International Working Group on

Satellite-based Emergency Mapping (IWG-SEM)

Minutes of the 2015 spring meeting, held in Bonn on May 28/29, 2015 hosted by UN-SPIDER, Germany

Participants

	Given Name	Family Name	Organization
1	Lars	Wirkus	Bonn Int. Centre for Conversion (BICC)
2	Nilesh	Mistry	DigitalGlobe (DG)
3	Caitlyn	Milton	DG/Tomnod (via webconf.)
4	Luke	Caley	DIFD (via webconf.) (UK)
5	Alexander	Mager	DLR (Germany)
6	Stefan	Voigt	DLR (Germany)
7	Francoise	Villette	EC-GROW Copernicus
8	Peter	Zeil	EC-GROW Copernicus
9	Annett	Wania	EC-JRC (via webconf.)
10	Jan	Kucera	EC-JRC (via webconf.)
11	Tom	Harmatha	EC-JRC (via webconf.)
12	Blake	Girardot	Hum. OpenStreetMap Team (HOT/OSM)
13	John	Bevington	ImageCat
14	Andrea	Ajmar	ITHACA (Italy)
15	Fabio	Giulio-Tonolo	ITHACA (Italy)
16	Suju	Li	NDRCC (China)
17	Nick	Behnken	Pacific Disaster Center (PDC) (US)
18	Fabian	Selg	University of Bonn
19	Lorant	Czaran	UNOOSA
20	Antje	Hecheltjen	UN-SPIDER
21	Gina	Kelly	UN-SPIDER
22	Shirish	Ravan	UN-SPIDER
23	Brenda	Jones	USGS (via webconf.) (US)

Day 1

- **Introduction**
    - Welcome, roundtable and introduction of agenda
- **Nepal earthquake: Review and lessons learnt**
    - *General*
        - DLR: The response to the Nepal earthquake was of typical scale and character to justify an IWG-SEM engagement in support of cooperation. The teleconferences held were one element to support the cooperation among involved players. It was once again obvious how mapping activities started without really knowing the exact requirements and priorities on the ground and that it takes a lot of discipline among the cooperating partners to work synergistically and coherently.
        - UNOOSA: Despite Haiti earthquake happening five years ago, the group did communicate and exchange information, yes, but actual coordinated and fully collaborative mapping did not happen.
        - ITHACA: Amount of available satellite data was challenging for emergency mapping initiatives (including volunteer based ones) to analyse and it seems that too much mapping was not an issue in this case.
    - *Data*
        - DLR: Acquisition of optical satellite imagery took almost three days due to cloud cover. SAR data was not used substantially due to missing recent reference imagery and the mountainous character of the area.
            - DG/Tomnod: Image acquisition usually very quick but images are not always publically available
        - DG/Tomnod: Strong need for trustworthy population data to avoid having to spend time on validating population data with volunteers.
        - ImageCat: Need to integrate data models (e.g. USGS earthquake models) and alternative data sources. Modelling approaches and mapping products are not in competition but should support and refine each other.
            - UNOOSA: Modelling is a valid approach and could be an area for the IWG-SEM to work on. Models can also be of good use if no other data is available, e.g. Myanmar floods 2008.
        - DIFD: Landslide data set/map generated in cooperation with UK research institutes. Offers to define/prepare similar products in advance for other scenarios. Offers to link with OCHA in order to work on similar/consistent data sets
        - NDRCC: Need for a step-wise mapping approach. After an earthquake: 30 minutes time for first information / overview / rough assessment based on models and sensors and a-priori information. Later on: Detailed, accurate information from remote sensing and on ground assessments

- o *Users*
  - ImageCat: Capabilities on the side of the user for GIS/RS-generated data need to be improved. Users need to be educated. Producers need to better understand user needs.
  - EC-GROW: Results of satellite image analysis must better be explained to the users. Campaign to build awareness on the user side regarding the use and limits of satellite based products to tackle wrong assumptions/expectations that may exist on their side.
  - NDRCC: User speaks different languages. Still need to better translate between user/producer "languages".
  - UNOOSA: User trainings/capacity building missions have been carried out in 30 countries so far and are one of the key activities of UN-SPIDER
  - HOT/OSM: There were disparate voices from the ground on mapping needs, which needed to be prioritized.

