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**Committee on the Peaceful  
Uses of Outer Space**  
**Scientific and Technical Subcommittee**  
**Fiftieth session**  
Vienna, 11-22 February 2013  
Item 8 of the provisional agenda\*  
**Space-system-based disaster management support**

**Report on the International Expert Meeting on  
Crowdsource Mapping for Disaster Risk Management and  
Emergency Response carried out in the framework of the  
United Nations Platform for Space-based Information for  
Disaster Management and Emergency Response  
(UN-SPIDER)**

*Summary*

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 to all countries and all relevant international and regional organizations to all types of space-based information and services relevant to disaster risk management to support the full disaster management cycle.

The present report contains a summary of one of the major activities carried out in 2012 in the framework of UN-SPIDER with regard to the workplan for the biennium 2012-2013.

This report focuses on the project entitled “Space-Based Information for Crowdsource Mapping” which is one of the core activities of UN-SPIDER. The UN-SPIDER International Expert Meeting on “Crowdsource Mapping for Disaster Risk Management and Emergency Response” took place in Vienna on 3-5 December 2012.

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## 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 to 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 should 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 its Working Group of the Whole.
3. The present report provides a summary of the third UN-SPIDER Expert Meeting on “Crowdsourcing Mapping for Disaster Risk Management and Emergency Response” held in Vienna on 3 to 5 December 2012 within the project “Space-Based Information for Crowdsourcing Mapping”.

## II. Background and objectives

4. In recent years, technological advancements have made it possible for Volunteer and Technical Communities (V&TCs) 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 United Nations Office for the Coordination of Humanitarian Affairs’ involvement in requesting the establishment of a crisis mapping platform in Libya and in the support the United Nations Foundation and the United Nations Office for the Coordination of Humanitarian Affairs provided to the 2011 Harvard Humanitarian Initiative Report, “Disaster Relief 2.0: The Future of Information Sharing in Humanitarian Emergencies” and as well through the partnership of UNOCHA with the “Digital Humanitarian Network”. The Office for Outer Space Affairs and UN-SPIDER have also recognized the importance of these inputs by organizing a series of workshops to create an exchange platform bridging the space technology community with those of crowdsourcing mapping, disaster management and social networks since 2011.
6. The UN-SPIDER Programme is ideally positioned to conduct this project given: its mandate and its role within the United Nations; its established 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.

The first activity of this project has been an Expert Meeting, held in Vienna from 5 to 6 July 2011. The proposed discussion of this first meeting aimed at: receiving feedback from experts from the disaster management/emergency response community regarding how information has to be generated and/or tailored to ensure that it can be used effectively; learning about novel potential applications and products which could be elaborated by the crowdsourcing mapping community that can support preparedness and emergency response; and receiving guidance on how to build upon existing solutions to facilitate the sharing of information within the disaster management/emergency response community.

7. The second activity of this project has been an Expert Meeting, held in Geneva on 16 November 2011 with a focus on exploring possible ways of contributing to better coordination of the crowdsourcing mapping community with the space technology community and on overall improvement of its involvement to facilitate the preparation and processing of space-based products used by the disaster management/emergency response community. The discussions targeted the opportunities that make space-based information available for disaster risk reduction and emergency response, including their access and use, as well as the further involvement of existing mechanisms to ensure increased coordination and cooperation of all three communities (crowdsourcing mapping community, disaster management/emergency response community and space technology community).

8. The third activity of this project has been an Expert Meeting, held in Vienna on 3 to 5 December 2012 with a specific focus on: how space-based technologies can contribute to the work of the V&TCs and to close the gap of the need to better define how the many fields come together to support crowdsourcing mapping activities, and more specifically to address questions being asked by all those getting involved; bringing together the three communities (crowdsourcing mapping community, disaster management/emergency response community and space technology community) to brief each other about their fields of expertise provides an opportunity to understand better the questions being asked and how space-based technologies could contribute to solving them; and to help building a tighter cooperation and further understanding among all three communities (crowdsourcing mapping community, disaster management/emergency response community and space technology community) and possibly work on an upcoming simulation exercise to be conducted in the upcoming months.

