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SINTEF REPORT

TITLE

Challenges for Mobile Solutions for Emergency Response

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ABSTRACT

In this report we first draw a picture of a typical emergency response situation with focus on the roles and resources involved. Then, we go into more details on the local command post and operational area, describing characteristics, users, equipment, needs and requirements, information flow and communication, and the challenges for ICT systems that follow from this. Finally, we give some examples of possible non-intrusive ICT support for mobile personnel in an avalanche operation.

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1 A typical emergency response situation

Figure 1 describes the main roles and resources involved in a typical emergency response situation. The colored boxes are described in more details in the following sections.

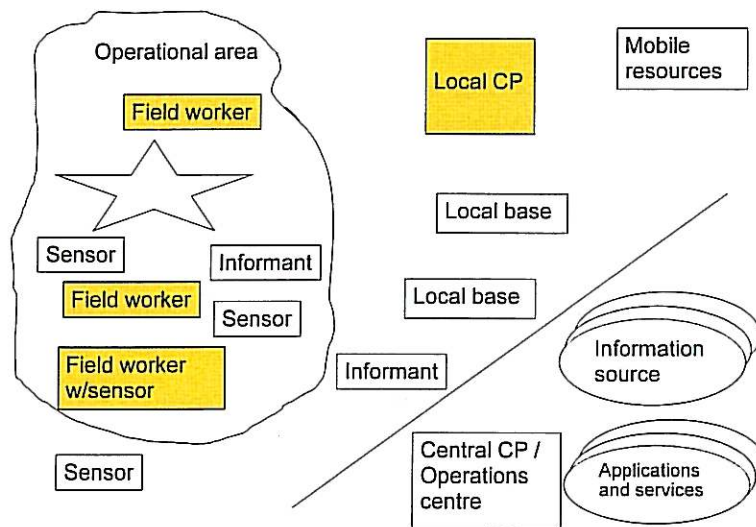


Figure 1 - Main roles and resources involved in typical emergency response situations

2 Local CP

Operations during an emergency situation usually lead from a local control post (CP), which is close to the scene of the incident, usually outdoors or in a car, caravan, tent, etc. The persons in the CP also move around more or less frequently. In addition to local leaders, there are usually also support personnel at the local CP. Suitable computer equipment for a local CP are portable computer(s) and/or mobile devices.

The tasks performed by the personnel at the local CP are highly attention requiring, they need to consider large amounts of information, and need to get an overview of this information in order to make the right decisions. Thus, there is a need to have priorities on information, to filter and to have optimal visualization of relevant information.

Information flows to and/or from the local CP and field personnel, information sources, remote applications and services, other local leaders, mobile resources, central CP, sensors, and local informants. One of the most important tasks is to appoint tasks to field personnel and other local leaders. To accomplish this information flow, voice communication (on radio) is often dominating today. In addition, there is some electronic communication with central CP / operations centre.

When designing ICT support for this user situations it is important to make systems that do not draw the attention away from the primary tasks of the user. But this must be balanced with the potential of using ICT systems to relieve the user from some of the stress and attention demands from the primary tasks. Many of the tasks at the local CP are best supported by equipment with a certain screen size - i.e. it is usually better suited on a portable computer than a mobile device. But in many situations the users need to move around outside the local CP from time to time - thus will also benefit from using mobile devices. This poses special challenges for ICT support. Regardless of equipment, there is a need for presenting optimal information in the best suited way, which again requires flexibility for the users with minimal efforts, which is also a big challenge. A more practical, but yet very important challenge is to have reliable communication, both for voice and data.

3 Operational area

The personnel operating at/insider the scene of the incident move around most of the time. Maybe even more than the personnel at the local CP, they are highly focused on primary task, which may be performed in very hostile environments, e.g. extreme heat or cold. In addition to ordinary field personnel, also some local leaders and specialized personnel are active in the operational area. Suitable computer equipment is primarily mobile devices. In addition, some personnel may be equipped with sensors reporting information automatically.

Given the level of attention on the primary tasks, there is need for efficient information flow, i.e. the personnel need to receive tasks from and provide information to the local CP, as well as getting/providing information from/to other local leaders, field personnel, and local informants. As for local CP, voice communication is often dominating today, in addition to radio, direct communication is also frequent.

When designing ICT support for this user situation it is important to make non-intrusive solutions. As oppose to the personnel at the local CP that are both information providers and consumers, the users in the operational area are primarily information providers. Thus, they may have to perform tasks that are not directly beneficial for solving their primary tasks. Therefore, it is important to minimize the needs for interaction, e.g. by providing information automatic through sensors, and reasoning based on sensor data. When interaction is needed, the choice of modalities to use is very important. As for local CP, reliable wireless communication is essential.

4 Examples of non-intrusive ICT support for mobile users

To show how non-intrusive ICT support for mobile users in emergency response may be designed, we give some examples of possible solutions for mobile personnel in avalanche operations, which we have studied specially.

Localization is very important in this type of operations, so GPS-based solutions are highly relevant, e.g. to use GPS tracking to make map of operational area automatically, to use GPS to obtain accurate position of findings in the avalanche, to use GPS tracking to make map of how well the different parts of the avalanche has been examined, and to use GPS to communicate location of tasks more efficiently and effective. Together with movement sensor, GPS can be used to report every point examined using the searching poles. Also RFID or bar code scanners may be utilized, e.g. to register available personnel, where different persons are located, especially who are inside and outside the operational area. When interaction is indeed needed, speech/sound based user interfaces may be utilized for communicating location of tasks and activity status.

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