

Performance of Municipal Crisis Management Teams – The impact of GPS in a C4ISTAR mission environment

Helena Granlund

Santa Anna IT Research Institute, Swedish Defence Research Agency

Rego Granlund

Santa Anna IT Research Institute, C2 Learning Labs

Nils Dahlbäck

Linköpings Universitet

Experiment Based Research

GPS vs Paper Map

- Identify differences in performance and communication between teams that had access to a GPS in their command posts, compared to teams that did not.

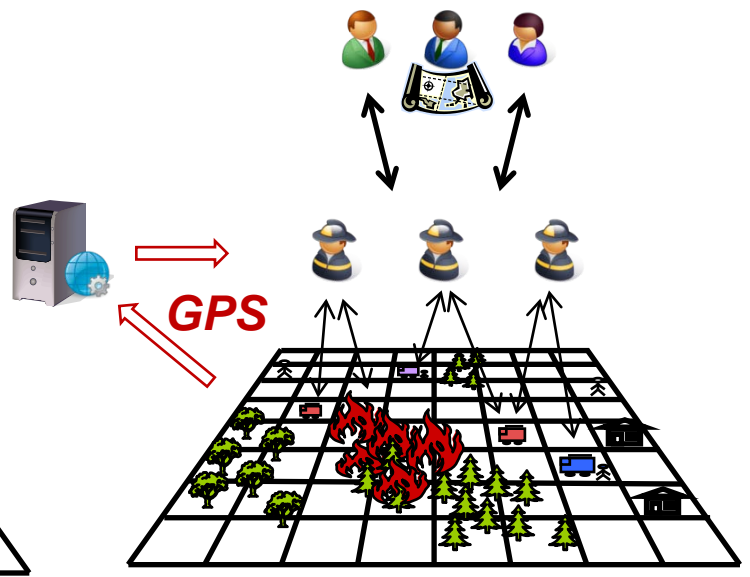
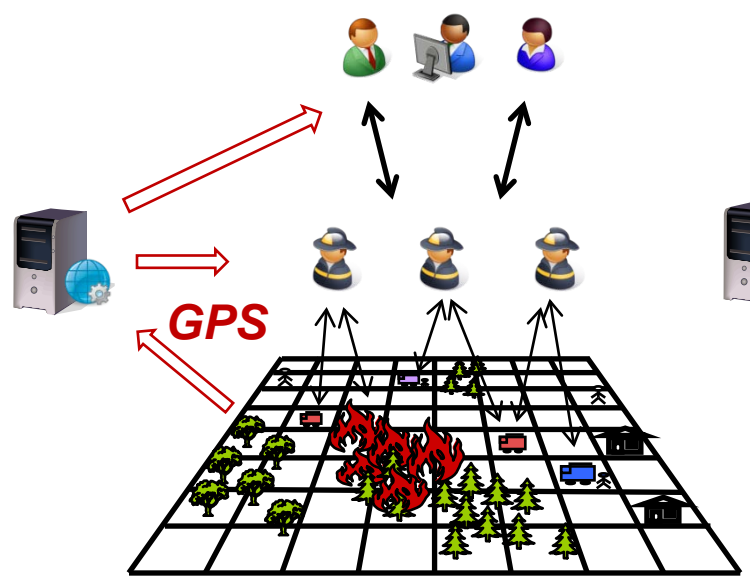
- Study 1 – 22 university student groups, a total of 132 students.

- Study 2 – 18 Swedish municipal crisis management teams, a total of 108 professionals.

