



# Interpreting Commander's Intent



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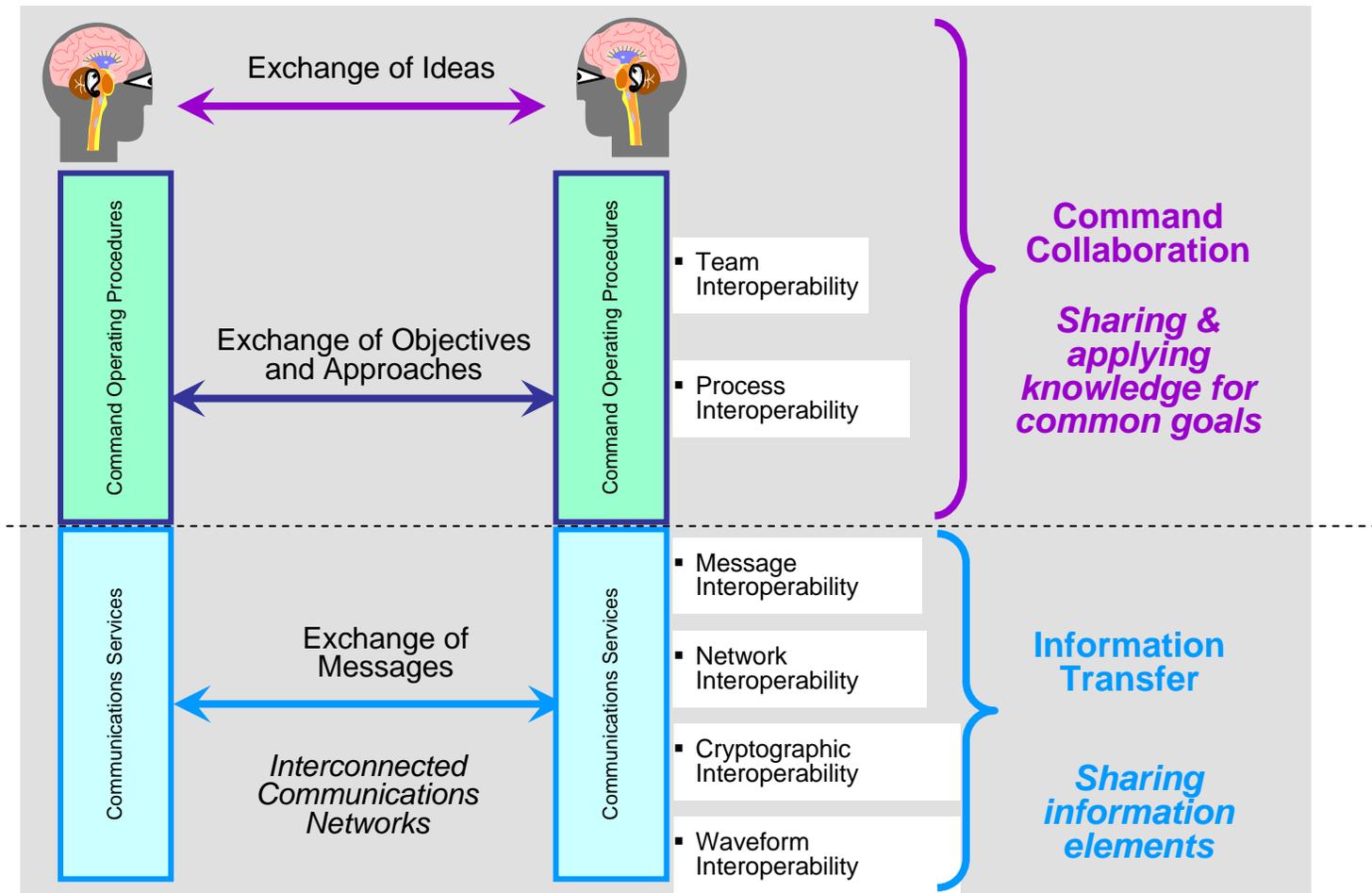
- The challenge for research, development, technology, and engineering (RDT&E)
- Commander's intent (CI), Situational Awareness (SA), Situational Understanding (SU)
- Problem statement - measuring CI / SA
- True / False Probes
- T/F Probes applied in experiment
- Conclusions & discussion



