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# Using microworlds to understand cultural influences on distributed collaborative decision making in C2 settings

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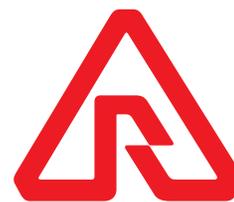
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Division of Industrial Ergonomics

# Acknowledgements



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- This research is funded by the Swedish Rescue Services Agency (SRSA),



RÄDDNINGSS  
VERKET

- The research was conducted in cooperation with Skövde university.



- Research questions and domain of study
  - Onsite operations coordination centers
- Background
  - Culture
- Method
  - Constraints on our study
  - Microworlds
  - Participants
  - Procedure
- Results and implications

# Research questions



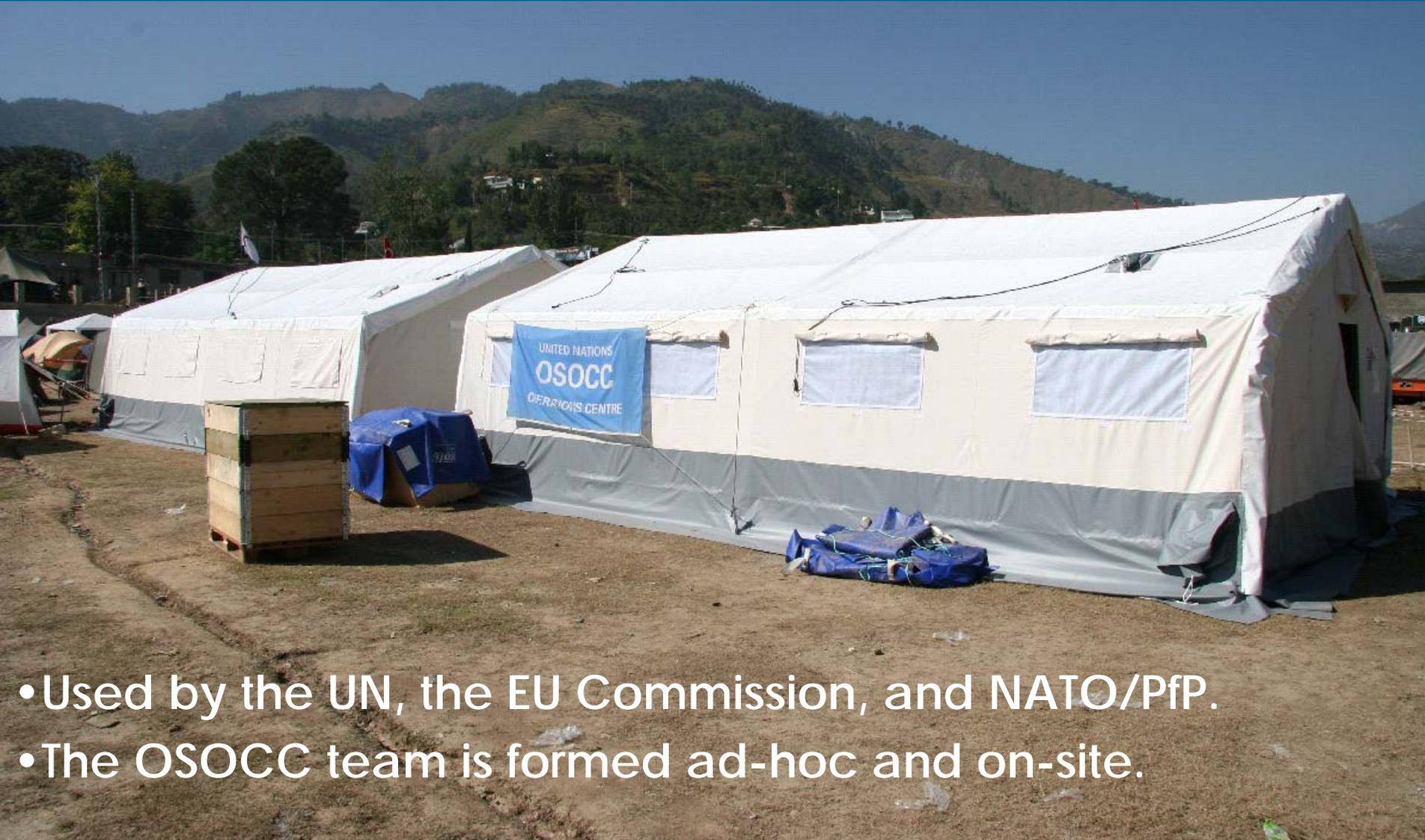
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- Do cultural differences in decision making and cooperation pose barriers to efficient cooperation in multinational coordination teams?
- If so, how?
- Can we identify dimensions of cultural diversity in norms to cooperation and coordination?

# Onsite Operations Coordination Centers (OSOCC)



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- Used by the UN, the EU Commission, and NATO/PfP.
- The OSOCC team is formed ad-hoc and on-site.

# What is Culture?



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- Culture is a relatively organized system of shared meanings (Smith and Bond, 1999, p. 39).
- Culture is passed from one generation to the next, sustained by social relations within highly specific contexts.
- Our cultural heritage largely defines our values.
  - how we prefer to lead our lives.

# Culture and Values



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- Schwartz's ten value types:
  - Universalism
  - Benevolence
  - Conformity
  - Tradition
  - Security
  - Power
  - Achievement
  - Hedonism
  - Stimulation
  - Self-direction

(Schwartz, 1992; 1994)

# Eliciting Values



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- Schwartz's ten value types:
  - Universalism
  - Benevolence
  - Conformity
  - Tradition
  - Security
  - Power
  - Achievement
  - Hedonism
  - Stimulation
  - **Self-direction**
- Self-direction
  - Creativity
  - Curious
  - Freedom
  - Choosing own goals
  - Independent
- What are the guiding principles in your life?
- Which are (un) important?

