

GMES activities in Emergency Humanitarian Mapping: **Respond** *Services toward Sustainability*



RESPOND
HUMANITARIAN
GLOBAL MAPPING SERVICES



Presentation to: **GMES Co-location Information Day**

by:

Nick Veck (*Infoterra Ltd*) & Francesco Pisano (*UN*)
on behalf of the Respond Consortium and its Users

Reminder: what is Respond?

- As a community response to real and urgent User need for global emergency mapping, **Respond** began during 2004, as one of the 2nd tranche of ESA's GMES Service Element (GSE) projects. Stage 2 began in Q4 2006 and will run until Q4 2009.
- **Respond** is an alliance of European and International organisations, working with the humanitarian community to improve access to maps, satellite imagery and geographic information.
- The **Respond** mission is to increase the efficiency and effectiveness of the European and international humanitarian community, through the appropriate and reliable application of geographic information.

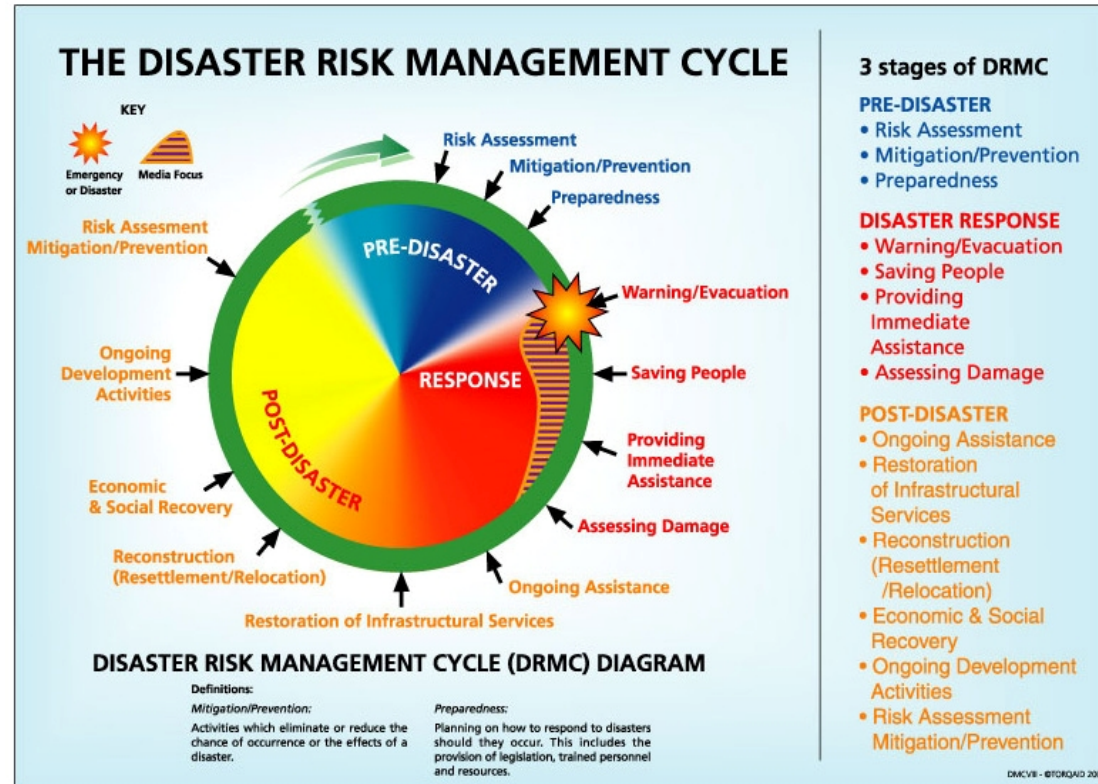


Respond: Aid Cycle & Sustainable Development

- EO-based geographic information is relevant for the entire humanitarian intervention cycle:

↻ Mitigation
 ↻ Response
 ↻ Recovery
 ↻ Preparedness

- It is relevant for both slow-onset and rapid-onset emergencies.