Experiment Design

GPS

Paper Map

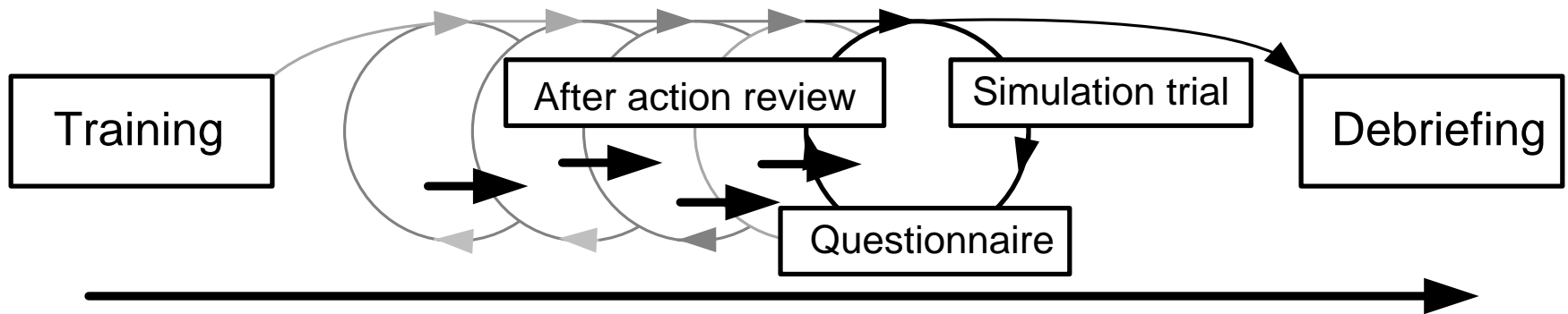


Command Post
(at home base)

Ground Chiefs
(on the field)

Resources

Procedure



Simulation Environment

The screenshot displays the C3Fire simulation environment. The main window is titled "Replay" and contains a topographic map of a region including Norrtorp, Österhagen, Hällfallstorp, Jacken, and Marielund. The map shows a fire spread pattern with red and black squares indicating active fire and burned-out areas. A grid of numbers is overlaid on the map, likely representing fire intensity or time steps. The interface includes several control panels:

- Session Control:** Time 02:29:43, Start, Pause, Save buttons.