(Schwartz, 1992; 1994)

# Culture and Cognition



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- Culture is particularly visible (to outsiders) when studying (or engaging in) verbal communication.
  - Different cultures have different communication styles
    - e.g., turn taking
- Culture influences how we perceive information, think about it, and act upon it.
  - Different cultures make different assumptions about the world of things and people
    - e.g., task allocation
  - Different cultures have different norms for decision making:

# Culture's impact on Decision Making



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- Who makes the decision?
  - Which authorities and entities are invested with responsibility and control over decision making?
- Who has the right to express opinions or advise?
- What values and interests are served by the decision?
- Is decision making an activity for the individual or the group?

# Research question



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- Do cultural differences in decision making and cooperation pose barriers to efficient cooperation in multinational coordination teams?
- If so, how?
- Can we identify dimensions of cultural diversity in norms to cooperation and coordination?



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# Method

How we elicit cultural differences in decision making using a laboratory simulation of an emergency management task.

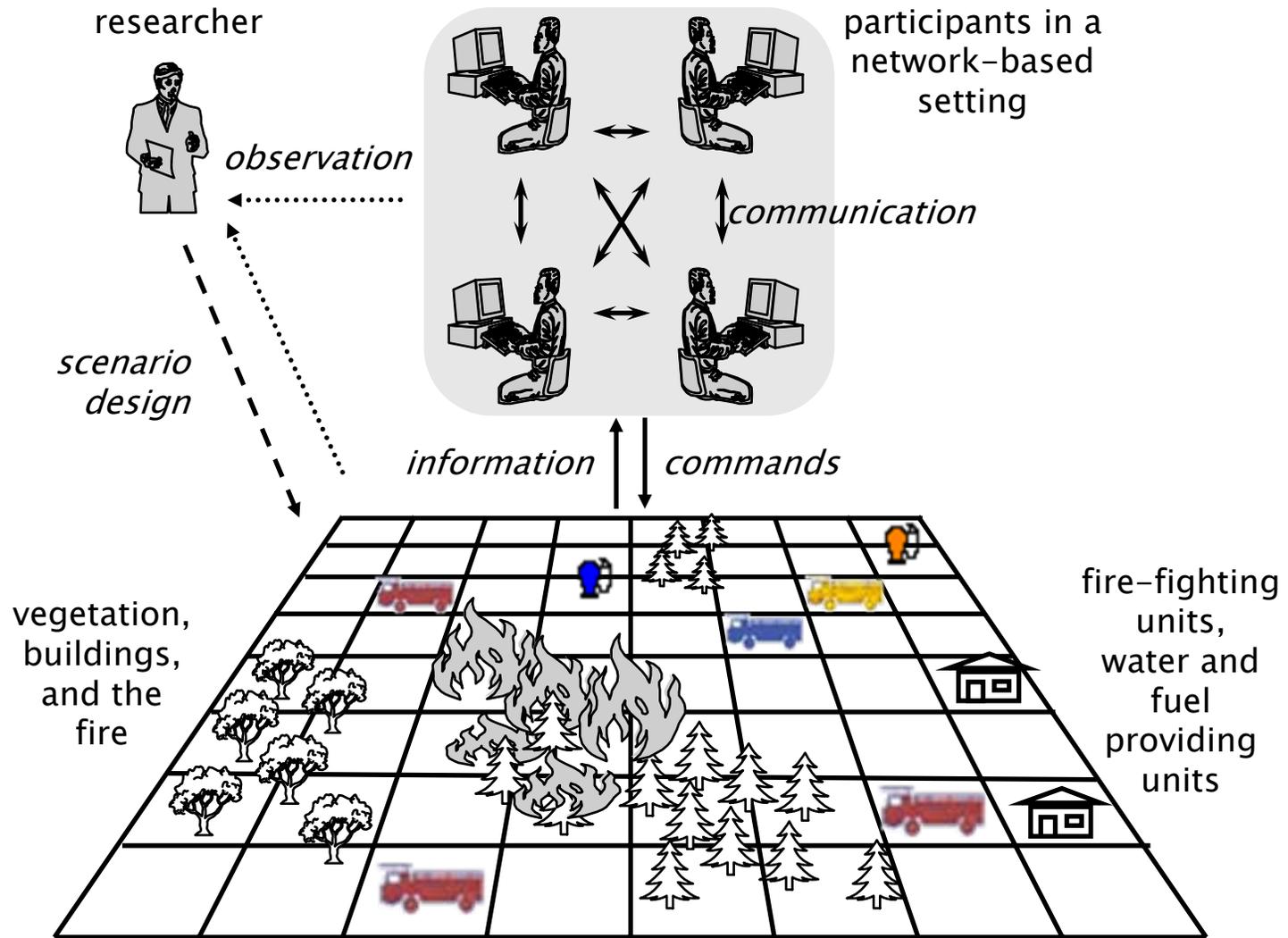
# Constraints on our study



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- To elicit and capture spontaneously collaborative decision making
- To emulate the ad-hoc nature of team formation
- To gather individual self-report information about values that are likely to influence teamwork and decision making

- A microworld is a simulation environment that bridges the gap between traditional laboratory experiments and field research.
  - A small and well-controlled system that retains the important characteristics of the real world system.
  - Dynamic
  - Complex
  - Controllable



# The Players' Tasks



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- Manage multiple and potentially conflicting goals
  - Suppress the fire or save the buildings?
- Allocate responsibilities
  - Players ↔ Trucks
  - Players ↔ Areas
  - ± Leader
- Develop a strategy for fighting the fire
  - Attack the fire? Control the burn?
- Take actions that implement the strategy
  - Issue commands to trucks
  - Manage limited resources
- Communicate and cooperate
  - Use the C3Fire e-mail system
  - Coordinate actions

# Data capture and display



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- Communication (Email)
- Commands to trucks
- Firefighting
  - Truck movement
  - Fire suppression
  - Clusters of activity

# Participants



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Nationality	Groups	Number of participants	Number of sessions for analysis
Swedes	4	32	64
Bosnians	3	22	46
Indians	4	30	62
Iranians	1	8	8
<b>TOTAL</b>	<b>11(12)</b>	<b>84 (92)</b>	<b>172 (180)</b>

