UCP 2022 MINUTES OF MEETING OF THE EMERGENCY MANAGEMENT & HUMANITARIAN AID MARKET SEGMENT PANEL

Meeting Date	03.10.2022	**Time**	10:00-18:30
Meeting Called By	EUSPA	**Location**	Prague (hybrid event)
Minutes Taken By	Víctor Álvarez, FDC Sarah Fischetti, EUSPA c/o BIP	**Next Meeting Date**	N/A
Attendees	**Vasileios Kalogirou, EUSPA, Session moderator** **Sarah Fischetti, EUSPA c/o BIP** **March Leminh, FDC, Panel coordinator** **Víctor Álvarez, FDC** **User Community Representatives (UCRs)** Paul Dettmer, World Food Programme, Panel Users' representative and speaker Francesca Somma, European Commission, DG DEFIS Alessandro Carrotta, European Commission, DG ECHO Emanuele Sapino, Copernicus EMS Team / JRC Dr. Chiara Casarotti, PhD, EUCENTRE Laura Ruiz, Spanish Red Cross Jean Philippe Malet, CNRS (excused) Complete list of attendees is in Annex 1.		
Distribution (in addition to attendees)	UCP Plenary, EUSPA, Public		

Agenda Items	Presenter
1. Welcome and introduction to the Emergency Management & Humanitarian Aid session	Vasileios Kalogirou, EUSPA
2. The Copernicus Emergency Management Service (EMS): overview, current state and evolution.	Francesca Somma, EC DG DEFIS Emanuele Sapino, Copernicus EMS Team / JRC
3. Galileo/EGNOS current state and future services for Emergency Management & Humanitarian Aid	Flavio Sbardellati, EUSPA *(excused)*
4. Disaster management: the Union Civil Protection Mechanism and its evolving needs	Alessandro Carrotta, EC DG ECHO
5. State of the EMHA market	Marc Leminh, FDC
6. Post-crisis damage assessment and building inspection	Dr. Chiara Casarotti, EUCENTRE
7. Monitoring of landslides	Jean-Philippe Malet, CNRS

	(excused)
8. Asset management in humanitarian aid operations	Paul Dettmer, World Food Programme
9. Humanitarian Needs Assessment	Laura Ruiz, Spanish Red Cross
10. Minutes of Meeting and Wrap up	Víctor Álvarez, FDC Vasileios Kalogirou, EUSPA

Summary

The Emergency Management and Humanitarian Aid panel of the User Consultation Platform (UCP) 2022 took place on 3rd October 2022 as an hybrid event, with in-person venue in Prague, Czech Republic. The panel gathered around 45 participants coming from research, humanitarian aid, industry as well as from European Institutions, covering the whole spectrum of the market segment.

The panellists gave in depth presentations of their applications, how they use satellite technologies (EO and GNSS) and what their specific requirements are. This broad coverage generated interest from the participants and helped start good interactions with all the attendees with many questions and comments.

The most commented topics are the following:

- End users need **easy to access information** compatible with legacy systems and directly usable in the field. Artificial Intelligence methods can contribute to this need;
- In many cases and applications, the frequency of satellite observations (i.e. **satellite revisit**) is equally (or more) important than the spatial resolution;
- The Humanitarian Aid sector still lacks **awareness** on the capabilities of the EU Space Programme. In this respect community-building activities would be very helpful;
- EUSPA shall continue user consultation for needs connected to **all the applications** that are defined in the scope of the Emergency Management and Humanitarian Aid segment.

1 MINUTES OF MEETING

Agenda Item 1 - Welcome and introduction to the Emergency Management & Humanitarian Aid session. Vasileios Kalogirou / EUSPA

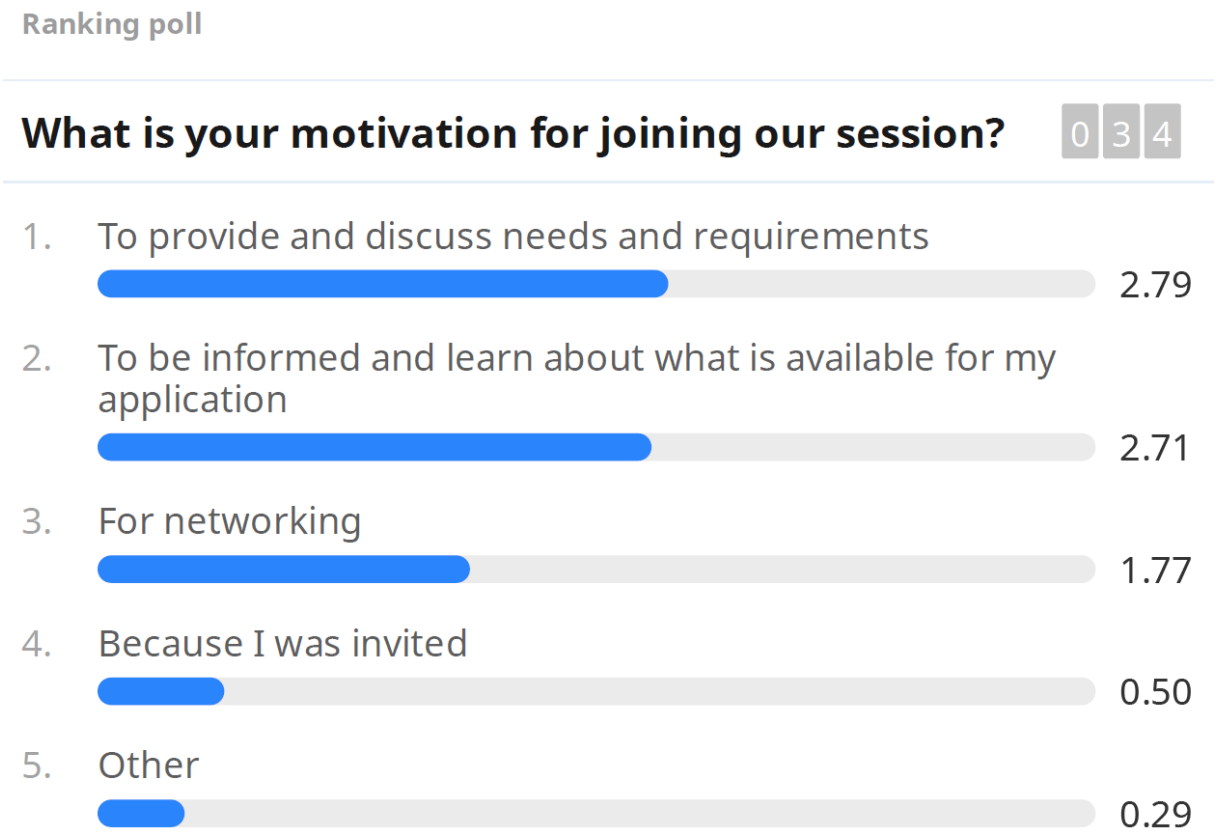
Vasileios Kalogirou, Emergency Management and Humanitarian Aid (EMHA) segment leader at EUSPA, welcomed all participants to the User Consultation Platform (UCP) session. He provided a brief overview of the day's objectives, and how the entire UCP is indeed a tool allowing EUSPA to achieve closer contact with the user community.

Indeed, the UCP aims at identifying the needs and requirements at application level relevant for Earth Observation (EO), Global Navigation Satellite System (GNSS) and Satellite Communications (SatCom). User needs and requirements from different market segments, including EMHA, can then be taken as inputs for the provision of user driven space-based services by the EU Space Programme.

Having for the last years focussed on the European GNSS programmes, EGNOS and Galileo, the former European GNSS Agency (GSA) evolved into EUSPA, which received an extended mandate, enlarging the scope of the Consultation to also cover EO and (if applicable) SatCom.

