Challenges for Mobile Solutions for Emergency Response
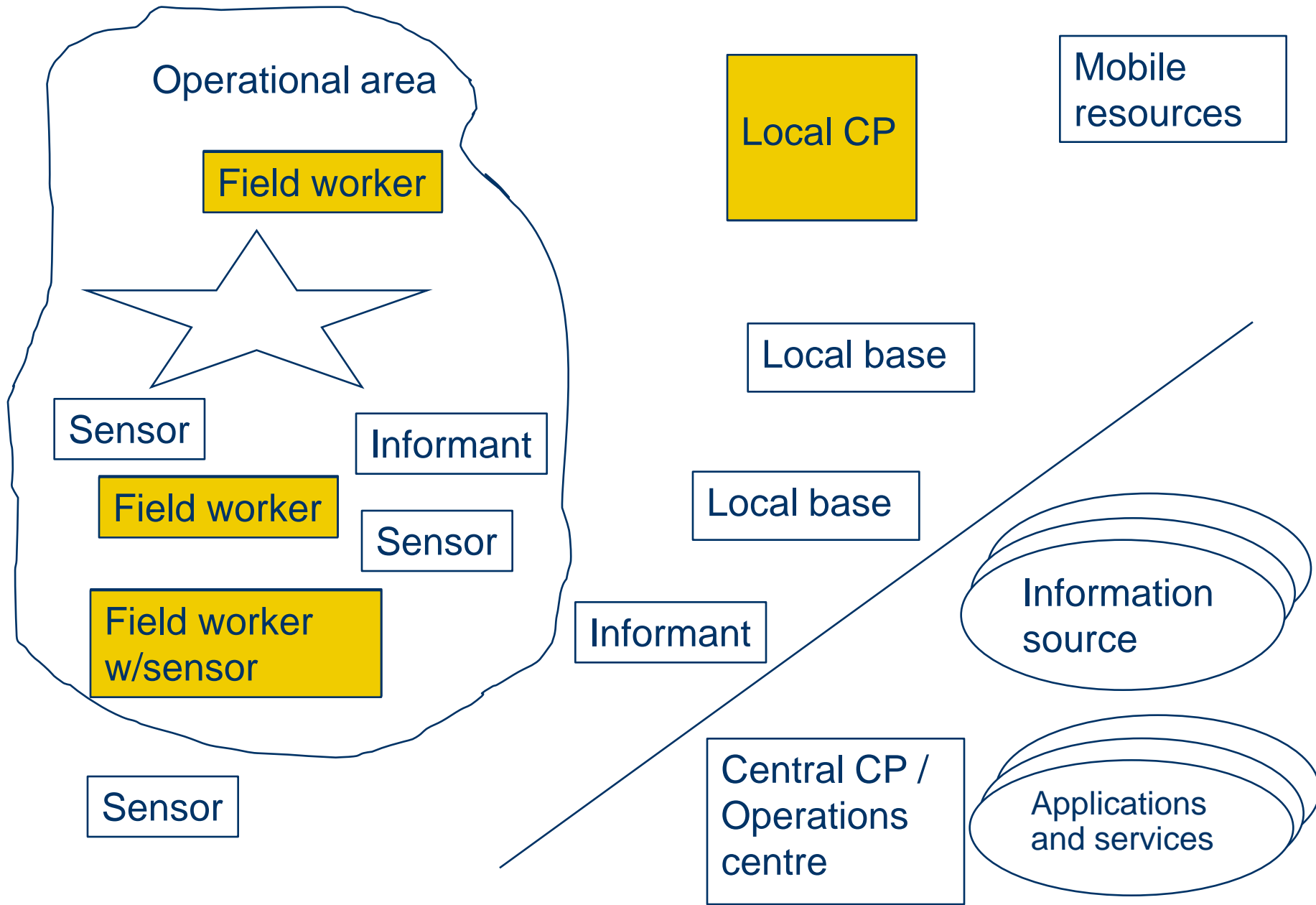
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SINTEF IKT

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Contents

- Actors and roles that are involved in emergency missions
- A closer look at Local CP and Field personnel
  - Characteristics
  - Users
  - Equipment
    - Computers
    - Infrastructure
  - Needs and requirements
  - Information flow
  - Communication
  - Challenges for ICT systems
- Common needs, challenges and opportunities

