General Assembly

Committee on the Peaceful
Uses of Outer Space
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Report on the International Expert Meeting on Crowdsource Mapping for Disaster Risk Management and Emergency Response, held in Vienna from 3 to 5 December 2012

I. Introduction

1.   In its resolution 61/110, the General Assembly decided to establish the United Nations Platform for Space-based Information for Disaster Management and Emergency Response (UN-SPIDER) as a programme within the United Nations to provide universal access for all countries and all relevant international and regional organizations to all types of space-based information and services relevant to disaster and disaster risk management to support the full disaster management cycle, and agreed that the programme would be implemented by the Office for Outer Space Affairs of the Secretariat.

2.   At its fifty-first session, the Committee on the Peaceful Uses of Outer Space agreed that progress reports on UN-SPIDER and its future workplans should be considered by the Scientific and Technical Subcommittee under a regular agenda item on space-system-based disaster management support and that the agenda item should be included in the list of issues to be considered by the Subcommittee's Working Group of the Whole.

3.   The present report provides a summary of the third UN-SPIDER Expert Meeting on Crowdsource Mapping for Disaster Risk Management and Emergency Response, held in Vienna from 3 to 5 December 2012 within the project entitled "Space-based information for crowdsource mapping". A more detailed report of this activity was submitted to the fiftieth session of the Scientific and Technical Subcommittee, held in February 2013, as a conference room paper.

II. Background and objectives

4. In recent years, technological advances have made it possible for volunteer and technical communities to provide increasing support to disaster risk management and emergency response efforts. Important cornerstones of this virtual effort are the possibility to access and take advantage of satellite imagery, as well as the use of other space-based technologies, such as telecommunications satellites and global navigation satellite systems.

5. The United Nations recognizes the importance of such new methodologies for disaster risk management and emergency response. This is demonstrated in the involvement of the Office for the Coordination of Humanitarian Affairs in requesting the establishment of a crisis mapping platform on Libya, in the support provided by the United Nations Foundation and the Office for the Coordination of Humanitarian Affairs to the 2011 Harvard Humanitarian Initiative report entitled "Disaster relief 2.0: The future of information sharing in humanitarian emergencies" and in the partnership of the Office for the Coordination of Humanitarian Affairs with the Digital Humanitarian Network. The Office for Outer Space Affairs and UN-SPIDER have also recognized the importance of these inputs by organizing, since 2011, a series of workshops to create an exchange platform to link the space technology community with the crowdsource mapping, disaster management and social network communities.

6. The UN-SPIDER programme is ideally positioned to carry out this project, given its mandate and its role within the United Nations, its networks bringing together national institutions responsible for disaster management and emergency response and space solution experts, and its technical foundation, particularly in the area of information technologies.

7. The first activity under the project was an expert meeting held in Vienna from 5 to 6 July 2011. The discussion at the first meeting was aimed at receiving feedback from experts from the disaster management and emergency response community on how information must be generated and/or tailored to ensure that it can be used effectively; learning about novel potential applications and products which could be developed by the crowdsource mapping community to support preparedness and emergency response; and receiving guidance on how to build upon existing solutions to facilitate sharing information within the disaster management and emergency response community.

8. The second activity under the project was an expert meeting held in Geneva on 16 November 2011 with a focus on exploring possible ways of contributing to better coordination between the crowdsource mapping community and the space technology community and on improving the involvement of the crowdsource mapping community so as to facilitate the preparation and processing of space-based products used by the disaster management and emergency response community. The discussions targeted opportunities for making space-based information available for disaster risk reduction and emergency response, including access and use, as well as further involvement of existing mechanisms to ensure increased coordination and cooperation among all three communities (crowdsource mapping, disaster management and emergency response, and space technology).

9.   The third activity under the project was an expert meeting held in Vienna from 3 to 5 December 2012 with a specific focus on how space-based technologies can contribute to the work of the volunteer and technical communities and the need to define more clearly how to bring together the many areas involved in supporting crowdsource mapping activities. Bringing together the three communities (crowdsource mapping, disaster management and emergency response, and space technology) to share information about their areas of expertise provided an opportunity to better understand the questions being asked and how space-based technologies could contribute to answering them. It also helped to build closer cooperation and promote understanding among all three communities and allowed them to discuss the possibility of conducting a simulation exercise in the upcoming months.

III. Programme

10.   The Expert Meeting heard introductory statements from representatives of the Office for Outer Space Affairs, the Government of Austria, the Austrian Research Promotion Agency and Secure World Foundation.

11.   The programme of work consisted of seven plenary sessions and three breakout sessions. In the plenary sessions, introductory presentations provided an overview of various topics and provided the three communities with an opportunity to brief participants on their respective areas of expertise. One "Ignite" talk session allowed for a maximum number of experts to present their ideas concisely to the audience.

