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Human Factors in Combat ID – An International Research Perspective

Julie Gadsden - Defence Science & Technology
Laboratory, UK Ministry of Defence

David Krause – DSTO, Australia

Murray Dixon – Canadian Forces Experimentation Centre

Larry Lewis – Joint Center for OA, US JFCOM

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DSTL/CP28560

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Structure

- The Technical Cooperation Program (TTCP) – Joint Systems and Analysis (JSA) Group – Action Group 13 (Fratricide Mitigation)
 - Objectives of the work programme and the workstreams
- UK Fratricide Board of Inquiry report analysis
 - What this tells us about causal factors – including human factors
- AG13 Conclusions and Recommendations
 - From a human factors perspective
- UK MOD's Combat ID Human Factors research programme

TTCP JSA AG13 “Fratricide Mitigation”

- Mandate:
 - “To provide a broad appreciation of the issues related to the mitigation of fratricide.
 - “... including an examination of the trends in fratricide over the period from the first Gulf War to the present.
 - “... to postulate approaches that could be taken to mitigate fratricide, without negatively impacting on mission success or overall casualty rates.
 - “... suggestions for how the TTCP nations should progress ... in terms of future R&D.”
- June 2004 – August 2007
- Canada (chair), Australia, UK and US

AG13 Workstreams

- **Historical Record:**

- The role of the historical record in understanding fratricide

- **Mission/Combat Effectiveness:**

- Analysis of the impact upon mission and combat effectiveness of the employment of strategies for fratricide mitigation

- **Network-Enabled Operations:**

- Analysis of the implications for friendly fire when operating in a network-enabled environment

- **R&D:**

- Analysis of the nations' friendly fire related R&D programmes, with identification of synergies, gaps and collaborative opportunities

- **Solutions:**

- Overview of the nations' current Combat ID solution strategies

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Fratricide incident sample

- 10 fratricide incidents selected for detailed study
 - Operation GRANBY (Operation Desert Storm) - 1991
 - Operation PROVIDE COMFORT (humanitarian aid in northern Iraq) - 1994
 - Operation TELIC (Operation Iraqi Freedom) - 2002/2003
- Chosen on the basis of:
 - detail of reports available
 - reliability of information sources

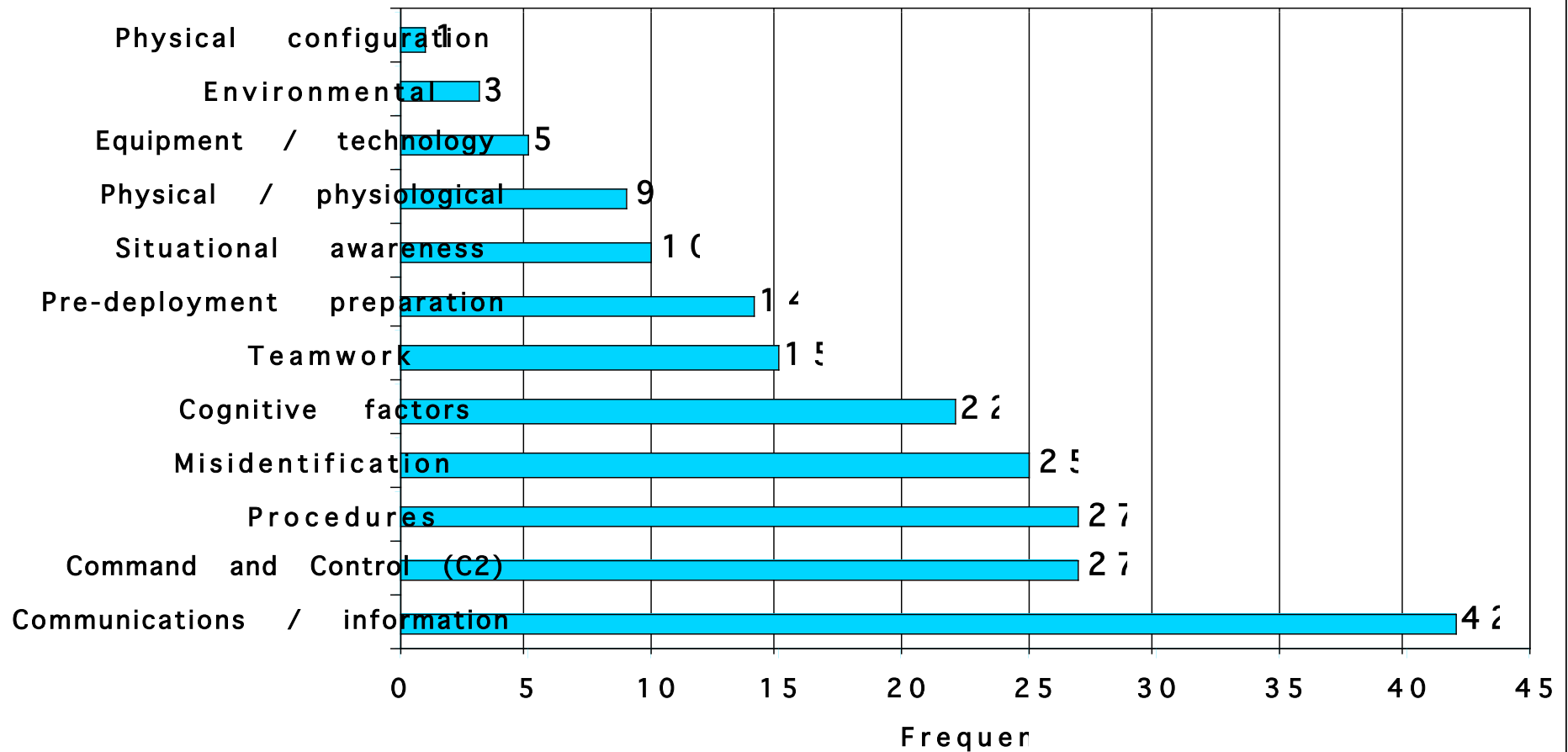
Fratricide Causal Analysis Schema

- Command and Control
- Procedures
- Equipment/Technology
- Situational Awareness
- Misidentification
- Physical/Psychological
- Pre-deployment Preparation
- Teamwork
- Environmental
- Communications/Information
- Platform Configuration
- Cognitive Factors