### **III. Programme**

9. The Expert Meeting was opened by introductory statements from representatives of the Office for Outer Space Affairs, the Government of Austria, the Austrian Research Promotion Agency (*Forschungsförderungsgesellschaft/FFG*) and the Secure World Foundation (SWF).

10. The programme of the Expert Meeting consisted of seven plenary sessions and three breakout sessions. In the plenary sessions, introductory presentations were used to provide an overview of various topics to be discussed and to give an opportunity to the three present communities (crowdsourcing mapping community, disaster management/emergency response community and space technology community) to brief the Meeting's participants on their respective field of expertise.

One ignite talk session allowed for a maximum number of experts to present their ideas in a concise manner to the audience.

11. 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 (crowdsource mapping community, disaster management/emergency response community and space technology community). The thematic areas covered during the breakout sessions were:

12. Breakout Session I:

- (i) *Presentations of prepared Country Profiles and discussion on possible simulation exercises*

13. During a subsequent plenary session and a group discussion the following topics for the Breakout Sessions II and III were identified:

Topics Breakout Session II:

- (i) *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*
- (ii) *Quality and reliability of crowdsourcing data for disaster management and emergency response*
- (iii) *Risks and solutions from data of social media*

Topics Breakout Session III:

- (i) *Licensing*
- (ii) *Guidelines and definitions*
- (iii) *Partnerships and work groups*

## IV. Attendance

14. The Expert Meeting brought together 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, Russia, Samoa, Sweden, Switzerland, United Kingdom of Great Britain and Northern Ireland, United States of America and Yemen.

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

## V. Presentations and plenary sessions

16. Participants were able to hear five introductory presentations after the official opening of the expert meeting. UN-SPIDER and the Secure World Foundation informed the audience about their activities and involvement in the field of crowdsourcing mapping. After these remarks, the Office of Outer Space Affairs informed about the Committee on the Peaceful Uses of Outer Space and the United Nations Development Agenda. This introduction was followed by presentations on the Samoa simulation exercise, an outcome of the UN-SPIDER International Crowdsourcing Community Meeting in Geneva in November 2011. This introductory session was closed by a presentation on the efforts of the crowdsourcing mapping community during Hurricane Sandy and their invaluable contribution to the disaster response.

17. After setting the framework of the Expert Meeting through the introduction presentations an ignite talk session took place to accommodate the large number of experts present in the meeting. The session had 10 five-minute presentations, covering a range of topics such as: “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”, “Crowdsourcing mapping and natural hazards early warning in Brazil”, “Crowdsourcing for land administration”, “Crisis mapping activity in Russia”. These ignite talks proved to be crucial for the understanding of the topic on crowdsourcing mapping, the different communities and various initiatives and opportunities.

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

19. Interventions that followed these presentations helped increased the understanding between the different communities present on the use of space technologies and geospatial information in various areas. Many national GIS teams referred to their prioritization of desertification while others added on the importance of not degrading the other disasters such as volcanic eruptions.

## VI. Breakout sessions

20. Discussions in the breakout sessions allowed for a structured exchange of views focusing on a set of topics which were provided to group members by the Organizing Committee and which the plenary session developed in a group session.

21. Breakout Session I:

- (i) *Presentations of prepared Country Profiles and discussion on possible simulation exercises*

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

23. To answer the specific expectations of each community, it was agreed that a set of definitions has to be agreed upon. These definitions must cover the different phases of a disaster to ensure a shared understanding of the different requirements different phases would have. This understanding would help define which risk areas can be targeted, what scenario needs to be planned, which stakeholders should be involved and what objectives should be accomplished.

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, serves specific user types and has a series of products which could be accessed publicly. Other issues such as data storage and dissemination were also discussed and the UN-SPIDER Portal was named as one potential resource.

25. Among other issues discussed, the group debated ways to motivate communities in participating and how it was important to work with real data, even in a simulation context. Building on the experience of Samoa, the need for targeted trainings on the use of crowdsource data was mentioned. The role of crowdsource for ground-truthing satellite image interpretation was also looked into as one new type of collaboration between service providers and voluntary communities.

26. Regarding participation to such an exercise, various communities should be involved. It is important to include as well women's groups and civil society groups, students, research institutions and universities, high schools and primary schools. The general recommendation was however to include as many groups as possible to such a landmark exercise. Nevertheless the disaster management/emergency response community noted that it could only enter the simulation if it is considered a complex emergency.