Strong Partnership – Whole Supply Chain

Prime: Infoterra UK Ltd



Core Users



Auswärtiges Amt

Technisches Hilfswerk



World Health Organization



In-sector providers – already providing services to specific segments



Value Adding Companies – skilled in supplying products to these services

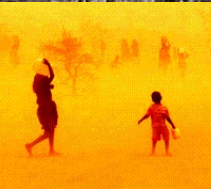
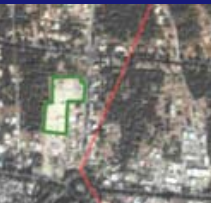


Consultants and Systems Engineers, etc



Respond Portfolio content themes

Portfolio Theme	Typical Content Type
1: Basic maps (digital, paper, EO, non-EO)	Maps & Map Archive to use for other themes
2: Crisis & Damage Mapping	Damage Maps
3: Situation Maps	Maps and GIS
4: Refugee/IDP support maps	Maps and GIS
5.1: Thematic maps for Prevention / Reconstruction Planning purposes	Thematic Maps
5.2: Health Maps	Thematic Maps
5.3: Environmental Impact Assessment Maps	Thematic Maps
6: Advanced Information Services	Global Services
7: Communication / reporting resources	Ad-hoc Mapping and Graphics

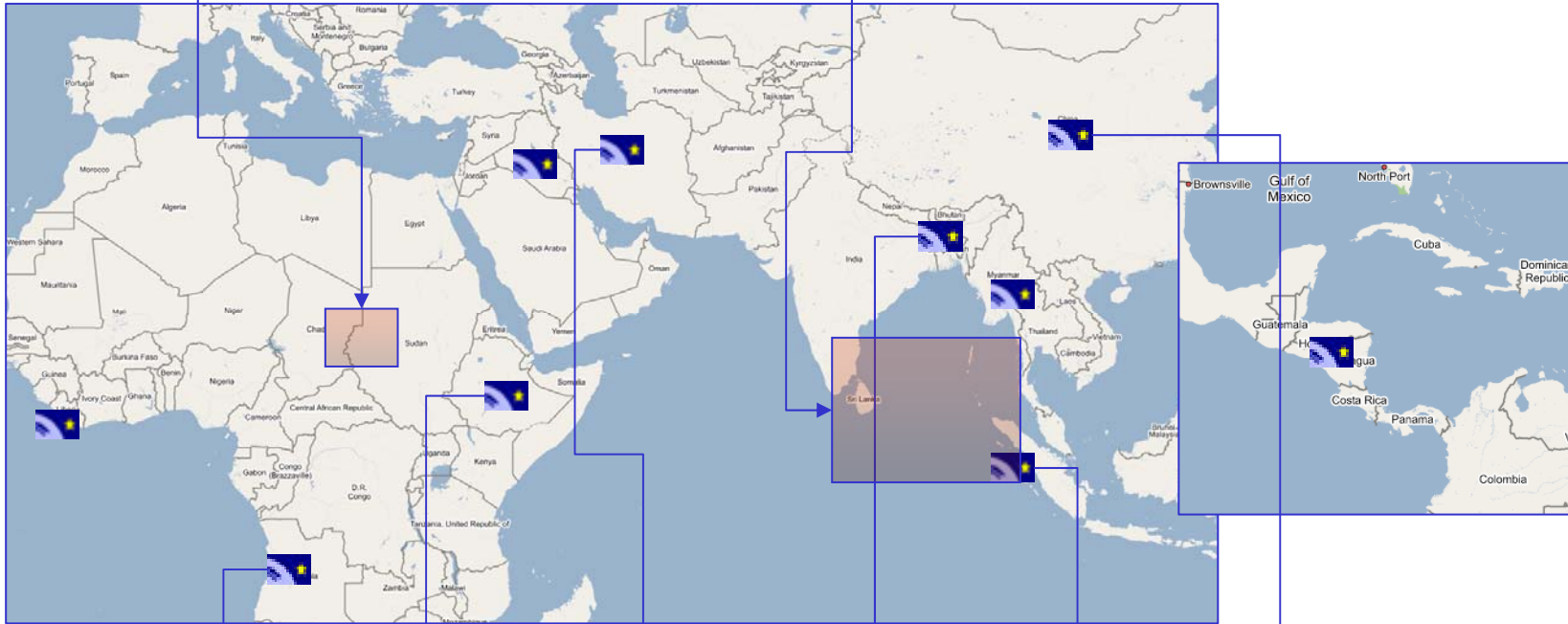


Respond – Some of the services delivered so far...