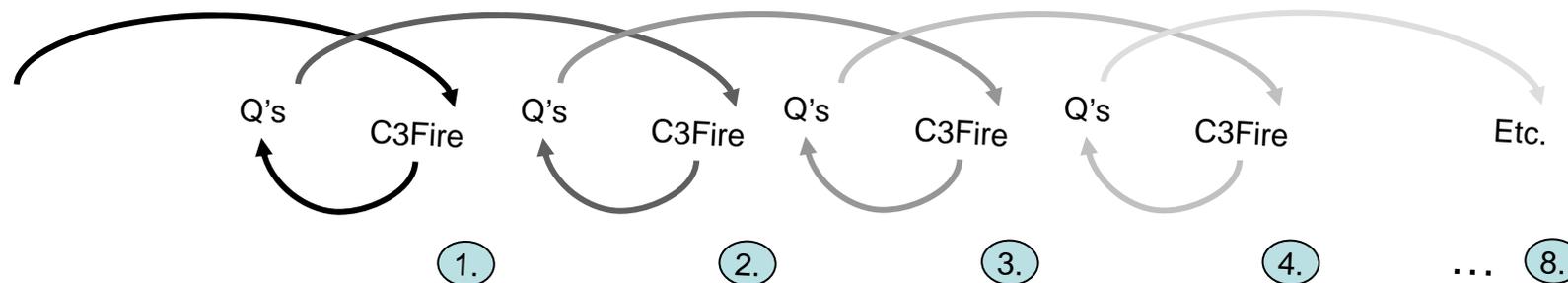
- We have conducted 12 experiments using C3Fire.
- Seven or eight participants took part in each experiment.
- To emulate the ad-hoc nature of the OSOCC, participants were randomly and anonymously divided into two teams.

# Procedure



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- Each participant
  - Is assigned a computer.
  - Reads instructions to subjects.
  - Receives training (individual and team)
- Cycle of activities
  - C3Fire play
  - Questionnaires



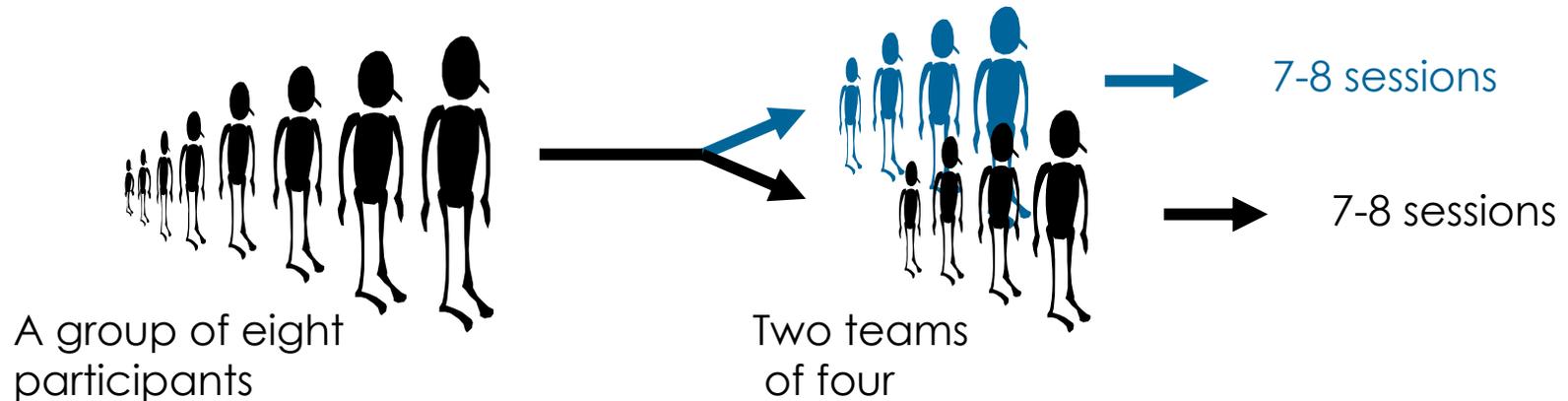
Q's = questionnaires    1. = cycle number

# C3Fire play



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- Two parallel sessions start simultaneously. C3Fire assigns the teams automatically.
- The game lasts until the fire is suppressed or 20 minutes have passed.



# Questionnaires



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- Directly after six of the eight sessions, the participants are asked to fill in a questionnaire:
  - Demographics
  - Neo FFI (Costa & McCrae, 1989)
  - Schwartz Value Survey (1992, 1994)
  - Time Horizon
  - Conflict avoidance
  - Tolerance for Uncertainty
- All questionnaires were distributed in Swedish for the Swedes, the Iranians, and the Bosnians, and in English for the Indians.
  - Back translation was used to insure conformity