- o *Coordination*
  - UNOOSA: Need for single information portal for users would be great to have but unfortunately very difficult to realize
    - UN-SPIDER: UN-SPIDER website gathers maps, AOIs, reports, etc. This is done on ad-hoc basis for major events.
    - EC-GROW: UNOSAT common map was useful. Copernicus provides an aggregator map to visualize Emergency Mapping GeoRSS feeds: http://emergency.copernicus.eu/mapping/georss-feeds-aggregated. EC-Copernicus also introduced a new product in its current phase called: Activation Extent Map, which shows all AOIs of one activation in a single map.
    - ITHACA: It is unlikely that a single information portal will prevail; Unosat live map was a possible solution, but it was based on manual updating by a single entity, limiting the effectiveness of the information (near-real time updating is crucial). IWG-SEM should encourage the use of interoperable standards(similar to the GeoRSS feeds proposed for exchange of information on the SEM activation) allowing to automatically broadcast updated information which can be accessed, aggregated and visualized with different technologies.
  - HOT/OSM: First step is to get aware of products that are being generated. HOT is able to integrate them then into their system. Initial IW-SEM telephone conferences showed that Nepalese authorities were not able to access data that was generated.
  - DIFD: Identification of priority tasks is necessary. Suggests link to agencies in the field such as WFP or MapAction, to get info on priorities. DFID suggest a follow-on workshop between IWG-SEM and those operational agencies (WFP, MapAction, REACH etc.) with a view to establishing this predictable mechanism

would be a welcome development to come from the lessons around the Nepal EQ.

DFID: Better use of coordination tools necessary. How to establish coordination structure and improve training within the IWG-SEM? E.g. INSARAG guidelines, list of standard products/portfolio from Nepal activation and their use would be beneficial.

- UNOOSA: Guidance from ground desirable but not always possible, e.g. Myanmar 2008.

- DLR: INSARAG guidelines and approach provides already a model when setting up IWG-SEM in the beginning.

o *Communication*
  - ITHACA: Need for standards in terms of communication tools. There are a variety of tools but no standards/guidelines for their use within IWG-SEM and the broader SEM community.

  - HOT/OSM: Very good experience with Skype rooms for real-time cooperation. Use strongly recommended, as asynchronous communication is possible and the message remain stable within the repository.

    - DIFD: Agrees. IWG-SEM needs a mechanism to speak to agencies in the field like WFP etc. IWG-SEM could make more use of simple collaboration tools like Skype, Google Docs, etc. and learn from e.g. from Digital Humanitarians community in this regard.

- **Collaborative Mapping I**

  o <u>Presentation by DG/Tomnod (Caitlyn Milton) on collaborative mapping for Nepal earthquake</u>
    - 500.000+ people activated by email
    - 75.000+ people via social media
    - Input: Image → Crowd tags → Crowd Rank (Reliability Algorithm) Analyst input plus automated verification of tags
    - 50.000 sqkm
    - 59.000 taggers
    - 900.000 tags placed (initially tagging each single building, then focus on damaged areas)
    - 5.3 Mio map views
    - 7.027 major destructions identified
    - 10.058 damaged buildings
    - 420 damaged roads / bridges
    - 4.229 tents / shelters (explicit request from users in the field)
    - KMZ, SHP, WFS, GeoJSON, API, CSV
    - Population data used in order to find populated places for priority areas
    - Creation of a data portal for data access in various formats (e.g. kmz, shp, wfs, geoJSON):

https://docs.google.com/forms/d/1CRKM9NfigsyIsLy4z8jXQbPeFZOM56b9Zls
QxbimrRQ/viewform

- Discussion:
  - DG/Tomnod on data availability and nature of collaborative mapping activities: In general, not all images and results of collaborative mapping activities are publically available. DG needs end-user requirements in order to start crowd-activity. Sometimes crowd gets paid if mapping is for commercial purposes. Imagery for Nepal mapping available on DGs website. Caitlyn can provide login credentials to access the data.
  - UNOOSA and DLR point out additional population data sets that might be of use for DG/Tomnod: JRC is working on global human settlements layer generated from Landsat-data to be published in 2015. DLR's global urban footprint data set to be released in 2016 possibly.