Mr Kalogirou explained the structure of the agenda of the day, having two parts: i) a first informatory part, in which participants were mainly briefed about the state-of-art of the relevant EU Space Programme, and ii) an applications part, ran in 4 consecutive sessions during which open discussions would be stimulated between all participants.

The use of slido (online Q&A and polling tool) was announced and all attendees were invited to make use of it by means of a question aimed at finding out the motivations of participants to join the UCP EMHA session:



As can be observed, a total of 34 persons participated in the first poll. From the 5 options available to rank, participants were allowed to vote for their top 3 preferred options. The results show the willingness of the audience to discuss needs and requirements and their interest in learning about the availability of solutions/products [in terms of EO and GNSS] for their applications.

The slides of this agenda item can be found as Attachment 1 in section 4.

Agenda Item 2 - The Copernicus Emergency Management Service (EMS): overview, current state and evolution. Francesca Somma / EC DG DEFIS and Emanuele Sapino / CEMS-JRC

The presentation started with a brief presentation of Copernicus Emergency Management Service (EMS) by Ms Somma, stressing that the added-value products delivered by Copernicus merge both satellite (from Sentinel and other contributing i.e. commercial missions) and in-situ data.

The Copernicus EMS covers all segments of the Emergency Management cycle, and is coordinated by 3 different EC DGs.

As part of on-demand services, the EMS offers two main products: Rapid Mapping and Risk and Recovery mapping. The first enables the rapid delivery of information, following a request, showing a quick impact assessment. The later provides non-immediate geospatial information that might be necessary for the management of an event.

The Copernicus EMS is mainly activated by 'authorised' users, which typically are national agencies in the field of civil protection. An alternative activation mechanism exists through the ERCC for 'non-authorised' users.

The Early Warning Monitoring Service is built around Floods, Fires and Droughts warnings.

As a non-EMS service, the European Ground Motion Service (EGMS) is provided by the Copernicus Land Monitoring Service (LMS) since May 2022, providing information regarding natural and anthropogenic ground motion and serving as a complement to the EMS.

Finally, the Exposure mapping services of the EMS make use of the global human settlement layer (GHSL) to provide various products related to population mapping. This is a more recent addition to the EMS service.

The second part of the presentation, provided by Mr Sapino, addressed several activation examples of the Copernicus EMS in the field of Humanitarian Aid, including the identification of the associated products.

For example:

- Product P18 of the Risk and Recovery Mapping portfolio makes use of VHR imagery and ancillary data to identify human settlement structures.

- Product P19 of the same portfolio allows, via a single activation, more than one product for monitoring purposes. It was noted how the information delivered provides evolution over time. Activation EMSN097 (IDP camps monitoring in Northern Mozambique) was shown as the delivered product provided also provided in-situ data such as water points

- Activation EMSN-113 (Crop change detection in conflict-affected areas) by WFP allowed to assess the agricultural production in Northern Nigeria. It was based on imagery but also other ancillary data.

The slides of this agenda item can be found as Attachment 2 in section 4.

Agenda Item 3 - Galileo/EGNOS current state and future services for Emergency Management & Humanitarian Aid. Delivered by Vasileios Kalogirou / EUSPA

This presentation provided a quick overview about the existing and future services provided by Galileo. Already operational:

- The Open Service (OS) is a public and freely accessible service, the one that all citizens can already make use of thanks to smartphones.
- The Public Regulated Service (PRS) is encrypted and tailored for the needs of specific communities in the governmental sector, such as law enforcement or civil protection.
- The Search and Rescue is Galileo's contribution to COSPAS-SARSAT with the inclusion of the return link capability. These 3 services are already operational.

The new upcoming Galileo services are:

- High Accuracy Service (HAS): providing decimetre-level accuracy and in test phase.
- Open Service Navigation Message Authentication (OSNMA): increasing the robustness of OS and also in test phase.
- Commercial Service (CS): providing signal authentication in a commercial framework.
- Emergency Warning Service (EWS): which is expected to become very relevant in the management of emergencies once it becomes operational.
- Remote Beacon Activation (RBA): to be tailored for the aviation and maritime segments.

The slides of this agenda item can be found as Attachment 3 in section 4.

Agenda Item 4 - Disaster management: the Union Civil Protection Mechanism and its evolving needs. Alessandro Carrotta / EC DG ECHO

The presentation by Mr Carrotta was delivered by teleconference. However, due to signal cuts this presentation had to be interrupted and continued by Mr Kalogirou, who showed and commented the remaining slides to the attendees.

Particular attention was paid to the challenges ahead the Union Civil Protection Mechanism, which are summarised below:

- **enhancing prevention and preparedness** for natural and man-made disasters – increase in the frequency and intensity of extreme weather events with high impact due to climate change
- dealing with the **evolving nature** of disaster/crisis management - **new risks** (health

emergencies, complex crisis)

- facing the **cross-sectoral nature** of disaster management - requires not to look at only the immediate/local impact area of a disaster, but also side effects in terms of displaced populations, etc.

The slides prepared by Mr Carrotta can be found as Attachment 4 in section 4.

Agenda Item 5 - State of the EMHA market. Marc Leminh / FDC for EUSPA

Mr Leminh explained the main steps of the UCP process, highlighting that a first draft version of the Report on User Requirements (RUR) was prepared by EUSPA and made available to the participants through the EU Space Week website. The next step consists on validating its contents (i.e. needs and requirements) and delivering conclusions, thanks to the discussions held at the UCP session.

This was followed by an introduction of how the EMHA applications were divided into 'clusters' at the beginning of the process and hence also in the document, highlighting that the Humanitarian Aid cluster is, indeed, transversal along the various phases of an Emergency.

A few examples of applications were shown, yet it was indicted that the RUR document has a lot of other applications not shown in the slides. In this first EMHA UCP, discussions would focus on 4 of them.

Mr Leminh then addressed the size of the EMHA applications market, in terms of EO and GNSS. All data being available in the EUSPA EO & GNSS Market Report[1]. One main conclusion was highlighted: the market is expected to grow in all 'clusters' over the next years.

The final part was devoted to introduce the EO and GNSS tables on user requirements that participants could find in the EMHA RUR document. It was explained that these were the result of the market and applications investigations, having been reviewed already by a few experts. All participants were aimed at providing comments on those, either during the different slots of the day, when tables would be shown, or after the event.

The slides of this agenda item can be found as Attachment 5 in section 4.

SESSION BREAK

DISCUSSIONS ON GNSS AND EO REQUIREMENTS PER APPLICATIONS

Agenda Item 6 - Post-crisis damage assessment and building inspection. Dr. Chiara Casarotti / EUCENTRE Foundation

[1] https://www.euspa.europa.eu/european-space/euspace-market/gnss-market/eo-gnss-market-report

Dr Casarotti took the floor after a quick introduction to the application and to herself was provided by Mr Kalogirou from EUSPA. The introductory slides from EUSPA can be found as Attachment 10 in section 4.

Dr Casarotti briefly introduced EUCENTRE and its departments, then focused on their activities on the topic.

EUCENTRE makes use and integrates satellite data (optical, SAR, GNSS) with ground-based monitoring and drones. Indeed, thanks to their participation in the NOCTUA project, they started to make more use of integrated data, and more specifically SAR and 'traditional' in-situ monitoring for Land and Structural analyses.

In the framework of other projects, monitoring is performed combining the use of drone surveys, GNSS and satellite SAR.

At a local scale, the monitoring of structures relies on GNSS, by essentially monitoring the displacement of relevant points. During no-emergency times, the monitoring addresses slow movements. After major events, the study relies on the comparison of pre- and post-measurements to study the changes in the structural dynamics of buildings and infrastructures, which permit evaluating the level of damages.

