Recent Developments in Emergency Telecommunications

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ABSTRACT

Recent Developments in the telecommunication technology offer a number of additional tools not only for the providers of emergency and disaster response, but may also facilitate early warning. Their application depends, however, on the regulatory framework governing telecommunications and on their appropriateness for the specific requirements in the pre-, peri- and post- impact phases of an event. Telecommunications are a key element for to the success of emergency preparedness and response, and the application of all available technologies and networks saves lives. The recent events in the Indian Ocean Region will have to be the subject of detailed analysis and evaluation of all existing mechanisms, hopefully leading to improvements in the organizational and operational field. First information available already in the immediate aftermath of the events of 26 December 2004 has been applied to the considerations in the present paper.

Keywords

Emergency, Disaster, Telecommunications, Early Warning, Mitigation, Response.

INTRODUCTION

This input to the ISCRAM2005 conference on Information Systems for Crisis Response and Management, Brussels, on April 20 2005, was initially prepared before a Tsunami affected numerous countries around the Indian Ocean. At the time the present, revised paper is written, less than two weeks after the tragic events, it is too early for a detailed analysis, but first lessons learned deserve to be considered already at this time.

As a consequence of the catastrophe of 26 December 2004, the focus of work of ISCRAM2005 will need to shift from Information Systems for Crisis Response and Management towards consideration of the roles of such Systems in early warning and preparedness. Without anticipating the results of an in-depth analysis of the geophysical, political, administrative, and operational implications, this paper considers a basic concept of alert mechanisms for which technologies are ready available. Already today it can be said, that the failure of early warning was not caused by a lack of tools, but by the complete lack of a concept for their utilization.

HIERARCHICAL STRUCTURES AND CHRONOLOGICAL SEQUENCES IN EARLY WARNING

In respect to a Tsunami, the acquisition of environmental data from geophysical and oceanographic data is the only primary source of inputs and such information stands at the beginning of any decision making process. Continuous monitoring of geophysical irregularities is largely ensured through existing institutions and with global coverage already at this time. Monitoring of the possible oceanographic consequences of a geophysical event, however, is so far limited to regions considered to be at particularly high risk due to anticipated earthquake activity and to demographic factors. Economic factors furthermore limit to the application of such monitoring. It will be a matter of development policy, to enable these indispensable initiating mechanisms also for the so far unprotected regions.

The consolidation of the data necessary for analysis requires telecommunication links. It will never be possible to rule out a disruption of telemetric data flow by the events themselves, but existing public and private networks can be presumed to be capable to ensure these links at any given time. The same applies for the communication of information and conclusions resulting from scientific analysis to the actual warning mechanisms.

Provided the continuous monitoring is matched by the continuous availability of interpretation of the scientific data gathered, the sequence as described above can take place almost in real time. Delay appears, at least so far, inevitable only in the next step. Identifying a risk is only one task, deciding on action to be taken is another one. Immediate decision-making at this stage has multiple implications of political, administrative and organizational nature. Institutionalized, permanent mechanisms for such monitoring can however minimize delays at that stage. This second

level of an early warning process will thus not necessarily delay the warning substantially. For the communication between observation points and an analysis center, existing networks and the use of backup links can cover all needs in a similar way as in the collection of initial data.

Only the third level, the dissemination of warnings, the complexity of the communications tools involved is increasing dramatically. In order to reach the largest possible number of potentially affected persons in the shortest possible time, all available technologies need to be applied simultaneously. At the same time, it must be considered that networks depending on a physical infrastructure might be available for pre-impact communication but are likely to be disrupted by the initial impact of an event and thus unavailable for warning about possible subsequent developments. This applies, in the case of a Tsunami, in particular for the additional waves typically following the initial flooding.

The possible roles of existing networks and suggestions for improvements thereto are analyzed in the following chapters of this paper. This review focuses on the mechanisms of emergency and disaster response. Some obstacles to communication, such as the inevitable overload of public networks or the physical disruption of their indispensable infrastructures may not apply to early warning, but will inevitably occur as consequences of the dissemination of a warning or of then initial impact of a disaster, i.e. at a time when information about immediate action to be taken remains key to survival.

EMERGENCY OR DISASTER ?

Technological developments and their consequences in the regulatory and operational context have recently led to extensive linguistic discussions on the use of the terms emergency and disaster. The two terms, so far used in a variety of combinations with "communication" and "Telecommunication", deed to be defined more precisely.