- <u>Presentation ImageCat</u>
  - Crowdsourcing activities since 2008:
    - Wenchuan, China
    - Haiti
    - Superstorm Sandy
  - 2008: Virtual Disaster Viewer – Online portal, not sustained anymore, used for 2008 China earthquake, Moderated Expert Crowd (engineers, master level remote sensing students)
  - 2010 Haiti: Joint Damage Database and Haiti Damage Atlasd (incl. World Bank, JRC, UNOSAT), Haiti Damage Atlas, PDNA → Potential users were not able to use the data / were not aware of the data being around
    - Lesson learned: Tag not-affected buildings as such in order to avoid confusion and duplication of work
  - 2012 Sandy: public information sources such as social media etc. were used, 17 cm aerial images, informal data collection from civil air patrol imagery which have GPS and took photos. Useful to reduce uncertainty. Distributed analysis on web-portal, identifying specific damage grades (4 classes and associated protocols, agreed with FEMA). 150 paid analysts. 147.000 buildings identified as damaged/affected.
  - User/customer always needed, approach is client-centric
  - Use of "expert" crowd. (More cautious, more consistent results)
  - Qualification, training and support for crowd necessary
  - Damage assigned according to official damage scales (e.g. EMS 98)
  - Lessons learned:
    - Major structural damages is observable from imagery with high degree of confidence
    - Minor / internal damage requires multiple data types -> data fusion, cross-validation with models
    - Fusion of imagery techniques provides optimal solution
    - Cross validation with model outputs identified
   - Altruism is main contributor to crowd participation
  - To discuss:

- Expert vs volunteer crowd
- Beyond altruism – how to ensure participation
  - Financial / scoring / gaming
- Public/private collaboration and partnerships
- Extent of "emergency" mapping – maintain participation in "calm" times (e.g. collecting information on building structure)
  - Role of consultants
  - Nepal: Planned research to investigate the efficacy of coordination of damage assessment initiative following the 2015 earthquake

- Presentation HOT-OSM
  - HOT-OSM: 99.5% volunteer-run
  - 1.000.000 volunteers
  - Capacity building
  - Base maps + IDP camps and response facilities
  - Satellite, Aerial, UAV
  - Bing imagery as base for digitization
  - Integrate open data sources and local mappers if available
  - Tasking Manager – tasks.hotosm.org
  - Simple Editing Tool: iD Web Editor, Potlatch2
  - Advanced Editing Tool: JOSM
  - Validation – Tags, Primitives, Proximity to physical features
  - Validation – MapRoulette
  - Validation – OSM User
  - Overpass OSM Extract Queries
  - HOT Exports in various formats
  - "External" services: GEOFABRIK updated OSM data in shapefile format every 30 minutes during Nepal crisis
  - Paper maps
  - Project: Open aerial map to show footprints of various agencies / image providers, etc.
  - Challenges:
    - Training and dealing with surges
    - Retaining mappers
    - Data validation and harmonization
    - Pre-processing, hosting and licensing of imagery
    - Data from humanitarian organizations on the ground

- General discussion on collaborative mapping
  - Technical standards:
    - UNOOSA: Satellite imagery should be provided to the crowd/community as WMS
    - DG: There is a strong need to establish a protocol/standard for sharing satellite data in crisis situations. These protocols must be set up in advance.
    - NDRCC sees the role and core topic of the IWG-SEM in developing standards and guidelines to prepare for emergency response
  - Coordination:

- ImageCat points out how US agencies (USGS, NGA, NOAA, etc.) coordinate well, efficient and on regular basis for US emergencies. <u>Daily</u> teleconferences provide an effective means for this. Suggests following this approach. Communication between major players needs to be improved in "peace time". Internships as possible way to achieve this. A repository of all players and their capabilities should be set up.
    - DG/Tomnod: Duplication of work needs to be avoided. Communication between major players needs improvement. Use of skype rooms strongly recommended. An "information market place" for end users should be developed.
    - EC-GROW and UNOOSA point out that crowd-mapping should be sustainable and reliable, i.e. the crowd should also be available for small events as opposed to major events.
- Crowdsourcing for Copernicus Emergency Support Mapping Service:
    - DLR and JRC: Since Copernicus products are paid for by the public, it would be a good thing to feedback results into public services like OSM and/or organise crowdsources mapping contributions within Copernicus. JRC: Crowdsourcing could be included in validation approaches for Copernicus products.