An example for the Ukrainian city of Mariupol was provided. In this case, SAR coherence maps from Sentinel-1 were used for urban monitoring, identification of urban areas impacted and evaluation of collapse extents. In this kind of scenarios, it is very important to evaluate accessibility (bridges viaducts…) but also hospitals, etc. all that can be necessary to deal with the emergency, and this is very much supported by in-situ work.

At a large scale, EO allows a general evaluation of the area and of the region's accessibility, which is very important for civil protections as in this way they possess a picture to size their response. For example, by estimating the number of moderately damaged buildings, these organisations can calculate the number of technicians necessary to be sent in-situ for visual inspection of buildings, thus enabling affected people to return earlier to their houses.

In the very final part of her presentation, Dr Casarotti addressed a few issues and needs related to GNSS and EO technologies, as well as their future use in the area of damage assessment.

- As main requirements for EO, a higher revisit time and higher spatial resolution was requested. Yet, upon having to choose between one of those, Dr Casarotti made more emphasis on the increase of the revisit time to have frequent observations.

- On the GNSS side, the main request was for higher accuracy (in the mm range), which is needed to monitor the displacements/deformations of very rigid buildings, mentioning that most times critical buildings belong to this type.

- The methodologies to use EO in this kind of applications are being consolidated. Further improvement and validation are still needed.

- A higher increase of the use of GNSS for the continuous monitoring of critical infrastructures

will require evolutions and updates of existing GNSS monitoring networks and the integration with existing traditional sensors (accelerometers, etc).

The slides of this agenda item can be found as Attachment 6 in section 4.

Q&A Session – Verbal interventions
Comment by crisis management association, Croatia.
A member of the Croatian Crisis Management Association contributed to the discussion by sharing some of their work and providing detailed explanations of their experience dealing with recent earthquakes (including main event and aftershocks) in Croatia.

To conduct safety risk assessment, they used existing archival data such as building height or age in conjunction with EO images. This assessment took place as a preparedness activity and proved to be very helpful when in 2020, an earthquake hit the country. In addition, more than 600 civil engineers were deployed to conduct in-situ building inspections.

Aerial imagery was also combined with drones because of the resolution provided (up to 3.5 cm), allowing to see chimneys in roofs and detecting those potentially damaged. Following this evaluation, specialised teams were sent on the ground to demolish the chimneys that could feel during the aftershocks.

In a second earthquake also in 2020, no high-resolution satellite imagery was available due to persistent cloud coverage, but they managed to provide the Copernicus EMS with drone imagery, allowing the damage assessment to be conducted. In his opinion, it would be useful to consolidate the integrated use of satellites and drones, as a 'standard'. He offered himself to provide more details offline to those interested.

Question (Q): Have you considered using social media and contributions from volunteers, who take and share pictures via open street maps, integrating their work in your system?
Answer (A): This is not currently done, although it would be useful, and R&D is on-going in the field. In addition, for the assessment of damages already localised, they still need technicians to evaluate in-situ each situation.

Q: Is Artificial Intelligence (AI) used to detect damaged buildings?
A: For the time being, data (for example from drones) is gathered and processed semi-automatically. Technicians must "look at the pictures" to indicate damages. They are involved in an R&D project to deal with automatic detection. Nonetheless, AI can be useful to make a pre-filtering of the huge number of pictures that can be gathered. In other words, AI can be very well suited for a "screening" of the data; but in the end there must be an expert "human eye" looking at that.

Q: Could you please indicate if tools are used for collecting in-situ information?
A: Tools are used to collect information, but the assessment of damages is based on expert judgement. Forms and standardised procedures to guide the assessment are used. In most countries, standards are national, but most of them follow the same principles.

Q: In Haiti 2010, many buildings collapsed but the roof structure remained nearly intact, so it was difficult to ascertain if buildings were standing or not. With pre- and after-InSAR data it was possible

to do a check in the vertical dimension to identify that. But what happens when the pre-event image is not available?
A: Then the damage cannot be assessed based on nadiral images, but only by using oblique imagery.

Q: There is a lot to be done for the protection of cultural heritage, when earthquakes hit. This is particular important in European countries. There is no dedicated service at Copernicus dealing with cultural heritage. From your experience in Italy, what do you suggest for this?
A: There is no monitoring service [in Italy] for this kind of buildings. This could be another type of service, not only for cultural heritage but also serving other kinds of buildings, such as hospitals.

A representative of the JRC clarified that there is no automatic instrument to monitor the status of infrastructure and buildings in the current Copernicus offer, but an on-request service is available, which can also be activated in the preparedness phase for such cases. It is observed that there is an ever-increasing interest for the protection of cultural heritage. More tailored products might follow in the future.

Comment by PAX, The Netherlands.
In an activation in St Marteen with the Netherlands Red Cross, we had to identify households [help and aid is delivered per household]. The difficulty was that several households could be located under one single roof. EO would allow mapping the number of roofs, but not the number of households. This indicates the importance of field workers, who conduct on-site visits to clarify the situation.

Comment by Geosystems Hellas, Greece.
In relation to Cultural Heritage and city centres, we have worked on that with the Greek Centre for Emergency studies. We measured the structural body of buildings, with 3D data together with information about the year of build (that statistically indicates the materials used). We developed a platform that made use of that together with AI and Copernicus data, and also Very High Resolution SAR data from contributing missions like COSMO-SkyMed. Based on that and historical data from past earthquakes, we aim at evaluating what might be happening in the future. But the platform relies on the use of big data: terabytes of data are processed including seismological, geological, structural and cadastral…this is the main issue we face. In the end, this will allow to us invent a method for the evacuation of buildings.

DG DEFIS clarified that the Risk and Recovery mapping can be used for risk assessment but is part of the FLEX services, which means that can have a latency time because a contract needs to be assigned.

Comment by SATCEN, EU.
The SATCEN is entrusted for the implementation of Copernicus services in support to external action, including damage assessment also in cultural heritage sites outside the EU. For example, it can be used to evaluate the damage occurred to cultural heritage in case of conflict, or caused by criminal activities also. They coordinate very much with the EMS; although higher security measures (in terms of sensitivity and location) apply in their case.

Comment by Airbus, France.
Airbus is one of the main providers of data within Copernicus EMS. When it comes to needs and requirements, sometimes these are also driven by the offer, by the new technologies entering the market, which needs to be embraced and taken in operational terms.

What they observe on this community, is that a lot of the needs are related to having timely access to the right information, it is about having the satellites available when an event occurs. A lot has been discussed up to now on the 'preparedness' phase, and in their opinion much more can be offered for that. So, for service providers, it is very important also to know the needs from final users, and demonstration projects can also serve to accelerate all of it.

Q: Since vulnerability of buildings is significantly based on their height and age of construction, how is vulnerability addressed for those buildings that need to be reinforced after an earthquake?
A: The databases they use for that are from ISTAT (Italian Statistics Institute), and they are the ones updating it periodically. The last information available in that database refers to the last intervention on each building (i.e. not only age of construction).

PAX points out that the update of such kind of databases is also possible thanks to in-situ data collection.

Q EUSPA. When it comes to the presented 'Noctua', is it a project, a platform developed with other partners? Is it operational? Does it integration various types of data?
It is a platform, and since the project is still on-going, it is only being used there. The platforms is envisaged to combine all information and inputs in the platform: a user would request a specific interest for area, zone, and all information would be collected under this platform.

Comment by UNOOSA and CEMS-JRC.
With respect to the damage assessment on building, it is a challenge to map the geographic extent of cases like e.g. floods in urban areas. It would be less difficult if a higher resolution DEM was available from Copernicus.

