



# COPE - Common Operational Picture Exploitation

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COPE is a FP7 Security Research project



VTT Technical Research Centre of Finland  
BAE Systems (United Kingdom)  
BAE Systems C-ITS (Sweden)  
TCD, Trinity College Dublin (Ireland)  
UTI Group (Romania)  
GMV-Skysoft (Portugal)  
CESS, Centre for European Security Strategies (Germany)  
IGSU, General Inspectorate for Emergency Situations (Romania)  
ESC, Emergency Services College (Finland)

<http://cope.vtt.fi>



# Objective of COPE Project

- The overall objective was to improve emergency management by **better command and control performance**.
- The aim was to create technological solutions that **increase situational awareness** among the stakeholders involved and enhance both horizontal and vertical **information flow** to and from a first responder.
- Various **human factors** methods ranging from functional task modelling to end user simulations were applied in **an usage-centred technology development** process.
- The project started in February 2008 and ends in January 2011.

# COPE – Objectives for the 1<sup>st</sup>, 2<sup>nd</sup> and 3<sup>rd</sup> Periods

- The objectives for **the 1st period** included one milestone “M1 Use case descriptions (D2.1)” . Generally the objective was **a thorough understanding of the first responder work** and the issues essential for COP, and **a review of the appropriate technologies**.
- The objectives for **the 2nd period** included two milestones “M2 Human Operator Support requirements (D3.2)” and “M3 Scenario descriptions from a user perspective (D4.4)”. Generally the objective was **to map the user requirements to the technological possibilities**, design and develop the technological solutions, and also to design the trials and scenarios for testing the technologies.
- The objectives for **the 3rd period** included **the testing and validation of the COPE Concept and technologies in a full scale trial** in Kuopio. Professional users executing the scenario were observed and interviewed in order to evaluate the new concept and technologies.

# Common Operational Picture (COP)

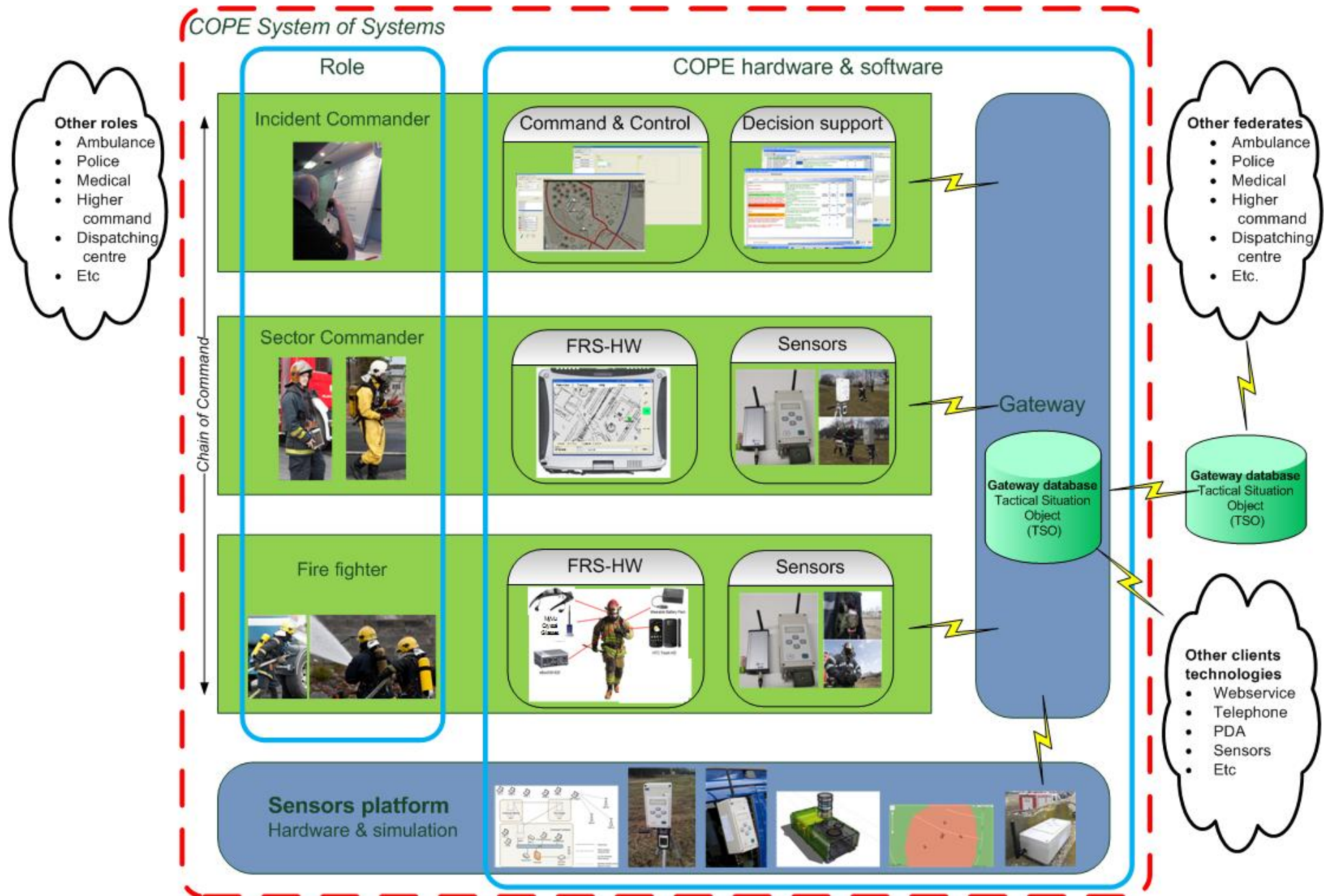
Emergency responders' on-line conception of the emergency situation which is as coherent as is possible.