Darfur Folio

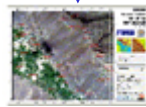
Tsunami Folio



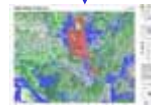
Epidemic



Flood



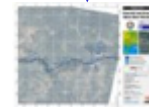
Earthquake



Flood



Earthquake



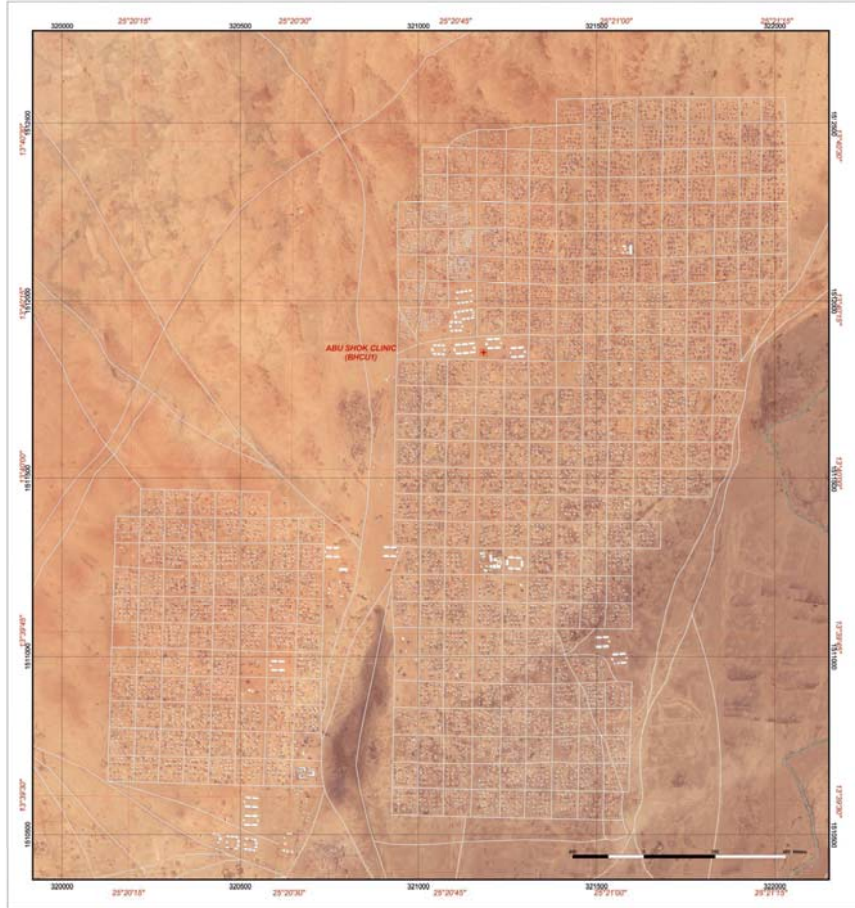
Flood

Mapping of Al Fashir: Guba Clinic (1:2k) and Abu Shoc IDP camp (1:5k)



SUDAN/DARFUR - ABU SHOK IDP CAMP

1:4000



SUDAN/DARFUR - GUBA CLINIC

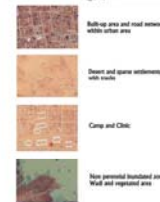
1:2000



Localization



Legend



Interpretation

Information were digitized on basis of the ICNOSIS for resolution satellite imagery.
 The background ICNOSIS image allows different scales possible in the platform, such as amount of road and roads, walls and their type, road network and human settlements.
 The high resolution image makes it possible to distinguish individual buildings, infrastructure and camp.
 The road classes were interpreted from the image without scale for its completeness or total connections.
 The ICNOSIS image allows an antithetical positional accuracy of GPOD 15m.

Data Source

Rawest color image: ICNOSIS from 08/14/2004
 ICNOSIS © Esri, Inc. 2004

Processing/Analysis

Image processing by KEYOS L.A.
 - Band combination
 - Chromaticity
 Map created September, 4th 2004 by KEYOS L.A.
 info@keyos.com
 www.keyos.com
 Projection
 UTM Zone 33 N
 Datum: WGS84
 Spheroid: WGS 84



Responding to the 2004 Asian Tsunami:

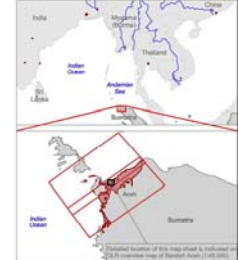


INDONESIA/SUMATRA - Banda Aceh Region - Map 6

1 : 10.000



Center for Satellite Based Crisis Information
- Emergency Mapping & Disaster Monitoring -
German Remote Sensing Data Center
German Aerospace Center



QUICKBIRD Imagery of January 02, 2005

Legend

- Severely damaged area
- Major roads
- Minor roads
- Contour line - 10m
- Contour line - 20m
- Contour line - 30m

Interpretation

This satellite map displays the area of Banda Aceh, Sumatra / Indonesia at a scale of 1:10,000. It shows an overview of the area struck by the tsunami flood wave of 26th December 2004. The map was derived from high resolution satellite imagery taken on 2nd January, 2005. It indicates that the seashore of the city of Aceh was extremely hit. Detailed analysis of the damage area shows, that 49 km² or 80% of the built-up city area (61 km²) were totally destroyed or extremely damaged. The corresponding 1:45,000 overview map indicates where this high resolution 1:10,000 map sheet is located.