Fratricide Causal Analysis Schema

- **Command and Control**
 - Procedures
 - Equipment/Technology
 - Situational Awareness
 - Misidentification
 - Physical/Psychological
 - Pre-deployment Preparation
 - Teamwork
- Commander's intent
 - Orders
 - Briefing
 - Planning
 - Co-ordination
 - Disruption of C2

Prevalence of causal categories



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AG13 human factors R&D issues

- Understanding the human decision-making process
- Understanding the factors that affect a person's trust in other people and in technology
- Identifying the key information elements necessary to conduct mission tasks
- The optimal employment of humans and technology to distribute information and to enable the understanding of circumstances
- The influence of culture on human behaviour as individuals and in teams
- The need for learning to keep up with rapid change

Recommendations – operations

- Solutions must be developed with a system-of-systems point of view
 - and the human is part of that system!
- We need integrated and interoperable solutions
 - both technologies and tactics/techniques/procedures (TTPs)
- Better training is a potential major contributor
 - M&S and SEs to improve awareness of issues
 - Recognition training systems
- Improved training strategies should be adopted
 - Including training on new systems – to build trust in systems
- Include Combat ID objectives in Coalition exercises

Recommendations – R&D

- Recognise that Combat ID solutions lie across domains of Target ID, Situational Awareness, etc.
- Adopt a more integrated approach to human factors and technology
- Focused research on understanding human decision making in complex situations
 - **NB We definitely didn't gain a sufficient understanding of the US human factors R&D programme!**
- Collaborate with other programmes to improve model fidelity – in particular the human component

AG13: Specific areas proposed for HF investigation

- Human decision making and support
- Factors influencing preconceived notions of the area of operations
- Factors that affect perceptions of the environment and targets
- The effect of morale on combat effectiveness and friendly fire (and vice versa)
- Human-machine interface principles and design

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HF findings from recent UK studies

- Aggregated findings from recent operational research studies have highlighted the importance of:
 - Development of coherence between UK and Coalition (particularly US) TTPs and training
 - Joint and Coalition training opportunities for UK personnel engaged in delivery and planning of Close Air Support
 - Recognition training for Forward Air Controllers (FACs) and pilots using images from different sensors in different environmental conditions
 - Training for FACs in the use of Link 16 and how their data may be exploited by others
 - Where high-latency SA systems are necessarily employed, development of pragmatic TTPs and training for their use

“Reducing the Risk of ‘Friendly Fire’ and Civilian Harm – A Human Factors Perspective” (2003/2004)

- Aim: to develop an improved understanding of the human factors which gave rise to friendly fire events
- Outputs:
 - Fratricide Briefing Pack;
 - anti-fratricide aide mémoire (“Don’t be a victim. Don’t be a cause”);
 - Fratricide Incident Causality Checklist
- Checklist later developed into Fratricide Causal Analysis Schema (described earlier)

“Investigation of Historical Records to Identify Causal Factors Behind Fratricide Incidents” (2006)

- Aim: To investigate historical causes of fratricide (by examining Board of Inquiry reports) and identify the key causes and contributing factors in order to formulate recommendations for reducing their likelihood in the future.
- Outputs:
 - key environmental, organisational, social and cognitive stressors/factors cited as contributing factors;
 - recurring patterns and/or themes;
 - recommendations for reducing negative impact.

“Tactics, Techniques and Procedures and Training Scoping Study” (2006)

- Aim: to identify what needed to be done for TTPs and training to support the introduction of Combat ID capability.
- Outputs:
 - Potential key issues and challenges associated with the introduction of Combat ID capability
 - Recommendations for enhancing training to address these issues

Balance of investment in Combat Identification (2004-present)

- Balance of Investment across:
 - Situational Awareness and Target ID equipments, tactics/techniques/procedures, and training
- Requires innovative model to assess impact in terms of mission/task outcome
- INtegrative Combat ID Entity-Relationship (INCIDER) model
 - Represents human decision making process at heart of Combat Identification
 - **Inputs:** human, physical and operational factors
 - **Output:** probability of correct identification of a battlespace entity

INCIDER Relationships Model

Physical Domain

- Sensor characteristics
- Target characteristics
- Environment

Human Domain

- Pre-set characteristics
- Variable characteristics
- Physiology
- Expectation

Operational Domain

- Scenario complexity
- Context and Rules of Engagement
- Possible target options

Specific Scenario:
Provides settings for
INCIDER model

**INCIDER
Encounter Model**

INCIDER Outputs:

- P(ID)
- Range at ID
- Time to ID

“Identification of Combat ID Failures and Cross-DLOD Mitigating Actions” (2008)

- **Research question:**

- “What factors affect operators’ decisions to fire (or not), that ultimately results in destruction of a non-enemy target or failure to engage the correct enemy target?”

- **Aim:**

- To identify mitigation areas across Defence Lines of Development

- **Summary findings:**

- “There exists no single factor, failure or solution to fratricide. The best mechanism for mitigating fratricide is to provide the human decision makers in the Close Air Support (CAS) chain with relevant team training, underpinned by robust and effective procedures that support the goals and limitations of the land component.”

Questions?



14 May 2008
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