



## NEWSLETTER

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### In focus

## Getting the bigger picture: Crowdsourcing Mapping for disasters

“The reality is that in a disaster, everyone has a piece of information, everyone has a piece of that picture.” Humanitarian OpenStreetMap’s Kate Chapman states in the UN report “Disaster Relief 2.0”. In disaster situations, however, it is not always easy for response teams to collect all these pieces in order to get the full picture they need to provide effective relief. Crowdsourcing Mapping aims to fill that gap: The idea is to collect data from as many on-site sources as possible and translate that real-time data into maps. Being aware of the surrounding and the infrastructure, locals can render accurate geo-referenced information or comment on existing data and thereby help

disaster managers expand the information they need for emergency operations. That is of course not only true for on-going disasters, but also for risk assessment and preparedness efforts.

In the field of disaster and risk management, Crowdsourcing refers to the possibility of communities and individuals to collect disaster-relevant information via various communication channels and social media platforms thus fitting several small pieces of information into a broader picture. By providing these platforms and processing the data into maps, Volunteer & Technical Communities (V&TCs) such as Humanitarian OpenStreetMap, Ushahidi or Crisis Mappers support national and international disaster and risk managers in their efforts.

aims at promoting the use of collaborative approaches to disaster and risk mapping. By fostering the exchange of new ideas and by substantially assisting the fast growing community, UN-SPIDER wants to help end-users get the bigger picture in crisis situations.

Under the auspices of UN-SPIDER, two expert meetings were organised in Vienna and Geneva bringing together the V&TCs, the disaster management community, as well as providers of satellite imagery, in order to exchange experiences and develop a common working strategy. Moreover, following the earthquake in Haiti, UN-SPIDER was also involved in developing strategies to support future disasters, by facilitating communication and cooperation among the different actors.

This Newsletter aims to shed light on the opportunities of Crowdsourcing Mapping for disaster and risk management, introduces some of its key players and presents lessons learnt from a simulation mapping exercise.

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UN-SPIDER, as a bridge between the disaster management communities and the providers of space-based resources, embraces the opportunities that Crowdsourcing Mapping entails and



OpenStreetMaps used during a mapping workshop in the Philippines

Credit: Smart Communications

# The Crowdsourcing Mapping Community

The Crowdsourcing Mapping Community is large and very diverse. The following presents some examples of the most active volunteer communities, platforms and technology providers.

Ushahidi (<http://ushahidi.com/>) started off to map reports of violence in Kenya after the post-election fallout in the beginning of 2008. It was heavily involved in the Haiti 2010 emergency response and has now been transformed from an *ad hoc* group of volunteers to a focused organisation. Its online mapping tool Crowdmapper allows users to set up their own maps.

The International Network of Crisis Mappers (<http://crisismappers.net/>) is one of the largest Crowdsourcing Mapping communities. It consists of experts, practitioners, policy-makers, technologists, researchers, journalists, scholars, hackers and skilled volunteers. The network provides mobile and web-based applications, maps, aerial and satellite imagery, live simulation or computational and statistical models to support humanitarian relief operations.

Crisis Commons (<http://crisiscommons.org/>) tries to connect to current and future V&TCs and to crisis management structures such as the UN Cluster system, in order to avoid duplication of efforts. This open forum platform assisted in the Haiti earthquake, the Pakistan and Thailand floods, as well as the Gulf Coast Oil Spill.

The Humanitarian OpenStreetMap Team is an initiative that promotes and facilitates the use of OpenStreetMap by providing trainings to local and humanitarian actors in the field. Their tool OpenStreetMap (<http://openstreetmap.org>) is a free wiki world



Ushahidi Crisismapping for Haiti

Credit: Digital Democracy

map. About 150,000 mappers are involved in the platform dedicated to building a free and open map of the world without legal or technical restrictions.

MapAction (<http://mapaction.org>) is a non-governmental organisation with a capacity to deploy a fully trained and equipped humanitarian mapping and information management team anywhere in the world, often within just hours. Their aim is to deliver vital information in mapped form, from data gathered at the disaster scene.

Google Crisis Response (<http://google.org/crisisresponse/>) and the MapMaker Initiative seek to make critical information more accessible around disasters and humanitarian crises. The team has responded to the 2010 Haiti earthquake and other major disasters. The offered tools include Google Earth and Custom Google Maps, allowing the documentation of disaster-affected areas. Furthermore, Google Fusion Tables or Google Docs help to organise and collaborate data online in real-time.