12.   In order to facilitate the thematic discussions during the breakout sessions, all participants were assigned to one of three breakout groups. Each group consisted of experts from all three communities.

13.   The thematic area covered during the first breakout session consisted of a presentation of prepared country profiles and discussions on possible simulation exercises.

14.   During a subsequent plenary session and a group discussion, the following topics for the second and third breakout sessions were identified:

Breakout session two:

(a)   How could space-based information improve the reliability of data? Can space-based information be used for the validation of data? Integration of space-based geospatial information with crowdsource data;

(b)   Quality and reliability of crowdsourcing data for disaster management and emergency response;

(c)   Risks and solutions relating to data from social media.

Breakout session three:

(a)   Licensing;

(b)   Guidelines and definitions;

(c)   Partnerships and work groups.

IV. Attendance

15. The Expert Meeting was attended by 83 experts and practitioners from the following 33 countries: Algeria, Australia, Austria, Belgium, Benin, Brazil, Canada, China, Colombia, Czech Republic, France, Germany, Greece, Hungary, Iran (Islamic Republic of), Ireland, Italy, Jamaica, Japan, Kenya, Mozambique, New Zealand, Nigeria, Poland, Qatar, Romania, Russian Federation, Samoa, Sweden, Switzerland, United Kingdom of Great Britain and Northern Ireland, United States of America and Yemen.

16. The Meeting was attended by representatives from several entities of the United Nations system, space and remote sensing agencies and national, regional and international disaster management and civil protection agencies, as well as various actors from the crowdsource mapping community representing voluntary networks, non-governmental organizations (NGOs), expert groups, universities, research institutions and the private sector.

V. Presentations and plenary sessions

17. Participants heard five introductory presentations after the official opening of the Expert Meeting. UN-SPIDER and the Secure World Foundation informed participants about their activities in the field of crowdsource mapping. After these remarks, the Office for Outer Space Affairs presented information about the Committee on the Peaceful Uses of Outer Space and the United Nations development agenda. This was followed by presentations on the Samoa simulation exercise, which was an outcome of the UN-SPIDER Expert Meeting in Geneva in November 2011. The introductory session ended with a presentation on the efforts of the crowdsource mapping community during Hurricane Sandy and their invaluable contribution to the disaster response.

18. Following the introductory presentations, an "Ignite" talk session was held so as to accommodate the large number of experts present at the meeting. The session had 10 five-minute presentations covering a range of topics, including:

  Crowdsourcing and local knowledge

  Combining satellite information and local knowledge for disaster planning

  Contingency planning for flood events — future applications?

  Emergency journalism in the age of big data

  The European Union Copernicus programme Emergency Management Service

  Crowdsource mapping and natural hazard early warning in Brazil

  Crowdsourcing for land administration

  Crisis mapping activity in the Russian Federation

The "Ignite" talks proved to be crucial for an understanding of crowdsource mapping, of the roles and activities of the different communities and of various initiatives and opportunities.

19. During the presentations in the plenary sessions, representatives of the crowdsource mapping community gave an overview of their respective experience in various thematic areas, their expertise and aspects of and approaches to crowdsourcing. In addition to providing excellent examples of the use of crowdsourcing for disaster response and the challenges of crowdsourcing, the sessions provided valuable insights on technical challenges and solutions.

20. Interventions that followed the presentations helped to increase understanding between the different communities on the use of space technologies and geospatial information in various areas. Many national Geographic Information System teams referred to their prioritization of desertification, while others referred to the importance of not underrating other disasters such as volcanic eruptions.

VI. Breakout sessions

21. Discussions in the breakout sessions allowed for a structured exchange of views focusing on a set of topics developed in a plenary session and provided to group members by the organizing committee.

Breakout session one
Presentation of prepared country profiles and discussion on possible simulation exercises

22. Representatives of organizations from Algeria, Indonesia, Jamaica, Mozambique, Nigeria and Samoa were invited to present country profiles so as to provide different alternatives for a potential simulation exercise. Although there was a proposal to decide on one simulation exercise to be conducted in 2013, the breakout session discussed what should be the context or conditions under which any simulation exercise should take place to optimize the inputs of each community and genuinely create a model for planning and action.

23. To answer the specific expectations of each community, it was agreed that a set of definitions needed to be agreed upon. Definitions needed to cover the different phases of a disaster to ensure a shared understanding of the different requirements under different phases.

24. The breakout session highlighted the issue that entities cannot easily obtain data and imagery to plan a simulation. The European Union Copernicus programme, for example, served specific user types and had a series of products that could be accessed publicly. Other issues such as data storage and dissemination were also discussed.