# RDT&E Challenge

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## Designing C4ISR technologies and organizational networks with human behavior in mind



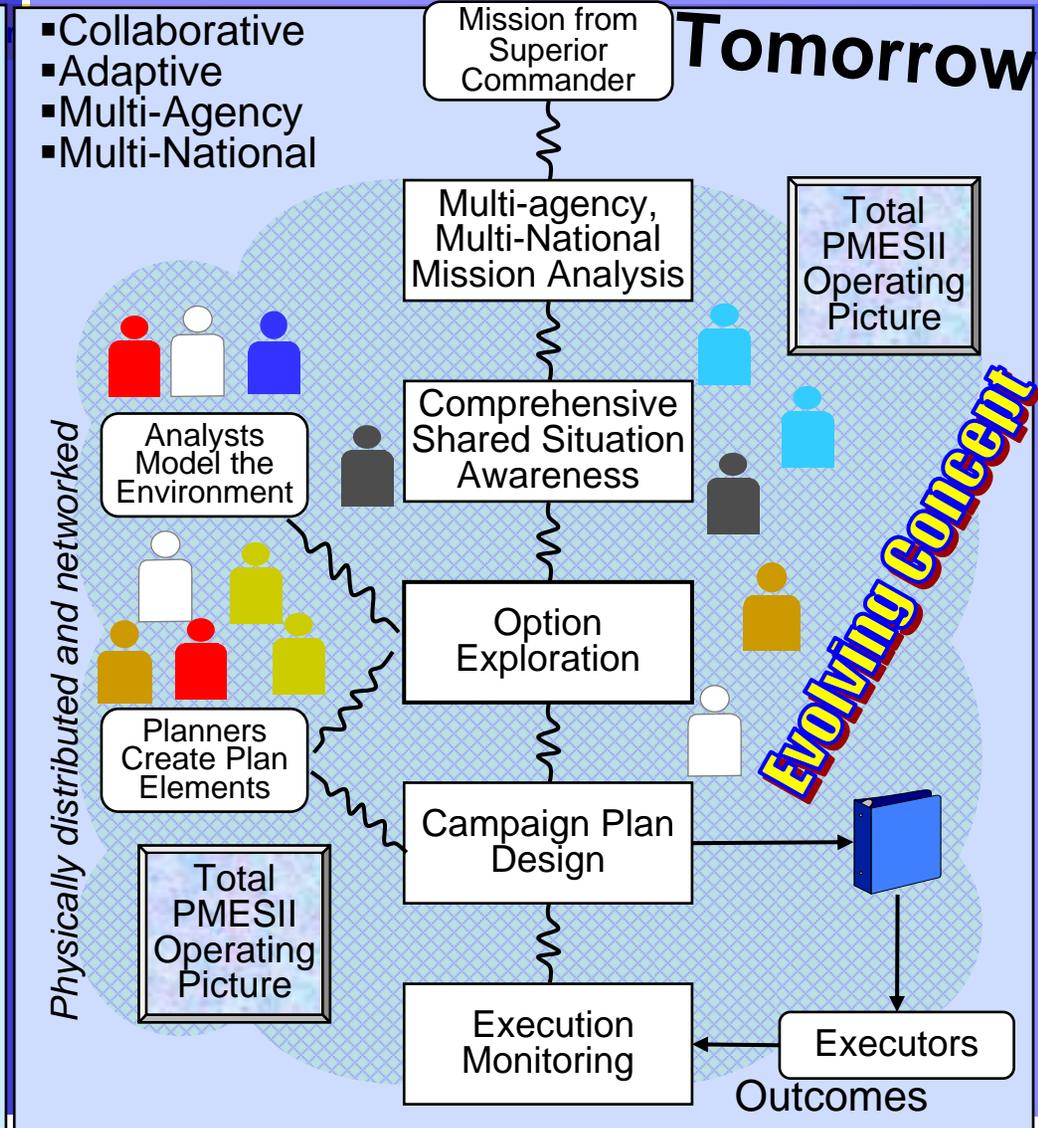
# Collaboration Environment

## Today

Military Decision Making Process using an Effects Based approach



## Tomorrow



**Challenge: continuously anticipate & adapt to an emergent situation**



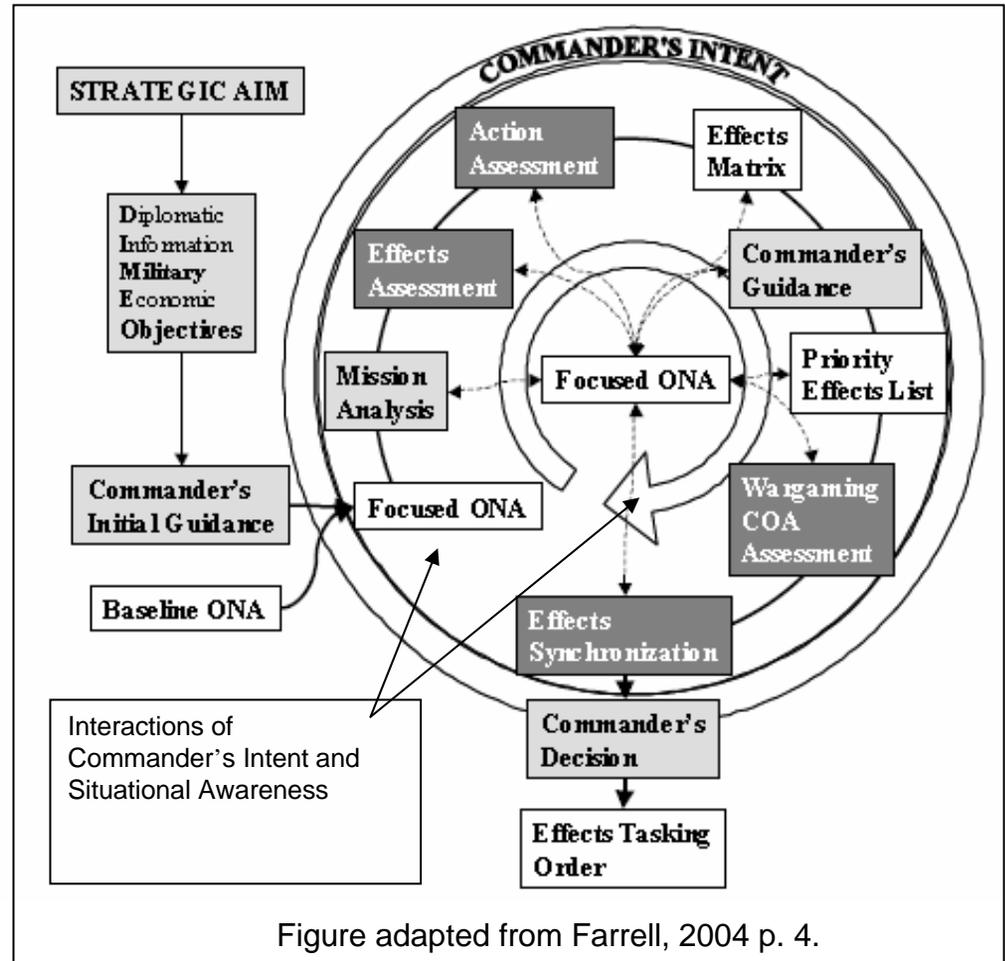
## How are they related?

- ✓ Process oriented
- ✓ Knowledge acquisition
- ✓ Technology enabled

**CI** is a statement of what the force must do and the conditions the force must meet to succeed

**SA** is knowledge of the present environment

**SU** is understanding relationships about factors in the environment





# Measuring CI / SA / SU

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ARL's approach to measuring SU was recognizing that the process for developing SU required that individuals collect and process data and make inferences about that data bounded by an understanding of the commander's intent and knowledge about the roles and responsibilities assigned to them.



**Developing SU, FMI 5-0.1**



# T/F Probe Methodology

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## Origin

### • True / False Probe Technique and SDT Analyses

Edgar, G.K., Smith, A.J., Stone, H.E., Beetham, D.L., Pritchard, C., (2000).