Similarly, the Sahana Software Foundation (<http://eden.sahanafoundation.org>) provides Eden, an open source humanitarian platform.

## Crowdsourcing Glossary

**Crowdsourcing:** A group collecting large amounts of information in order to gain a precise and complete overview of a certain topic or event. The concept derives from the idea that a group of people (the crowd) can provide a broader picture than an individual thus representing collective intelligence.

**Crowdsourcing- vs. Crisismapping:** Crisismapping is understood as live mapping of onset crises. Furthermore, Crisismapping might include natural as well as political and humanitarian crises. Crowdsourcing Mapping encompasses activities that support not only emergency and humanitarian response, but the full disaster management cycle.

**Geolocating:** Identifying the geographic location of an object or place. In the field of disaster management it often refers to sharing an online map of calamities that have taken place or people in distress at a certain location.

**Linked Data:** Describing a recommended best practice for exposing, sharing, and connecting pieces of data, information, and knowledge on the Semantic Web.

**V&TCs:** Volunteer and Technical Communities that apply their expertise in social media, geographic information systems (GIS), database management and online campaigns to disaster and risk management.

## A Crowdsourcing Mapping Timeline



1858

The Oxford English Dictionary is one of the earliest examples of a Crowdsourcing effort. The Philological Society, together with over 800 volunteer readers collected words from all available books and documented their usage. They documented over 6 million submissions over a period of 70 years.



2006

“Crowdsourcing” - the term is born with the article ‘The Rise of Crowdsourcing’ by Jeff Howe published in the June 2006 issue of Wired Magazine.

# Interview: Jen Ziemke, Co-Founder Crisis Mappers

**Jen, can you give us a very brief outline of your organization's goals and methods of working?**

**Jen Ziemke:** Well, we are not a formal organization but a loose network of friends and colleagues from a wide variety of backgrounds living in nearly every country in the world. We grew from 100 Crisis Mappers in 2009 to well over 4,000 members today. We host an annual conference series, the International Conference on Crisis Mapping (ICCM), where users can raise core concerns and lessons learned. Our members share information and resources via [www.crisismappers.net](http://www.crisismappers.net), and reach out via our active googlegroup: [crisismappers@googlegroups.com](mailto:crisismappers@googlegroups.com).

**Recent disasters in Haiti or Japan have shown that Crowdsourcing is a popular new player in Crisis Response. From your experience, how useful has Crowdsourcing Mapping proven to be to respond to disasters?**

**Jen Ziemke:** The extent and degree to which crowdsourced mapping has proved useful in saving lives during disasters is a hotly-contested area and is a subject under constant debate. I do believe everyone recognizes the incredible potential and also possible pitfalls of engaging new data, methods and groups of people in support of effective disaster response. We are now able to hear stories from the crowd, in real time, and pull this data in a map for improved situational awareness. We are now leveraging volunteer technical communities and diasporic populations to help translate, georeference, and curate large datasets. In this new period, it is becoming increasingly apparent that, like it

or not, changes in social practices facilitated by advances in technology mean that these new players and new trends will only increase, not decrease. We are witnessing the leading edge of a sea change, one in which the final outcome is unknown but the wave of change is certain to change the fundamentals of the landscape.

**Critical voices claim that Crowdsourcing Mapping cannot deliver truly reliable data – how do Crisis Mappers respond to this charge?**

**Jen Ziemke:** 9-1-1 and 1-1-2 emergency alert systems have always been crowdsourced. And we have found ways to cope with the fact that the people phoning in their SOS may lie. Having them text their needs instead of call by voice does not fundamentally alter the data landscape such that these data suddenly become less reliable. Our confidence in a given event is raised the more independent voices report on the same event. Using triangulation, probability scoring, imagery and trusted networks, we can significantly mitigate this problem and estimate the degree of credibility of any given event. And if we can not tolerate any uncertainty in the data, we use trusted networks and trained friends, or networks of networks models, to further ameliorate these concerns.

