Availability of Technologies versus Capabilities of Users

Hans Zimmermann
International Councilor
The International Emergency Management Society (TIEMS)
Hans.Zimmermann@ties.itu.int

ABSTRACT

The regulatory environment is no longer the primary hindrance to the full application of telecommunications technology in the service of emergency response, disaster prevention and relief, and crisis management. Nowadays the restricting factor is the lack of knowledge about the capabilities, but also the limitations, of the multitude of specialized and of public communication systems. This paper will analyze the situation with the help of some practical examples and will recommend an interdisciplinary multi-stakeholder based approach to an educational concept for emergency and disaster telecommunications.

Keywords

Telecommunication, emergency response, disaster response, crisis management, training, public networks, non-public networks, telecommunications regulation, cellular broadcast, amateur radio.

INTRODUCTION

The number and diversity of tools and systems applicable to emergency and disaster communications increases continuously. Economic factors determine the degree to which the institutional providers of emergency response can actually apply them to their every day tasks. In response to disasters, with their by definition[1] inherent complexity and characteristic dimensions, additional factors govern the use of communications. Through the availability of mobile personal communications this situation applies well beyond the group of specialized professionals.

The two user groups, emergency responders and the general public, do however differ in their ability to apply the available technologies to the specific requirements created by extraordinary situations. Training in the use of a technology in routine situations is an integral part of the introduction of system for professional emergency response. For public networks, user friendliness is a primary consideration for their acceptance and thus their economic feasibility. Some existing features present in personal mobile communication equipment and some capabilities inherent to public networks have potential applications throughout all phases of emergency operations. Not all of them are however known to the subscriber, and the network operators largely ignore the existing opportunities. The same applies to most of the non-public telecommunication systems utilized by specific, closed user groups. To the extent that such communication systems are more than "virtual private networks", using public network's infrastructure, they can provide emergency support when the aforementioned public systems are or become unavailable.

Knowledge about what the available means of communication can or cannot accomplish is needed. Training must to extend beyond the professional responders. This requires not only the development of training material but also the creation of awareness for needs and options, and of incentives to dedicate time and efforts to the learning process. Technical staff and professional users depend on system-specific instruction. Emergency managers need to be familiarized with the possibilities and the limits of all means possibly at their disposal in different situations. The

consumer as an "appliance operator" needs to be put in a position to use all potentially helpful features of his or her appliance.

NEW TECHNOLOGIES DEMAND NEW KNOWLEDGE

Fifteen years ago, an international conference on emergency telecommunications concluded, that the tools were available, but the regulatory environment often restricted their use. A follow-up conference defined the way forward. In a complex process, an international treaty[2] was adopted and now provides the framework for efficient application of telecommunication resources to disaster mitigation and relief.

Today we have a similar situation: In one conference after the other we hear, that more than ever, and certainly even more so tomorrow, the tools are available. What is today restricting their use in the prevention and alleviation of human suffering, is a lack of knowledge about the tools' capabilities and of know-how in their application.

This time, they way forward needs not be a way through diplomatic conferences and procedures. Needed is a process guided by an institution dedicated to the application of telecommunications to emergency response and to disaster prevention and preparedness. Such a process is a multi stakeholder task, but a driving force is needed to take the lead. The task being of educational nature, the academic world is the place to look to for such leadership.

EXAMPLE ONE: HIDDEN FEATURES IN PUBLIC NETWORKS' SUBSCRIBER EQUIPMENT

The Video Cassette Recorder or VCR has for a long time been the subject of many anecdotes and is a prime example for an appliance overtaxing the user with its countless features. The average owner will hardly ever need all of them, but the laws of competitive marketing demand their inclusion – even if it reduces the user-friendliness of the equipment.

A similar situation is found mobile personal communication devices of the latest generation. In an exceptional situation, a supplementary feature might well be of vital importance, provided the user is familiar with it: A "handy" is no longer just a "telephone" – it is a calculator, a notebook, a digital camera and a video recorder, it communicates in voice and text modes, and the service providers outdo each other when it comes to supplementary features of their competing networks. Some features might not even been mentioned in the instruction manual, but in specific situations they might represent a considerable added value. Yet other capabilities are part of the system without being transparent to or accessible by the user.

The media reported how pictures taken with the camera integrated in a handy led to the identification of suspects in the aftermath of the terrorist attacks on the London public transport system in 2005[3]. In addition to the presence of mind needed to take a picture while confronted with a potentially live threatening situation, the photographer needed to be sufficiently familiar with her or his equipment to successfully use one of its advanced features.

