# WORKSHOP REPORT

# Swiss Crisis Mapping

# Using geo-data and social media in crisis and disaster management in Switzerland

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# 1    Zusammenfassung

Am 5. September 2013 fand der Experten-Workshop ‹Swiss Crisis Mapping – Wege zur Nutzung geobasierter Daten und sozialer Medien im Krisen- und Katastrophenmanagement in der Schweiz› an der ETH Zürich statt. Den Hintergrund des Workshops bildet der dynamische Wandel, der sich gegenwärtig bei der Nutzung von Geo-Daten im Krisen- und Katastrophenmanagement vollzieht. Zwar spielen geobasierte Daten seit Langem in nahezu allen Bereichen des Krisen- und Katastrophenmanagements eine wichtige Rolle. Jedoch hat sich erst in jüngerer Zeit die Kartierung von bevölkerungsschutzrelevanten Daten «demokratisiert» im Sinne neuer Partizipationsmöglichkeiten für zivilgesellschaftliche Gruppen und individuelle Mediennutzer.

Der Workshop wurde gemeinsam vom Bundesamt für Bevölkerungsschutz (BABS), dem Center for Security Studies (CSS) an der ETH Zürich sowie dem Institut Vermessung und Geoinformation der Fachhochschule Nordwestschweiz (FHNW) durchgeführt und richtete sich an ausgewählte Expertinnen und Experten aus den Bereichen Katastrophen- und Risikomanagement, neue Kommunikations- und Informationstechnologien sowie Kartographie und Geo-Informatik. Im Vordergrund stand, unterschiedliche Perspektiven auf das Thema Crisis Mapping im Schweizer Kontext zu gewinnen sowie die Vernetzung der beteiligten Akteure zu fördern und Möglichkeiten für weiterführende Kooperationen zu erörtern.

Der erste Teil des Workshops begann mit einer Begrüssung der Teilnehmer durch Christian Fuchs von der Nationalen Alarmzentrale (NAZ). Danach führte Prof. Hans-Jörg Stark von der FHNW in die Thematik aus einer technischen Perspektive ein. Ergänzt wurde seine Präsentation durch einen Vortrag von Florian Roth vom CSS, der das Phänomen Crisis Mapping aus sozialwissenschaftlicher Sicht analysierte. Den zweiten Teil des Workshops bildete eine Szenario-Übung unter Leitung des CSS, bei der die Teilnehmer in Kleingruppen unterschiedliche Krisen-Szenarien durchspielten und mithilfe einer Online-Plattform selbständig Crisis Mapping-Anwendungen erstellten. Im dritten Teil folgten zwei Präsentationen, welche die Diskussion um weitere Perspektiven ergänzten. Zunächst erläuterte Thomas Körkel (Swisscom), wie Telekommunikationsanbieter ihre Krisenkommunikationsprozesse organisieren. Danach analysierte der Journalist Julian Schmidli, welche Rolle die Medien bei zukünftigen Crisis-Mapping-Projekten spielen könnten. Den Abschluss des Workshops bildete eine breite Diskussion zu gegenwärtigen Herausforderungen auf dem Gebiet des Crisis Mapping, die von Christian Fuchs eingeleitet wurde. Wie die umfassende und intensive Diskussion zeigte, besteht heutzutage weitestgehend Konsens hinsichtlich des Potentials von Crisis Mapping. Um dieses Potential auszunutzen sind jedoch verstärkte Anstrengun-

gen, sowohl auf der technischen als auch auf gesellschaftspolitischen Ebene, notwendig. Insbesondere ist eine bessere Vernetzung der unterschiedlichen gesellschaftlichen Akteure notwendig, um gemeinsam an Lösungsstrategien zu arbeiten, die Crisis Mapping zu einem integralen Bestandteil bei der Prävention und Bewältigung von zukünftigen Krisen und Katastrophen machen können.

# 2    Background

Accurate and timely maps are a vital resource in contemporary disaster and crisis management. Maps are essential for identifying vulnerabilities, monitoring the effects of disasters and organizing countermeasures. Traditionally, the mapping of crises was the exclusive domain of experts, including cartographers and crisis management professionals. But with the growing availability of participatory information and communications technology, this monopoly is disappearing.