JRC explains that Copernicus offers that for the EU, but not for the rest of the world. In addition, the Floods delineation products is offered as part of the risks and recovery mapping catalogue [production time between 5 and 10 days], but not as part of Rapid Mapping due to the activation-response times. Activation of the CEMS can include a combination of different products, as could be floods and impact assessment in one single map.

Validation of requirements

(See draft user requirement tables for EO and GNSS in Attachment 10)

Two operational scenarios were identified, prior to the UCP, in this application: one corresponding to the large-scale damage assessment over a wide area, and another one corresponding to a detailed building damage assessment, with the scale is reduced at building-level.

For the large-scale scenario, it was discussed that:

- The minimum of 10x10 m resolution seems more logic for optical imagery. A lot of COSMO-Skymed and SENTINEL 1 data is used, and that has better resolution.
- Timeliness: in the case of earthquakes, the parameter is important not only in terms of

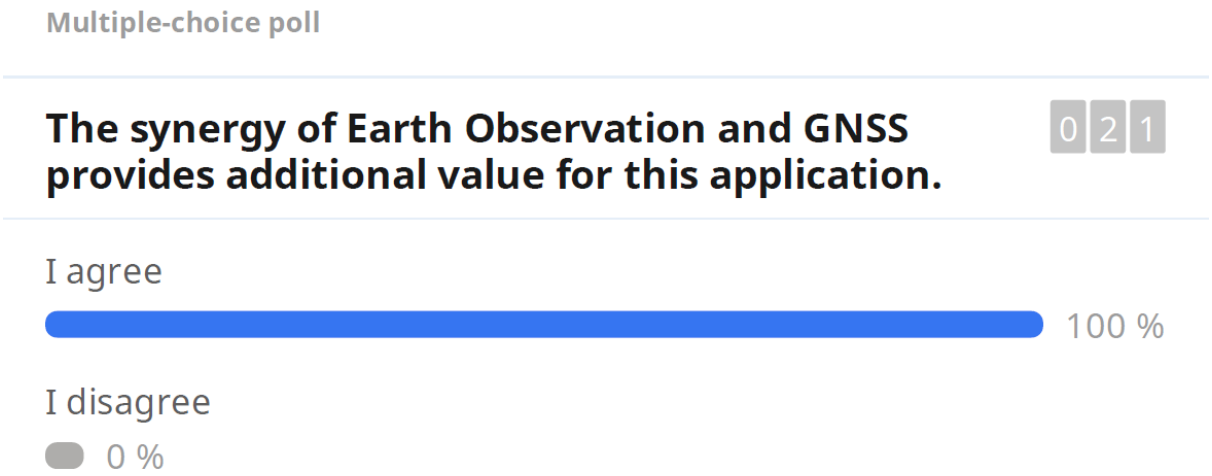
number of days, but because the occurrence of aftershocks (with varying levels of intensity) may require daily updates.

Applicable to both scenarios, it was suggested to add details related to 'spectral ranges': RGB and infra for optical data, C-band, L-band and X-band in the case of SAR. A meter-level requirement is given in terms of 'geometrical accuracy', it is suggested to include it in the table. The comment is taken into account.

Finally, it was mentioned the need to provide more information about the information delivered to users, so they can understand what they are receiving. Data should be delivered together with historical data before the event; that would allow general public to understand how serious the event has been.

The audience did not provide comments related to GNSS requirements.

Before closing the morning session, a poll was proposed to the audience about the value that GNSS and EO can provide for this application. The results are depicted below:



Lunch Break

Agenda Item 7 - Monitoring of landslides / Jean-Philippe Malet, CNRS

Due to last-minute issues with his travel arrangements, Mr Malet could not participate neither in-situ nor via teleconference in the session. Hence Mr Kalogirou gave an introduction to the application and went through Mr Malet slides.

Again, particular emphasis was given to the main conclusions raised by Mr Malet for the use of EO and GNSS in the monitoring of landslides:

- For **EO:**

- High-revisit time (3 days) and multi-band missions (especially L-band, e.g. NiSAR) are needed
- Very-high-resolution optical data is critical – e.g. Sentinel-2 / HR (5 m)
- Satellite with systematic stereoscopic acquisitions
- Better geometric accuracies, especially for optical imagery (many ”statistical” corrections needed for image matching and corrections of geometric errors – deramping, destripping, etc)
- Both on-line webservices + standard products are needed; EGMS has many limitations for landslide and other geohazards
- Some private constellations provide interesting images

- For **GNSS:**
  - The emergence of low-cost and accurate receivers will multiply the use of GNSS signals for landslides monitoring
  - Smaller and more robust (frequency range stability) antennas are needed
  - Towards MEMs (small dust) GNSS receivers
  - PPP processing methods are relevant; open the door for on-board position processing
  - 3hrs solution with <1 cm horizontal accuracy is a target
  - Estimating the atmospheric delays might be helpful for landslide applications
  - Increase in the correction of the signals (atmosphere, time, satellite position, etc)
  - Extension of EGNOS/WAAS in other regions than Europe will be helpful

The introductory slides from EUSPA can be found as Attachment 7 in section 4; while Mr Malet slides can be found as Attachment 7.

Q&A Session – Verbal interventions
Despite the unavailability of the speaker, the audience was willing to share their experience and raise questions.

Comment by UNOOSA.
They have conducted ground measurements, experimentally, just before volcanic eruptions. They found one side of the volcano displacing faster than the other.

One of the challenges they face nowadays is the unavailability of combined ascending/descending modes when doing InSAR based on Sentinel 1 data. The premature end of Sentinel-1B mission impacts this kind of analyses.

Post-meeting comment by speaker: the launch of Sentinel-1C is pre-anticipated. In the longer term, the launch of the Harmony mission (which will accompany, by 2030 the new series of

Sentinel 1 satellites) will already increase the revisit time by a factor 2. Thus it will be a very relevant and structuring mission.

The deployment of permanent reflectors should also be encouraged: this kind of permanent scatterers are need especially for vegetated areas.

Post-meeting comment by speaker: the NiSAR satellite (in L-band), mission from NASA and ISRO, should tackle this current limitation of the Sentinel-1 C-band. In the longer term, EU should consider the preparation/launch of SAR satellite with multiple band SAR (technology should allow this ….) and among other satellite coupling C- and L-band

Comment by Yetitmoves.
With a great deal of experience in the use of GNSS for the monitoring of landslides, they have already deployed around 150 receivers in 30 monitoring sites. In 90% of these sites, they installed single-frequency (L1) receivers. It was explained to the audience that, when the distance between the monitoring stations and the base station is short enough, the ionospheric delays can be removed rather easily without having to use dual-frequency (L1 + L5) receivers, which tend to be more expensive. DF is mostly desirable when the baselines are longer, over 10km; that is when the ionosphere starts to decouple from stations.

Post-meeting comment by speaker: *Agreed. Indeed, today low-cost mono (L1) frequency receivers exists, and full operational systems (including battery, digitizer, solar panel and real time telemetry) are available for ca. 700€ per station.*

Comment from Tor Vergata, University of Rome.
For the measurements obtained in situ, it would be desirable to have a calibration standard. Precise calibration of instruments is necessary when dealing with millimetric accuracies.

Post-meeting comment by speaker: yes, for tectonic applications in which reaching a few mm accuracy is needed, this is critical. For other application (volcanoes, landslides), 5 to 10 mm accuracy are needed so it is less critical.

Open discussion on the "complexity of use" of space products.
Users in developing countries see InSAR too complex. Products need to be adjusted to the final users, who need the end result. The final result would be the 'risk' map. The lack of awareness is related to this, it can make people think that products are too complex to use.