**The Volunteer and Technical Community is changing as fast as it is growing. What are the steps ahead for Crowdsourcing Mapping from the Crisis Mappers' point of view?**

**Jen Ziemke:** It is difficult to speak for the many different "Crisis Mappers" on the network who have very different jobs



Jen Ziemke

and experiences and even goals for utilizing real-time maps. Some of us work remotely from a disaster, feverishly on our laptop, developing apps or algorithms or running volunteer communities. Others of us are human rights defenders or election monitors using maps to condemn state repression or corruption, while still others are on the ground providing life saving assistance in the midst of a disaster. Some members are busy developing enhanced visualization and analytic techniques for large datasets, so we can begin to detect the signal from the noise and enhance our capacity to analyse and understand the data we collect. Others are wrapping their mind around the political, power-based and institutional puzzles these new practices tend to raise, as our hacker friends are developing new apps, engaging diasporic or volunteer communities, and developing sophisticated algorithms for natural language processing. We are grateful to the remote sensing community for working to release high-resolution satellite imagery to volunteer technical communities who can help improve baseline maps after a disaster. It has been, above all, a fantastic whirlwind and an incredible learning experience.

## 2007

Crowdsourcing for crisis mapping begins: The non-profit company Ushahidi starts mapping incidents of violence and peace efforts during the post-election phase in Kenya 2007-2008.

## 2008

ImageCat Inc. and the Earthquake Engineering Research Institute (EERI) develop the Virtual Disaster Viewer, one of the first social mapping tools that interpret satellite imagery with GPS-referenced ground photographs and videos.

## 2009

October: Crisis Mappers Network holds its first conference in Cleveland, USA. Creation of UN Global Pulse Initiative to explore opportunities for using real-time data to gain a more accurate understanding of the impacts of global crises such as disasters.



## Crowdsource Mapping in Haiti

On 12 January 2010 a devastating earthquake struck Haiti. The extensive damage to the infrastructure made satellite images and maps vital to help assess the situation and plan relief work. Such images can be used by disaster responders to help identify critical areas, accessible roads as well as suitable areas to set up shelter.

UN-SPIDER experts became involved in supporting these relief efforts only minutes after the earthquake had hit. UN-SPIDER coordinated with a vast number of providers of space-based information and value-adding partners to provide satellite imagery and rapid mapping. Among others, the United Nations Office for Outer Space Affairs (UNOOSA) activated the International Charter: Space and Major Disasters on behalf of the United Nations Stabilization Mission in Haiti (MINUSTAH) to make satellite imagery accessible via this international mechanism. All information was shared widely on the UN-SPIDER Knowledge Portal (un-spider.org). This was central to assisting emergency responders and the V&TCs in identifying and accessing available imagery as well as to help decision makers deal with the tremendous amount of information that flooded the community.

The catastrophic event in Haiti in 2010 was the first one, in which a significant amount of imagery was made publicly available without copyright restrictions. V&TCs were able to take advantage of the vast amount of post-disaster imagery to update existing information (for example an urban map of Port-au-Prince) or to create information and knowledge to support relief efforts.

## Interview: David Stevens, UN-SPIDER

**Crowdsourcing for disaster relief has been drawing more and more attention particularly since the 2010 Haiti earthquake. How important, in your view, is the support this community is providing to the response efforts?**

**David Stevens:** One of the first things you learn when working with the humanitarian and emergency response communities is that the only tools and information they will use and trust in a crisis are the ones they have been using already. You cannot “cook a new recipe” in the middle of a crisis. So although this community is well intentioned, the success stories so far have been mostly in situations where decision makers actually reached out and specifically guided the Crowdsourcing efforts to ensure they got what they needed. We have to build these linkages straight into the decision making process. We have to work with these first responders, making them aware of the available opportunities and learn from them what exactly they need from the crowd.



David Stevens

**How does UN-SPIDER support Crowdsource Mapping for disasters?**

**David Stevens:** UN-SPIDER works with both the space community and the disaster and risk management community. This means that we are in an exceptional position to ensure that these communities work with and benefit from the Crowdsourcing Mapping community. We are working to ensure that the V&TCs, on the one hand, have access to space-based resources (satellite imagery, global navigation satellite systems) and satellite communications and, on the other hand, to ensure that these V&TCs work directly with the National Disaster Management Organisations in incorporating Crowdsourcing maps into their activities.