**Figure 1 Crowdsourced crisis map created after the Great East Japan Earthquake 2011**
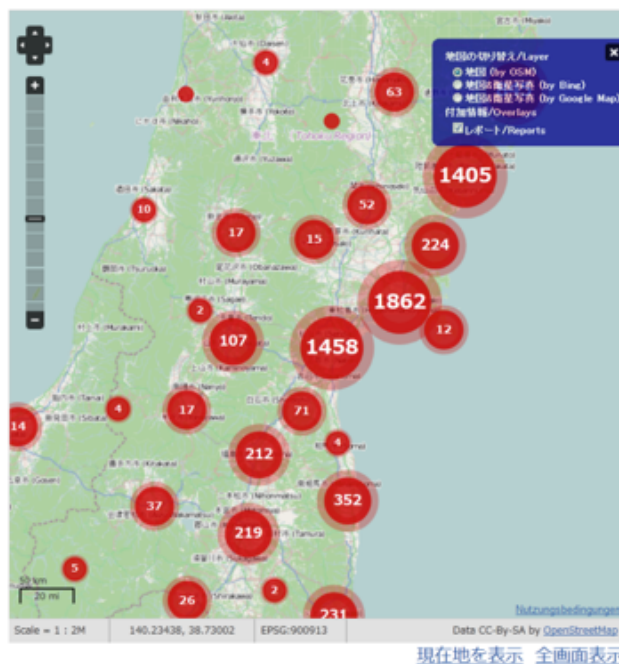


source: Sinai.info

Recent disasters have witnessed a new generation of online maps, created by civil society actors and relying on volunteers to collect, organize, verify, visualize and share geo-referenced information. Depending on the demands of the situation, crisis mapping can fulfill various functions. For example, a crisis map can involve collecting and organizing information from an affected area in order to

improve the situational awareness of emergency responders. Crisis mapping can also be used to filter and categorize information from other sources such as social media, allowing crisis managers to implement more effective countermeasures.

To address the emerging phenomenon of crisis mapping with a particular focus on the Swiss context, the Center for Security Studies (CSS) at the ETH Zürich, the Swiss Federal Office for Civil Protection (BABS) and the Institute of Geomatics Engineering at the University of Applied Sciences and Arts Northwestern Switzerland (FHNW) jointly organized an expert workshop. The event was conducted at the Center for Security Studies in Zürich on September 5, 2013.[1]

# 3 Workshop goals

The central aim of the expert workshop was to strengthen relationships between the various actors in Switzerland that could potentially be involved in future crisis mapping processes, including public authorities, private enterprises, academia and civil society. In particular, the workshop asked how crisis mapping can be integrated with established disaster management procedures. To these ends, the workshop brought together a variety of stakeholders, including geo-specialists, media professionals, civil protection officials and other experts in the field, to participate in an open dialogue.

Moreover, the workshop included a scenario exercise for a crisis map in Switzerland, which aimed to identify opportunities to make use of crowdsourcing and geo-technologies in future crises in the Swiss context. Also, the exercise aimed to pinpoint the possible technical, organizational and social challenges and discuss options to overcome these problems.

# 4 Introductory session

The workshop was opened by Christian Fuchs, head of information at the National Emergency Operations Centre (Nationale Alarmzentrale, NAZ) in Switzerland, which is part of the Federal Office for Civil Protection (BABS). After Mr. Fuchs' opening remarks, Prof. Hans-Jörg Stark from the Institute of Geomatics Engineering at the University of Applied Sciences and Arts Northwestern Switzerland (FHNW) provided a presentation on the topic of crisis

mapping from a technical perspective.[2] As Prof. Stark explained, crisis mapping is still a very young and dynamic phenomenon. It was only made possible by the rapid spread of mobile communication technologies, increased internet bandwidth and widespread access to global satellite navigation information and geo-data in recent years. According to Prof. Stark, one of the main challenges in the field of crisis mapping is enhancing mutual understanding among stakeholders. This could be done, he concluded, with the establishment new networks, connecting key national and international actors in the field. At the same time, on the technical side, applications and interfaces for the creation of situation-tailored crisis maps needed to be developed further.

**Figure 2: Presentation by Hans-Jörg Stark**



In a second presentation, Florian Roth from the Center for Security Studies analyzed crisis mapping from a social science perspective.[3] His presentation was based on two recent studies on social media and crisis mapping, which he co-authored with his colleagues Jennifer Giroux and Michel Herzog.[4]

According to Mr. Roth, the phenomenon of crisis mapping can be understood as the result of transformative processes in three interlinked social subsystems: Cartography, mass communication and finally civil protection. These subsystems have witnessed a breakdown of traditional, mostly hierarchical structures in recent years. What once were domains almost exclusively controlled by experts and authorities, have now become the fields of activity of a broad range of social actors, including NGOs, individual online activists, but also regular citizens that

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1    For further information, see the conference website *http://www.css.ethz. ch/events/CrisisMapping*.