To start with semantics: An emergency is a sudden, urgent, usually unexpected occurrence requiring immediate action, and a disaster is a calamitous event[1]. The latter is often resulting from an emergency, if the latter cannot be controlled by immediately available, locally assigned means. Both, emergency and disaster create situations requiring the rapid deployment of tools for an information exchange under the particular conditions encountered by the interveners. These interveners differ in several ways, and so do their telecommunication requirements.

Initial communication to an emergency can start in either of two directions: A message from the affected location or person to the potential emergency response service typically initiates response to an unpredictable incident. An early warning message from a respective authority to the potentially affected location or person(s) will be needed in case of a predictable hazard.

The primary response to an emergency is generally provided by local, permanently established services, such as fire fighters, operating in their assigned geographical range, while a possible subsequent disaster response is likely to involve partners like humanitarian organizations, operating outside any pre-determined territory. In the past, the telecommunication tools of both groups were using technologies which were not necessarily compatible, but at least of similar character. Most common was the non-public, dedicated network of the individual institutions. This has changed dramatically in recent years. In the case of a warning originating from an institutional emergency service, all available public means need to be put to use.

To an increasing degree, the institutional, local emergency response providers relay on infrastructure-dependent networks, offering capabilities not available on a traditional point-to-point network. Examples are the TETRA[2] and TETRAPOL[3] networks already being introduced by numerous police forces and rescue services, and future concepts like MESA[4] being developed at this time. Again, compatibility is ensured only to the degree foreseen by the network designers, but the use of any such systems is now strictly limited to the existence of their specific network infrastructure, stationary hardware exposed to the impact of a possible disastrous event.

At the same time and more than ever, the response to a disaster is likely to involve relief providers operating in unpredictable locations, many of them without any permanent telecommunication infrastructure even in normal times. The same applies to warning mechanisms, where analysis and interpretation might place in a central institution and has to reach locations under possibly different jurisdictions. Consequently, the terms emergency and disaster

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[1] *Webster's College Dictionary* New York, 1995

[2] *Terrestrial Trunked Radio*, http://www.tetramou.com/

[3] *TETRAPOL*, http://www.tetrapol.com/www/general/index.php

[4] *Project MESA*, for details http://www.projectmesa.org/ refers

telecommunications are being redefined, and while the discussions are still continuing, agreement has widely be reached as follows:[5]

Emergency telecommunications in a wider sense include the alert of initial responders, usually through public networks such as the public, fixed line or mobile, telephone services. They also include the information exchange during the intervention of the responsible emergency service providers and rescue services, as well as all the additional telecommunications required if and when an emergency develops into a disaster.

Disaster telecommunications in a more restrictive sense include the information exchange requirements of all disaster response and relief providers necessary for their activities, from mobilization of assistance, through their operational and even administrative activities, all the way to feedback and finally transition from relief to development or back normal live.

Telecommunications take place in a regulatory environment governed by national and international rules and regulations. Different institutions and government entities develop and implement these rules and regulations, and matters concerning public networks and private networks, networks with or without fixed infrastructure and with or without international links, are frequently under the control of different bodies. For the emergency or disaster manager it is essential to be aware of this situation as well as of the capabilities and limitations of the systems available or proposed to them.

NEW USES FOR PUBLIC NETWORKS

Emergency response is almost always initiated through public networks, and the initial response often uses the same networks in addition to their own, no-public links. Disaster response is mostly taking place in locations which where public telecommunication networks are either not existing, have been disabled by the impact of the disaster or are in any case overloaded. Public networks can nevertheless play an at least supporting role also in the aftermath of a disaster, provided the possible impacts of such an event are taken into consideration throughout the design process. The International Telecommunication Union (ITU) recommends, that administrations ensure proper consideration of disaster telecommunications by the telecommunication service providers, and ensure the inclusion of provision of telecommunications as part of disaster mitigation and relief operations through appropriate national regulations[6]

The rapidly increasing availability of telecommunications has added two new aspects: Public telecommunications are becoming valuable tools for the dissemination of information to the potentially affected population. At the same time, the availability of telecommunications has become something taken for granted by more and more people.