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# Results and implications

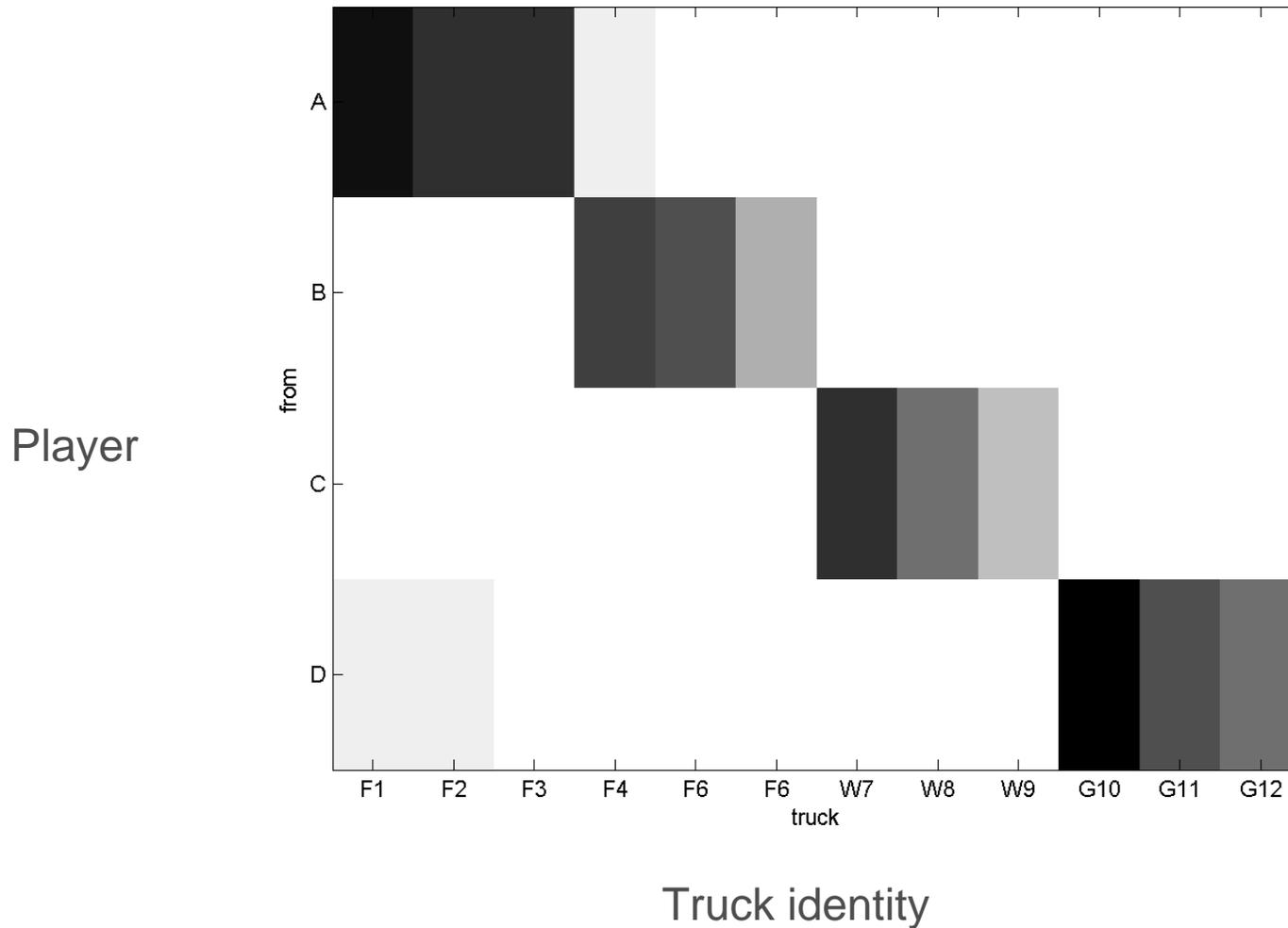
# Three dimensions of cultural diversity



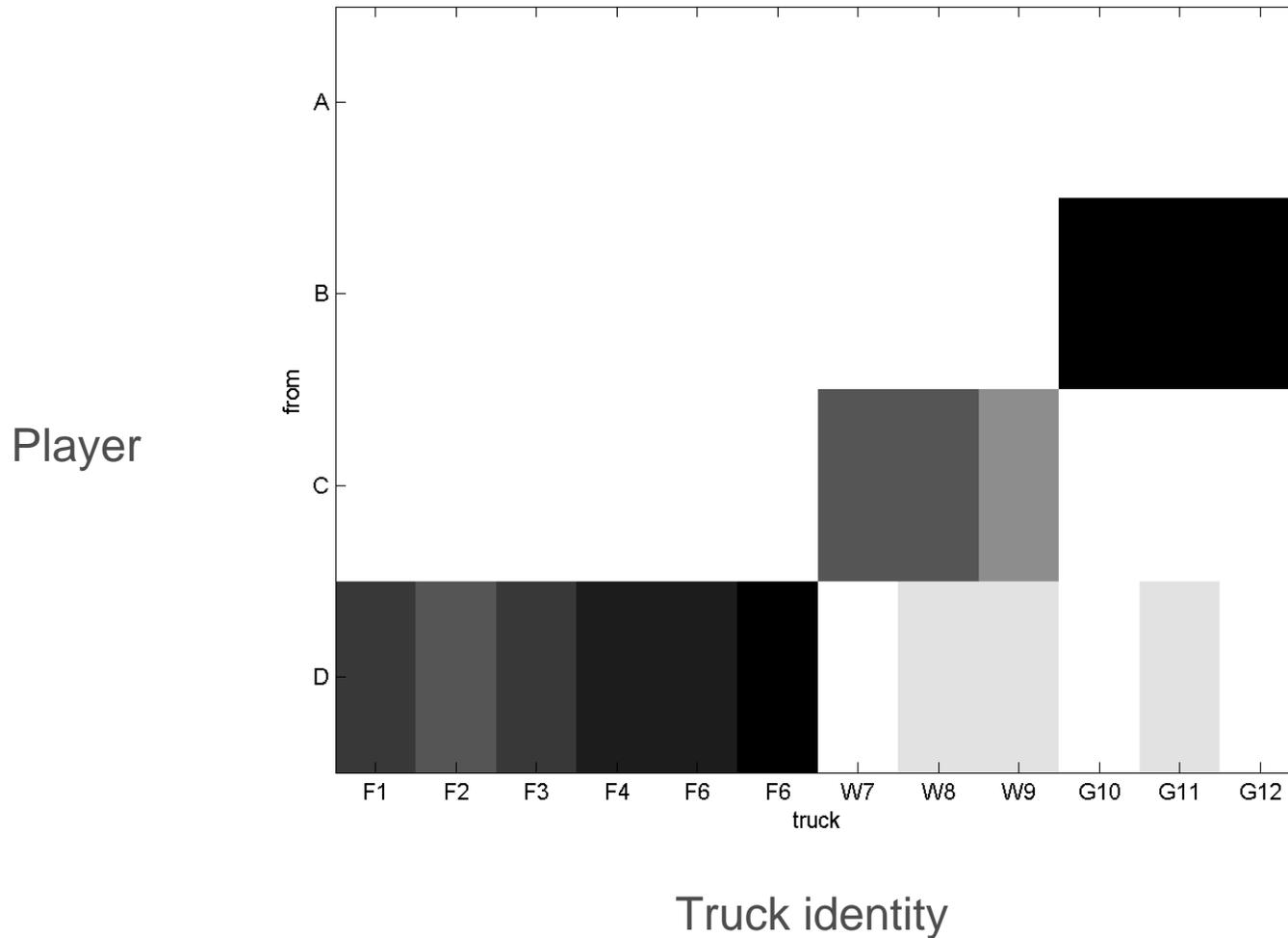
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1. Task allocation: Their methods for allocating roles and tasks across team members,
2. Conflict avoidance: The teams' attitude toward conflict, and
3. Goal establishment: How goals and strategies are established.