27. The session agreed that one important outcome of a simulation exercise needs 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 response effectiveness.

28. Further details of such a simulation exercise were discussed, including the preparation of data by United Nations entities or international bodies; defining the test site; and ensuring close contacts with local decision makers. Also satellite data providers would need to be involved to acquire and share data, including archive data. The crowdsource mapping community may be used to extract information from imagery and technical bodies, such as ISPRS or OGC, could ensure data quality.

29. Breakout session II:

- (i) *How could space-based information improve the reliability of data? Can space-based information be used for the validation of data?*

30. The discussion started by looking at the added value the disaster management/emergency response community could provide to crowdsourcing mapping community. It was commented that, in principle, collection of geo-referenced data can now be executed through well-established tools, facilitating the aggregation of additional data. However, it was commented that information was not used or shared correctly due to the lack of an agreed framework and standardized requirements. It was suggested to learn from recent disasters and identify user requests to anticipate their needs and develop a typology within the community. Several actors including NATO, OGC, ISPRS and GEO are working on similar issues and could be integrated in a concerted effort.

31. Discussions took place on the importance of a two-way feedback between communities; on the importance to use crowdsourcing to empower decision makers; and on the role the crowdsourcing mapping community can play in the domain of risk mapping.

32. The group discussed also the advantages of the validation process through crowdsourcing and validation of data, for example during drought preparedness.

*(ii) Quality and reliability of crowdsourcing data for disaster management and emergency response*

33. It was noted that the quality of a product often depends on the needs of the user and on the expected usage to be made of it and that there can be different definitions of quality and reliability for local communities and official uses. Although some research has already been conducted there is more research and funding needed for the identification of different methods of verification and validation of data.

34. The group discussed that there could be two starting points to improve the quality of data. Firstly, the quality depends heavily on the provider of data user profiles: the distinction between anonymous and register users; between “general” crowd and subgroups of trusted people. Secondly, filtering the data by, for example, asking where the information originates from or by setting up a framework where the crowd verifies the crowd, respecting transparency and open data policies and practices.

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

36. To achieve this goal it was recommended to proceed via a two-step approach. The first should facilitate the exchange of data; and the second step should be the development of standards, guidelines and practices by the communities themselves. Interested organizations, donors and various partners should work together on this matter. e.g. Ushahidi is working on such a project and OCHA/UNHCR has also developed a common language.

37. From the point of view of the crowdsourcing mapping community this is a twofold issue since they have an interest to provide the affected communities with useful and relevant products and want to be seen as a reliable partner as well by official emergency management agencies. These agencies may want to use crowdsourcing data to fill the gaps or to complement traditional sources.



38. Emergency managers and disaster managers raised the question to the crowdsourcing mapping community regarding how they can ensure accuracy and quality of data and products. It was replied that close analysis of community concerns and identification of stakeholders was required. Disaster managers also inquired how civil protection agencies could tap into crowdsourcing capacities for prevention and preparedness. As crowdsourcing efforts were considered spontaneous, an opportunity for civil protection agencies and civil society was identified for mobilization through best practice examples to ensure proper cooperation. Involvement of communities was considered important as well.

39. To prove the reliability to official agencies it could be useful to demonstrate the accuracy of crowdsourced data compared with more “traditional data” and to document the efforts made on the evaluation and verification of the crowdsourced data. In Indonesia for example, a joint verification of data was set up between Open Street Map, NGOs and the Government to build a stronger level of confidence.

40. Regarding the needs and requirements of the space technology community from the crowdsourcing mapping community, participants mentioned the need of validation of data from end-users as well as the need to continuously report back on on-going emergencies. Possible applications involving local communities for preparedness and forecasting were discussed.

41. An improvement of communication and publicity of crowdsourcing activities would help tremendously to support the efforts by the crowdsourcing mapping community.

*(iii) Risks and solutions from data of social media*

42. Social media such as Facebook or Twitter are not only part of a new decade of journalism, but also a new helpful tool for the disaster management. The use of social media can improve information management in emergency response and early warning. It is therefore seen as a way forward although not yet fully reliable. The social media channels (Twitter and Facebook) can be a useful tool for disaster management mainly because of the timeliness of the information.