Operational area

Field worker

Sensor

Informant

Field worker

Sensor

Field worker w/sensor

Informant

Sensor

Local CP

Mobile resources

Local base

Local base

Information source

Central CP / Operations centre

Applications and services

Local CP

- Characteristics
  - Close to the scene of the incident
  - Outdoors
  - In car
  - In caravan
  - In tent
  - Move around more or less frequently
- Users
  - Local leader(s)
  - Support personnel
- Equipment
  - Computers
    - Portable computer(s)
    - Mobile devices
  - Infrastructure
    - Wireless communication

Local CP

- **Needs and requirements**
  - Highly attention requiring tasks
  - Much information
    - Overview
    - Priority
    - Visualization
- **Information flow**
  - Collect from field personnel
  - Collect from information sources
  - Collect from (and provide to) remote applications and services
  - Collect from and provide to other local leaders
  - Collect from and provide to mobile resources
  - Collect from and provide to central CP
  - Collect from sensors
  - Collect from local informants
  - Appoint tasks to field personnel and other local leaders

Local CP

- **Communication**
  - With most of the actors and roles that are involved
  - Much voice communication today
    - Radio
    - Phone
  - Some electronic communication with central CP / operations centre
- **Challenges for ICT systems**
  - Balance between
    - Attention to ICT system
    - ICT systems relieving the user
  - User may be moving much around
  - Present optimal information
  - Flexibility with minimal efforts
  - Reliable communication

Field personnel

- **Characteristics**
  - At/insider the scene of the incident
  - Move around most of the time
  - Highly focused on primary task
  - May operate in very hostile environments
- **Users**
  - Field personnel
  - Local leaders
  - Specialized personnel
- **Equipment**
  - Computers
    - Mobile devices
  - Infrastructure
    - Wireless communication
    - Equipped with sensors

Field personnel

- **Needs and requirements**
  - Highly attention requiring tasks
  - Efficient information flow
    - Receive tasks
    - Provide information
- **Information flow**
  - Collect from and provide to local CP
  - Collect from and provide to other local leaders
  - Collect from and provide to other field personnel
  - Receive tasks from local CP and other local leaders
  - Provide indirectly through carrying sensors
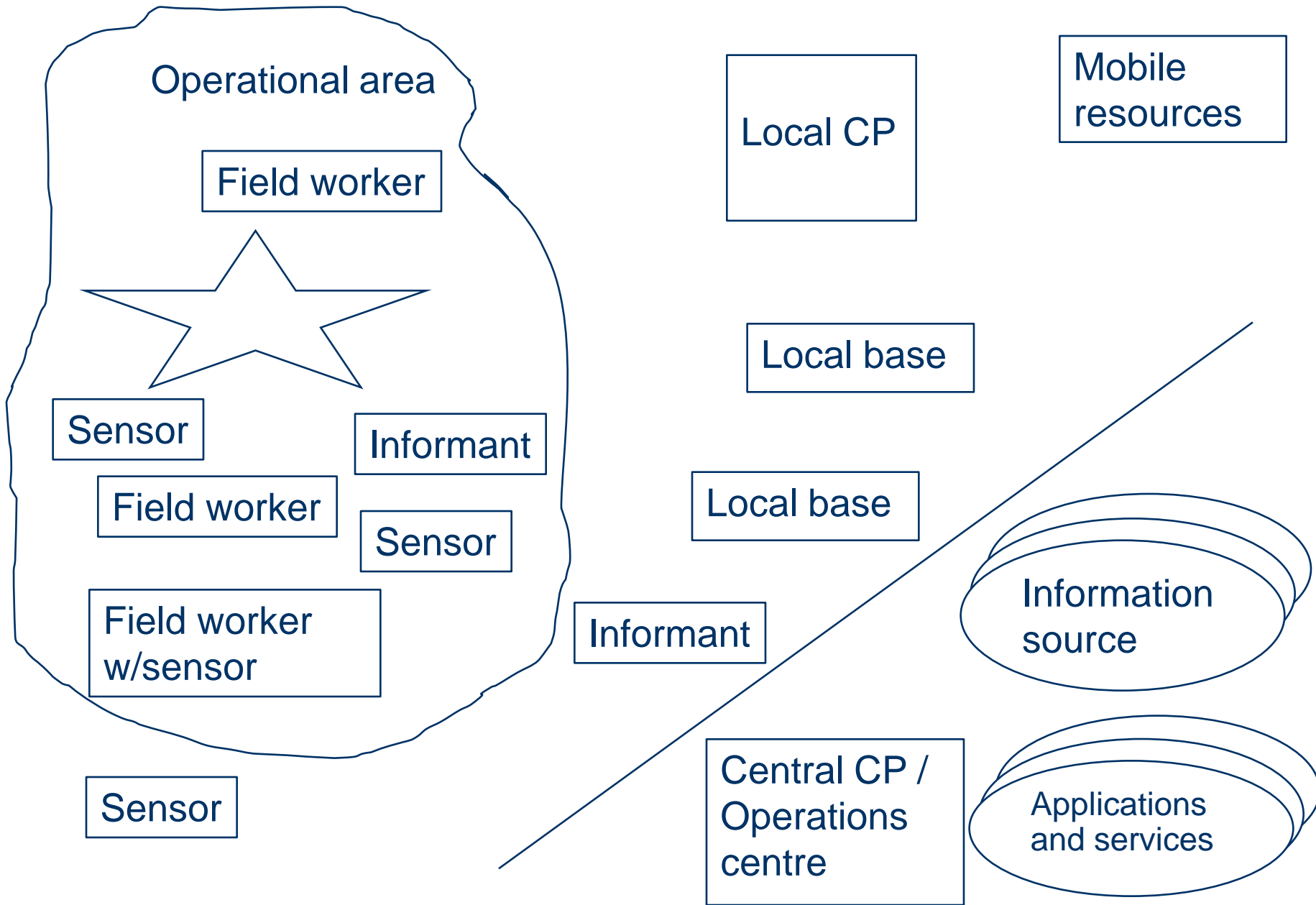 - Collect from local informants