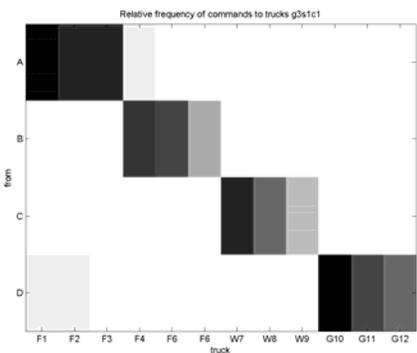
# Task allocation



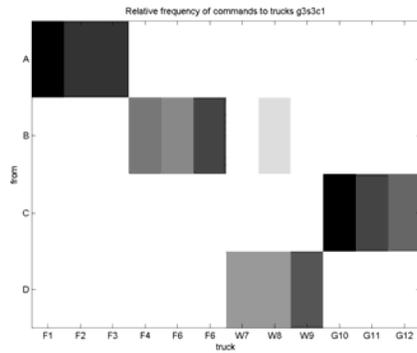
# Task allocation



# Partitioned structure

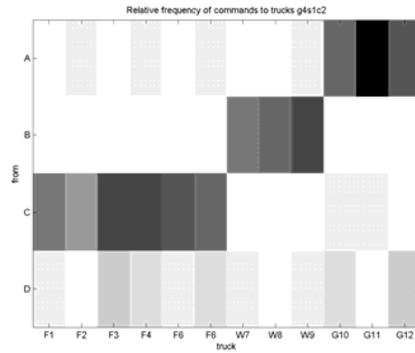


convenience

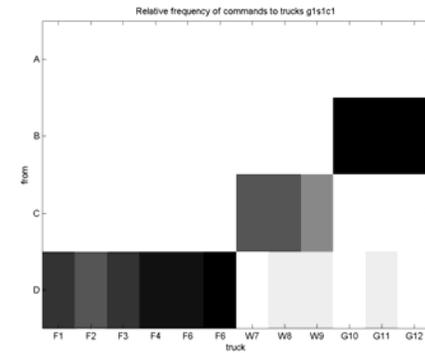


preference

# Structures with leadership

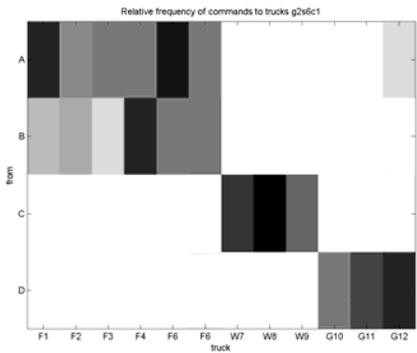


assistant

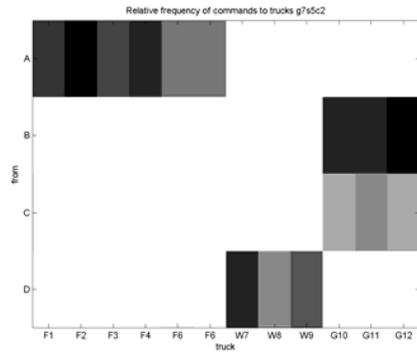


coordinator

# Shared structure

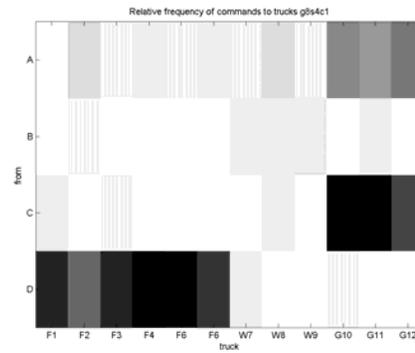