Scale

0 250 500 750 m

1 : 10.000

Projection: UTM Zone 48 N
Spheroid: WGS84
Datum: WGS 84

Data Source

QUICKBIRD © DIGITALGLOBE 2005 - 2005/01/02
processed by JRC 2005

Landset imagery from Global Land Cover Facility Base maps (50k) from: East View Cartographic.

Processing / Analysis

Image processing and analysis by DLR

- image enhancement
- georectifying base maps
- road network and damaged areas derived from Quickbird imagery
- SRTM-DEM processing

Map created January 05, 2005 by ZHO@DLR.DE

Joint Tsunami relief mapping by DLR and JRC in the framework of RESPOND

EUROPEAN COMMISSION
Joint Research Centre

RESPOND
EUROPEAN COMMISSION
Joint Research Centre

Some statistics on the 214 Tsunami Maps (55 funded by Respond) made by partners during the first 4 weeks after the event:

Maps by Area of Interest:	No.	%
Overview	8	3.8%
Maldives	4	1.9%
India	27	12.7%
Thailand	8	3.8%
Indonesia	100	46.9%
Myanmar	8	3.8%
Sri Lanka	57	26.8%
Africa	1	0.5%
Total	213	100.0%
(61 of Banda Aceh)		28.6%

By main data source:	No.	%
ASAR	3	1.4%
Meris	1	0.5%
IKONOS	26	12.2%
IRS	10	4.7%
Landsat	34	16.0%
Landscan Pop	7	3.3%
MODIS	1	0.5%
Quickbird	29	13.6%
SPOT	78	36.6%
SRTM	9	4.2%
Radarsat	6	2.8%
Vegetation	2	0.9%
DMC	1	0.5%
Other	6	2.8%




Link between Respond and the International Charter: "Space & Major Disasters"

✓ The Charter is an operational mechanism which delivers space imagery to civil protection agencies, emergency & rescue services and to signatories during natural emergency situations.

✓ **Respond** is a relevant framework for making use of the Charter for operational end-to-end crisis mapping solutions (**VA services**), especially for situations outside of Europe.

✓ The Charter is a key mechanism to ensure fast delivery of our Emergency Response products worldwide.







INTERNATIONAL CHARTER

International Charter Space & Major Disasters
Charte Internationale Espace et Catastrophes Majeures

CHARTRE INTERNATIONALE

PARTNERS / PARTENAIRES :

-  **esa** EUROPEAN SPACE AGENCY / AGENCE SPATIALE EUROPÉENNE
-  **cnes** CENTRE NATIONAL D'ÉTUDES SPATIALES
-  **CSA** CANADIAN SPACE AGENCY / AGENCE SPATIALE CANADIENNE
-  NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
-  ARGENTINA'S COMMISSION NATIONAL DE ACTIVIDADES ESPACIALES
-  INDIAN SPACE RESEARCH ORGANISATION



2007 Mozambique Flooding

Three weeks ago, **Respond** was called upon to provide satellite mapping, following a major flood in Mozambique...