Both aspects need to be taken into consideration when reviewing telecommunication requirements for emergency response and disaster relief, as well as for early warning. Two examples shall illustrate possibilities opened by new technologies:

PREFERENTIAL STATUS FOR EMERGENCY CALLS ON PUBLIC NETWORKS

The option, to assign a priority status to users expected to carry out critical functions during emergencies or disaster situations, it not a major technological problem. There are, however, two major obstacles to the introduction of such priority schemes: First of all, unless the definition of privileged users is regulated by the national administration, setting standards for all network operators and service providers, such attribution might become an element in the commercial competition between these enterprises. Furthermore, privileged status must be ensured throughout all connected networks, if calls from and to an affected area are not to be blocked at the next overloaded exchange outside the authority of one country or even one network operator. Efforts to establish international standards are presently in progress in the International Telecommunication Union's Standardization Sector (ITU-T).[7]

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[5] the following review if based primarily on the deliberations and findings of ITU Study Groups (in particular ITU-R SG8 and Working Party 8A in 2003/2004 regarding Public Protection and Disaster Relief (PPDR).

[6] *Recommendation 12* of the World Telecommunication Development Conference (WTDC-2002, Istanbul 2002*), Consideration of disaster telecommunications needs in telecommunication development activities*, available at http://www.itu.int/ITU-D/isap/WTDC-02FinalReport/Section4/Recommendations/Rec012.pdf

[7] *For examples* of this work http://www.itu.int/ITU-T/studygroups/index.html refers

For the most critical communication links in early warning system, preferential schemes such as presently under discussion may not be sufficient. Even preemptive preferences might not cover the most time-critical requirements, and permanently dedicated connections might be the only acceptable solution.

CELLULAR BROADCAST

The rapid development of personal mobile communications provides emergency and disaster management with a tool one could, even in locations with dense fixed-line telephone networks, only dream so far: A very large number of people within an area, easily and quickly defined on a map, can be alerted to a critical situation or a potential hazard, and this without the need any additional user equipment and even on an already overloaded public network. The *Cellular Emergency Alert Systems Association (CEASA)*[8], a not-for-profit organization, developed concepts for the application of Cellular Broadcast in emergency telecommunications. Through its branches in America, Asia, Australia and Europe, CEASA supports national emergency services, regulatory authorities and network operators, providing information and proposing best practices and regulatory instruments for the deployment of Cell Broadcast public warning systems. In 2004 the Dutch Government decided to introduce the first cellular-alert-based government to citizen warning system by cellular broadcast and full implementation is scheduled for July 2005. Similar decisions are presently expected in other countries.

Cellular Broadcast allows the real time simultaneous transmission of a short message to the alphanumeric display of all cellular telephones with in the range of any defined number of cells. The message looks like a regular SMS message, but it is carried over dedicated, permanently reserved channels already existing on most cellular telephone systems. Addressing all phones operating within the coverage of the cells determined by the entity issuing the alert ensures, that all users in this area, independently of their origin, are reached. Cellular phone density decides about the economical feasibility of network coverage. The cellular alert system is therefore also ideal for locations such as tourist resorts with their already now typically high density of non-resident or "roaming" subscribers. Cell Broadcasting is an already existing function of most modern digital mobile phone systems, such as GSM, UMTS, and CDMA.

It can therefore be stated that Cellular broadcast would have saved thousands of lives, if its existing capabilities would have been use for the dissemination of early warning messages inn at least the locations which due to their importance for the tourist industry have coverage by one or more GSM networks[9]. This applies in particular for the affected areas in Thailand[10] and to some extent also in Sri Lanka[11] and other countries. A warning message to even possibly the small percentage of GSM subscribers actually having their phones switched on while engaged in typical leisure activities would have lead to a real-time dissemination of the warning message among all persons at risk. The number of people reached by a cellular alert would under these conditions most probably be considerably higher than the number of people reached by radio or television broadcast.

While the degree of destruction affecting the functioning of the GSM infrastructure by the first Tsunami wave would still have to be analyzed but could be expected, that even during the peri-impact phase cellular alert messages would have reduced the additional losses of live substantially. Given the fact that tourists cannot be expected to be familiar with the topography and with local disaster procedures such as evacuation routes, the value of additional information even after the initial impact of an event will be of particular value.

TELECOMMUNICATIONS AS A RELIEF COMMODITY

It was during the crises in former Yugoslavia in the 1990's, that it became obvious to which extent people whose lives are disrupted by a disastrous event feel the lack of the telecommunications facilities they got used to. For the first time, large parts of a population used to easy access to public telecommunication networks was suddenly confronted with displacement and thus the total disruption of their communication capability. Similar observations were made in the aftermath of the earthquake in Kobe. The events of September 11, 2001 were another case where the disruption of everyday communication links was felt in this way.