43. It is important to distinguish between providing information and receiving information, private users and organizations as the different types of disasters require different approaches on using social media tools.

44. It will be necessary to implement regulations or filters to manage misinformation that can be generated through social media. Collaboration with platform providers could be established to support the creation of such filters, by providing lists with existing filters to help users as well as organizations and the media distinguish between reliable and unreliable sources. Feedback from users about the usefulness of information spread via social media is important.

45. The biggest issues in the use of social media data are reliability and trust of provided information. Although the verification of fake cases and rumours is already carried out processes to reduce them at the source must be designed.

46. It was discussed that the combination between crowdsourcing and social media requires a definition of structure and hierarchy. The users of social media channels are often not informed about the fact that the information which they are submitting could be used for disaster response. Therefore, techniques,

methodologies and tools are 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 “rate the person” who shared the information system.

47. Trusted sources should increase their social media presence and therefore complement and not override traditional media channels. International actors, governmental institutions or other established entities should use social media as a dissemination tool, so that users have a choice of trusted sources.

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

49. Breakout session III:

(i) *Licensing*

50. Addressing the question of the ability to access and integrate space-based information, several aspects were addressed, including licensing issues for satellite and aerial imagery, access to existing mechanisms that make imagery available, time limits on availability related to preparedness and response as well as the differentiation of products and processes that are needed for different kinds of disasters.

51. The representatives from the emergency management community also requested easier access to space-based information at reasonable costs, in particular to archives, for disaster preparedness and response. The issue of low bandwidth environments and the types of products needed was considered. The group also addressed the need to get access to knowledge resource centres. Regarding data requirements, they should be easy to handle and easy to process but also be reliable and offer real-time information on location of disasters and damages. A proper system and framework to manage these data are called for. Also the need for regular high resolution imagery before an event happens was mentioned.

52. The group discussed the issue of funding. It was commented that United Nations entities as well as national space agencies could not provide imagery free of charge to the disaster management/emergency response community. The issue of licenses was considered a major obstacle. Several international mechanisms are now looking at the possibility to share satellite images. Participants were informed that through the United States Geological Survey (USGS) access to high resolution imagery will be provide in case the agency becomes involved in the response. The group also discussed the possibility of pooling resources and buying imagery with a multi-agency license since normally licenses limit the number of organizations that can use the imagery.

53. It was commented that open source images are only available at low or medium geometric resolution. However, the question was raised whether high resolution images were the most important ones for disaster managers. It was rather considered necessary to assess the best use of available data in comparison to the emergency needs since every event requires different geometric resolution.

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

*(ii) Guidelines and Definitions*

55. The group discussed the importance of developing a clear definition of what crowdsourcing actually is. This definition should be accompanied by a guideline on the adequate usage of crowdsourced resources. The various forms, scopes or sizes a “crowd” can take must also be described.

56. It was noted that there is no one community that is exclusively focused on this methodology. The methodology used eventually depends on the position in the information management cycle as well as on different models of crowdsourcing. The crowdsourcing mapping community is apparently made up of a multiple of actors including voluntary associations, non-governmental organizations, individuals and private sector agencies.

57. As strengths and advantages of crowdsourcing, the group identified the swarm and surge capacity, the access to local knowledge (including from the diaspora community) as well as the speed of execution. There is a clear understanding that crowdsourced data needs to serve a defined purpose and can bring benefits in the various phases of the disaster management cycle. It was also recognized that crowdsourcing does not replace large institutions but rather complements them or “augments” their reach and impact. A trade-off between speed and quality control was identified as a potential risk of the informal space; coordination being a shared challenge between communities.

*(iii) Partnerships and Work Groups*

58. This group discussed aspects of coordination between the crowdsourcing mapping and the emergency response community. One challenge identified was that emergency responders do not necessarily know about the opportunities provided by the crowdsourcing groups. Table top exercises in follow-up meetings were suggested in this regard. Also, feedback from the emergency response community was considered very important. International organizations, such as the Office of Outer Space Affairs could come in to close coordination loops between partners.

59. Training needs were identified for technical groups to better understand the needs of users at local and country levels. Simulations and trainings are always great opportunities to build partnerships.