Post-meeting comment by speaker: fully agreed. Training/capacity building is needed and the events should be tuned to the audience. Nowadays, some on-line platforms are available to ease the InSAR and the optical satellite imagery processing for geohazards (e.g. Comet in the UK, GEP operated by ESA, EPOS-ERIC for Europe, of Data-Terra/ForM@Ter in France). This should help democratize the use of InSAR/optical correlation in the future for new applications and non-experts. All these platforms do use science state-of-the-art processing algorithms.

The UNEP commented that landslides are very often something which does not attract a lot of attention. And in some countries, users need information related to landslide risks (landslides derived from heavy rains for example) in the preparedness phase. People may think that anything that UN

proposes could be too complex and too expensive for them. There is clearly an issue with communication.

A representative from MSF (Médecins Sans Frontières) added, with respect to the lack of awareness of users on the products available, that knowing the methodologies and rationales behind generated products is important for them. It can be difficult to explain to final decision makers some of the data presented (e.g. 'you can trust this at 80%'), so having more information on the underlying method helps.

> *Post-meeting comment by speaker: Fully agreed. Trustability of the products is a key element; the delivered products should be described with relevant metadata, the processing lieage should be described (to be able to be reproduced), the products should be delivered with "errors bars" and quality indicators, etc. This is in line with the current OpenData/OpenScience and FAIR approaches.*

Comment by Earth Live.
It is clear that for some users the delay between product request and its delivery is too long. For this reason, this spin-off from Thales plans to make use of imagery obtained with a telescope hosted in a geostationary orbit. It will offer optical imagery with resolutions of 40m. Then they will apply AI algorithms to detect starting fires or other events, so that alerts can then be made available in near-real time to first responders via their GIS systems.

> *Post-meeting comment by speaker: Users should define usage scenarios and expected delivery time (with associated accuracy) to progress in faster delivery. The initiative from Earth Live is interesting, although unfortunately the 40m resolution is not relevant for smaller objects / hazards such as landslides or volcanoes.*

Validation of requirements

(See draft user requirement tables for EO and GNSS in Attachment 7)

On EO side, it was highlighted that perhaps for the inventory scenario it could be good to have data twice a year, every 6 months.

On the GNSS side, it was suggested to introduce somehow the applicability and complementarity between single- and dual-frequency monitoring stations.

Agenda Item 8 - Asset management in humanitarian aid operations. Paul Dettmer / World Food Program
Mr Dettmer came to the stage after a quick introduction to the application and to himself was provided by Mr Kalogirou from EUSPA. The introductory slides from EUSPA can be found as Attachment 7 in section 4.

Mr Dettmer clarified that his presentation should not be perceived as how the UN or the WFP manages all of their assets. In the end, the humanitarian community is very diverse; so the presentation focused on how satellite technology is being used for the tracking of their vehicles, as part of the fleet management activities.

Fleet management means: estimate the number of vehicles to be provided as well as human resources to be involved; then fuel and all the necessary resources for the fleet maintenance. This means costs estimation and management. The estimation is complex as some of WFP activities are very long-term (above 5 years duration), especially the changing lives one, which tries to build resilience in communities. Therefore, their emergencies can last for 5 or 6 years in many cases; such a scale can be quite different with respect to other disasters or humanitarian organisations.

Mr Dettmer played a short video presenting how big their supply chain is, highlighting that vehicles and land vehicles and its tracking in particular, is only a part of it. Indeed, WFP leads with different modes of transportation; but always trying to make use of the most efficient ones.

Today, they use around 5.600 trucks worldwide, 1.000 are owned by WFP. The other 4.600 are commercial trucks they contract so as not to enter in competition with local providers.

Fleet management starts in country offices, where the needs in terms of assets and people/staff are assessed and planned. Then security, maintenance, road safety, is also taken into account. One of the main figures or KPIs related to fleet management is the cost per ton-kilometre.

The tracking of trucks is conducted thanks to devices installed in each vehicle[2]. Location is based on GNSS, while connectivity relies on cellular networks or SATCOM. Most operations concentrate in sub saharan Africa and parts of Asia. Therefore and given its coverage, they do not use EGNOS.

The devices must be also resistant to the environment in which they operate, and that includes meeting IP standards to cope with dust, heat or vibration.

Safety and security aspects are the main motivations for having implemented such a system (see slide 11). When it comes to giving a weight for each of the capabilities enabled by the system, around 80% is related to having accurate real-time location of the trucks.

The panic button is also very important and always uses satellite (Immarsat) connectivity. The capability to shut the engine down and thus immobilise the truck remotely was also requested from the system vendor, since driving a vehicle with UN markings has significant implications.

The WFP is also starting to make use of historical archive data for various applications: identification of delivery points, accessibility constraints (e.g. road closures), impossible crossings, etc. It is also taking into account the fact that road constraints may affect different types of vehicles in distinct ways. Another example of exploitation of archive data is the mapping of the road network in places such as Afghanistan or Pakistan.

[2] Indeed, truck drivers do not make use of the GNSS embedded in the devices; the device is installed just for reporting purposes.

In any case, the use of archival data is yet quite limited. But the WFP is aware of its potential and this is a field for exploration, since they may be the only organisation having large amounts of traffic data in certain places.

In terms of durability of the devices, it was necessary for the vendor to ensure a 10 year duration, which is more or less the lifecycle of a truck. In other words, the solution had to be solid and run for years without malfunction.

The security was also important, especially when it comes to reporting the data back to the HQ. Also, in GNSS terms, having an accurate, reliable and available location would contribute to it.

In addition, the system had to provide 100% global geographical coverage and be able to operate in difficult terrain (high altitude, canyons…).

Then, when it comes to the use of the information received in the HQ, it was necessary to ensure that the data would be integrated in legacy systems. Indeed, Mr Dettmer pointed out such requirement as something quite generic to the overall humanitarian aid sector: the embracement of new technologies and services has to seamlessly integrate in legacy systems in support for a better decision making process. Information, for example, cannot be received in the form of a static pdf.

Better planning of humanitarian operations will be possible as more and more information from different organisations can be placed together in one place; this will allow developing new tools and services.

The slides presented by Mr Dettmer can be found as Attachment 8 in section 4.

Q&A Session – Verbal interventions

Q: Are you tracking flows in Ukraine?
A: WFP tracks only its own vehicles; they cannot monitor private vehicles. In Europe, as they do not have vehicles operating, they have nothing to track. In the particular case of Ukraine, they rely on commercial operators and therefore they cannot track any kind of flows. They tried in the past to install their devices in third-party trucks, but did not succeed.

Q: Which percentage of trucks do you track?
A: We track around 1.000 of the 5.600 vehicles we use [~18%]. But even if it is a small percentage, we are probably the only ones with such data. And indeed, we go to places where nobody else goes.

Q: Are you offering that data openly online for other humanitarian aid organisations?
A: Currently we do not. Location data has a lot of confidentiality constraints, it is very critical; we had a lot of discussions recently to share that data internally with the UN DSS (United Nations Department for Safety and Security), who are the ones we call when we are in distress. It is not that simple to share it, and we are working on it.

Q: What systems and GIS are you using?
A: The device and service are provided by Novacom CLS, in Toulouse. Then we put it in different GIS engines we have.

Q: What about the API that you mentioned in the presentation? What kind of information to share?
A: If we could make our data available in an adequate format, a user could try to find out if a certain route is open in a certain month, or on seasonal basis, the platform could show that in rainy seasons, or dry, we go there or we do not. The idea is that other organisations could integrate that into their systems.

Comment by MSF
In many places, as humanitarian aid is coordinated, the organisations work alone, and therefore it would be quite straightforward to correlate vehicle movements with organisations (even if data was provided without details such as registration plate, etc). One may immediately know which organisation is moving vehicles, because there is actually only one organisation in the area. This is a big problem for us. So although the idea is fantastic, even if we could share such kind of data, it would actually be difficult to do it if the anonymity of data is not ensured.