Day 2

- **Issuing SEM Guidelines 2.0 and earthquake chapter**
    - DLR: Introduction and current status of guidelines:
        - Final version of 2.0 to be published online once review by UNOOSA is complete. Possibility to comment on guidelines in separate document. Intended review and update cycle for the guidelines could be one year and should be clearly highlighted in the guidelines.
    - Earthquake chapter and general earthquake damage assessment approach:
        - UN-SPIDER to set up table of content for earthquake chapter (ITHACA highlights that the original idea was to use the same structure for the different disaster-related chapters). Guidelines can be linked to UN-SPIDER regional support office's "recommended practice" – documents.

- EC-GROW sketches mind map for earthquake chapter following the introductory discussions.
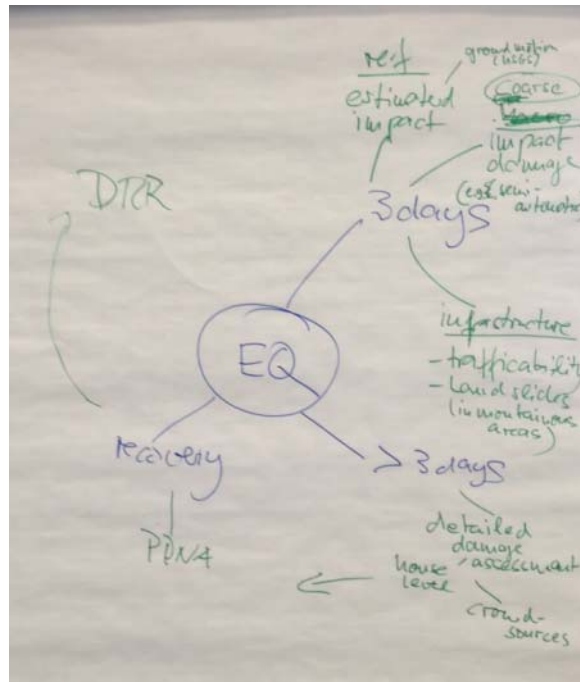

- Key elements:
    - 1st: First overview maps with estimated impact based on models or semi-automated algorithms.
    - 2nd: Quick assessment maps, e.g. including landslide and landslide lake overview in mountainous areas to identify affected areas < 3days
    - 3rd: Detailed damage assessment of buildings and infrastructure based on common earthquake damage scale. Building assessment on single buildings or building blocks or grids/administrative units > 3days.

- ITHACA: Need to define a common standard for earthquake damage assessment => EMS 98 is the basis but fine-tuning is required, taking vertical imagery limitations into account (e.g. limit to destroyed, major damages and possibly damaged being slight damage grades unreliable, as confirmed by ImageCat during the 1st day). A lot of research papers focused on semi-automated algorithms for earthquake damage assessment are available, but there is a strong doubt on their operational status (i.e. never seen similar products in the first hours after post-event image availability)

- UNOOSA suggests performing literature review concerning (semi)-automatic damage assessment and applying findings on Digital Globe imagery from Nepal.

- **IWG-SEM-GeoRSS – Where we are and thinking forward: How to put the GeoRSS feeds into full action**

- o Introduction and review by DLR.

- o JRC: Presentation on current status of GeoRSS feeds – see Annex.

- o Discussion: How to engage more agencies to issue GeoRSS feeds on activations and products?

  - ▪ EC-GROW: Copernicus, DLR, SERTIT, Charter are in. Group needs to find out why other members don't issue feeds.

  - ▪ JRC proposes to set up web based "GeoRSS Feeds Producer" platform for organizations that do not have automatic feed creation capability within their content management systems. This could be achieved within several weeks.

  - ▪ DG willing to provide information for GeoRSS aggregator. Need for IWG-SEM to provide technical details on feed specs. Framework needed for DG to work in.