The formation, sharing and presentation of the COP is supported by information and communication technological (ICT) tools.

## COPE Concept - Requirements

On the basis of initial user interviews and existing literature three high level requirements were identified for ICT tools:

1. **Forming** a model of the situation
2. **Presenting** the model of the situation
3. **Sharing** the model of the situation



# COPE Concept Solutions

## Concept requirements

**Forming** a model of the situation

**Presenting** the model of the situation

**Sharing** the model

## Concept solutions

**Actor's  
Terminals  
for  
Participation**

**Sensors  
for  
Extending  
Human Senses**

**Semantic Structuring  
for  
Relevance of Information**

**Gateway on WLAN  
for  
Availability of  
Information**

## Concept applications

Managing tasks

Visual presentation  
• Map  
• Video

Enhancing visual perception  
Camera, infrared camera

Observing environment  
• Detecting hazardous materials (NH<sub>3</sub>)  
• Weather

Locating objects  
• personnel (GPS, inertia)  
• resources, hazmat

Control of information load

Alarming  
smoke diving duration  
new tasks

Delivering of in time information  
• Map  
• Tasks

Retrieval of stored information (video)

Ad hoc communication network

# Actors' terminals for participation



Command & Control  
system (C2)

Sector commanders' system



Fire fighters' systems



## Sensors Extending Human Senses



GPS positioning, inertia for indoor, sensor platform (temperature, gas etc)