2    Prof. Stark's presentation is available at *http://prezi.com/qymkpq87aab7/ crisis-mapping/?utm_campaign=share&utm_medium=copy*

3    Mr. Roth's presentation can be found at *http://prezi.com/nywnwxusxz3o/ crisis-mapping/?utm_campaign=share&utm_medium=copy*

4    Florian Roth, Jennifer Giroux, Michel Herzog (2013): Crisis Mapping in Switzerland: A Stakeholder Analysis, Risk and Resilience Report, Center for Security Studies (CSS), ETH Zurich; Jennifer Giroux, Florian Roth, Michel Herzog (2013): Using ICT & Social Media in Disasters: Opportunities & Risks for Government, Risk and Resilience Report, Center for Security Studies (CSS), ETH Zurich. Both studies are available online: *http://www. css.ethz.ch/riskreports*

make use of new information and communication technologies in crisis situations just as in everyday life. Coincidently, Mr. Roth pointed out using different examples of recent crisis mapping projects, it is not only grass roots actors that enable crisis mapping. Rather, established actors, such as first responder organizations and private business companies, also often play pivotal roles in crisis mapping, even though these collaborations mostly have been established on an ad-hoc basis. A key challenge for the next years will be to develop institutional frameworks and processes for such collaborations that especially allow the integration of crowdsourced crisis mapping into established crisis and disaster processes and structures.

Figure 3: Screenshot from presentation by Florian Roth depicting how crisis mapping is at the intersection of domains of cartography, communication and civil protection.
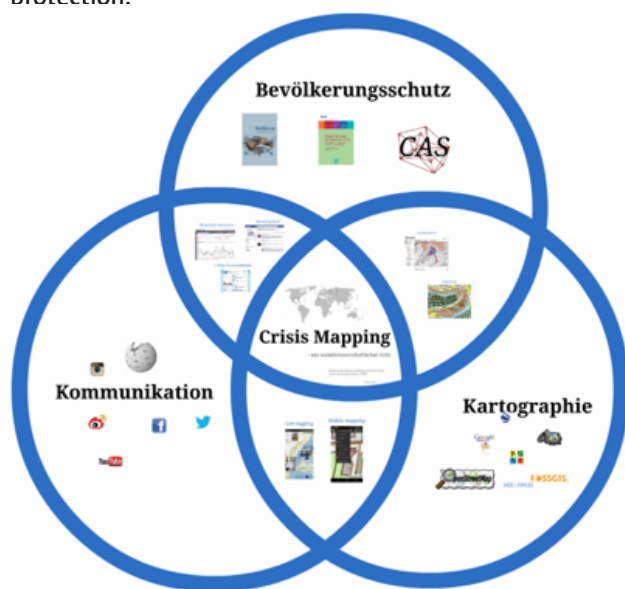


The two presentations were followed by vivid discussions of various aspects of the crisis mapping topic. Among others, the participants raised the question why in some crisis situations crowdsourced maps and other forms of community self-organization emerge, while in other – seemingly similar – situations no of such processes can be observed. As different participants argued, crisis mapping is closely connected to social and cultural traditions in how individuals and social groups cope with disasters. Accordingly, recent disasters in Central Europe, the United States and Southern Asia have shown that many citizens are willing to take over personal responsibility during crisis situations. At the same time, especially in highly-developed societies, it has to be observed that parts of society tend to expect government authorities to manage risks and crises for them. Consequently, engaging people in crisis mapping often presupposes risk

communication strategies that make explicit the limits of governmental disaster management capabilities and that emphasize the need for self-efficacy and societal resilience.

# 5    Scenario exercise

The second part of the workshop was a scenario exercise, in which the participants could gain hands-on experience with the creation and management of a crisis mapping platform. The exercise drew on several hazard scenarios for Switzerland, which had been developed by the Federal Office for Civil Protection. The scenarios included different hazard types such as a severe pandemic, a regional flooding event and a national power blackout.