fire

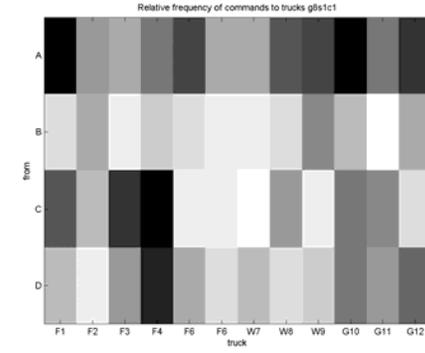


gas

# Vague or no structure



vague



none

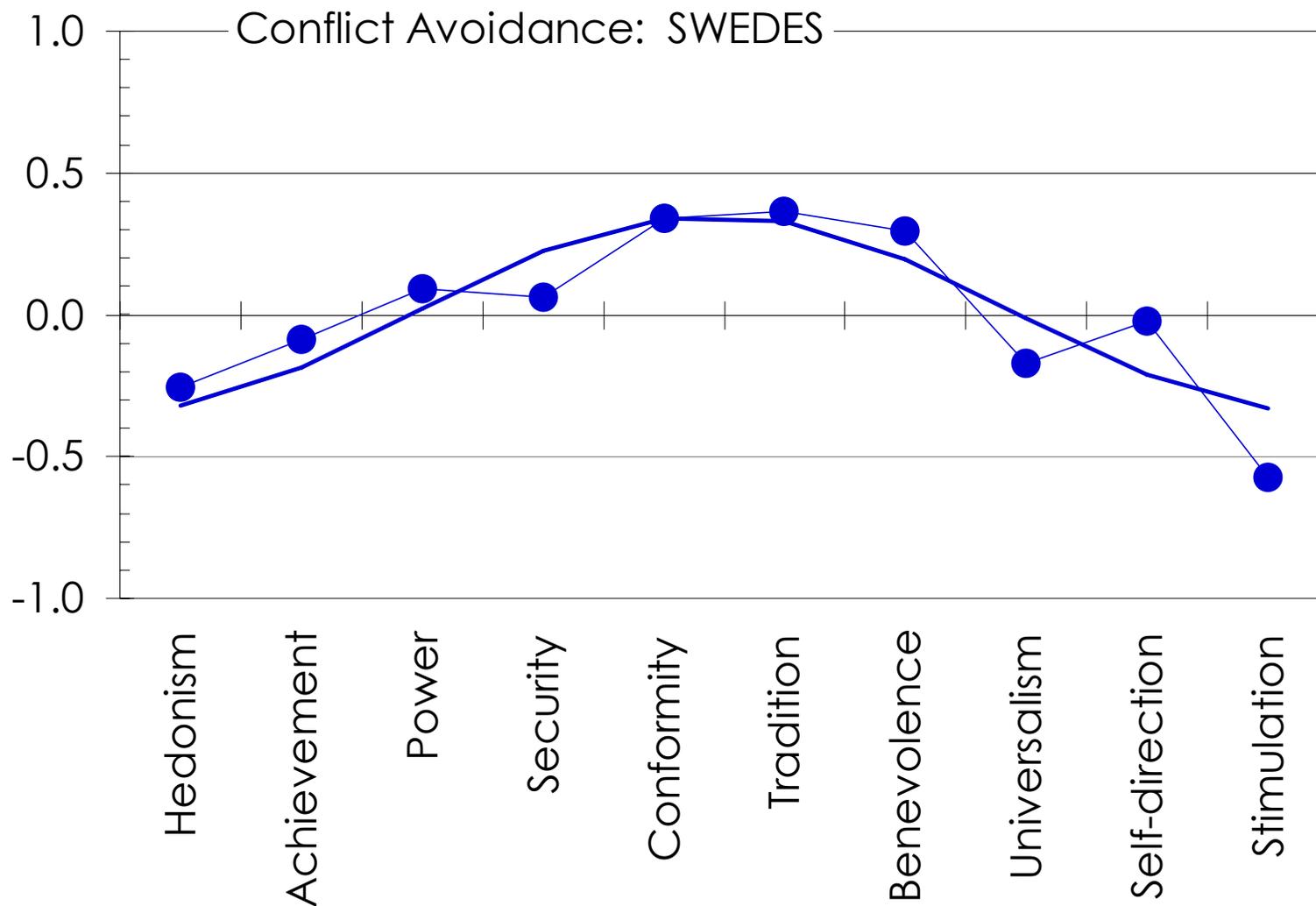
# Conflict avoidance



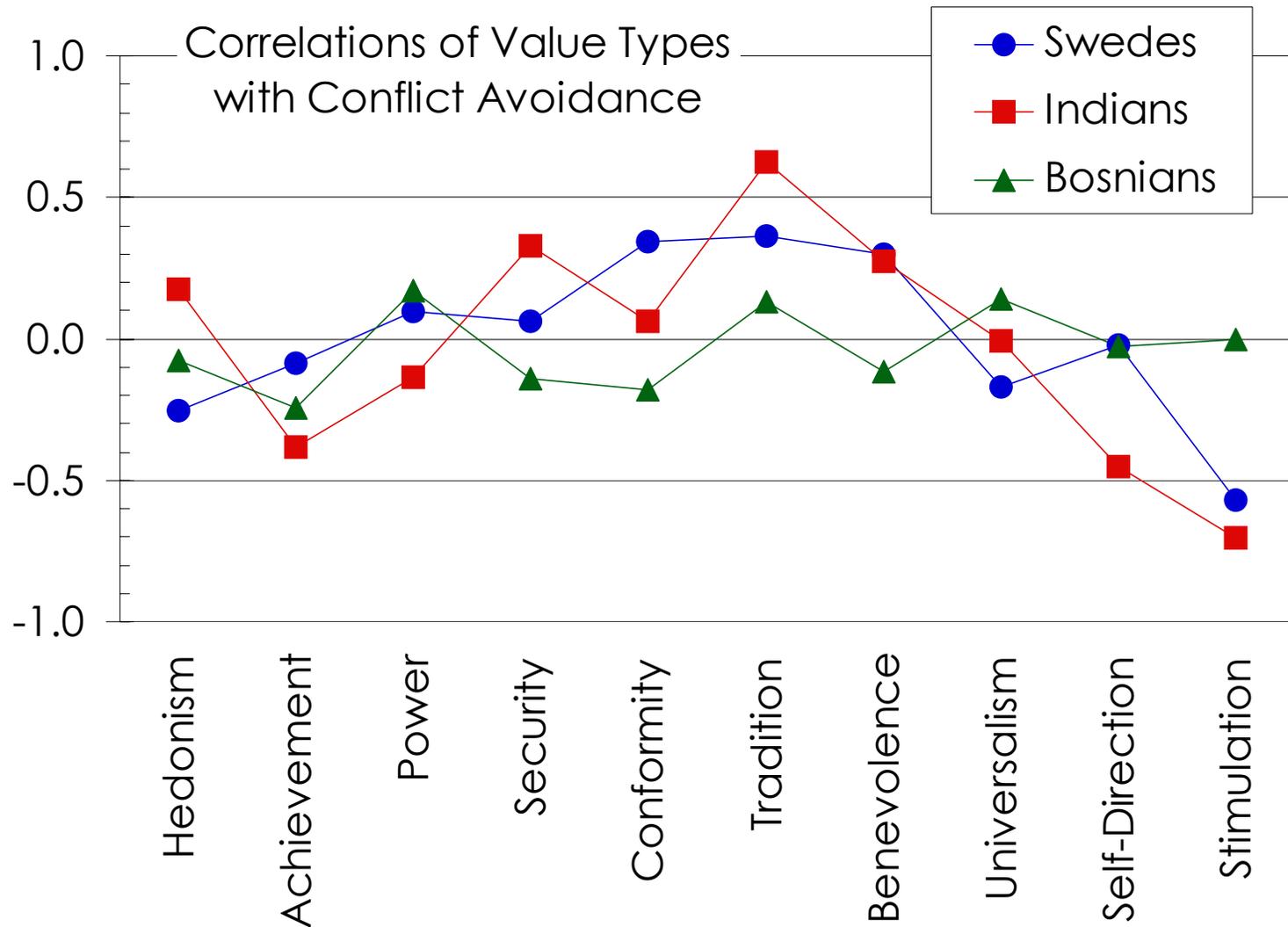
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1. Task allocation: Their methods for allocating roles and tasks across team members,
2. The teams' attitude toward conflict, and
3. How goals and strategies are established.