QUASA: QUantifying and Analyzing Situational Awareness. Paper presented at the IMCD People in Digitized Command and Control Symposium, RMCS Shrivenham, UK (CD-ROM)

### • T/F Probe and SDT applied to Commander's Intent

Multi-National Experiments 3 and 4 (Leggatt, 2005)

## Guidelines

- Reflect Commander's Intent
- Be a mixture of implicit and explicit issues
- Use simple language (probes should not be a language test for non-native English speakers)
- Not be a verbatim copy of published guidance
- Operationally relevant

Source: (Leggatt, 2005)

## Sample Probes

- The Commander wants the positive activities of the military to receive media attention (T)
- The Commander's main objective is to capture the territory of Jurongland (F)
- The Commander's intends to take every effort in IO before commencing air-strikes in Middleland (T)

## Experiment in Coalition Operations

### Objectives

Develop and evaluate technologies to improve cognitive interoperability & collaboration among joint, interagency, & multinational forces conducting combat & stability operations.



### Methods

#### Conditions

- Run 1: Degraded System Interoperability or collaboration tools
- Run 2: System Interoperability + advanced collaboration tools & team performance feedback

#### Players

- 130 Singapore Armed Forces (SAF) & Staff College Students
- US military officers (35ID & JFCOM)
- Representatives of US, SN, other government agencies and non-government organizations

#### Location

SAF Centre for Military Experimentation, Singapore, October 2 - 14 2006

### Measures

- **Situational**
  - Communication Analysis
  - Leader and Team Trust
  - Team Experiences
  - Workload
- **Dispositional**
  - Cultural Understanding – GlobeSmart Commander
  - Uncertainty Response Scale
  - Conflict Avoidance
- **Outcome Measures**
  - **Situation Understanding**
  - Commitment