Figure 4: Group work during scenario exercise



The exercise started with an introduction to the crisis mapping tools 'Ushahidi'[5] and 'Crowdmap'[6] by Jennifer Giroux and Myriam Dunn Cavelty, both at the Center for Security Studies. Thereafter, five exercise groups were formed, each consisting of four to five participants. Within each group, different functional roles were assigned, such as information collectors, information verifiers and information mappers. Then, each group had to define a category system for their specific purposes, develop verification routines and cope with unexpected disturbances, inserted by the scenario supervisors. Finally, the results were presented and the specific problems were evaluated. As the discussion revealed, many groups had faced similar challenges during the exercise. One common point of discussion was how to develop categories and definitions for collecting and coding crowdsourced data in a situation where little information is available on the nature of the crisis and there is also high uncertainty or

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5    See *http://www.ushahidi.com*
6    See *http://crowdmap.com*

ambiguity regarding the further development of the situation. Another issue highlighted by many groups was that without predefined procedures for the verification of crowdsourced information, it was practically impossible to identify incorrect reports in a timely manner. Finally, many participants struggled with the question how the crisis maps could be aligned with crisis information from other sources and ultimately made usable for disaster management authorities as well as the public. A common perception was that the legal and organizational frameworks are still inadequate to allow an effective use of crisis maps in disaster management.

# 6    Stakeholder perspective session

The third session was dedicated to the role of various stakeholders in crisis mapping. It began with a presentation by Thomas Körkel, Swisscom. He provided insights how telecommunication companies are planning today for different crisis situations and how their efforts may develop in the future. In particular, Mr. Körkel detailed strategies for maintaining and restoring information infrastructures during and after disasters and other crisis situations, including mesh network technologies and the deployment of mobile internet access points. In disaster contexts, such measures can be essential to enable crisis mapping and other uses of ICT. Further, he described how different telecommunication companies in Switzerland cooperate in the so-called "Crisis Response Team Telecom" to find common solutions for a quick bounce back to normality after disturbances.

**Figure 5: Group discussion following the presentation by Thomas Körkel**



In another presentation, journalist Julian Schmidli shared his experiences in data journalism in Switzerland

regarding natural hazards.[7] Further, he discussed possible roles for the 'traditional' media in crisis mapping, suggesting that well-connected media outlets such as "20 Minuten" could moderate and facilitate crisis mapping efforts. Today, many media organizations have realized the opportunities of mapping technologies as well as the involvement of their users to establish quicker and more interactive forms of news media. Mr. Schmidli also pointed to some of the challenges that could hamper efforts. In particular, he stressed that mutual trust would be vital for any successful collaboration in this area. Again, the presentations were followed by fruitful discussions between the workshop participants. Much of the debate focused on the often congruent, but sometimes also diverging priorities and interests of the different stakeholders involved in crisis communication. While on one side, news media organizations and civil activists put emphasis on the timeliness and accessibility of all crisis information potentially relevant for the public, on the other side civil protection authorities and professional cartographers aim for maximum reliability and preciseness of information. Establishing a mutual understanding for these different organizational cultures and finding ways to reconcile them, was found to be a major challenge that needs to be addressed in order to foster future collaborations.

# 7    Discussion and outlook

The workshop concluded with a presentation by Christian Fuchs from the National Emergency Operations Center and an extensive discussion how the use of geo-based technologies and social media could be further developed in Switzerland and beyond. In his presentation, Mr. Fuchs explored potential future developments in crisis mapping, emphasizing that in the next years geo-referenced information will gain further in importance in all parts of civil protection, from disaster preparedness and prevention to crisis mitigation and recovery. A major task in this context will be to consolidate and standardize communication procedures between authorities as well as with stakeholders and the broader public. The decentralized responsibilities in Swiss civil protection are a major factor to take into account in such efforts. In a first step, information issued by all authorities in a disaster situation should be provided in a format that makes it easy for crisis mappers to include it into their maps. Further, efforts to improve the verification of crowdsourced

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7    See *http://www.julianschmidli.com/?tag=data*

information will have to be reinforced, to make this information really usable and actionable for civil protection authorities. It is still an open question whether authorities can organize themselves the resources to classify and verify such information or how they will cooperate with volunteers or commercial providers of such information. Finally, Mr. Fuchs reminded the workshop participants that from a civil protection view, crisis mapping is still a very new and dynamic field that requires the constant dialogue between all actors. Experiences in other countries as well as exercises in Switzerland should be used to learn and get more insight.

As the concluding discussion showed, realizing the potential of crowdsourced crisis mapping for professional disaster and crisis management remains a challenge on many levels. First, there are technical problems such as inadequate data standards and interfaces. Even if all actors involved are committed to addressing these problems, establishing common standards across different levels of government for new information and communications technologies is a serious challenge, especially in a federal system like Switzerland. Further, there are legal issues that need to be clarified with regard to the use of proprietary geo-information. For example, the exchange of geographical information between public organizations like Swisstopo, private companies active in the mapping domain such as Google or Microsoft and the public has to be facilitated in order to improve the quality of maps available in disaster situations. In this context, today, established institutional routines and identities are also an obstacle, as they often resist new forms of collaboration.