# The correlogram



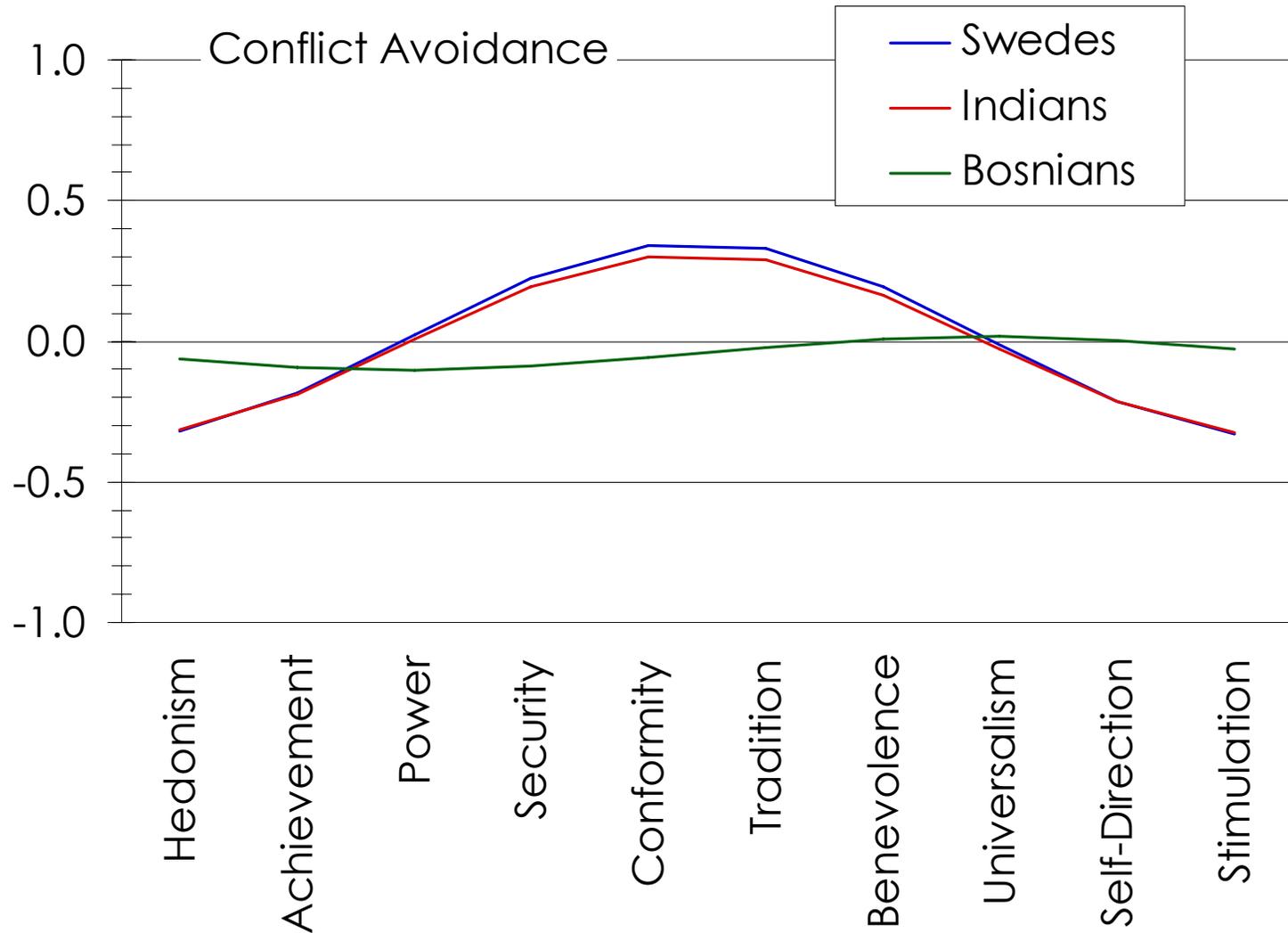
# Conflict avoidance – all groups



# Models of conflict avoidance



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# Models of conflict avoidance



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- Swedish and Indian model:
  - Conservative people seek to avoid conflict.
    - Maxima at conformity and tradition
  - Pleasure seekers do not avoid conflict.
    - Minima at hedonism and stimulation
- Bosnian model:
  - Weak correlations between conflict avoidance and all value types.
  - Have Bosnians been conditioned to believe that conflict cannot be avoided?