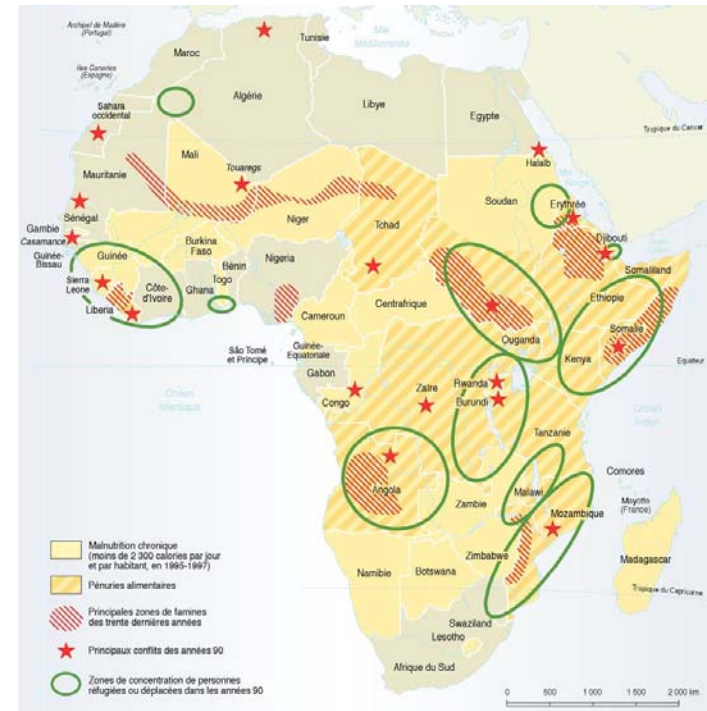
- The Charter was activated by the WFP, with UNOSAT support, and multiple satellites were tasked to provide imagery;
- Maps based on existing (pre-disaster) and newly acquired data have been produced by DLR-ZKI;
- The bad weather continues and further satellite-derived maps derived from Envisat SAR imagery are currently being prepared;
- The radar and optical maps show the flood extent and the effect on the local transport network;

Respond maps have been distributed to the UN and national disaster response teams and today are being used by 19 different NGOs in the field.



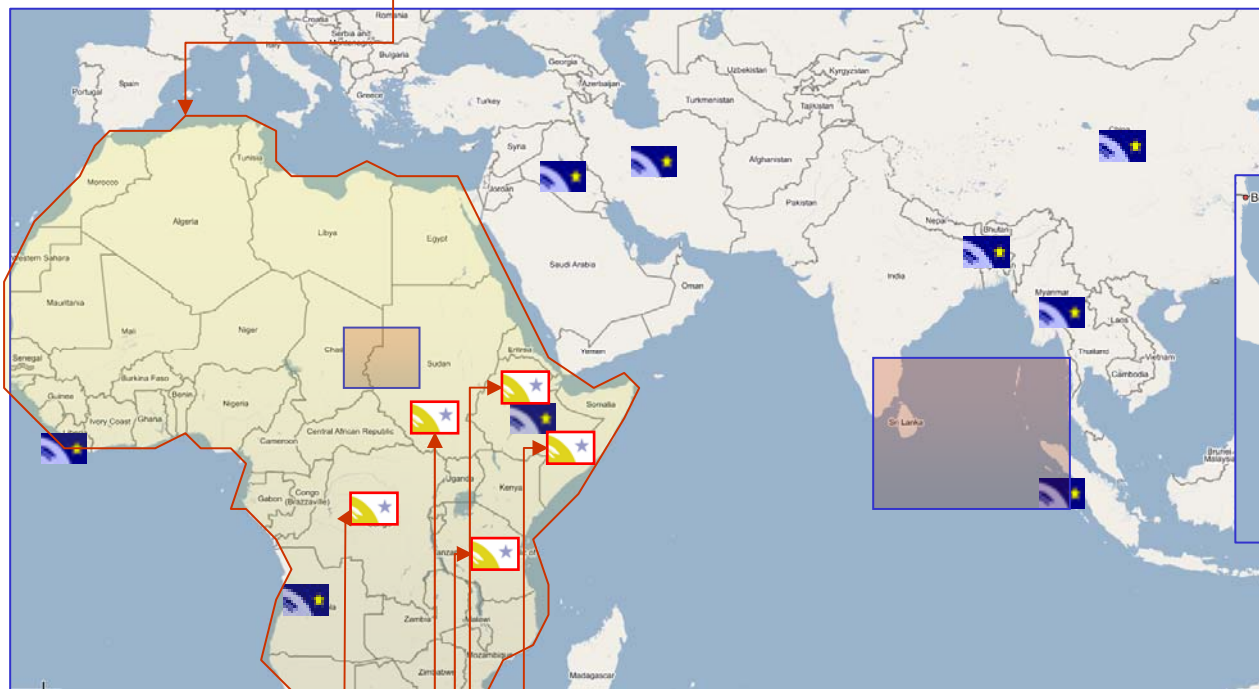
Further Stage-2 Service Coverage:

- Our Core users have **prioritised** their **reference mapping** coverage requirements;
- They would like **global coverage of background mapping** on the web, in 5 years;
- Prioritisation of hot spots by users;
- Impossible to accurately predict fast-onset crises – but mapping can be used in support of forecasting.



Respond – Some of the other services in the pipeline for 2007 and beyond...