The provision of access to telecommunication has thus become a need to be taken into considerations by the providers of disaster relief. Little has been done so far, and with the exception of the work of one non-governmental

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[8] *For details*, http://www.ceasa-int.org refers

[9] For detailed coverage maps, http://www.gsmworld.com/roaming/gsminfo/index.shtml refers.

[10] http://www.gsmworld.com/roaming/gsminfo/cou_th.shtml

[11] http://www.gsmworld.com/roaming/gsminfo/cou_lk.shtml

organization[12] and some commercial service providers[13], telecommunications are still not recognized as a relief commodity similar to food and shelter.

One of the reasons for this can be found in the regulatory implications facing potential providers of an ad-hoc public communication service with public access. Under the *Tampere Convention on the Provision of Telecommunication Resources for Disaster Mitigation and Relief Operations*[14], telecommunications among the operational partners involved in a disaster relief operation benefit of exemption from licensing requirements and fees. For the provision of telecommunication services to the population affected by a disaster or even to national entities, however, national licensing regulations, often governed by commercial interests, remain applicable[15]. The formal entry into force[16] of the Tampere Convention on 8 January 2005 is a milestone in the development of an appropriate regulatory framework.

The concepts defined in the *Tampere Convention on the Provision of Telecommunication Resources for Disaster Mitigation and Relief Operations* will also provide an example and can serve as the precedent when it comes to the development of an international agreement that could, if not by itself creating the necessary mechanisms, so at least facilitate or enable international cooperation on early warning. If anything positive can come form a disaster like the recent Tsunamis, it is the awareness for the need for such cooperation, and the way to it leads not only through technologies and interoperability, but first of all through agreement on policies. New capabilities add compatibility problems to networks in which inter-operability was so far a minor problem. Even the most basic disaster response radio networks, typically consisting of fixed, mobile and hand-held transceivers on VHF, with or without the inclusion of a repeater station, and voice links on short wave, have been affected by new technologies. The possibility to address calls only to selected individual stations or groups of stations offers advantages in some cases, but can create an obstacle for the real-time sharing of information among all stations on the network.

NEW DEVELOPMENTS IN PRIVATE NETWORKS

A major compatibility problem results, however, from the fact that several equipment manufacturers have introduced their own, proprietary standards for such selective calling, thus limiting the users' choice in the procurement of the most appropriate equipment for their specific purposes and hindering the information exchange between partners having chosen different suppliers for their radio equipment[17]. One is sadly reminded of the days when the Marconi Corporation jeopardized maritime safety, by strictly prohibiting any communication between their clients and stations not using this company's radios. It took an intergovernmental conference, to agree on the priority of a distress call independently of who had supplied the radio sets or employed the operators. It appears, that the technology of the early 21st century risks bringing us back into the regulatory environment of a hundred years ago.

SATELLITE NETWORKS FOR EMERGENCY COMMUNICATIONS

The enthusiasm about the availability of truly mobile satellite communications, welcomed initially as the ultimate solution to all emergency telecommunications problems, diminished rapidly when the disaster relief providers with their commonly very limited resources were confronted with the bills for the use of this equipment. This applies for

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[12] *Telecommunications sans frontiers*, information available at http://perso.wanadoo.fr/tsfi/html_e/e_en_savoir_plus_presentation.html

[13] *One example* is the "Ericsson Response" and "First on the Ground" initiative of Ericsson, Sweden, details at http://www.ericsson.com/about/ericssonresponse/description/volunteers.shtml

[14] *Text and Commentaries* are available at http://www.reliefweb.int/telecoms/tampere/index.html

[15] *Example:* In support of the international humanitarian operations following the war in Afghanistan, a private enterprise provided free of charge a GSM mobile phone system. The network configuration allowed international calls, and some phones were officially handed over to government officials. This situation, together with the fact that the authorities intended to honor a license issued by an earlier government to a competitor of the enterprise providing the temporary installation, resulted in the removal of the infrastructure deployed by the latter after a short period.

[16] United Nations, Depositary Notification C.N.1253.2004 of 13 December 2004 available as http://untreaty.un.org/English/CNs/2004/1201_1300/1253e.doc

[17] The *Working Group on Emergency Telecommunications (WGET),* an inter-agency mechanism of providers of humanitarian assistance, is presently trying to negotiate an acceptance of common standards by at least two major suppliers of short wave radio equipment Information on the work of the WGET is available at http://www.reliefweb.int/telecoms/intro/wget.html

all satellite communications and the introduction of data modes with higher bandwidth requirements has aggravated this problem.