25. The session agreed that one important outcome of a simulation exercise needed to be the improvement of communication between the authorities and the communities. Training and exercises involving end users during the simulation would increase the overall effectiveness of the response.

Breakout session two
How could space-based information improve the reliability of data?
Can space-based information be used for the validation of data?

26. Discussions took place on the importance of a two-way feedback between communities; on the importance of using crowdsourcing to empower decision makers; and on the role the crowdsource mapping community can play in the domain of risk mapping. The group also discussed the advantages of the validation process through crowdsourcing and validation of data generally, for example relating to drought preparedness.

Quality and reliability of crowdsourcing data for disaster management and emergency response

27. It was noted that the quality of a product often depended on the needs of the user and on the expected usage to be made of it, and that there could be different definitions of quality and reliability for local communities and official uses.

28. The group discussed that there could be two starting points to improve the quality of data. Firstly, quality depended heavily on the provider of data user profiles, specifically the distinction between anonymous and registered users; and between the "general" crowd and subgroups of trusted people. Secondly, filtering the data by, for example, asking where the information originated from or by setting up a framework where the crowd verified the crowd, while respecting transparency and open data policies and practices, was important.

29. It was stressed that the development of standards, guidelines and practices would facilitate the exchange and transferability of data between communities and this would consequently improve quality (of data format, taxonomy, symbology, etc.).

30. Regarding what the space technology community required from the crowdsource mapping community, participants mentioned the need for validation of data from end users, as well as the need for exchange of information between different partners during emergency response.

31. Improvement in communication and publicity of crowdsourcing activities would help tremendously to support the efforts by the crowdsource mapping community.

Risks and solutions relating to data from social media

32. Participants noted that social media such as Facebook and Twitter were not only part of a new decade of journalism, but also a new, helpful tool for disaster management. The use of social media could improve information management in emergency response and early warning. Social media were therefore seen as a way forward, although not yet fully reliable. The social media channels could be a useful tool for disaster management mainly because of the timeliness of the information.

33. The need for structure and hierarchy to be defined in the context of integrating the relationship between crowdsourcing and social media was discussed. Users of social media channels were often not aware that the information they were submitting could be used for disaster response. Therefore, techniques, methodologies and tools were required to inform the user community. One possible

solution to improve the validation system of social media information could be the establishment of a feedback system or a system allowing others to "rate the person" who had shared the information.

34.   Stakeholders using social media for disaster management should be identified (NGOs, Governments, etc.). The group discussed the possibility of NGOs and Governments raising awareness about the possibilities of social media in disseminating important information during a crisis.

Breakout session three
Licensing

35.   Several aspects of the ability to access and integrate space-based information were addressed, including matters relating to licensing of satellite and aerial imagery, access to existing mechanisms that make imagery available, time limits on availability relating to preparedness and response and being able to differentiate between products and processes that are needed for different kinds of disasters.

36.   The representatives from the emergency management community also requested easier access to space-based information, in particular to archives, at a reasonable cost for disaster preparedness and response. The group also addressed the need to be able to access knowledge resource centres. Regarding data requirements, these should be easy to handle and easy to process but also reliable and offer real-time information on location of disasters and damage. A proper system and a framework to manage these data were called for. The need for regular high resolution imagery before an event happened was also mentioned.

37.   The group discussed the issue of funding. The comment was made that neither United Nations entities nor national space agencies could provide imagery free of charge to the disaster management and emergency response community. The need for licences was considered to be a major obstacle. Several international mechanisms were now looking at the possibility of sharing satellite images. Participants were informed that access to high resolution imagery would be provided by the United States Geological Survey if that agency became involved in a response. The group also discussed the possibility of pooling resources and buying imagery with a multi-agency licence, since normally licences limited the number of organizations that can use the imagery.

38.   The group envisaged various forms of public-private partnerships with image providers, international organizations and service providers, which could make access, storage and dissemination of data and information more open to the various communities.

Guidelines and definitions

39.   The group discussed the importance of developing a clear definition of crowdsourcing, which should be accompanied by guidelines on the proper usage of crowdsourced resources. The various forms, scopes or sizes a "crowd" can take also needed to be described.

40.   It was noted that there was no single community that was exclusively focused on crowdsourcing approaches. The methodology used ultimately depended on the phase of the disaster management cycle, as well as on different models of

crowdsourcing. The crowdsource mapping community was apparently made up of multiple actors including voluntary associations, NGOs, individuals and private sector agencies.

Partnerships and work groups

41. This group discussed aspects of coordination between the crowdsource mapping and the emergency response communities. One challenge identified was that emergency responders did not necessarily know about the opportunities provided by the crowdsource groups.

42. Training needs were identified for technical groups to better understand the needs of users at the local and country levels. Simulations and training events were always excellent opportunities to build partnerships.