  - ▪ ITHACA encourages group to reflect about purpose of 2nd level GeoRSS feeds (already foreseen as the natural evolution of the 1st level, see attachment to mail sent on 22/10/2014 at 18:00 by Jan Kucera) with regard to user needs (i.e. proposal of AOIs sent by users). These are not supposed to be part of the feeds currently. Need to easily differentiate between SEM-provided information and user-provided information etc. Avoid mix-up.

    - • HOT-OSM: Feeds will work in both ways which is welcome.

  - ▪ JRC sees need to discuss who is allowed to join GeoRSS feeds in order to avoid problems.

  - ▪ Possible additional users: WFP, UNOSAT, OCHA field offices, UNHCR field offices, Cartographic Section/DPKO, PDC, NGA, USGS for major events

    - • IWG-SEM needs to gain critical mass from its own members in order to convince "outside" organizations to join. UNOOSA: 2nd level GeoRSS feeds can to be used in order to gain this critical mass. ITHACA: a standard press-release advertising the IWG-SEM GeoRSS feed concept and referencing current operational examples should be prepared, so that each IWG-SEM member can share it through its main communication channel (e.g. web-site news).

- o Discussion on future extensions to current GeoRSS feeds:

  - ▪ UN-SPIDER: HDDS supports WMS which could be a way for feeding satellite imagery into aggregator maps as a next step.

  - ▪ JRC: At the moment GeoRSS feed supports metadata only which is done on purpose to keep efforts for issuing feeds low for mapping centres.

  - ▪ HOT/OSM: Use WMS to extract AOI polygons from WMS imagery.

  - ▪ JRC: WMS can be put into aggregator as separate layer but not into aggregated outgoing feed.

  - ▪ UNOOSA suggests focusing on aggregator's main purpose: Providing metadata for activation coordinates, image footprints and map products.

- • **Collaborative Mapping II: How to adopt ideas and concepts by a broader community**

o HOT/OSM states that "crowd + experts" can very well complement and support each other.

o DLR/OSM sketch a possible way of cooperation between crowd and expert satellite mappers:
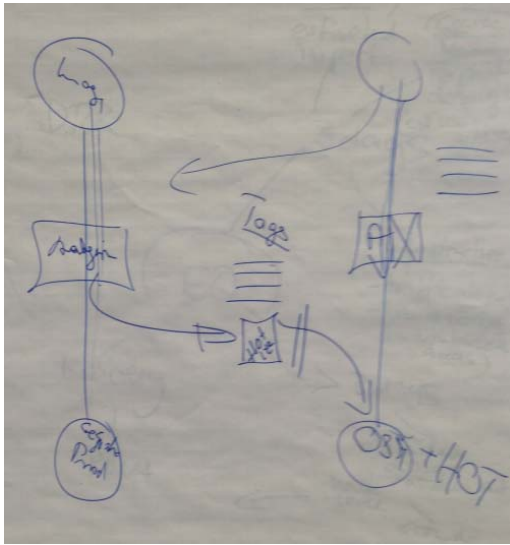
▪ HOT/OSM: Lack of damage tags on OSM-side is a great opportunity for collaboration since specs can now be defined together. Tagging features with information on confidence levels and/or time-stamps ("provisional", „temporal", "transitory" etc.) have all been experimented with by OSM and are technically possible.

▪ ITHACA highlight that tagging standards should not be a major issue, being manageable in the ETL (Extraction, Transformation, Loading) phase. Ithaca proposes to start collaboration by ingesting IDP-camp data into OSM database. When damage analysis is made on reference data coming from OSM, crisis information management is easier since only event specific attributes have to be transferred.

• HOT/OSM argues that in some cases geometries will need to be included into OSM since Copernicus and other Service Providers very often create new data that is useful for OSM.

▪ EC-GROW points out that validation must be performed <u>before</u> feeding data into OSM since it could end up there forever. DLR states that a variety of ideas exists for validating and identifying data by tagging it with producer's signature or PGP stamps. ITHACA sees danger of information being outdated if validation process is time-consuming. DLR agrees.

▪ HOT/OSM points out the advantage of online OSM data its high flexibility. Users can use the data in any way they want without having to deal with static, inflexible maps etc.

▪ Next steps: HOT/OSM to discuss ideas outlined above internally. If approved, HOT/OSM will contact IWG-SEM group members to find out more about their

workflows, data structure, etc. A sub-group on IWG-SEM side should be set up lead by a coordinator to work on these issues.