- Time Speed:** Speed = 5, Set button.
- Wind:** Wind 0.0, a wind direction indicator.
- Unit Info:** A table listing units and their status.
- Unit Property:** A table showing properties for unit L1.
- Fire Palette:** Legend for fire states: Clear, Fire, ClosedOut, BurnedOut, FireBreak.
- Pointer Position:** x, y = 1, 35.

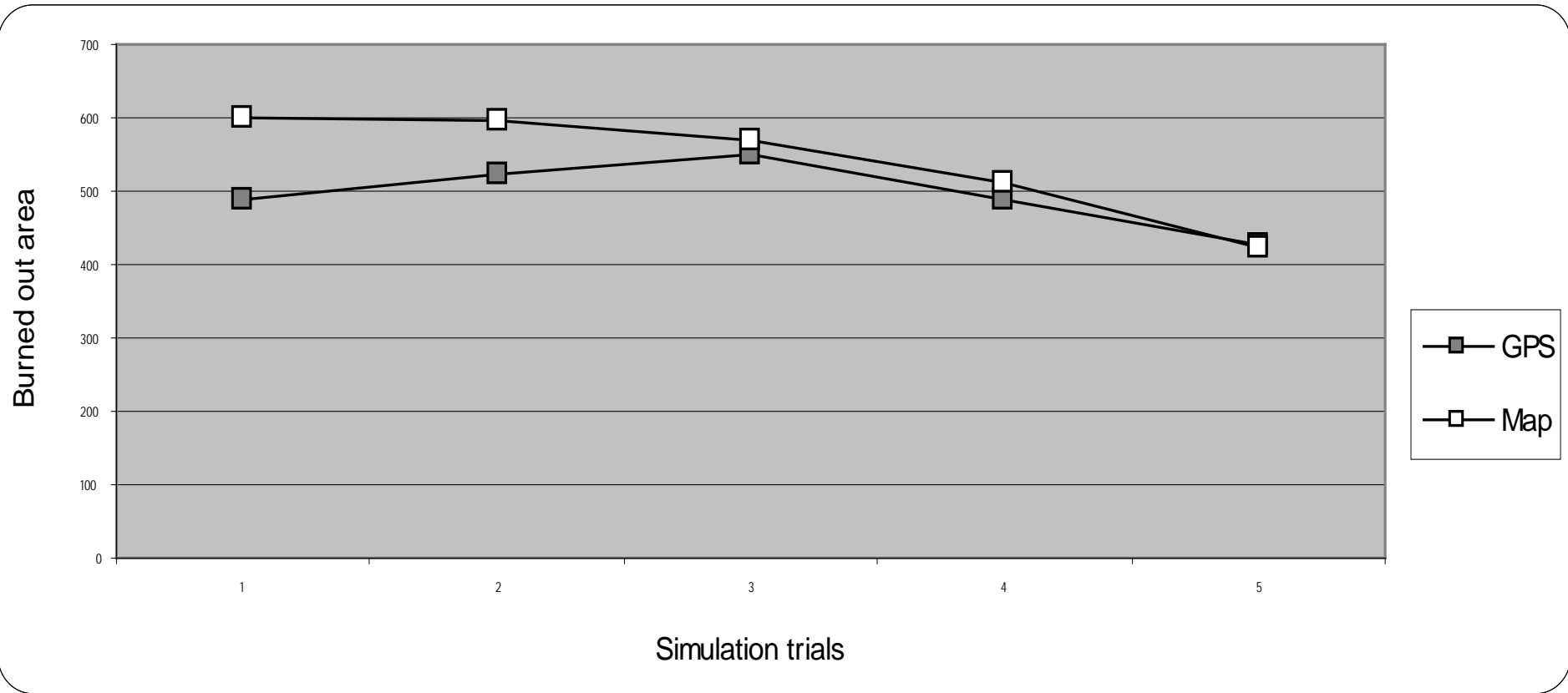
ID	Pos	GoTo	Activity	Wat
L1	30, 59		Inactive	0
L2	12, 42		Inactive	0
S5	24, 52		Inactive	20
S6	25, 50		Firefighting	50
S7	24, 49		Demobilizi...	20
S8	25, 58	28, 58	Moving	20
S9	27, 58		Demobilizi...	20
S10	26, 58		Demobilizi...	20
S11	16, 48	14, 49	Moving	80
S12	18, 48	14, 50	Moving	80