And while the above example concerns a secondary, but not an actually hidden feature, some of the latter type features are reported[4] to have played key roles in the investigation of events in London and elsewhere.. The owner of a cellular phone can in most cases be identified not only through the serial number of the equipment, but also through data embedded in the phone card. Different from an engraved or stamped serial number, this hidden electronic identification is not accessible and consequently not exposed to erasing or a modification by the user. These and other features of a personal communication device are the most important considerations when considering the potential abuse of such devices for illegal, criminal or even terrorist activities.

EXAMPLE TWO: HIDDEN CAPABILITIES IN PUBLIC NETWORKS' INFRASTRUCTURE

The possibility to broadcast a message to a large number of mobile phone network subscribers is known to all users, if only from the frequent, unsolicited commercial announcements appearing on the screen of the mobile phones. More appropriate use of the message broadcast capability is made by entities offering targeted and selected information on a subscription basis. In an emergency situation it is however difficult to systematically reach the potentially affected subscribers, and this even if the dissemination is based on opt-in subscription to the respective message service[5]. A hidden and so far little used network capability overcomes this problem:

Cellular broadcast[6] messages can be targeted to all subscribers located at any given time within the range of one or more exactly determined cells. In locations such as trade fairs, busy airports or tourist resorts, only a small percentage of cell phone users are locally registered subscribers and could be identified and targeted as potentially affected individuals. At any time, some users registered in the target area of an alert are furthermore likely to be away from their home location, and alerting them would risk creating confusion or even panic in non-affected locations.

In addition, cellular broadcast completely immune against the network overload inevitably resulting from a disaster situation, and cellular broadcast is a capability already available in almost all networks at least of the GSM system. The only limit to its application is the lack of awareness for the capability among the decision makers in emergency preparedness, as well as among the users, which do not yet make this capability an element in their choice of a service provider.

The capability of locating the position of a caller, with an accuracy of at least the dimension of a cell, and in many cases even far more accurately is another example of an existing network capability with applications in emergency management. Already applied by institutional emergency services this added value of mobile phone networks is not always realized by users considering other, lower cost telecommunication options[7] as full substitutes for the telephone system. Research on this and other system inherent capabilities of mobile public networks has been initiated following the events of September 11, 2001[8], and in 2004 the US Federal Communications Commission initiated regulatory action on the subject.[9]

EXAMPLE THREE: HIDDEN OPPORTUNITIES FOR PUBLIC NETWORKS' OPERATORS

The market for mobile personal communications is highly competitive. The availability of early warning in case of disasters and other capabilities of a network in potentially live-threatening situations has a potential as a sales argument, but it does so only if the client is aware of the existence of the capability.

Network operators have so far refrained from using emergency-related capabilities as a sales argument.[10] Reluctance to invoke negative topics such as emergencies in their public relations efforts is one probable reason, the complexity in respect to telecommunications regulations a second one.[11] The high level of public awareness, generated by the unusually high number of tragic events over the past year[12], does not by itself also ensure the education of the consumer. Information in respect to the product remains the domain of the service providers, who might use it as an opportunity for promoting their services, and who have even an obligation to increase the awareness for potentially live-saving features and capabilities existing within their systems.

EXAMPLE FOUR: HIDDEN OPPORTUNITIES FOR PRIVATE NETWORKS

Specialized user groups operate closed networks with characteristics matching their particular requirements. In addition to "virtual private networks" making use of encryption and similar technologies to transmit non-public information over public networks, they use in many cases own communication links. Typical examples for systems not depending on vulnerable networks outside the control of the users are VSAT links[13], and to some extent the. Terrestrial Trunked Radio (TETRA), an open digital standard defined by the European Telecommunications Standard Institute (ETSI)[14]. Advanced technologies imply increasing infrastructure dependence, and their ability to interact with networks of potential partners may restrict their functioning unless interoperability is taken into consideration from the very beginning of the planning process. The acquisition of digital voice and data networks for emergency services enhances enhance their capabilities and effectiveness. Inevitably, however, the territorial restrictions resulting from their character as instruments of local or regional administrative and political entities reduces their ability to coordinate actions with the possibly unforeseen partners in response to a major disaster. Competition between the commercial interests of the providers of different proprietary systems enhances this situation. Education on the opportunities can consequently only target the decision makers, typically on all levels of public administration.