- **Taking stock of three years of IWG-SEM work – are we on track?**
    - Introduction by Simonetta DiPippo (UNOOSA) and Luc St-Pierre (UN-SPIDER)
        - EC-GROW sees widening of group's membership to make it truly global as a major task for the new chair.
        - UN-SPIDER encourages members of the group to link-up with UN-SPIDER directly for common projects.
        - Results of UN-SPIDER Bonn conference and IWG-SEM activities to be reported to UNCOPUOS
    - Discussion on fields of activity
        - DG finds the work of IWG-SEM extremely necessary since it provides great platform for collaboration and coordination.
        - EC-GROW expresses wish to perform simulation exercises on group level to test things in advance of real disasters. Training activities could also be used to promote and facilitate the use of the mapping guidelines.
            - ITHACA emphasizes that exercises/contests could be a good way to test semi-automatic building damage assessment methodologies
        - UN-SPIDER: Mapping guidelines should be used for capacity building missions on a regional level in countries that are often affected by disasters.
        - EC-GROW suggests adding to the emergency phase, the preparation and post-disaster phases to enable members of the group who also cover these phases to exchange know-how and coordination strategies. EC proposes renaming group from IWG-SEM to IWG-SEI = Space based Emergency Information).
            - DLR sees no urgent need to change the name and states that IWG-SEM already contributes indirectly to disaster risk reduction by the work it does. Once the group has achieved the goals it set itself in the first place further action could be taken on. It is reminded that the group's work is been done on a voluntarily best-effort base and activities should be held in a realistic level.
            - UNOOSA and USGS agree with DLR and suggest following a step-by-step approach: The tasks which were set two years ago should be finished first before branching out.
            - UN-SPIDER mentions that very often governments ask for guidance on satellite based damage assessment activities in a post-disaster phase. This could be a new task for the group.
    - Discussion on membership policy
        - DLR wonders if original requirement for membership, i.e. being a non-commercial entity, is still necessary and up-to-date.
            - EC-GROW list various possibilities for involving commercial entities:

- o temporary ad-hoc membership to work on certain topics

- o long-term membership

- o observer

- UNOOSA suggests starting with commercial entities as observers and review their status on regular basis.

- DG would be happy to join and points out the need for other big commercial players such as Airbus to join as well.

- ITHACA supports membership for commercial partners without limitations but checking members' active contribution to the group (all members, not just commercial ones) .

- Discussion concludes with the following proposal:

  - o The group is open for all types of actively contributing entities. However, if an organisation is not actively participating in meetings, telecons and work of the group, they will be considered as inactive and will be removed from the mailing lists after two years. Thus, the group will open up to any type of member as long as they contribute to the group's work. This proposal needs to be confirmed at the next telecon. If approved, the membership policy criteria statement on website needs to be revised. Existing members must be notified about the new membership policy and asked once again about their willingness to stay in the group.

- o Any other business

  - ▪ Mailing lists: It was agreed that for now mainly one mailing list will be maintained and used: members@iwg-sem.org. In case of emergency usage of the list an identifier "[IWG-SEM: emergency]" will be used in the subject line of the mails to allow easier filtering. The emergency@iwg-sem.org list will remain inactive for now and may be reactivated upon necessity.

  - ▪ Topics for some of next meetings

    - Social media as emerging field and complementary tool for very early response stage, ahead of first satellite-based maps available.

    - Early warning

      - o PDC, DLR, ITHACA, UNOOSA agree that both topics are of major interest to the group. At some point, early warning could even be included in the mapping guidelines. Links to actors in the field of early warning such as the global flood working group should be established. Major social media actors should be invited for next physical meeting.