Property	Value
ID	L1
Type	Fire Fighter
Moving Time	4
Fuel Tank Size	0
Fuel Level Count Down Speed	0.0
Fuel Refill Speed	0.0

Result

- Performance
 - between GPS and Paper Map
 - command posts with different professional distribution
- Critical Area
 - between GPS and Paper Map
 - command posts with different professional distribution
- Communication
 - between GPS and Paper Map
 - within GPS

Performance, between GPS and Paper Map

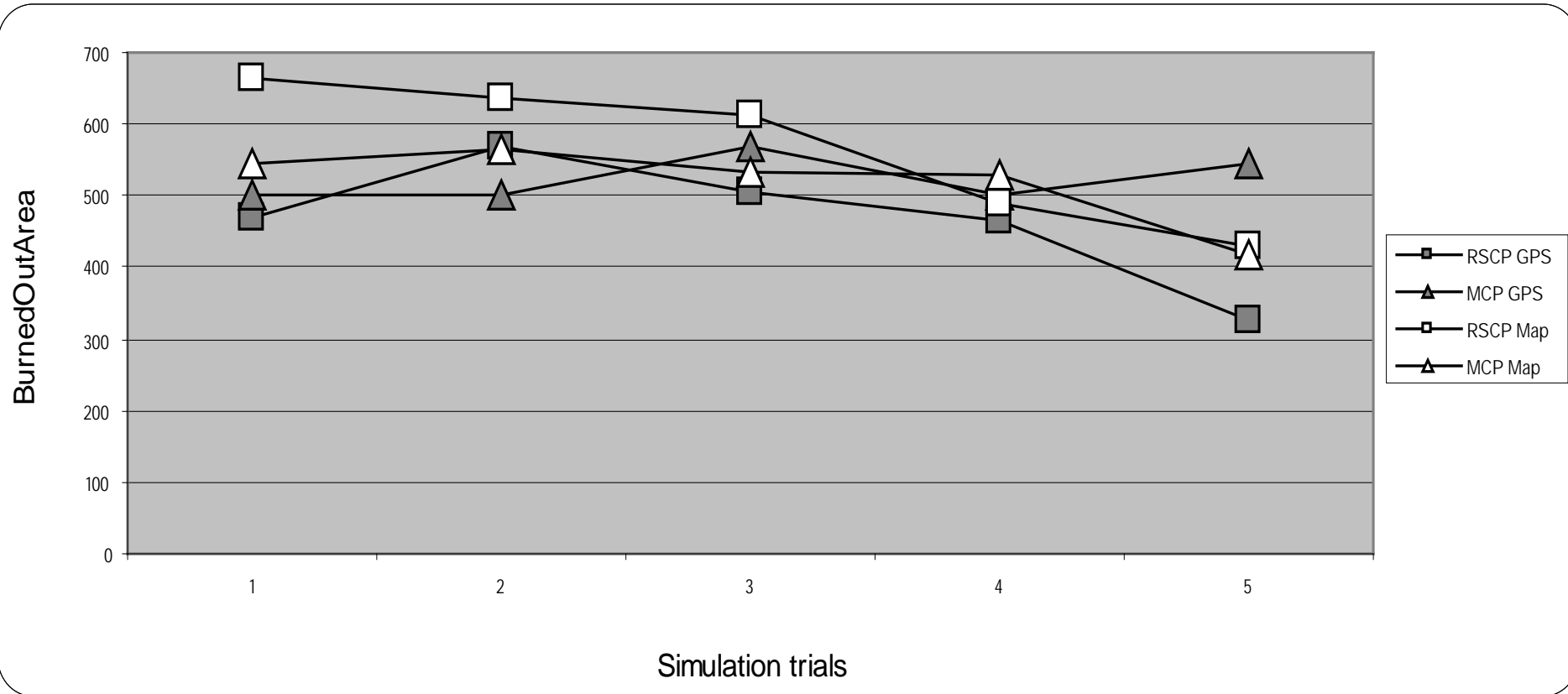


Command posts with different professional distribution

- **RSCP**, The three participants in the command post are all rescue service personnel
(Rescue Service Command Post)
- **MCP**, The three participants in the command post are a mix of rescue service personnel and other municipal personnel
(Mixed Command Post)

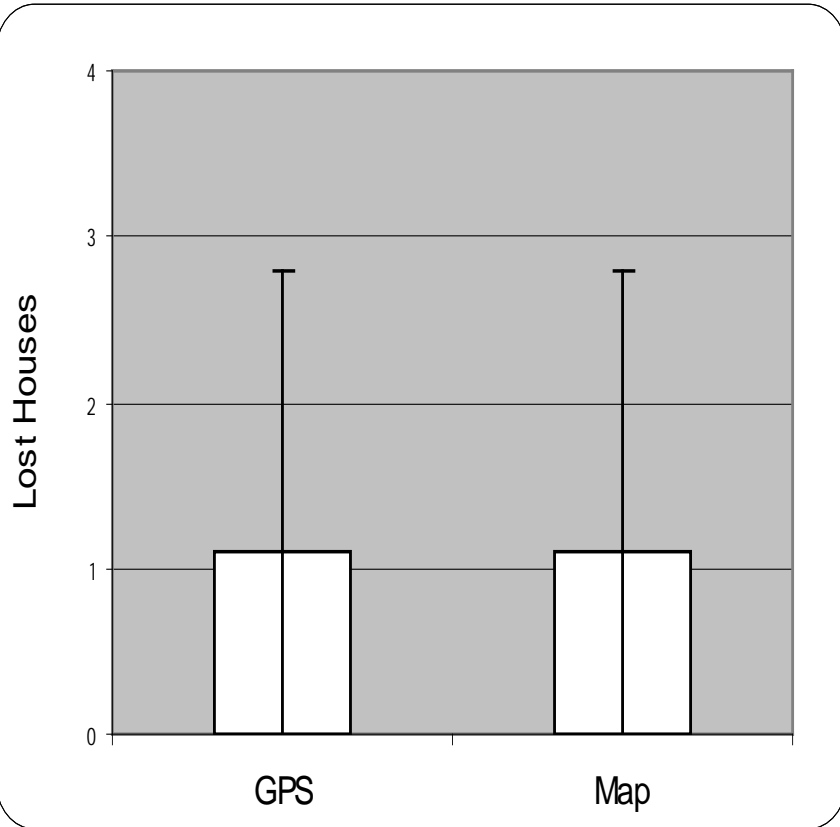
Performance, different professional distribution