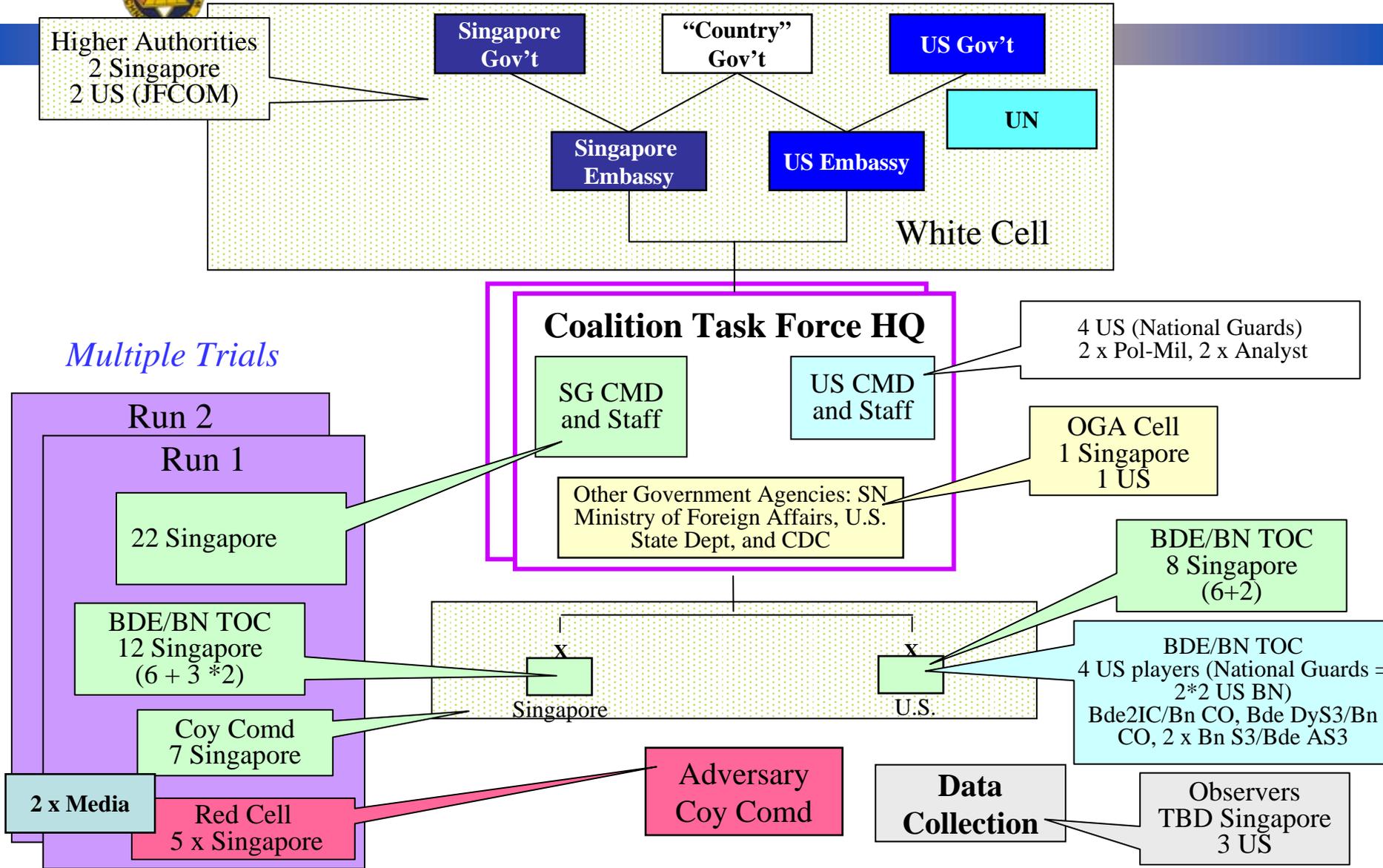


# Experiment Conditions

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| Trial  | Conditions   |
|--|--|
| <p><b>Run 1: Each entity employs its own computing and communications capability; not interoperable.</b></p> | <ul style="list-style-type: none"><li>▪ SN uses current SN C3 capabilities (not identified)</li><li>▪ US Military uses current SN C3 capabilities</li><li>▪ US non Military uses private services (voice, chat, message)</li><li>▪ Other entities use public services (voice, chat, message)</li></ul> <p>Emulated using private services for voice, chat, message</p> |
| <p><b>Run 2: Each entity employs a fully interoperable computing and communications capability.</b></p>      | <ul style="list-style-type: none"><li>▪ All entities use <b>CATISA</b> (SN software collaboration tools) in full collaborative mode to represent an interoperable collaboration system</li><li>▪ Selected entities will receive <b>TeamViz</b> feedback about team communication and collaboration</li></ul>   |

# Experiment Organization





# Experiment Hypothesis

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Future systems (collaborative and context aware) will improve efficiency and effectiveness of coalition civil-military operations, as compared to current systems (Run 1), in terms of:

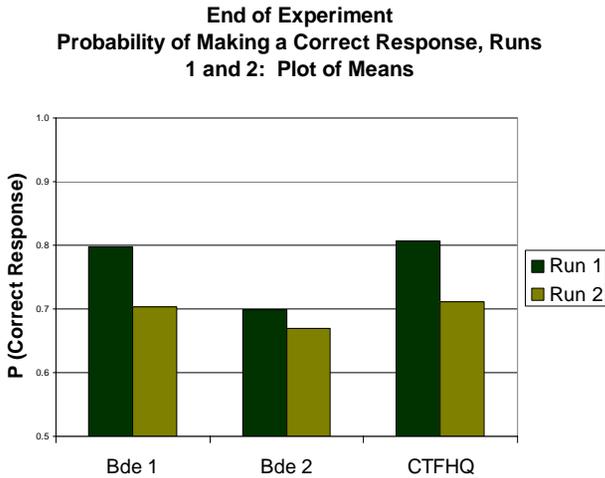
- **Degree of understanding the situation**
- **Degree of understanding mission and “commander’s intent”**
- Ability to adapt to unforeseen critical incidents
- Plan confidence
- Level of trust between team members
- Communication patterns and content
  - more likely to communication within/between teams
  - awareness of similar discussions that occur
  - awareness of groupthink



# Results: Situational Understanding

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**Objective:** To determine if a difference in performance exists between a non-collaborative (Run 1) and a fully collaborative (Run 2) distributed and collocated multinational CTFHQ?