Deployable sensors for HazMat



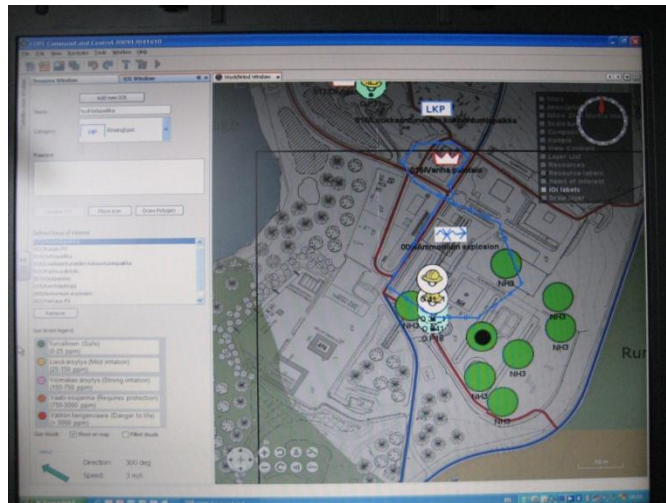
— Helmet mounted thermal and video camera



— Local weather conditions observation

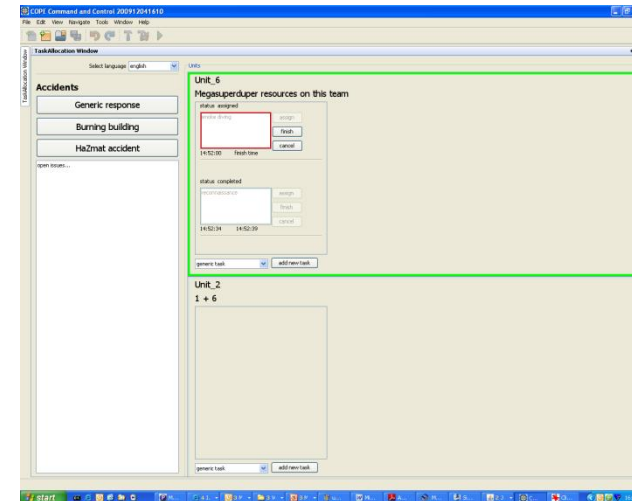
# Semantic Information System

All systems “speak the same language”

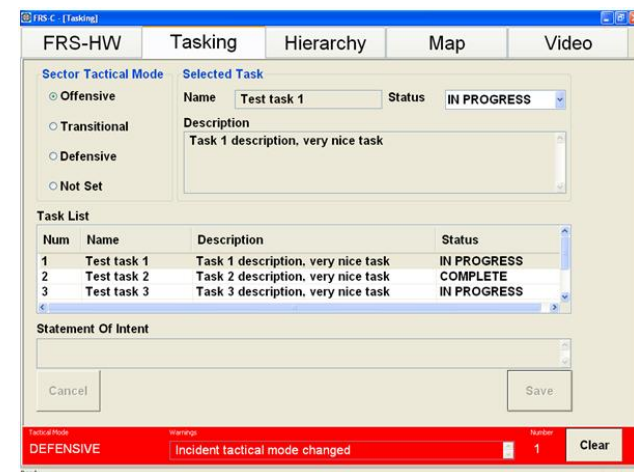


## Information in C2

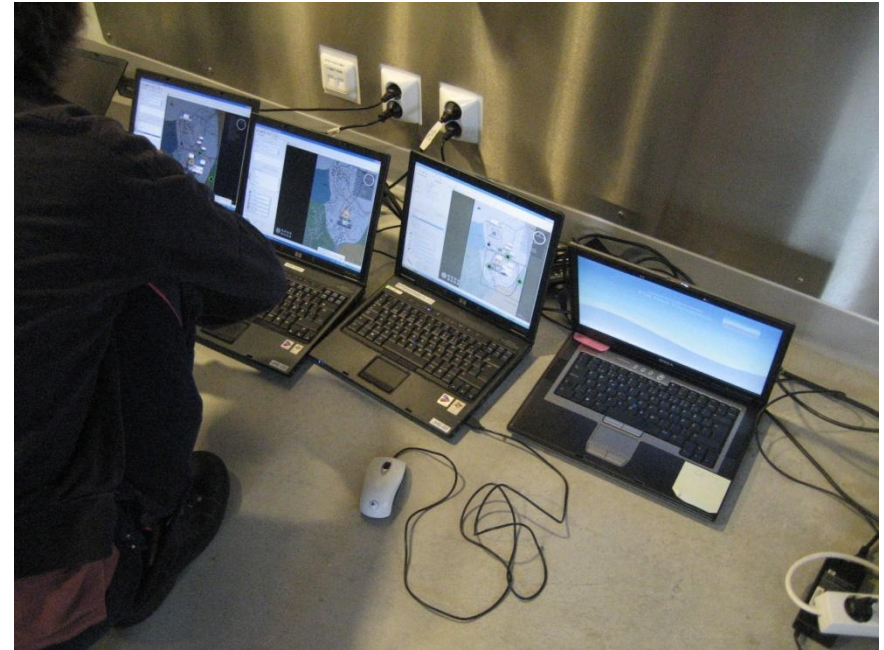
- measurements from sensors
- location of firemen
- regions and objects of interest
- explanations attached to the objects