Rescue Service (RSCP) vs Municipality Mix (MCP)

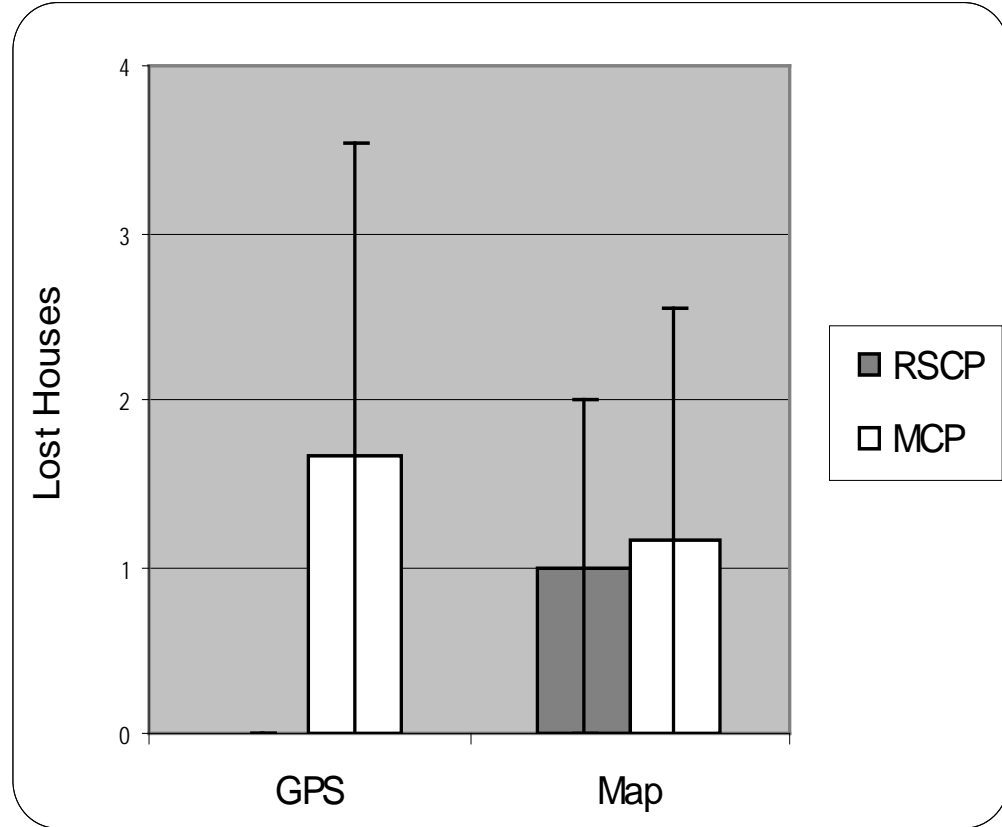


Critical Area

Between GPS and Paper Map



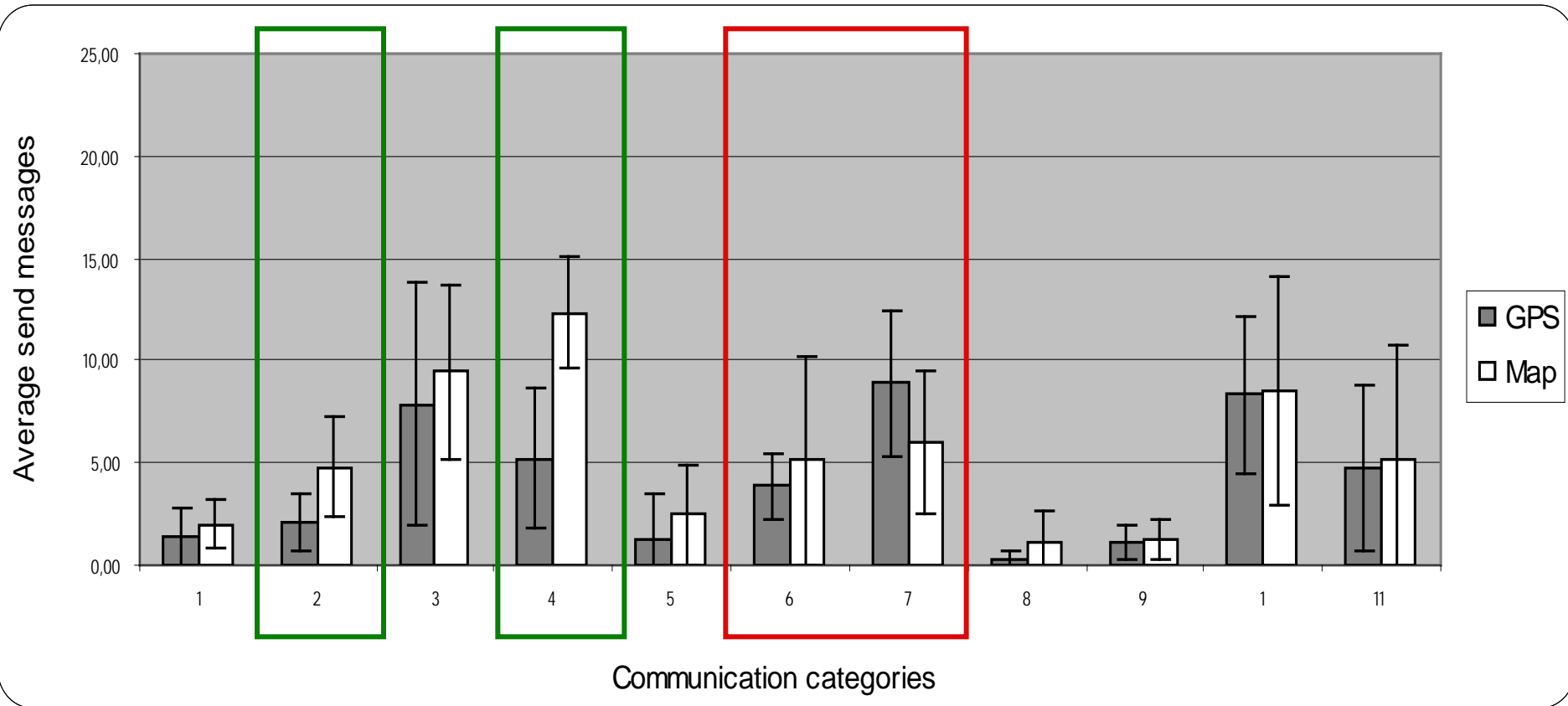
Different professional distribution



Communication

<i>Question</i>		<i>Information</i>			<i>Order</i>		<i>Other</i>			
1	2	3	4	5	6	7	8	9	10	11
<i>About Fire</i>	<i>About other persons activity</i>	<i>About Fire</i>	<i>About own activity</i>	<i>About other persons activity</i>	<i>Mission order</i>	<i>Direct order</i>	<i>Request for help</i>	<i>Request for clarification</i>	<i>Acknowledgment on info or order</i>	<i>Miscellaneous</i>