**Run 1:**

N: 23 (Represents only 43% of data due to incomplete responses)

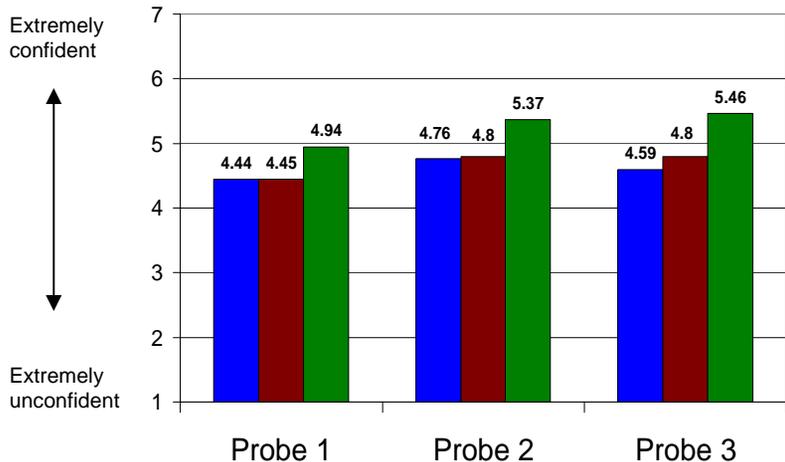
M: 0.7717 ( $\pm 0.028$ )

**Run 2:**

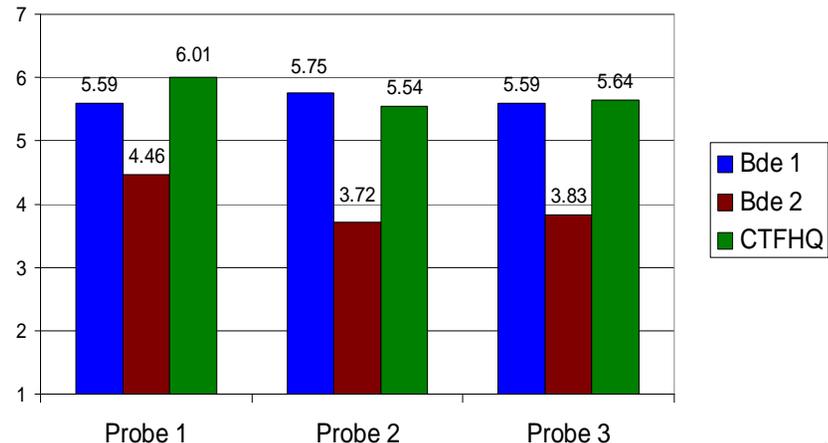
N: 21 (Represents only 53% of data due to incomplete responses)

M: 0.6995 ( $\pm 0.029$ )

Run 1 - Team Confidence Ratings:  
Plot of Means



Run 2 - Team Confidence Rating:  
Plot of Means





# Results: Situational Understanding

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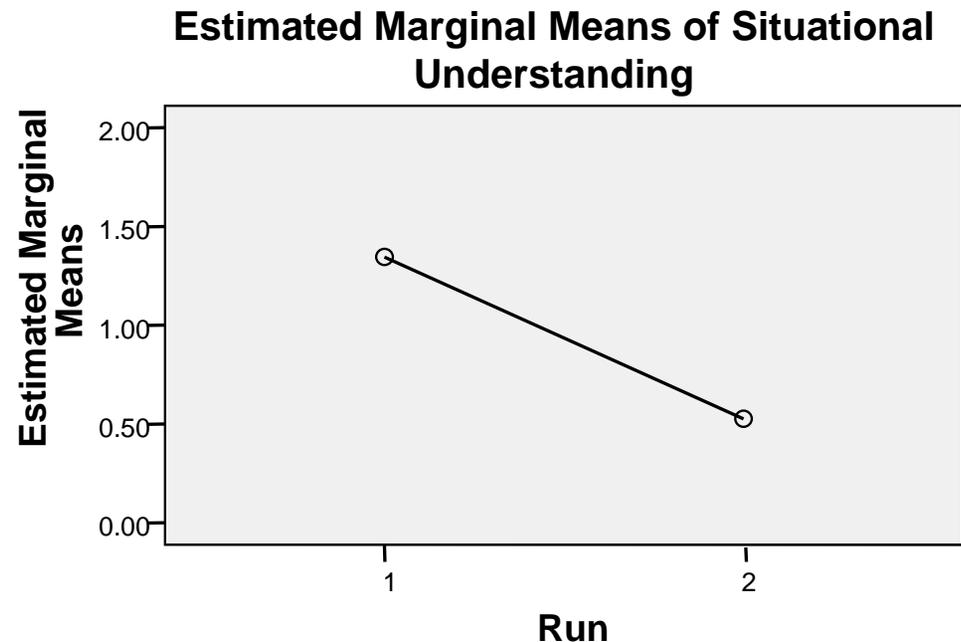
Bottom Line Up Front: Run 1 participants out performed Run 2