Comment.
It looks like what you need is a sort of Waze but tailored to humanitarian aid actions. The data we see on Google actually comes from Waze users, it is crowdsourced. Waze has an API that can privately be used so, why not using it?

Q: Do you plan to integrate EO data in your system, for example to create access constraint maps or similar?
A: We could use applications that can detect infrastructure damages, as long as data is produced in a way we can integrate in our platform. But we do not want a static map; we need something that can also indicate when damages or road blockings have been solved. This is not in place today.

On the other hand, it is important that agreements and arrangements that could allow us to activate services be in place before something happens. It would be great having long-terms agreements allowing the activation of a service, instantly; and for that all contractual issues should be arranged in advance.

Comment from MSF
In line with WFP request, MSF requires services that can be integrated in their own systems, rather than receiving PDF maps. It would be excellent having everything that Copernicus offers allowing all that data to be embedded in their own applications. A kind of API or similar would be excellent.

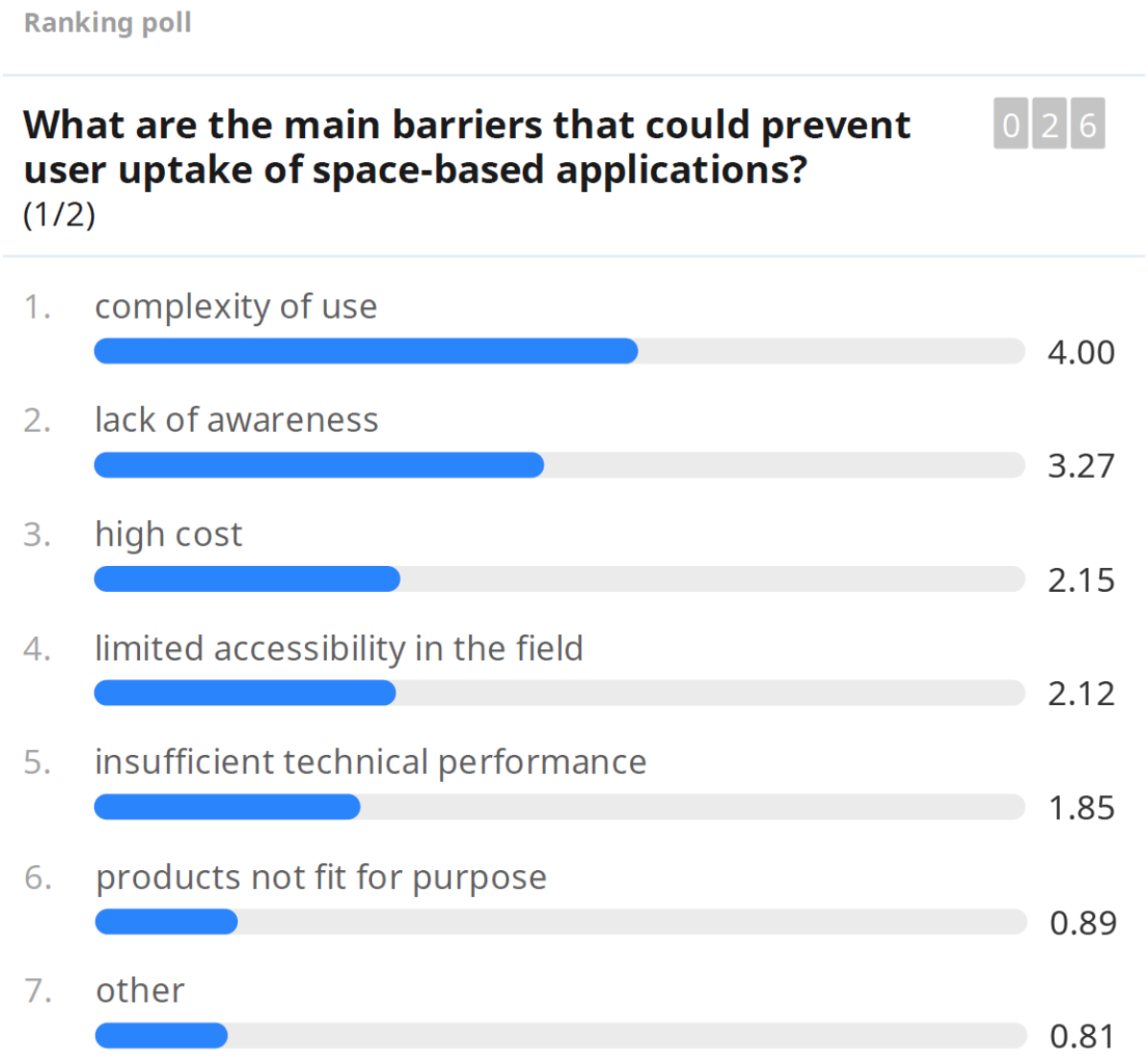
Q: As for spoofing in conflict zones, is that something you have experienced?
A: Nowadays, there is no control on spoofing on WFP side. This is because we wanted a turn-key solution. We do not know when spoofing occurs, we just need in the app a truck positioned. How those coordinates came, how they were authenticated, calculated, processed, secured…that is all on the service provider side. Because we do not have the capabilities and is not our core business to do that. So we need to make sure that the device is installed and works. And then of course we can do data analyses. But on the data generation, or how the device works with the different GNSS constellations, or with the SATCOM, that is all outsourced. We need the service, we need it to run reliable, but your question would be more interested for the service provider.

Validation of requirements

(See draft user requirement tables for GNSS in Attachment 10)

No comments regarding the requirements.

It was then the moment to run a new poll between attendees, this time concerning the barriers to adopt space-based technologies. The results are depicted in the following figure:



Agenda Item 9 - Health, medicine response and coordination. Laura Ruiz / Spanish Red Cross
To finish the day, Ms Ruiz came to the stage after a quick introduction was provided by Mr Kalogirou from EUSPA. The introductory slides from EUSPA can be found as Attachment 7 in section 4.

From the very beginning, Ms Ruiz (who works in the Disaster Management Unit) stressed to the audience how important the **preparedness phase** is for the Spanish Red Cross. Indeed, at economic level, it is commonly said that every Euro properly invested in this phase saves up to 4€ when the actual disaster happens. Another pillar of the way they work is the planning of their activities: none of the answers they give has not been planned in advance; no response is improvised.

Ms Ruiz very much emphasised that the Spanish Red Cross never leads the response in their interventions. Instead, they always work following the leadership of local societies [local or national Red Cross or Red Crescent societies], providing whenever possible the kind of help that is requested. Working with the national societies is a must because they are the ones who have the knowledge at local level. The drawback of it is that a common problem they face is the lack of training in some aspects, including technological ones. In any case, it is important to improve their preparedness for disasters.

But local communities are also important, they are the ones who know better the risks in the places they live, and where the most vulnerable people are located. The Vulnerability and Capacity Assessment (VCA) is a participatory community risk assessment process that enables communities, with the support of Red Cross Red / Crescent National Societies, to assess and analyse the risks they face, explore where these risks come from, which members of the community are most exposed, what capacities are available, etc. This information cannot be provided by satellites and must be obtained. Indeed, showing satellite imagery to some communities can be sometimes confusing, as they may not even understand it.

Secondary data (information obtained by sources other than the Red Cross, not collected by them) is also important and tremendously used. With all of that, then they can start doing maps, products, etc, in order to identify areas with high risk of natural disasters, analysis of the most vulnerable infrastructures or population.