Web Map Layers for Africa



Landslide Vulnerability

Development Planning

Logistics Maps

Refugee / IDP
+ Field Support




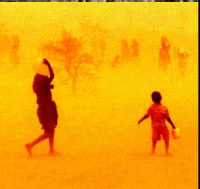


Land Cover
Mapping

+ Crisis & Damage Mapping – wherever it occurs

+ Support to Food security and Health Actions

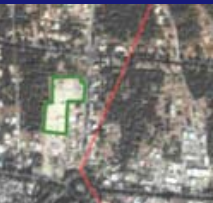


Respond SLAs

Service Name	SLAs (done and planned)
 <p>Basic maps</p>	<p>INT'L USERS - OCHA, DPKO, UNHCR, WFP, UNJLC, WHO, ISDR, UNEP, HCHR, UNDP, UNOPS, DG-ENV</p>
	<p>NAT'L USERS - USAR – Urban Search & Rescue, NL People in Need, ADRA (US), Agencia Espanola de Cooperacion Internacional (AECI), InterSOS, Canadian Red Cross, German Red Cross, THW</p>
<p>Crisis & damage mapping</p>	<p>INT'L USERS - OCHA, WFP, UNJLC, WHO, UNEP, UNDP</p>
	<p>NAT'L USERS - USAR – Urban Search & Rescue, NL, Centro Nacional de Epidemiología, Cruz Roja Española, Agencia Espanola de Cooperacion Internacional (AECI), Swedish Rescue Service, German Red Cross, THW</p>
 <p>Situation maps</p>	<p>INT'L USERS - DPKO, WFP, UNJLC, HCHR, UNDP, UNOPS NAT'L USERS – THW, German Red Cross, Swedish Rescue, NGOs</p>
<p>Refugee/IDP support maps</p>	<p>INT'L USERS - UNHCR, UNOPS</p>
	<p>NAT'L USERS - InterSOS, THW</p>
<p>Thematic maps Environment/Prevention/ Reconstruction/Planning/Health</p>	<p>INT'L USERS - UNJLC, UNDP, UNOPS, Caritas Int'l, UN/ISDR, WHO, UNEP, DG-ENV</p>
	<p>NAT'L USERS - Dokters van de Wereld, NL, InterSOS, People in Need, ADRA, CERMES - Niger, Instit PASTEUR de Madagascar, SDC – Swiss agency for Development & Cooperation, THW</p>
<p>Advanced Info Services, Communication, Reporting</p>	<p>UNDP, UNOPS, UK DfID, OCHA, NGO family, DG-ENV</p>

USER DRIVEN SERVICES:

Portfolio Theme	REQUIRED OUTPUTS
1: Basic maps (digital, paper, EO, non-EO)	Readily available reference maps
2: Crisis & Damage Mapping	Near-real time post disaster imagery, GIS and analysis
3. Situation Maps 4: Refugee/IDP support maps	Maps and GIS dedicated information (security, w/w/w)
5.1: Thematic maps for Prevention / Reconstruction Planning purposes 5.2: Health Maps 5.3: Environmental Impact Assessment Maps	Vulnerability assessment, risk analysis, hazard monitoring, etc
6: Advanced Information Services	Early geographic information on impending, imminent crises (Reuters/AlertNet)
7: Communication / reporting resources	Ad-hoc Mapping and Graphics to build case, to document activity



No. of users, by Service

QUESTIONS

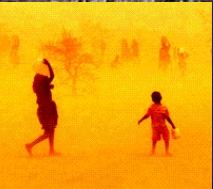
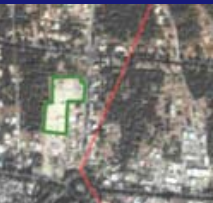
- How many users does this particular service have now?
- Are the users mostly International, national or regional?
- Who is the most important/active European User Organization for this service?
- Who are the most important/active National/Regional User Organization for this service?
- Who is the main user community presently involved?
- How many signed SLAs for this service today?

SERVICE	Int'l	national	total
Basic maps	12	9	21
Crisis & damage mapping	6	6	12
Situation maps	6	4	10
Thematic maps: Environment/Prevention/ Reconstruction/Planning/Health	11	8	19
Refugee/IDP support maps	2	2	4

Users feedback:

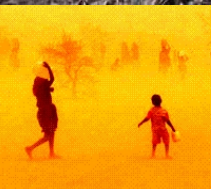
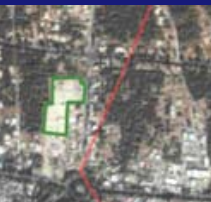
- After 3+ years, do you have factual, representative user feedback?
- What is the user feedback on this particular service delivered so far?
- Based on user feedback on this particular service, how should we proceed?