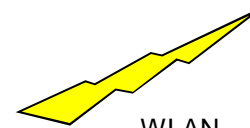
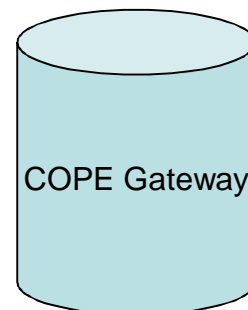
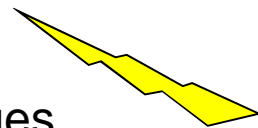
Task information in C2 and SC's terminal



## Availability of information: COPE Gateway on a WLAN



TSO messages



WLAN

TSO messages

# COPE Concept Development

- The COPE concept was developed, tested and evaluated through extensive design experiments:
  - Two technology integration tests
  - Three end user exercises in realistic situations (extending in size)
- A large amount of data was collected of technology performance, end user performance, and experience
- Applicability of the COPE Concept was analysed with a Usability Case method

... more in user group ...

## Demonstration of COPE solutions for ...

**Forming** a  
model of the  
situation

**Presenting** a  
model of the  
situation

**Sharing**  
the model

# Sensemaking, Coordination, Maintaining common ground

Intrinsic cognitive demands  
of ER work

## COP

Concept requirements

**Forming** a model  
of the situation

**Presenting** a  
model of the  
situation

**Sharing**  
the model

Concept solutions

Actor's  
**Terminals for  
Participation**

**Sensors for  
Extending  
Human Senses**

**Semantic Structuring  
of Information  
for Abstraction of  
Relevant Information**

**Gateway and  
WLAN for  
Availability of All  
Information**

Managing tasks  
(C2, SC)

Enhancing visual  
perception

- Camera, infrared camera

Control of  
information load

Delivering of  
in time information

- Map (C2, SC)
- Tasks (C2, SC)

Visual presentation

- Map (C2, SC)
- Video (SC, visor)

Observing environment

- Hazardous materials (NH<sub>3</sub>)
- Weather

Alarming

- smoke diving duration
- new tasks

Retrieval of  
stored information (video)