Ms Ruiz then also addressed the **lack of baseline data**, which in some places is a big limitation. Indeed, many of the most vulnerable places to disasters are also the less mapped places on the planet. That was the main motivation for the creation, several years ago, of the Missing Maps initiative. Under this initiative, volunteers make use of visible satellite imagery to identify dwelling structures, which then must also be inspected on-site by more volunteers.

There is no automatic pre-identification using other types of images because for volunteers this is normally their first contact with geographic information systems and they do not have technical knowledge. As always however, there could be issues with the images: in many occasions their resolution is poor or the images are simply too old to be useful.

In the **response phase**, then, the first 48 hours of response are very important and the main problem then is the lack of primary data. In this first phase, the Emergency Needs Assessment (ENA) has to cope with this limitation. As time passes, more information becomes available and the ENA can be refined.

In this phase GNSS is used mainly through smartphones and tablets, which become so useful to collect primary data via surveys. These types of surveys are tailored with relevant questions and can include photos or audio if necessary. As local communities and societies are involved in the data collection process, they use smartphones with open source software, which is very practical.

As for the use of EO, for the time being they always make use of satellite optical imagery. Neither SAR images nor Artificial Intelligence algorithms are used. The reason for that is the lack of resources to adapt their processes and train their people to make use of all that. But there is a certain interest to start using and applying these methods if proved useful.

Being users of optical imagery, their needs concentrate on having imagery which is up-to-date and with a higher resolution.

Drones are also being used in order to quickly gather information and show communities where the different facilities can be located in a refugee camp, while monitoring their growth and expansion over time.

In her last slides, Ms Ruiz provided interesting messages regarding the limitations to uptake GNSS and EO technologies, as well as what they expect for the future. All information can be found as Attachment 9 in section 4.

Q&A Session – Verbal interventions

Q: On the participation of community: how to mitigate the risks of making communities visible in some contexts (displaced, refugees…) thanks to the use of your maps?
A: It all starts with what the communities want, either if they want to be mapped or not. As for refugee maps, it is usually more needed than not. It also allows international audience to know that something is happening.

Q: Is Copernicus data useful for you? How can EU help in making the community more aware about the Copernicus offer?
A: Yes, it is useful, of course, and we use it. However, it is also true that we do not have the time to look at all products and/or services Copernicus provides, especially in the response phase when we dedicate our time only to what can deliver quick and straight-forward results.

Q: In your opinion, how could a service provider insert local community data in its products?
A: It is very difficult since, as you have seen, we many times gather data by means of hand-written maps! And then again in the response phase we do not have time for that.

Q: Is there any automation in the gathering or collection of data you use?
A: This is coming, but the Spanish Red Cross is not using this yet. Other societies are working on it, and this is coming. MapSwipe is an intermediate example for that, where people from home can help mapping for example houses below canopy, etc.

Comment by PAX
I wonder when our smartphones will have a better GNSS accuracy. I work very much with that and when sometimes I compare the position with the very high-resolution imagery, we may find contradictory information.

Ms Ruiz described an issue faced sometimes, when conducting surveys by local communities. If the geolocation does not work in less than a minute, they think it does not work and they do not collect the position and stop the survey.

Q: How updated are the maps and which gaps you try to complete [via MapsSwipe, OpenStreetMap]?
A: It really depends on the areas; but if there is an emergency somewhere, you will see that the activity spikes. The communities may be passive, but the effort from the global community increases, for example, today in the case of Ukraine. The quantity and quality of information that is suddenly available in Ukraine is an effort from the community.

Ms Ruiz: we must also remember that the information has to be validated as well, and for that we need people onsite. All information that is prepared by the community must be validated on-site.

Q: Is the humanitarian community using standard symbology, or standards that should be taken into account?
Yes, of course. The SPHERE standard is something that everyone has to use. This standard is about everything: it covers how aid must be provided, it tackles water, protection, gender…everything. It is a manual that anyone working in the humanitarian aid has to use.

For example, in terms of water: it tells about maximum distance between people and fresh water pumps, about the minimum number of litres to have, etc.

Q: Do other Red Cross societies have the same processes and procedures?
Yes. If, for example we speak about Emergency Response Units and water plans, every society that has this unit and this capability works in the same way.

If I leave a plan to be completed by the Netherlands Red Cross, they will know how to follow it. That is good because it allows all of use to work in the same way.

Q: I would say there is no standard about map layouts, although OCHA is working on it, I think?
The IFRC has some minimum standards, and we of course follow OCHA.

MSF adds they also follow OCHA standards.

Q: We saw how you activated a damage assessment based on aerial survey, with people in an helicopter. This is in the response phase, and you also talked about the very short time you have for analysing data and producing information in this phase. How is this more effective than using very high-resolution satellite data?
This is used for orange and red emergencies, at least for the IFRC. That means that the measure of the emergency is very big, and so is the impact on population. In 'normal' emergencies, we do not use this kind of assessment and we use satellite imagery, provided of course that up-to-date imagery is available quickly enough. If information comes after 7 days, things could change.

Q for JRC: is an evolution of the Copernicus EMS planned, so it can incorporate data from aerial surveys?
There will be an evolution, but for the time being limited to European countries.

Comment by JRC.
On the other hand, it is worth noting that perhaps a few of the maps/products that the Spanish Red Cross showed in their presentation are available from the Copernicus EMS mapping services. We have

the risk and recovery standard that in 5 to 15 days can deliver information including updated satellite imagery.

Comment by Spanish Red Cross
If we are in the middle of an emergency, we do not have time to browse the entire website looking for products. It would be extremely useful for us, and you would facilitate our work very much, if you provided a catalogue about the products tailored to my activity, about the products that would be good for me when an emergency occurs. During that period, we do not have time to go through the website, analysing what can suite my needs and then doing the activation. Sometimes, although the website is very complete, we get lost with it.

A 2-page catalogue of products could suffice, perhaps together with some quick training adapted to humanitarians.

Comment from audience.
Most of what you seem to ask might be already available and in place. Perhaps it is a matter of awareness and about not only the industry coming closer to humanitarians, but also about humanitarians talking closer with the space community.

Validation of requirements

(See draft user requirement tables for EO and GNSS in Attachment 10)

(For the proper understanding of the table, Ms Ruiz explains the difference between the response phases: this first response is like the first 48 hours, then come later 7-day and 40-days periods).

It is important to have data downloadable in standard formats and that are not big in size. It is better, if necessary, to split data in various smaller files if necessary.

When it comes to DEM data, 30 meters grid may suffice for most applications. However, for the planning of water pumps better resolutions may be needed.

User Needs and Requirements – Synthesis of discussion outcomes

The requirements compiled in the draft Report on User Needs and Requirements (RUR) circulated prior to the UCP were reviewed with the participants. The discussions raised the **need to refine some of the requirements and/or to add new ones**. Therefore, requirements which were reviewed and did not deserve any comment or change from the audience are not depicted in the next tables.