**Crowdsourcing has so far focused on the response phase. Could Crowdsourcing Mapping also serve as a means to enhance disaster preparedness or support disaster risk management?**

**David Stevens:** We all know that the response efforts during the 2004 Indian Ocean tsunami ran out of people to help before they ran out of money. But for the similar silent tsunami of the drought in Africa the scale of support received was dismal. Similarly, this community swarms together after major disasters but shies away from smaller disasters and from preparedness and risk prevention activities. We are working to identify volunteers that can collaborate more closely at the national level directly with the National Disaster Management Organisations and also to engage this community to support the full disaster management cycle.

### 2010

Social media and mobile technology facilitate emergency requests: 4363 SMS emergency number is established after Haiti earthquake for sending help requests. Global V&TC community translates these pleas onto maps and supports disaster response efforts.

### 2011

July: UN-SPIDER Expert Meeting on Crowdsourcing Mapping in Vienna  
November: UN-SPIDER Expert meeting on Crowdsourcing Mapping in Geneva  
November: UN-SPIDER Crowdsourcing Mapping Simulation Exercise in Samoa

### 2012

May: Global Pulse publishes White Paper “Big Data for Development: Opportunities & Challenges.”  
December: United Nations International Expert Meeting on Crowdsourcing Mapping in Vienna

## Debating Crowdsourcing Mapping: UN-SPIDER International Meetings

When promoting Crowdsourcing Mapping, it is important to bring two sets of people to the table. Those who understand disaster and risk management and those who understand the technologies of collaborative mapping based on satellite imagery. Since UN-SPIDER is a programme created to bring the opportunities of space-based resources (such as maps) to the benefit of disaster management and emergency response, it held two international expert meetings to foster a dialogue on Crowdsourcing Mapping for preparedness and emergency response with all relevant stakeholders. Both meetings were supported by the Government of Austria and Secure World Foundation.

The first meeting – hosted in Vienna in July 2011 – brought together 64 experts and practitioners from 29 countries, along with representatives from several United Nations entities, space and remote-sensing organisations as well as national, regional and international disaster management and civil protection agencies. Moreover, numerous Crowdsourcing communities, represented by V&TCs, non-governmental organisations, expert groups, universities, research institutions and the private sector completed the list of participants.

What all parties agree on is that Crowdsourcing Mapping should not be seen as a replacement for the initiatives which are already being carried out by existing

organisations. It should rather be seen as an additional tool and represent a further benefit to the disaster risk management process. This is specifically the case in the production of geospatial information by allowing both experts and ordinary citizens to create and access geographical knowledge.

Since Crowdsourcing Mapping products aim at an improved decision-making process in the area of disaster risk management and emergency response, end-users need to be able to access and use the information provided by the V&TCs effectively. This includes technical accessibility as well as awareness of the existence of Crowdsourcing tools. Similarly, with Crowdsourcing Mapping being a collaborative approach, it was pointed out that the V&TCs also have a need for information and feedback from the end-user side in order to properly evaluate the usefulness of the products created.

For the second expert meeting, organised in Geneva in November 2011, experts and practitioners representing 21 countries and various United Nations agencies including the Geneva-based humanitarian community came together. However, the majority of participants encompassed representatives from the Crowdsourcing communities, including voluntary networks, non-governmental organisations, expert groups, universities, research institutions and the private sector.

Following up on the Vienna event, this meeting was organised back-to-back with the 2011 International Conference on Crisis Mapping, which enabled broad participation of the crisis-mapping community. This time, the experts focused on coordination issues of the Crowdsourcing and space technology communities. The discussions targeted opportunities to 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 communities.

Experts also discussed the use of the term “Crowdsourcing Mapping”, instead of “Crisismapping”. The latter is understood to be a very broad term including natural, social and environmental issues, as well as political and humanitarian crises, while Crowdsourcing Mapping encompasses actions and activities that support the full disaster management cycle including disaster risk management.

Finally, both expert meetings covered the issue of data licensing, which is essential to ensure that the V&TCs can access satellite imagery in order to enhance the effectiveness of their work. Moreover, it is seen as an objective to further improve volunteer management, in a fashion that could enable Crowdsourcing activities to be carried out in a coordinated manner.