# Goal establishment



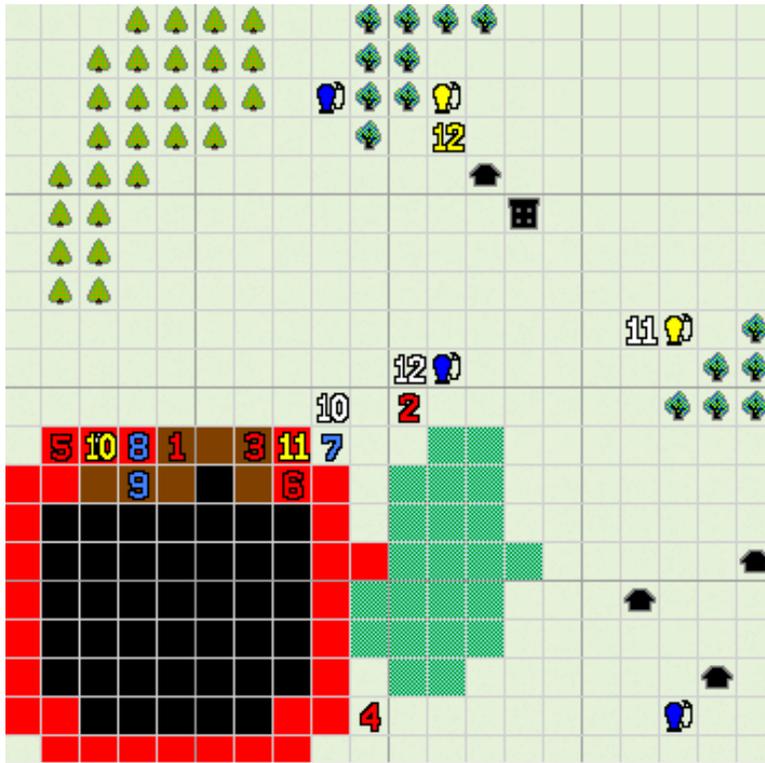
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1. Task allocation: Their methods for allocating roles and tasks across team members,
2. The teams' attitude toward conflict, and
3. How goals and strategies are set up
  - Priorities
  - Firefighting behavior

# Priorities and behavior



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Fight the fire



Protect houses and schools

# Three dimensions of cultural diversity



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<b>Dimension</b>	<b>-</b>	<b>+</b>
<b>Clearly structured task allocation</b>	Indians Bosnians	Swedes
<b>Tolerance for conflict</b>	Swedes Indians	Bosnians
<b>Clearly structured goals</b>		Swedes Indians Bosnians

# Performance



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- The three cultures established different goals
  - Swedes attacked the fire
  - Bosnians contained the fire
  - Indians saved the houses
- Hence, there is no single performance metric that can be applied to all groups.
- This is a major take home message!

# Implications



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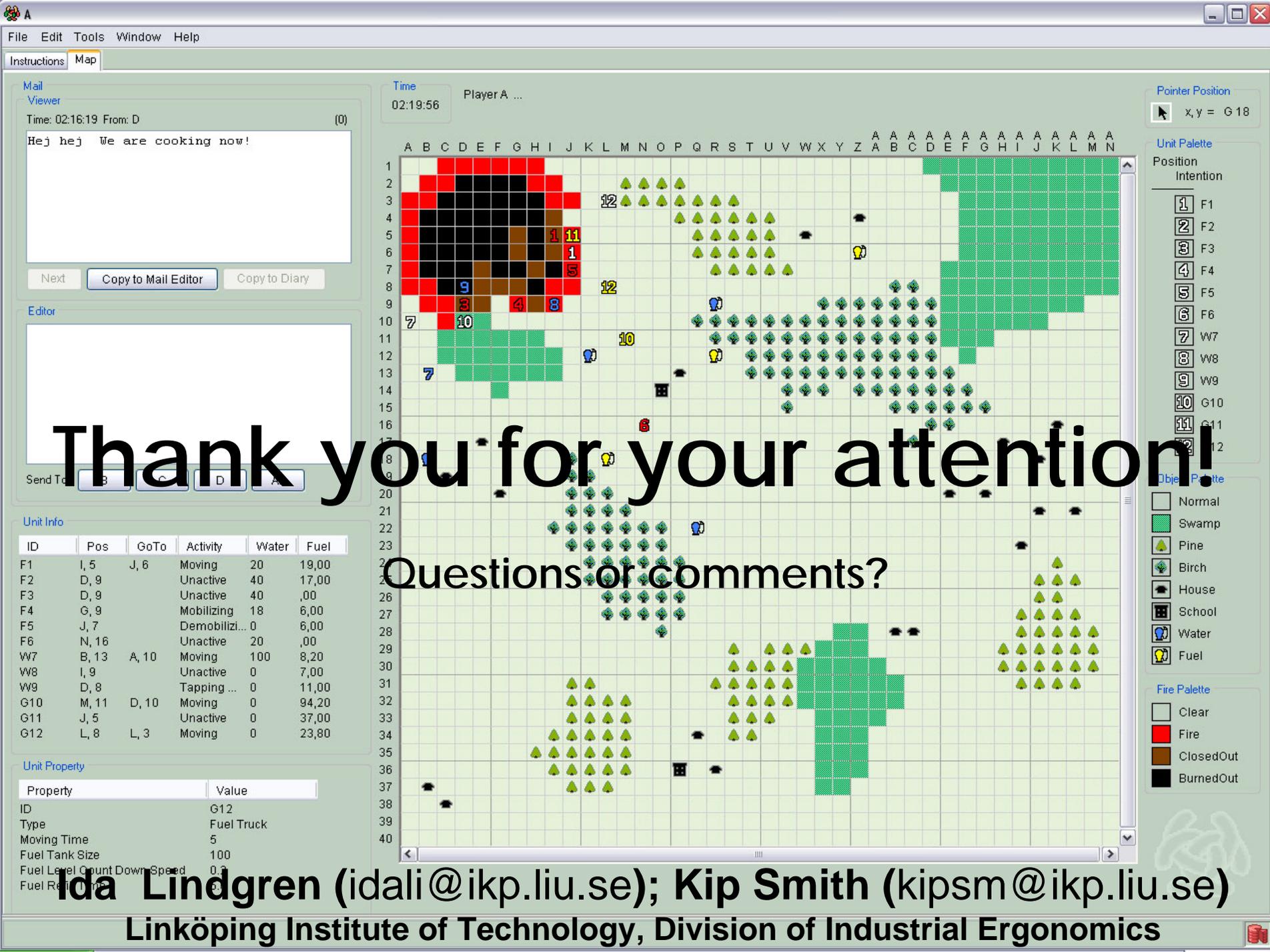
- The data showed that people from these three cultures have diverse norms for collaborative decision making
- The existence of cultural differences does not imply that one way is better than the other.
- These differences might lead to difficulties in cooperation.

# Implications for the OSOCC



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- Cultural aspects of cooperation and communication should be topics during training.
- Helping personnel of multinational teams learn and know about cultural differences might create understanding and promote better cooperation.



Thank you for your attention!

Questions or comments?

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