**Situational Understanding: A significant difference exists in a CTFHQ's ability to identify true statements about the situation**

$F(1, 43) = 14.858, p = .000433$

Run 1:  $N = 23, M: 1.35, SD: 0.159$

Run 2:  $N = 21, M: 0.49, SD: 0.102$





- **Confidence Ratings**

- Participants are generally confident about their responses
- Appears to be a difference between the CTF and Brigades in Run 1, while Brigade 2 in Run 1 were less confident than the CTF and Brigade 1
- Anecdotal: The closer you are to the CTFHQ, the more confident you are in your ability to gain situational understanding

- **Correct Response**

- Overall, Run 1 CTFHQ demonstrated the highest probability of making a correct response with its CTF earning the highest probability of correct responses ( $0.8071 \pm 0.021$ )

- **Situational Understanding**

- Run 1 CTFHQ performed better than Run 2 CTFHQ at discriminating true versus false statements
- Anecdotal: SU was probably greater in Run 1 CTFHQ due to an overall confidence and understanding of the traditional planning process, and the result of emerging strategies for improved information management



# T / F Probes

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### 1<sup>st</sup> Iteration

1. The CTF Commander wants the positive activities of the military to receive media attention. [T]
2. If the opposing force were to expand their operations beyond the Naval port, The Freedom CP has full and immediate authority to engage the enemy. [T]
3. The CTF Commander notes that Terrorist suspects are not a part of the Middleland forces. [T]
4. The role of the Intel Analysts is to assist in finding out potential suspects seeking to increase violence in Jurongland. [T]
5. The CTF Commander notes that military intervention in the area must be persistent and consistent. [T]
6. Jurongland has been investing in chemical and biological agents. [F]
7. The CTF Commander does not regard the establishment of basic human rights as a priority. [F]
8. The CTF Commander's main objective is to capture the territory of Jurongland. [F]

### 2<sup>nd</sup> Iteration

1. The establishment of the No-Fly Zone and Zone of Separation in Middleland is to not disrupt civil or economic activities. [T]
2. The Commander intends to use international pressure and economic sanctions to deter Middleland from further invasion. [T]
3. The Commander intends to use a show of force if evacuations create additional violence.[T]
4. The Commander regards the establishment of security and peace as a priority over and above recapturing the Naval facility. [T]
5. The Commander intends to take every effort in IO before commencing air strikes in Middleland. [T]
6. The Tiger Beer truck explosion was attributed to the Middleland Forces. [F]
7. ECA B (Economic Survival) is deemed to be the most dangerous for the coalition forces.[F]
8. 1st Bde is to assist the Jurongland Homeland Security Forces in maintaining peace and security. [F]

### 3<sup>rd</sup> Iteration

1. The establishment of the No-Fly Zone and Zone of Separation in Middleland is to not disrupt civil or economic activities. [T]
2. The Commander intends to use international pressure and economic sanctions to deter Middleland from further invasion. [T]
3. The Commander intends to use a show of force if evacuations create additional violence.[T]
4. Sharing information with the NGOs is in line with the Commander's intent to avoid civilian casualties. [T]
5. If the CTF receives media credit for the recapture of the naval facility, this would be in line with Commander's intent. [F]
6. The Commander does not regard the establishment of a strong Jurongland government as a priority. [F]
7. ECA B (Economic Survival) is deemed to be the most dangerous for the coalition forces.[F]
8. 2nd Bde is tasked to defend the Naval facility. [F]