In the early stages of development and deployment, most satellite network operators announced reduced fees for humanitarian users, who were expected to be only an insignificant market segment. Reality, in particular the availability of terrestrial personal mobile communications, with their rapidly increasing coverage of most regions with a certain population density, showed the much higher importance of emergency telecommunications as revenue generating traffic.

In the aftermath of a disaster, satellite networks encounter overload problems very similar to those encountered in terrestrial public networks, this in particular following the introduction of spot beams and of multiple satellite configurations, allowing a reduction of power in the mobile terminals or handsets, but limiting the number of simultaneous connections possible within the footprint of any one such spot beam or on any one satellite. Limited geographical coverage of some of the existing systems furthermore prevents those ready to intervene in disasters, worldwide and on shortest notice, to standardize on one network and the related equipment.

An alternative to the use of personal, mobile terminals on public networks was found in the use of VSAT[18] links. While not actually mobile, VSAT terminals of easily deployable size are becoming available, but the savings achieved in equipment and transport cost can on the long run not compensate the higher cost for the leasing of bandwidth for such "fly-away" terminals. At the same time, the complexity of the peripheral equipment under the responsibility of each user increases the requirements in respect to expertise and the presence of qualified technical personnel in the field.

A valuable tool for early warning could be the direct (mostly digital) broadcasting over satellite, such as provided by the "Worldspace" satellites. Its application will however depend on agreements authorizing the trans border broadcasting of warning messages directly to the public.

A TIME-TESTED SERVICE COMES TO THE RESCUE

One radio communication service has proven its value for emergency telecommunications over a long period of time: The *Amateur Radio Service* has been a valuable resource throughout the history of radio, and the question heard some times "amateur radio – are they still doing this?"- can be answered only with a strong "yes".[19]

The skills of dedicated volunteers are the most valuable asset for the maintenance of telecommunications under adverse conditions. Many radio amateurs can be found among the telecommunication staff of humanitarian organizations and institutions, working as technicians and operators in the field and all the way up to headquarters telecommunication management. In times of need, many more skilled volunteers support operations, be it by operating their own equipment and the emergency networks permanently established in many countries[20], or being by making their expertise available by temporarily changing from their normal professional activities to those of relief workers.

The ITU World Radiocommunication Conference (WRC-02, Geneva, 2004) has recognized the importance of the amateur radio service in its revision 5 of the *Radio Regulations*. This international treaty, regulating all radio communication services, to take the necessary steps to allow amateur stations to prepare for and meet communication needs in support of disaster relief"[21] and removed restrictions on the transmission of international communications on behalf of third parties in case of emergencies or disaster relief[22]. In the same sense, recommendation 13 of the ITU Telecommunication Development Sector (ITU-D) is presently being revised, requesting administrations to remove national regulatory barriers not only to the effective utilization of the amateur radio services for disaster communications, but also for related training activities[23].

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[18] *For details on VSAT technology*, *The Global VSAT Forum* web page http://www.gvf.org/ refers

[19] For details on the role of the amateur radio service in emergency situations , www.iaru.org/emergency refers.

[20] *One example* is the situation in the USA, where the national amateur radio association *American Radio Relay League (ARRL)* maintains close links with national authorities. The efforts of the ARRL emergency telecommunications program has just again been recognised by a government grant for its further development. For details, http://www.arrl.org/news/stories/2004/09/08/100/?nc=1 refers

[21] *Radio Regulations*, Article 25.9A

[22] *Radio Regulations*, Article 25.3 2)

[23] *Recommendation ITU-D 13*, Effective utilization of the amateur services in disaster mitigation and relief operations, revisions introduced in ITU-D Study Group 2, September 2004

The implementation of the new regulations and the further development of the amateur radio service and of its role in disaster response is supported by the *International Radio Amateur Union (IARU)*[24], the worldwide federation of all national amateur radio associations, who identified the support of emergency telecommunications as one of the most important characteristics of this service.