MAIN QUESTIONS



Value statements from users:

- *“This is the only available professionally produced post-tsunami city map of Banda Aceh. The product is so much valued as it took into consideration input from OCHA HIC in the field and its knowledge of the local needs. This product is paramount to other available products”. (UN user in Banda Aceh).*
- *“TSF was quickly installed in the field (for example Muzaffarabad) printing hardcopy maps in A4 size to arriving aid teams within 48 hours after the disaster. The most useful and popular map was the VMAP1 containing map from ITUK together with detailed pre- and post-disaster damage assessments and landslide maps”. (NGO user in Pakistan, October 2005).*
- *“The availability to mass-produce hardcopies for IFRC staff departing to the field and for coordination purposes in Geneva was much appreciated. The damage assessment maps, in particular landslides, were the most used in the field.” (International Federation of Red Cross and Red Crescent Societies, Oct 2005)*



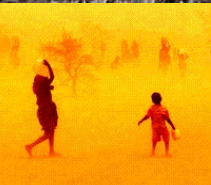
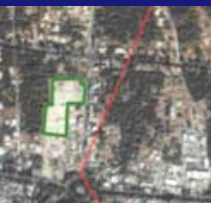
Users' federation

- **User Executive Board for Respond;**
- **User Federation & Feedback mechanism in place to voice the views of the user community (coordinated by UNOSAT);**
- **Meetings: Annual User Consultation meetings (2004-2006);**
- **User Position Paper (October 2005) endorsed by UN (incl. OCHA, UNHCR), EC (incl. DG-ECHO, DG-RELEX), National and NGO users (THW, DfID).**



Excerpt from User Position Paper:

Product	Stage 2 Output (total, over 3 years duration)
Basic Maps (Map Sheets and VMAP tiles, on-line)	400-500 sheets/tiles (including access to separate GIS layers)
Crisis and Damage Mapping (responses to emergencies, including Charter activations)	40-50 responses
Situation Maps	50-75 map sheets
Refugee/IDP Support maps	50-75 camps mapped
Thematic maps for prevention, reconstruction and planning/Health maps/Environmental Impact Maps	80-100 mapsheets
Information services	-
Communication/reporting	50-100 maps

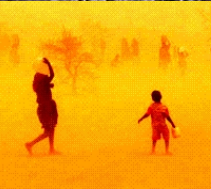


Overview of user feedback

Policy Level	Blue				Blue		Blue		Blue	Blue		Blue					Blue	Blue					
Operational Level	Blue	Blue	Blue	Blue	Blue	Blue	Blue			Blue			Blue	Blue					Blue		Blue	Blue	
HIGH interest	Red	Red	Red			Red												Red				Red	Red
MEDIUM interest				Red	Red		Red	Red	Red		Red	Red		Red						Red			
LOW interest										Red					Red	Red		Red					
Thematic Maps		Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green								Green		Green	
Crisis/Damage Maps	Green	Green		Green	Green	Green	Green			Green			Green	Green	Green	Green	Green		Green		Green	Green	
Basic Topo Maps	Green	Green	Green		Green	Green	Green	Green		Green	Green			Green	Green	Green	Green		Green	Green	Green	Green	
	OCHA	WFP	UNHCR	FAO	UNDP	WHO	UNOPS	UNICEF	ISDR	IFRC	ICRC	ICHD	UNJLC	MSF	OXFAM	CARE	AlertNet	SCHR	InterSOS	DPKO	DRK	THW	

- Blue Areas in which EO is relevant for the entity
- Red Level of interest in EO applications
- Green Type of application of interest as stated by entity
- Grey Type of application of interest as inferred by ULO
- Yellow Respond main user, or direct exposure to Respond process and products

Humanitarian aid: HRR and re-organisation

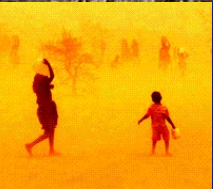


Humanitarian Sector	Parameter
Food and nutrition	Crop production
	Vegetation cover
	Food distribution
Water and sanitation	Surface water
	Ground water
	Water pollution
	Hydrographic network
	Waste management
Health	Hospitals
	Temperature (air, water)
	Humidity
	Lakes and rivers
Emergency shelter	Field assessments
	Pre-disaster identification
	Post-disaster assessment
	Distribution density
Recovery/reconstruction	Baseline data
	Pre-disaster situation
	Debris analysis