  - ▪ Next telecon will be held on the 16th of June 2015 hosted by UN-SPIDER

  - ▪ EC-GROW thanks DLR for chairmanship

Action Items

AI 1	Work on aggregator GeoRSS Level 1. Ask organisations about their use. Shared Press release about GeoRSS, referencing operational examples and existing aggregators. Promote / implement GeoRSS Level 2.
AI 2	Set up email-conversation between HOT-OSM and group on joint damage tagging. Set up sub-group on joint damaging tagging.
AI 3	Set up table of content for earthquake chapter and start the writing process.
AI 4	Finalize guidelines 2.0 , (including the flood chapter)
AI 5	Encourage further organisations to use and adopt the GeoRSS notification system for emergency mapping activations (e.g. UNOSAT)
AI 6	Revise list of future activities (2014 Munich Meeting)
AI 7	Set-up and maintain an "ideas document" for guidelines. Revision document for guidelines.
AI 8	Revision of membership policy with members and update on web
AI 9	Start the editing of the earthquake chapter of guidelines

ANNEX: Presentation of GeoRSS usage level 1 and 2

GeoRSS Feeds to Support Information Sharing
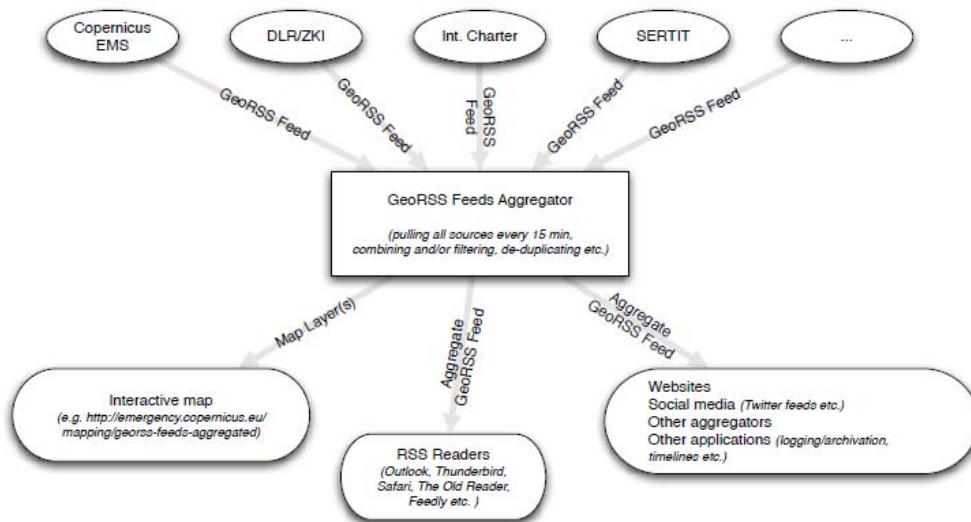
**European Commission
DG Joint Research Centre**

Copernicus EMS - Mapping

IWG-SEM Spring Meeting 28-29 May, 2015

GeoRSS feeds to support information sharing

GeoRSS feeds to support information sharing

On activation level (feed of activations)   *Already specified by IWG-SEM*
  ‣ geo:point, basic metadata in description
  ‣ already specified and working (Copernicus EMS, DLR/ZKI, SERTIT)
  ‣ output e.g. http://emergency.copernicus.eu/mapping/georss-feeds-aggregated

On component level (feed of AOIs, maps, imagery)   *Proposal*
  ‣ geo:polygon, basic metadata in description
  ‣ various component types as RSS attribute <category> (with diff. metadata):
      ‣ AOI (proposed/intended areas) *[planned map types, req. sensor type]*
      ‣ Map *[producer, content description, scale, extent, download links]*
      ‣ Image *[sensor, resolution, pre/post event, acquisition date]*
  ‣ possible output examples:
      ‣ interactive map (with filters)
      ‣ filtered (e.g. area-limited, time-limited etc.) aggregate GeoRSS feeds

3

GeoRSS feeds to support information sharing

Source feeds (on both activation and component levels) can be:
  ‣ (semi-) automated (as exports from current workflow management systems)
  ‣ manually edited (for org.s without a workflow mgm. system)

                                                              Proposal

JRC proposes to build a "GeoRSS Feeds Producer" platform ("FP")
  ‣ each organization can log in and
      ‣ see their automatically produced feed items (subscribed by the FP)
      ‣ add/edit/delete their manual feed items
  ‣ FP would then produce for each organization:
      ‣ one general feed URL (with activation-level feed)
      ‣ one feed URL per activation (with component-level feed)
      ‣ above would work as a source for the GeoRSS Feeds Aggregator
      ‣ could also be used anywhere else (e.g. internally by the org.)