60. The space technology community requested from the crowdsourcing mapping community to interact closer with end-users at identifying their needs. It was argued that needs change over time and that they were often difficult to find. Although the crowd is often considered diverse or even inherently chaotic, it is also able to work through protocols and standards. A channel for communication between communities and entities is needed to identify semantic information more easily and help close the existing gap between needs, data and crowdsourcing products. Regarding the question of how to make crowdsourced resources available to local communities in developing countries, it was argued that still many countries do not rely on volunteer support. However, experience shows that involvement of local

communities proves to be beneficial for data sharing and for taking advantage of new technologies and methodologies.

61. The space technology community requested from the disaster management/emergency response community to share reports and analyses for contribution to risk and response awareness activities as well as to share 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 on a disaster; that business cases should be built for space-based information; and that databases on vulnerable areas should be prepared in partnerships.

62. The group recommended the establishment of a public platform that would facilitate collaboration amongst the participants by supporting exchanges and sharing of data. Such a platform would also increase bounding between communities.

63. To convince the various partners and communities of the potential strengths and values of crowdsourcing it would be important to have a clear knowledge of what the crowdsource mapping community expects from other people. Using instruments such as social media, broadcasting, radio and print media would strengthen actions and help in building common goals and collaborations.

## **VII. Recommendations**

64. This report reflects the discussions during the meeting and underlines the fact that the topic and the thematic area still need a clear definition. In this regard, it was proposed that together with representatives from all communities a Wiki could be created to work on questions regarding taxonomy and methodologies.

65. A further key issue is to consider how the diverse groups can cooperate without duplication of efforts. This entails informing communities on what others do as well as providing a means of distributing existing information. Better understanding about the strengths and opportunities of the three communities (crowdsource mapping community, disaster management/emergency response community and space technology community) was considered helpful in this regard.

66. The expert meeting put in evidence that neither of the communities exactly knows or recognizes the expectations and recommendations from other involved parties. It was proposed to develop guidelines that would help create this understanding and propose ways forward. It was underlined that it is important to draw the attention firstly to existing initiatives such as DHNetwork and International Crisis Mappers Community, which can still benefit from an increased coordination and additional external support.

67. It was recommended that UN-SPIDER functions as a mediator for the communities as its mandate and its knowledge portal are 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 of these efforts. Questions regarding who would lead these efforts on behalf of the communities and how next phases would look like were discussed. It was recommended that UN-SPIDER provides assistance in documentation and in the facilitation of group interactions.

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

69. To understand each other's key aspects and main foci it was suggested that a survey on the needs and expectations of the various communities be executed as a follow-up to this Workshop. UN-SPIDER with its network and being in the centre of all three communities (crowdsource mapping community, disaster management/emergency response community and space technology community) was asked to conduct this survey.

70. UN-SPIDER must continue to promote the topic of crowdsourcing at technical advisory missions and ensure that these communities are better integrated in national disaster management procedures.

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

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

73. The crowdsource mapping community requested the disaster management/emergency response community to consider a direct communication channel as well as what categories of information and verification protocols are needed during an emergency (format and typology). It was also asked which preparedness data would need to be mapped and with which parameters of quality and timeliness.

74. An important question raised was the one on how to ensure 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 amongst the participants by supporting exchanges and sharing of data. Such a platform would also increase bonding between communities.

## **VIII. Final remarks**

75. One of the predefined goals by the organizing committee of the Expert Meeting was to plan and work on a possible simulation exercise in the upcoming months. The discussion around this topic rather showed the need to work on standards, guidelines and methodologies upfront.

76. Good practices could be promoted by entities of the United Nations System but a lack of collaboration is still felt between communities. As different standards further complicate collaboration, various initiatives were called for; a document defining terms and semantic descriptions; clear needs and explanations of required outputs need to better be expressed; better understanding of internal protocols and processes needs to be developed; and trust in new methodologies and techniques must be built.

77. The expert meeting took note of the fact that different findings from the first two expert meetings on crowdsourcing mapping are reiterated during the third “International Expert meeting on Crowdsourcing Mapping for Disaster Risk Management and Emergency Response” and hence are reflected again in this report.

78. Although the Expert Meeting did not set a clear framework for a crowdsourcing simulation exercise in any country, the organizing committee was able to draw a lot of positive conclusions.