Dedicated networks are also operated by other public services or private enterprises. The restricted access to private networks makes them almost always immune against overload while also ensuring the confidentiality of communications. I case of emergency, they cannot necessarily provide interoperability with other networks, but they can provide separate channels of communication. Typical examples for such networks are communication systems operated by public and private transport companies. The awareness of such network's existence is reciprocal

proportional to their number in any given environment: The services depending on them are taken for granted but their modus operandi, including most of the capabilities of the communication tools applied in the implementation of their tasks, is not normally transparent to the individuals they ultimately serve. Education needs to target the potential users of such private, dedicated services during an emergency situation. Comparable to the situation in respect to public services, the service provider may be a channel for the creation of awareness for the hidden opportunities.

BRIDGING THE KNOWLEDGE-GAP

Over the past years, "bridging the gap"[15] has become a standard term in the vocabulary of any discussion of telecommunication development issues. This was recognized by the World Telecommunication Development Conference (Istanbul, 2002).[16]The knowledge-gap confronting us in respect to the telecommunication requirements in emergency response, disaster preparedness and relief, or crisis management, does however not follow the geographical determinations[17] established for the "digital divide" in information and communication technology (ICT). The "knowledge-gap" runs somewhere between the technologists, those who develop, design and implement telecommunications systems, networks and equipment, and the variety of users having the resulting services at their disposal without always knowing what they hold in their hands.

The gap starts among those directly involved with and in charge of emergency telecommunications. As a result of the lack of knowledge, the decision makers in emergency management often encounter the problem to select the appropriate tool for a specific task, without really knowing all the capabilities of what they already have at their disposal, and of what might be the most appropriate acquisitions to supplement their existing instrumentarium. They do not know it, because of widespread shortcomings in management culture. The general view is, that technical tools simply have to do what they are supposed to do, and that the technical staff has to see to it that this happens.

The gap also shows up when an individual or an institution is confronted with an exceptional situation in which a readily available tool for information exchange could be literally vital and potentially life-saving resource. Only knowing about the hidden features and capabilities, and realizing the opportunities these characteristics provide, will allow the respective use of the an available system.

TOWARDS A CULTURE OF KNOWLEDGE SHARING

An effort to bridge the gap inevitably finds itself confronted not only with considerable diversity in respect to the knowledge to be transferred, but also with wide cultural and system-immanent characteristics of the recipients of the information. An approach therefore needs to be not only interdisciplinary in the widest sense, but its methodology needs to respect the specific attitude of the audience towards being educated.

A need for interdisciplinary character of training furthermore results from the diversity of the subject matter to be covered. Technical information needs to be addressed to those involved with the actual operation of a communication system, but will at the same time not be accepted by non-technical professionals such as many senior level emergency managers or decision-makers in emergency preparedness policy. In reverse, those concerned with the operation of a system will not wish to receive information, which they already have, or which is outside the responsibilities of their functions.

A first attempt to close the knowledge gap has been undertaken by the International Telecommunication Union in 2005. A basic training course in emergency telecommunications was designed and very successfully run as an on-line, e-learning event, using an inter-active virtual classroom application. Five modules were presented over the course period of five weeks, and the use of a virtual forum for discussion and feedback allowed an evaluation of the students' progress and a certification upon successful completion of the curriculum. This basic course in English, French and Spanish will also be made available in a non-interactive electronic format in 2006. [18]

Progressing from the initial basic course to specific modules targeted to the aforementioned audiences requires interdisciplinary methodology. Involvement of the developers, producers and service providers in the telecommunication industry will be required. Overcoming the reluctances resulting from the proprietary character of much of the information concerned will be a major task. Only the academic sector as a non-commercial partner without an own agenda can be expected to overcome this obstacle. The wide spectrum of its membership makes

ISCRAM appear as a promising forum for further development in closing the gap between the availability of technology and the capability of potential users to apply it in this most noble of tasks:

The prevention and, where such is not possible, the alleviation of human suffering caused by disasters.

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About the Author

Hans Zimmermann *retired from the post of Senior Humanitarian 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, chaired the editorial board for the "Handbook on Emergency Telecommunications for Developing Countries" published by the International Telecommunication Union (ITU) and is the author of the ITU training course on emergency telecommunications. He presently also serves as advisor to several academic and commercial entities, as international Councilor of the International Emergency Management Society (TIEMS), as the chairman of the international chapter of the Cellular Emergency Alert Systems Association (CEASA), and as the Disaster Communications Coordinator of the International Amateur Radio Union (IARU). Most recently he participated as keynote speaker in conferences on emergency management and communications in several countries, including Australia and China, and was honored by the United States Institute of Peace (USIP) and the Crisis Management Initiative (CMI) of former Finnish President Martti Ahtisaari 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 the Special Delegate for the operations in Namibia. Mr. Zimmermann is a former trustee and board member of the International Institute of Communications (IIC) and of other international and regional institutions. He is a Swiss national now living in France, and his academic background is in political science.