Ad hoc  
communication network

Functional solutions

Locating objects

- personnel (GPS, inertia)
- resources, hazmat

EVIDENCE

PE

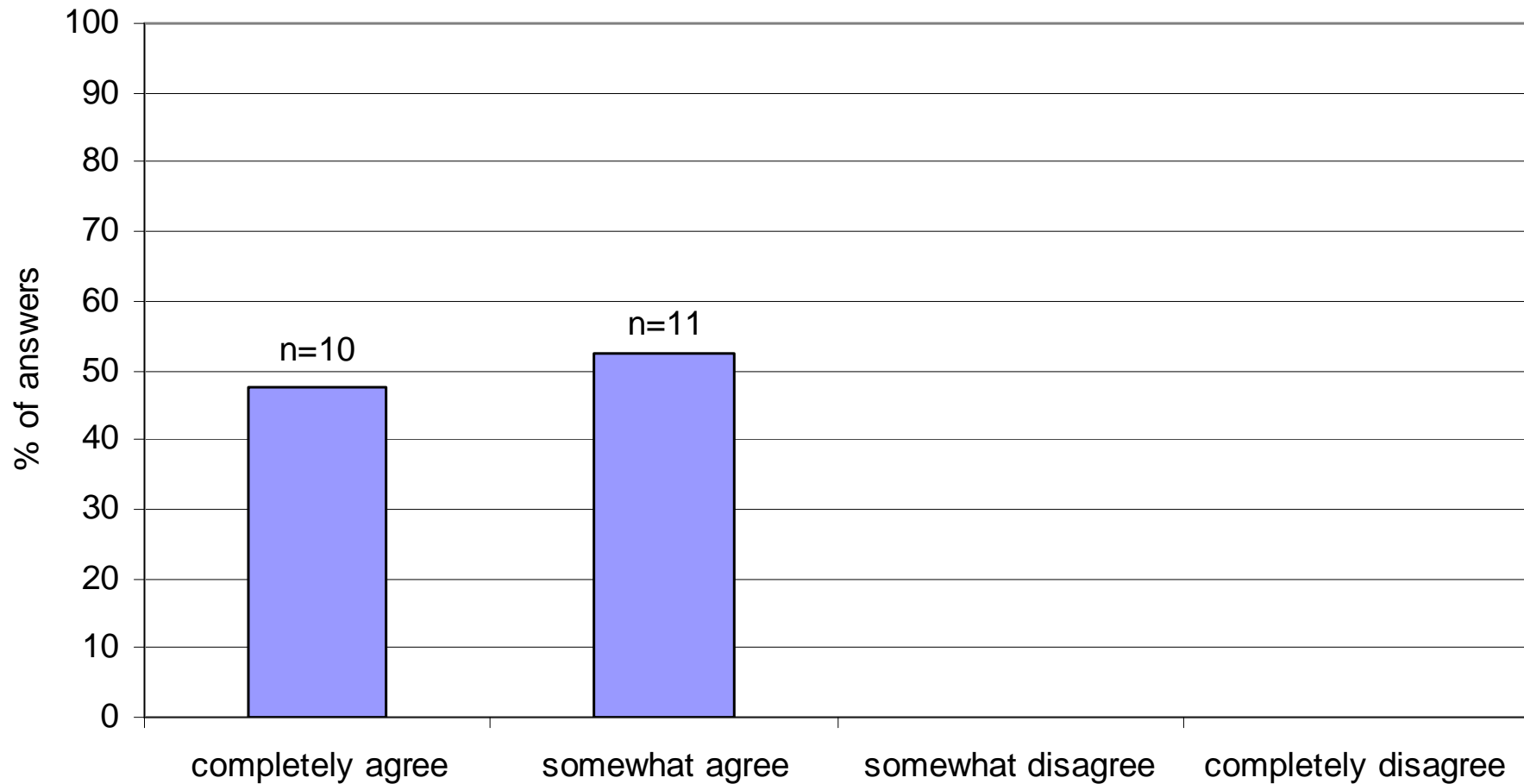
# COPE Concept - User Experience Results

User experience data was collected after the final trial  
from all the end users  
who had tested the COPE system