UN-SPIDER Expert Meeting on Crowdsourcing Mapping in Geneva, November 2011

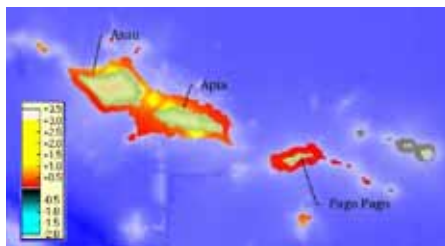
# Samoa: Practising Crowdsourcing Mapping

Coordination is a critical element in the post-disaster phase. During the first UN-SPIDER Expert Meeting in 2011 in Vienna, participants therefore agreed to carry out a simulation exercise in Samoa to practise a coordinated approach to Crowdsourcing Mapping with the various communities. During the second UN-SPIDER Expert Meeting in 2011 in Geneva, participants fine-tuned the proposed exercise and those involved were provided with a specific role for the simulation. Representatives of UNOOSA, the United Nations Office for the Coordination of Humanitarian Affairs (UNOCHA), the Government of Samoa, CrisisMappers, GISCorps, the European Commission Joint Research Center (JRC), Open Street Map and several other partners agreed to participate in the exercise.

The two-day “Samoa Simulation Exercise” took place on 3 and 4 December 2011 with a cyclone scenario. The two core activities were a local training exercise with the Disaster Advisory Council simulating Ministry level responses, and an online exercise encompassing participants from the V&TCs, the disaster management and the space communities, using and developing various products, tools and datasets.



Heat map indicating the concentration of requests for help (GISCorps)



Map showing cyclone storm surge predictions (JRC/GDACS)

The exercise utilized local public and private actors at the ground level for disaster response training and coordination activities. Meanwhile, the representatives of the V&TCs were responsible for simulating storm surge modelling, providing imagery data, and generating field requests and reports. Further coordination efforts were simulated through a range of technical platforms.

Reports and datasets were produced for post-processing and analysis of the simulated impact of the storm and the effectiveness of the Crowdsourcing coordination efforts. Participants regarded the exercise as a valuable learning experience and concluded that the lessons learnt in this simulation exercise should be incorporated into other, similar activities.

Additional benefits included the development of volunteer skills in Samoa, better understanding of the potential of space-based information, updating of baseline data for Samoa (roads, buildings and hydrography), new GIS datasets for hospitals, schools, hotels, villages and social infrastructures as well as a better understanding of forecasts for flooding and storm surge.

## Crowdsourcing Mapping: Moving forward

Crowdsourcing Mapping is an interdisciplinary field bridging many areas of expertise, including the need to access and use space-based technologies. In order to ensure that these cutting-edge technologies do contribute to the work of the disaster and disaster risk management community, there is a need to better define how the various areas of expertise come together.

UN-SPIDER is working to ensure that the three communities (Crowdsourcing Mapping, disaster/risk management and space technology communities) join their fields of expertise. Within its mandate to serve as a bridge between these stakeholders, UN-SPIDER aims at helping them better understand the needs of the other communities and answer the questions being asked.

Building on top of the recommendations put forward during the two Expert Meetings and the Samoa Simulation Exercise, UN-SPIDER is now working closely with UNOCHA and the United Nations Strategy for Disaster Reduction (UNISDR) in leveraging on the opportunities available from the Crowdsourcing Mapping communities. Additionally, by inviting Crowdsourcing experts to join Technical Advisory Missions, UN-SPIDER raises awareness on the potential of Crowdsourcing Mapping for emergency response as well as for disaster risk management in countries all over the world.



UNITED NATIONS

The United Nations Office for Outer Space Affairs (UNOOSA) implements the decisions of the General Assembly and of the Committee on the Peaceful Uses of Outer Space and its two Subcommittees, the Scientific and Technical Subcommittee and the Legal Subcommittee. The Office is responsible for promoting international cooperation in the peaceful uses of outer space, and assisting developing countries in using space science and technology. In resolution 61/110 of 14 December 2006 the United Nations General Assembly agreed to establish the “United Nations Platform for Space-based Information for Disaster Management and Emergency Response - UN-SPIDER” as a new United Nations programme to be implemented by UNOOSA. UN-SPIDER is the first programme of its kind to focus on the need to ensure access to and use of space-based solutions during all phases of the disaster management cycle, including the risk reduction phase which will significantly contribute to the reduction in the loss of lives and property.  
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