Humanitarian Sector	Parameter
IT/Telecommunication	Radio coverage
Logistics	Roads
	Bridges
	Rivers
	Ports
	Airports
Camp management	Snow cover
	Land slides
	Location planning
	Camp layout
Protection	Shelter detection
	Registration
	Firewood availability
Education	Theatre of operations and international borders
	Damage assessments
Education	Local capacity building
	School (re) location

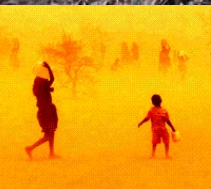
EO Humanitarian Mapping - Conclusions:

- **Respond** approach is GMES Global satellite mapping in action:
 - Satellites ably demonstrated as a credible tool for rapid mapping and damage assessment;
 - Link with International Charter Space and Major Disasters is key;
 - Real benefits to local people;
 - Bringing together major European players, with capacity to provide a useful service, worldwide;
- **Respond** partners continue to have roles in the tsunami and earthquake reconstruction, as well as in many other development areas.



The Respond Experience:

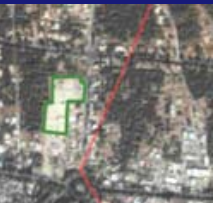
- Bringing the **Respond** partners and users together was initially quite a challenge:
 - ↳ The supply-side partners include large numbers of commercial and institutional players throughout Europe;
 - ↳ The users are a diverse group of charities, international organisations and government departments;
 - ↳ They have a real need for geographic information, but no interest whatsoever in satellites!
- But we have learned and succeeded to provide vital mapping to emergency response and development teams, worldwide.
- **Respond** has up to now been active in **13 humanitarian emergency events**, 11 of which have coincided with Charter activations.
- More than **150 different map sheets** have been delivered, so far.




Long-term Respond vision:

In 5 years time:

- ↪ The Humanitarian and Development Aid community will have **guaranteed** access to global mapping from European suppliers;
- ↪ The community will have access to an archive of detailed **base mapping, imagery and thematic mapping** for use in emergency situations;
- ↪ The community will have access to **rapid assessment maps** and information **for every emergency**; and
- ↪ Using maps and imagery will be as **familiar** and **routine** as using a word processor.



Transition to the Emergency Response Core Service – the (Users) Implementation Group paper states:

- 
- ↪ The initial scope of the Emergency Response service is to provide **rapid mapping services**. These are intended to gather together all the activities necessary to produce in digital format, or on a paper, a synthetic, structured and compound representation of the information believed to be necessary.

 - ↪ GMES Emergency Response services are **worldwide** (outside Europe, ie. for the rest of the world); however, the following should be considered as priority areas:
 - **For Natural Disasters:** all regions where international assistance may be solicited and primarily: Central America, Africa and South-East Asia;
 - **For Complex emergencies:** all regions where international assistance may be solicited, primarily: EU Neighbourhood regions (Northern Africa, Near/Middle East, Eastern Europe).

Transition to the Emergency Response Core Service (more excerpts from the IG paper):

↪ Data and information generated by the GMES Emergency Response services can be used to enhance **emergency preparedness** and **early reaction to foreseeable or imminent crises and disasters**.

↪ **ERCS Users** include:

- **EU national teams:**

- ↪ civil protection entities

- ↪ EU national agencies

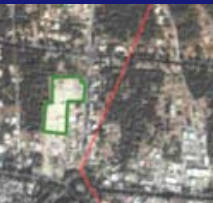
- ↪ European NGOs active in humanitarian situations occurring outside the EU space;

- **Actors from the UN system:**

- ↪ **All UN humanitarian agencies and international NGOs linked to the UN humanitarian coordination system, through the established EU-UN communication channels;**

- ↪ Red Cross & Red Crescent movement

- ↪ International NGOs.



Transition to the Emergency Response Core Service (the IG paper):

- ↪ Proven **Respond** services are ideally suited to meet the needs of the Emergency Response Core Service (ERCS);
- ↪ There is a clear match between the objectives and output of **Respond** and the requirements of the ERCS;
- ↪ As the Prime Contractors for both **Respond** and RISK-EOS, the Infoterra Group are leading a bid in answer to the current FP7 Call, and are working closely with the key other players, to bring all the relevant teams together.
- ↪ The **Respond** partners are ready to work together with the other GSEs (and further partners), to develop and deliver the GMES solution, to meet the urgent needs of the EU and international Emergency Response community.



★ GMES in Humanitarian and Development Aid: Respond



RESPOND
HUMANITARIAN
GLOBAL MAPPING SERVICES



Thank you for listening!