Field personnel

- **Communication**
    - With local CP / local leaders and other field personnel
    - Much voice communication today
        - Person to person
        - Radio / phone
        - Shouting
- **Challenges for ICT systems**
    - User is moving very much around
    - All focus on primary task
        - Non-intrusive solutions
    - Balance between
        - Information needs
        - Information provision
    - Minimize needs for interaction
        - Automatic through sensors
        - Reasoning based on sensor data
        - Optimal choice of modalities
    - Reliable communication

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w/sensor

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Central CP /
Operations
centre

Information
source

Applications
and services

Common needs and challenges

- Integration of information from different sources
  - From different organizations
  - From different systems and a variety of sources
  - From sensors
  - Data – information - presentation
- Adapting information to different situations
  - Standards and plans
  - Templates for different types of situations
  - Handling unexpected incidents
- Integration of maps and pictures
  - Incl. pictometri / angled photos
- Handing resources
  - Management and overview
  - Across organizations
  - Incl. human resources and equipment

Common needs and challenges

- Exploit local sensors and infrastructure
- Availability of mobile resources
- Robust communication
- Reliable sensor data
    - e.g. accuracy
- Sensor fusion
- Compose/adapt information and services to changing needs
- Adapt solutions to different kind of equipment
    - Screen size
    - Operating systems
    - Interaction mechanisms
    - Available modalities

Opportunities

- Possible approaches for ICT support connected to mobile personnel in avalanche operations
  - Use GPS tracking to make map of operational area automatically
  - Use GPS to obtain accurate position of findings in the avalanche
  - Use RFID or bar code scanner to registrer
    - Available personnel
    - Where different persons are located
      - Inside or outside the operational area
  - Use GPS tracking to make map of how well the different parts of the avalanche has been examined
    - Visualize using different shades

Opportunities

- Possible approaches for ICT support connected to mobile personnel in avalanche operations
  - Use movement sensor & GPS to registrer every point examined using the searching poles
  - Use local D-GPS to increase accuracy of GPS tracking
  - Use ad hoc WLAN to ensure reliable wireless communication
  - Use ad hoc base station to ensure reliable wireless communication
  - Use GPS to communicate location of tasks more efficiently and effective
  - Use speach/sound based UI for mobile personnel
    - Location of tasks
    - Report activities
    - Automatic transfer to local CP

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