT ?

CERTIFIED OGC COMPLIANT

safer
Services and Applications For Emergency Response

Seek the good balance between validity and reactivity

- Validation and degree of tolerance all along the crisis lifecycle



- Crow sourcing mostly pertinent just after the crisis ?

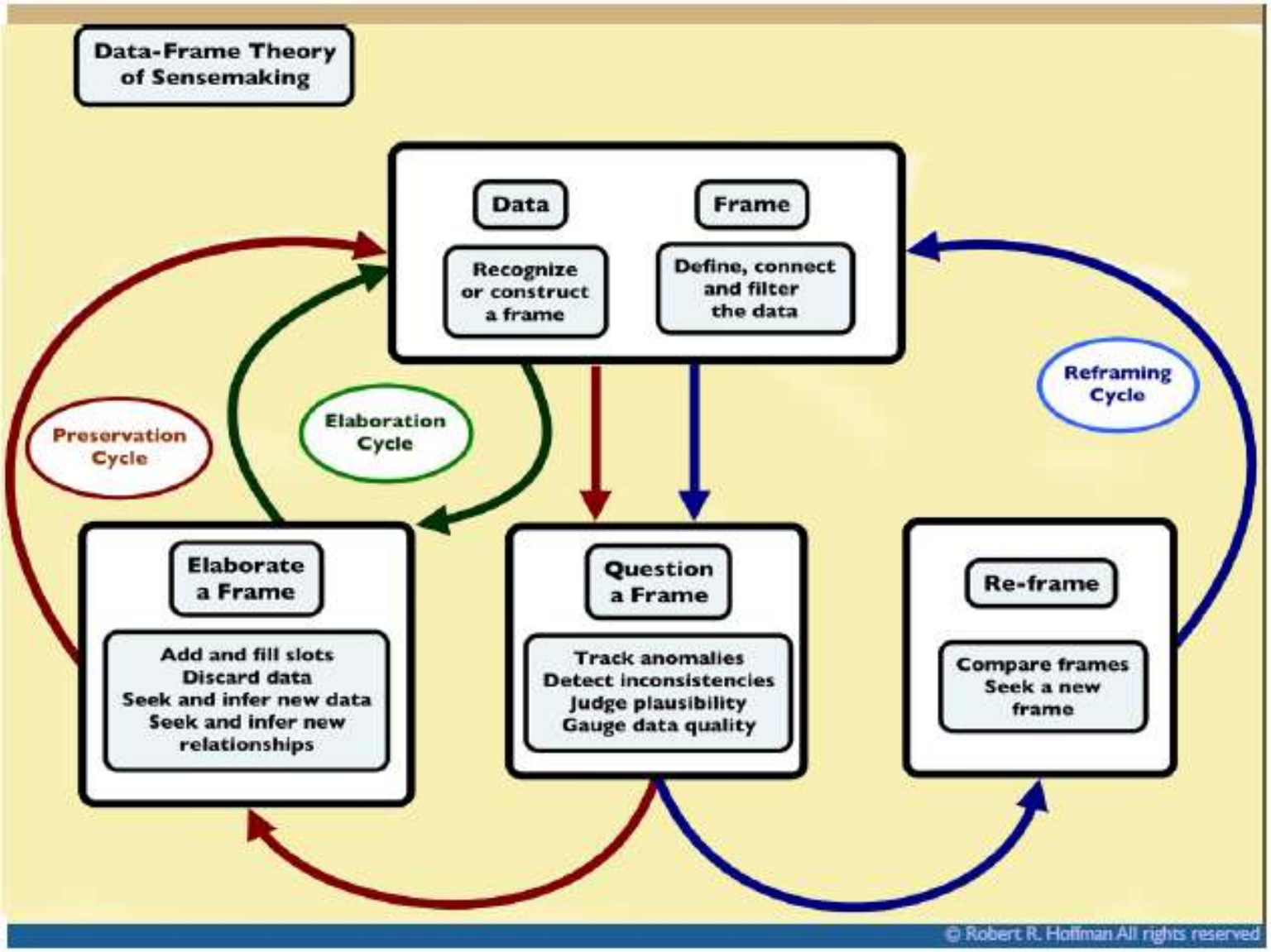
Safer
Services and Applications For Emergency Response

Tobii T120

- **Sampling frequency 120 Hz**: faster than the slowest (25-60 Hz): good compromise between
  - Accuracy (distance from measured position and true position) and
  - Precision (ability to reliably reproduce measurement)
  - A higher sampling frequency (used for calculation of fast eye mov, saccades and gaze contingent experiments) sometimes comes at the cost of precision
- **Remote = non intrusive** (vs head mounted/chin rest/bite bars, scleral search coils!!), reducing the fatigue effects on task performance - contra: data loss when subject moves..
- **PCCR (Pupil Centre Corneal Reflection)- near IR** is used to create the reflection patterns on the cornea and pupil; two image sensors are used to capture images of the eyes and the reflection patterns.
- Software: **advanced tools for analysis and visualization**, in-depth qualitative and quantitative analysis. Data is easily taken to meaningful comparison, interpretation and presentation.

Experts can see things that others cannot

(This is why I prefer to talk of *remote perceiving* rather than remote sensing.)


Data-Frame Theory of Sensemaking
Data
Recognize or construct a frame
Frame
Define, connect and filter the data
Preservation Cycle
Elaboration Cycle
Reframing Cycle
Elaborate a Frame
Add and fill slots
Discard data
Seek and infer new data
Seek and infer new relationships
Question a Frame
Track anomalies
Detect inconsistencies
Judge plausibility
Gauge data quality
Re-frame
Compare frames
Seek a new frame
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Implications

- Knowledge capture, preservation and re-use.
- Using technology to escape the "10-year rule."
- Any method for accelerating the achievement of expertise will hinge on the ability to support the processes of *perceptual re-learning of dynamic cue configurations and of dynamic cue configurations that exist across multiple data types.*
- This is a fundamental challenge for the psychology of expertise, the field of remote sensing, and for the design of technology.

Key issues

From the keynotes

- **trusted** analysis
- community crisis management
- share the reliability of information - **feedback**
- JRC Validation Protocol
  - reliability of information content
  - consistency of information support
  - usability of the product
  - efficiency of the service

Issues raised during the workshop

- sobering results
- validation/calibration not possible without long-term observations (inventories)
- crisis room situation & periodical exercises
- introduce level of quality to rapid mapping products
- volunteer task force for crisis mapping
- processing of crowd-sourced data
- informing the public – who and how?
- extraction of information and effective visualisation

Questions:

- What is the added value of validation?
- What does/can the end-user expect from validation/validated products and services?

Achievements & challenges

Achievements / Challenges

- Valid. Is a required process to build trust
- The valgeo community (network) can come out with a signal to be acted upon

- Users still need to get used to this type of information
- The trust of the SP is a priority
- Need for a proto-validation (basic carto. Issues)
- Validation should be separated from the production process
- How do you communicate better validation results ?

Next steps

- Validation of JRC validation protocol
- use the concept for your own case
- provide **feedback**

practical steps:

- register to the ValgEO website
- post your feedback on the website

recommendation:

- special session at next year's ValgEO
  from concept to guidelines

http://isferea.jrc.ec.europa.eu/Workshops/2009-11-VALgEO