43. The space technology community requested the crowdsource mapping community to interact more closely with end users in identifying their needs. Although the crowd was often considered diverse or even inherently chaotic, it was also able to work through protocols and standards. A channel for communication between communities and entities was needed to identify information more easily and help close the current gap between needs, data and crowdsource products. Regarding the question of how to make crowdsourced resources available to local communities in developing countries, it was argued that many countries still did not count on volunteer support. However, experience showed that involvement of local communities proved to be beneficial for data sharing and for taking advantage of new technologies and methodologies.

44. The space technology community requested that the disaster management and emergency response community share reports and analysis on activities relating to risk and response awareness as well as their standard response mechanisms. In terms of preparation, the group suggested that more information should be made available on the type of data and products required for specific phases of response to a disaster; that business cases should be built for space-based information; and that databases on vulnerable areas should be prepared in partnerships.

45. The group recommended the establishment of a public platform that would facilitate collaboration among the participants by supporting exchange and sharing of data. Such a platform would also increase bonding between communities.

VII. Recommendations

46. The present report reflects the discussions during the Expert Meeting and underlines the fact that the topic and the thematic area still need to be clearly defined. In this regard, it was proposed that a Wiki could be created allowing representatives from all the communities to work on questions regarding taxonomy and methodologies.

47. A further key issue is to consider how the diverse groups can cooperate without duplicating their efforts. This entails establishing what all the communities do and providing a means of disseminating existing information. Better understanding about the strengths and opportunities of the three communities

(crowdsource mapping, disaster management and emergency response, and space technology) was considered helpful in this regard.

48. The Expert Meeting showed that none of the communities knew exactly or recognized the expectations and recommendations of other involved parties. It was proposed to develop guidelines that would help create this understanding and propose ways forward. It was underlined that it was important to draw attention firstly to existing initiatives, such as the Digital Humanitarian Network and the International Network of Crisis Mappers, which could still benefit from increased coordination and additional external support.

49. It was recommended that UN-SPIDER function as a mediator for the communities bearing in mind that its mandate and its knowledge portal were in place. Nevertheless, it was underlined that UN-SPIDER should not be a stakeholder or the owner of these processes but rather function as the gateway and bridge for these efforts. Questions regarding who would lead these efforts on behalf of the communities and what the next phases would look like were discussed. It was recommended that UN-SPIDER provide assistance in documentation and in the facilitation of group interactions.

50. The particular roles for UN-SPIDER were considered to be in the field of preparedness, information dissemination and awareness-raising. The programme was considered to be in a good position to address decision makers and invite them to take part in relevant activities. Also, UN-SPIDER might be able to facilitate the development of a glossary or lexicon of each community for the benefit of the other participating groups.

51. To understand each other's key aspects and main focuses it was suggested that a survey on the needs and expectations of the various communities be conducted as a follow-up to the Expert Meeting. UN-SPIDER with its network and being in the centre of all three communities was asked to conduct this survey.

52. UN-SPIDER needed to continue to promote the topic of crowdsourcing during technical advisory missions and ensure that these communities were better integrated into national disaster management procedures.

53. During the breakout session a possible simulation exercise in Jamaica was discussed. The existing governmental structure already in place and the known context could offer the perfect framework for such a project. At the request of the Government of Jamaica, a detailed proposal could be prepared together with various partners in 2013.

54. One suggestion was to build an integrated public platform for the crowdsource mapping community. This should be a platform where everybody could participate and should aim at improving collaboration between the participants. Sharing of data would improve the work productivity of each stakeholder group which could also be validated within this framework. The platform could make data available to the community.

55. The crowdsource mapping community requested the disaster management and emergency response community to consider a direct communication channel and to define what categories of information and verification protocols were needed during an emergency (format and typology). It was also asked which preparedness data

would need to be mapped and what would be the parameters of quality and timeliness.

56. An important question raised was how to ensure the involvement of the crowdsource mapping community in activities, including preparedness and mitigation efforts. In this regard a need was voiced to establish a continuous arena for communication, including a framework and tools for open communication. The proposed follow-up action was to establish a public platform to facilitate collaboration among the participants by supporting exchanges and sharing of data. Such a platform would also increase bonding between communities.

57. Good practices could be promoted by entities of the United Nations system but a lack of collaboration was still felt between communities. As different standards further complicated collaboration, various initiatives were called for: a document defining terms and semantic descriptions; a better expression of clear needs and explanations of required outputs; development of a better understanding of internal protocols and processes; and building trust in new methodologies and techniques.

58. The Expert Meeting took note of the fact that various findings from the first two meetings on crowdsource mapping were reiterated during the third Expert Meeting and hence are reflected again in the present report.

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