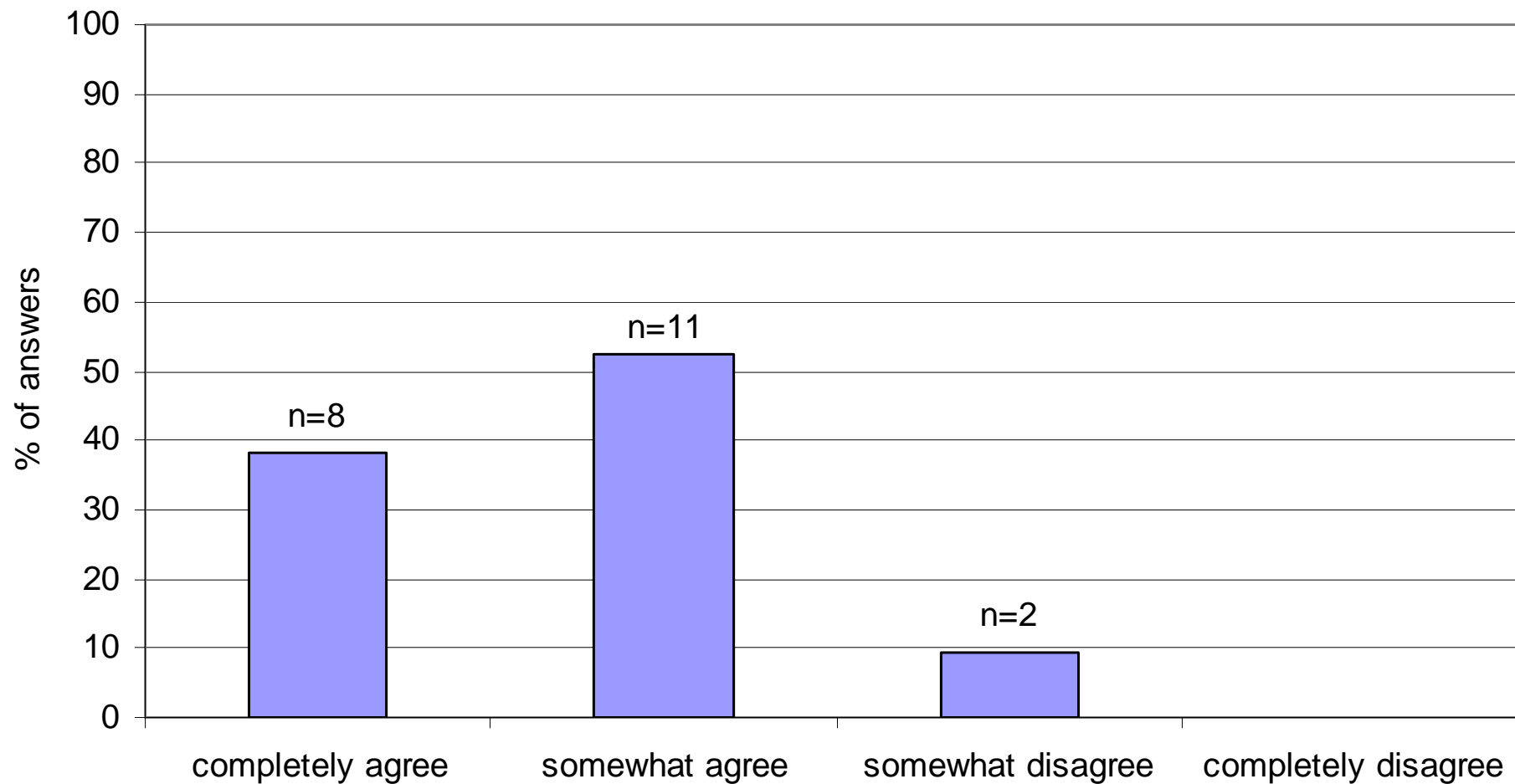
Concept - if fully developed - enhances COP ?

Could it be applied in professional use ?

'Common operational picture would be enhanced if this kind of (but fully developed) new technology was used in emergency response.'



'When fully developed, the system could fit well in the professional use  
in the future'



# COPE – Conclusions

Usage-centred design applied included a thorough analysis of user activity and co-design with technology development

All the developed technologies worked well when tested separately

COPE concept supports the functions needed for enhancing COP

- ✓ Forming a model of the situation
  - ✓ Presenting the model
  - ✓ Sharing the model



## Thank You !



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