As was suggested during the discussion, a way to overcome these challenges could be disaster exercises that include social media elements or also mapping projects in non-crisis situations (for example risk maps) that could serve to make valuable experiences and establish personal and organizational networks also useful in times of crisis. As a concrete first step to foster a continued dialogue between the various actors, the Center for Security Studies offered to set up an online platform, with relevant documents and links on the topic of crisis mapping, hosted by the International Security Network (ISN).[8]

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8   *http://www.isn.ethz.ch/Digital-Library/Articles/Special-Feature/Detail/ ?lng=en&id=168871&tabid=1454423182&contextid774=168871&context id775=168919*.

## Appendix I: Workshop program

08.45 – 08.50    Welcome by Christian Fuchs, Federal Office for Civil Protection (BABS)

08.50 – 09.05    Presentation I *"Crisis Mapping from a technical perspective"*
Prof. Hans-Jörg Stark, Institute of Geomatics Engineering (IVGI), FHNW

09.05 – 09.20    Presentation II *"Crisis Mapping from a social science perspective"*
Florian Roth, Center for Security Studies (CSS), ETH Zürich

09.20 – 09.30    Discussion

09.30 – 10.00    Introduction to scenario exercise, Jennifer Giroux & Myriam Dunn Cavelty, CSS

10.00 – 10.30    *Coffee break*

10.30 – 12.00    Scenario exercise *"Swiss Crisis Mapping"*
Jennifer Giroux & Myriam Dunn Cavelty, Center for Security Studies (CSS), ETH Zürich

12.00 – 12.30    Discussion of results from scenario exercise

12.30 – 14.00    *Common lunch*

14.00 – 14.15    Presentation III *"Crisis Mapping from the perspective of a telecommunication company"*, Thomas Körkel, Swisscom

14.15 – 14.30    Presentation IV *"Crisis Mapping from a media perspective"*
Julian Schmidli, SonntagsZeitung

14.30 – 15.00    Discussion

15.00 – 15.30    *Coffee break*

15.30 – 15.45    Concluding presentation *"The future of crisis mapping in Switzerland"*
Christian Fuchs, Federal Office for Civil Protection (BABS)

15.45 – 16.30    Discussion regarding way forward

16.30             *End of event*

## Appendix II: List of participants

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|---|---|
| Andres, Norina | Eidg. Forschungsanstalt für Wald, Schnee und Landschaft (WSL) |
| Bialek, Roland | Nationale Alarmzentrale (NAZ), Bundesamt für Bevölkerungsschutz (BABS) |
| Bovet, Stéphane | Swisstopo |
| Brem, Stefan | Bundesamt für Bevölkerungsschutz (BABS) |
| Buri, Peter | Kantonaler Führungsstab Aargau |
| Dunn Cavelty, Myriam | Center for Security Studies (CSS), ETH Zürich |
| Emmerich, Thomas | Kantonale Krisenorganisation (KKO) Basel-Stadt |
| Flückiger, Kevin | Institut Vermessung und Geoinformation IVGI, FHNW |
| Fuchs, Christian | Nationale Alarmzentrale (NAZ), Bundesamt für Bevölkerungsschutz (BABS) |
| Giroux, Jennifer | Center for Security Studies (CSS), ETH Zürich |
| Haslinger, Florian | Schweizerischer Erdbebendienst (SED) |
| Hegg, Christoph | Eidg. Forschungsanstalt für Wald, Schnee und Landschaft (WSL) |
| Herzog, Michel | Center for Security Studies (CSS), ETH Zürich |
| Heyer, Nicolas | Google |
| Kästli, Philipp | Schweizerischer Erdbebendienst (SED) |
| Keusen, Mario | Swisstopo |
| Körkel, Thomas | Swisscom |
| Marschall, Iris | Institut Vermessung und Geoinformation IVGI, FHNW |
| Nebiker, Stephan | Institut Vermessung und Geoinformation IVGI, FHNW |
| Prior, Tim | Center for Security Studies (CSS), ETH Zürich |
| Rieser, Micha | Stadt Zürich |
| Roth, Florian | Center for Security Studies (CSS), ETH Zürich |
| Ruckli, Carmen | Bundesamt für Bevölkerungsschutz (BABS) |
| Schmidli, Julian | SonntagsZeitung |
| Stark, Hans-Jörg | Institut Vermessung und Geoinformation IVGI, FHNW |
| Straumann, Ralph | Ernst Basler + Partner |
| Wiemer, Stefan | Schweizerischer Erdbebendienst (SED) |
| Wirz, Michael | Stadtpolizei Zürich |

## CSS
ETH Zurich

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