Communication, between GPS and Paper Map

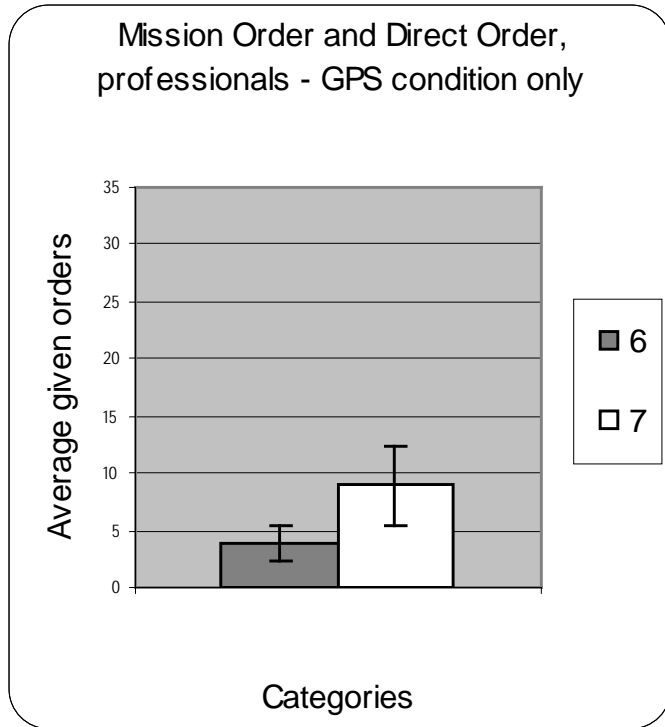


Information about own Activity, 4
Questions about other persons Activity, 2

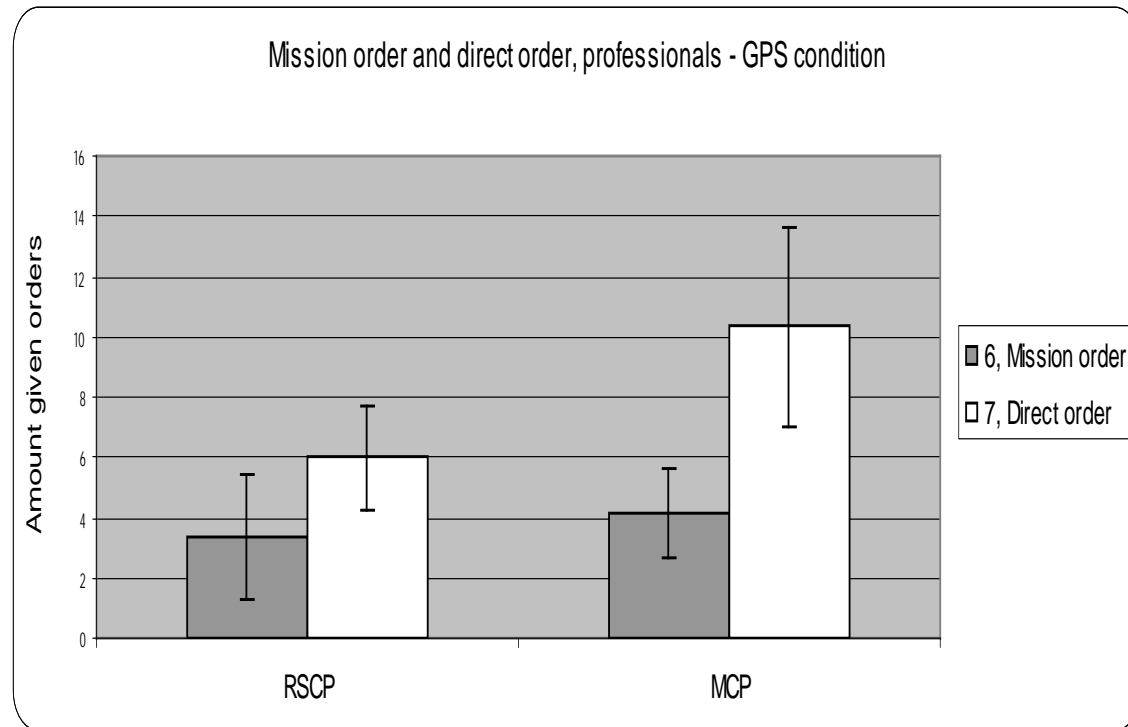
Mission order, 6
Direct order, 7

Communication, mission order and direct order

Within GPS



Within GPS, different professional distribution



Summary

S, decision making; time consumption and decision quality

C2, the GPS raised the inclination for direct orders

C3, the GPS was restrictively used as a means of communication

TA, the GPS was a precondition for saving all houses

GPS as an integral part of municipal management teams
will be fully effective only in combination with
methodological awareness of the whole spectrum C4ISTAR

Questions?

Contact

Helena Granlund

helena.granlund@foi.se

Performance, between GPS and Paper Map

Students vs Professionals