Requirements relevant to EO

Application/ Operational Scenario	**Parameter**	**Requirement**
Post Crisis Damage Assessment And Building Inspection / Large-scale damage assessment	Temporal resolution (i.e. revisit time)	Daily in the immediate aftermath of a disaster
Post Crisis Damage Assessment And Building Inspection	Data type	Must integrate data from different sensors and technologies (satellite, UAV and in-situ)
Post Crisis Damage Assessment And Building Inspection / Large-scale damage assessment	Service provider offer / What the service does	Use of AI for accelerating the processing of data incl. automatic detection.
Landslides and Terrain deformation monitoring / Monitoring of landslide displacement.	Temporal resolution (i.e. revisit time)	3 days
Landslides and Terrain deformation monitoring / Monitoring of landslide displacement.	Service provider offer / What the service does	Use of AI to accelerate the processing of data
Landslides and Terrain deformation monitoring / Landslides inventory	Service provider offer / What the service does	Use of AI to accelerate the automatic detection of landslides
Health, medicine response & coordination / Preparedness actions	Timeliness of imagery	Up-to-date imagery is needed
Health, medicine response & coordination / Response	Service provider offer / What the service does	Provide information on displacement of affected population

Requirements relevant to GNSS

Application/ Operational Scenario	Parameter	Requirement
Landslides and Terrain deformation monitoring / Monitoring of landslide displacement.	Price of GNSS monitoring station	Below 1.000€ / station
Landslides and Terrain deformation monitoring / Monitoring of landslide displacement.	Frequency of recordings	1 Hz
Landslides and Terrain deformation monitoring / Monitoring of landslide displacement.	Frequency range	Both Single Frequency (SF) and Dual Frequency (DF) services are needed
Landslides and Terrain deformation monitoring / Monitoring of landslide displacement.	Information processing	Near Real Time
Humanitarian Aid Asset Management	Robustness	Solutions must be reliable and authenticated, to tackle jamming and spoofing.

2 CONCLUSIONS

The Emergency Management and Humanitarian Aid UCP session was successfully closed by M. Kalogirou from EUSPA.

Key results of this working session were highlighted during the plenary UCP session on 4th October, 2022 by Paul Dettmer from the WFP.

These results are summarised below as well:

- **4 applications** were selected for an in-depth study before the UCP. These applications were used to stimulate discussions amongst the audience. As a result of discussions and exchanges, the following requirements were identified on top of those already present in the RUR:
    - **Monitoring of landslides**[3]
        i. High-revisit times and multi-band EO missions are required, *and relevant on-line processing services (processing platforms, with both systematic and on-demand services) should push forward.*
        ii. *Unless L-band SAR missions are available and used,* installation of permanent reflectors in forest areas are needed to improve SAR-based monitoring.
        iii. The availability of low-cost GNSS stations will increase the use of this technology
        iv. *More training and capacity building on InSAR/optical image analysis for categories of stakeholders should be proposed*
    - **Damage assessment and building inspection**
        i. High accuracy GNSS solutions are required for the displacements/deformations monitoring of very rigid buildings
        ii. Higher spatial resolution from EO services is required for the detailed assessment of infrastructures
    - **Humanitarian Aid applications: Asset management in humanitarian operations & Health, Medicine and Response coordination**
        i. EO data is needed to generate and improve “access constraints” maps
        ii. EO and GNSS technologies can be perceived as very complex. There is a need to translate such complexity into simple services and solutions
        iii. The reliability of GNSS (in terms of jamming/spoofing/ authentication) may becoming a growing concern

[3] In the case of **Monitoring of Landslides**, all wording in *Italics* has been added post-meeting considering the inputs from the speaker, who unfortunately could not be present during the UCP.

iv. Humanitarians conduct a significant number of surveys amid local communities: these have to be quick, so for GNSS the Time to First Accurate Fix must be <1 min

v. The preparedness phase is essential in the humanitarian community, and up-to-date imagery in this phase is needed

- **Transversal needs** amongst all the applications were also identified:
  i. **Integration** of different sensors and technologies is a transversal need (satellite, UAV and in-situ data)
  ii. **Awareness** of the available data and services: more effort must be dedicated to ensure that users are up-to-date with respect to the products available
  iii. **Use of AI** in accelerating the processing of data (e.g. for quick damage assessments)
- **All of them reflected on the need to build on integration of EO and GNSS information into legacy systems**

As **topics potentially deserving additional R&D**, the following three emerged during the session:

- The use of **Artificial Intelligence** for several use cases in the EMHA segment (e.g. automatic damage assessment, fires detection, population counting, etc);
- Development of technologies for the implementation of "**access constraints" map services** usable in humanitarian aid applications;
- Development of technologies able to **integrate data from different sensors** (e.g. EO data from satellites, UAVs, in-situ, etc) for several use cases.

Finally, a few next steps were suggested:

- Attract new users into the community by creating **ready-to-use APIs, interfaces and services**.
- **Introduce community building activities**: Proposal for creating a humanitarian aid community WG that uses space data, to improve know how and raise awareness in the community.
- **Build on** already existing services (e.g. Copernicus Emergency Management Service), bringing them in the hands of practitioners and humanitarian aid actors.
- **Expand** to user needs and requirements for other segment applications that were not discussed during the event (e.g. applications on forest fires, floods etc).

3 OTHER NOTES & INFORMATION

With the contribution of:

4 ANNEXES & ATTACHMENTS

Annex 1: List of Attendees

Attachment 1: UCP 2022Emergency Management and Humanitarian Aid session, EUSPA
Attachment 2: CEMS – An overview, DG DEFIS and CEMS-JRC
Attachment 3: Overview of the Galileo service portfolio, EUSPA
Attachment 4: Union Civil Protection Mechanism and Use Cases for Secure Satellite Communication, DG ECHO
Attachment 5: Market Status, FDC/EUSPA
Attachment 6: EUCENTRE Foundation: Post-event technical support, EUCENTRE
Attachment 7: Landslide monitoring and hazard assessment: satellite EO and GNSS inputs, CNRS
Attachment 8: Humanitarian Asset Management, UN World Food Programme (WFP)
Attachment 9: Geographic information in humanitarian response, Spanish Red Cross
Attachment 11: Deep dive in four applications, EUSPA
Attachment 12: EMHA Panel Results Summary

5 ANNEX 1: LIST OF ATTENDEES

#	Name	Organization
1	Alessandro Carrotta	DG ECHO
2	Alessandro Flamini	e-GEOS
3	Angela Corbari	STUDIOMAPP
4	Angelidis Panos	ENTRUSTED GOVSATCOM Hellenic Army
5	Chiara Casarotti	EUCENTRE
6	Denis Bruckert	SATCEN
7	Dimitris Bliziotis	Hellenic Space Center (HSC)
8	Dino Sujak	ITF Enhancing Human Security
9	Emanuele Sapino	JRC
10	Ewelina Kaatz	POLSA
11	Francesca Cassini	University of Rome Tor Vergata
12	Francesca Somma	DG DEFIS
13	Franziska Diesing	Airbus
14	Frederic Martinent	EARTH LIVE
15	Garance Weller	Telespazio
16	George Kokkinis	Centre for Security Studies - Greece
17	Jean-Philippe Malet	University of Strasbourg
18	Jeremy Fain	BWI
19	Jorge Gomes	VOST EUROPE
20	Juan Carlos Villagran de Leon	UNOOSA / UN-SPIDER
21	Juan Manuel del Salvador Codosero Bolaños	Spanish Ministry of Transport
22	Kristin Fleischer	IABG
23	Kyriacos Themistocleous	ERATOSTHENES Centre of Excellence
24	Laura Ruiz Oliveros	Spanish Red Cross
25	Leslie Jessen	MSF-GIS Centre
26	Lou Villafranca	ULB
27	March Leminh	FDC
28	Massimiliano Chersich	YETITMOVES
29	Milaim Sylka	GOI
30	Noemi Ruotolo	BIP - Business Integration Partners
31	Olivier Hautecoeur	EXOVISION
32	Paul Dettmer	WFP
33	Paula Padrino Vilela	UNEP
34	Pavel Jurus	BIG TERRA
35	Robert Jaramillo	PAX
36	Roberto Fabrizi	Satlantis
37	Roberto Muscinelli	BIP - Business Integration Partners
38	Sarah Fischetti	BIP - Business Integration Partners
39	Sira Christophe	BCSF - Remass

40	Vanina Fissore	ITHACA
41	Vasileious Kalogirou	EUSPA
42	Victor Alvarez Cotrofe	FDC
43	Yulia Lem	President & Founder iNGO United for U

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