Its very character as a multitude of non-permanent networks limits the role of the amateur radio service as a tool of early warning. The amateur radio service can however provide highly resistant backup links already at this stage of events, and in the recent Tsunami disaster the amateur radio service it provided several isolated locations with the only link to the "outside world" for extended periods of time.[25]

THE KEY TO SUCCESS IN A CHANGING ENVIRONMENT

New technologies and management tools are only as good as the potential users' capability of applying them to their task. Training for those who use new tools, and information for those who decide on the concept of operations, be it on headquarters level or on the site of a major event, is the key to success. Familiarity with at least the basic applications for electronic information exchange is widespread, and while disaster response providers face the same problems as any enterprise looking for qualified information technology specialists, the number professionals in this field is growing. People who know how to cope with the often extreme situations encountered when the normally available routine telecommunication facilities fail, are very, very rare. The new technologies have raises high expectations, but without the skills of the sometimes almost forgotten "Radio man" even the most advanced computers cannot communicate.

It is at this point, that the ITU in cooperation with the United Nations and other institutions and organizations developed some years ago its *Handbook on Disaster Communications*[26]. This book is presently being revised, and its second edition under the tile *Handbook on Emergency Telecommunications for Developing Countries"* has been published by the ITU in January 2005.[27]

The change in the title of the book brings us back to the first considerations in this paper: The change from "Disaster" to "Emergency" reflects the wider scope from the alert to a situation requiring urgent response through the intervention phase all the way to the response to a potentially disastrous situation and subsequent relief efforts. The change from "communications" to "telecommunications" reflects the role of telecommunications as the logistics of information exchange and as different from communications in the sense of statements or the activity of the media.

As outlined above, telecommunications take place in a nationally and internationally extremely regulated environment and new technologies offer new possibilities, but also challenges. Aspects of national sovereignty and security as well as commercial considerations influence this environment. Lack of training and awareness of the capabilities as well as the limitations of new technologies limit their application. On both issues, the emergency managers and their organizations have to play a key role: It is their task, to raise the awareness of regulatory authorities and to support those who are already working on the removal of regulatory barriers They are also the ones who are in the best position to support training and the dissemination of information. By assuming this task, disaster managers and their organizations can facilitate their own work and make an additional contribution to their main task:

To prevent, and, where this is not possible, to alleviate the human suffering caused by disasters.

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[24] For details http://www.iaru.org refers

[25] for details see for example http://www.arrl.org/news/stories/2005/01/07/7/?nc=1

[26] *Handbook on Disaster Communications*, ITU, Geneva, first edition 2001, available through ITU Publications, http://www.itu.int/publications/index.html

[27] The second edition will be made available at nominal cost to developing countries and humanitarian organizations, for details http://ecs.itu.ch/cgi-bin/ebookshop/ refers.

ABOUT THE AUTHOR

Hans Zimmermann retired from the post of Senior Officer in the United Nations in 2004. His responsibilities included the co-ordination of international humanitarian assistance and the implementation of the mandate of the Operational Coordinator under the "Tampere Convention on the Provision of Telecommunication Resources for Disaster Mitigation and Relief Operations". From 1994 - 2003 he chaired the Inter-Agency Working Group on Emergency Telecommunications (WGET), and he regularly represented the United Nations and the humanitarian community in major international and intergovernmental conferences. Mr. Zimmermann frequently writes for publications on humanitarian affairs and on regulatory aspects of telecommunications, and chairs the editorial board for the "Handbook on Emergency Telecommunications for Developing Countries" published by the International Telecommunication Union (ITU). He presently serves as advisor to several academic and commercial entities and as the Disaster Communications Coordinator of the International Amateur Radio Union (IARU) and as the chairman of the international chapter of the Cellular Emergency Alert Society (CEASA). In November 2004, the United States Institute of Peace (USIP) and the Crisis Management Initiative (CMI) of former Finnish President Martti Ahtisaari honoured Mr. Zimmermann with the Award for Singular Perseverance and Promotion of the Tampere Convention.

Mr. Zimmermann's professional assignments with the United Nations included long-term posts in Lebanon, Ethiopia, Pakistan, Afghanistan, Iran and Liberia, and he led assessment and evaluation missions to Somalia, Zambia, Pakistan, Serbia and Montenegro, Nepal, and other countries affected by natural disasters or major humanitarian crises. From 1989 to 1991 he served with the Swiss Department of Foreign Affairs, as Special Delegate for the operations in Namibia. Mr. Zimmermann is a former trustee of the International Institute of Communications (IIC), member of the Pacific Telecommunication Council (PTC) and of other international and regional institutions. He is a Swiss national now living in France, and his academic background is in political science.