Ergonomics Challenges for Digitisation of Mission Planning Systems




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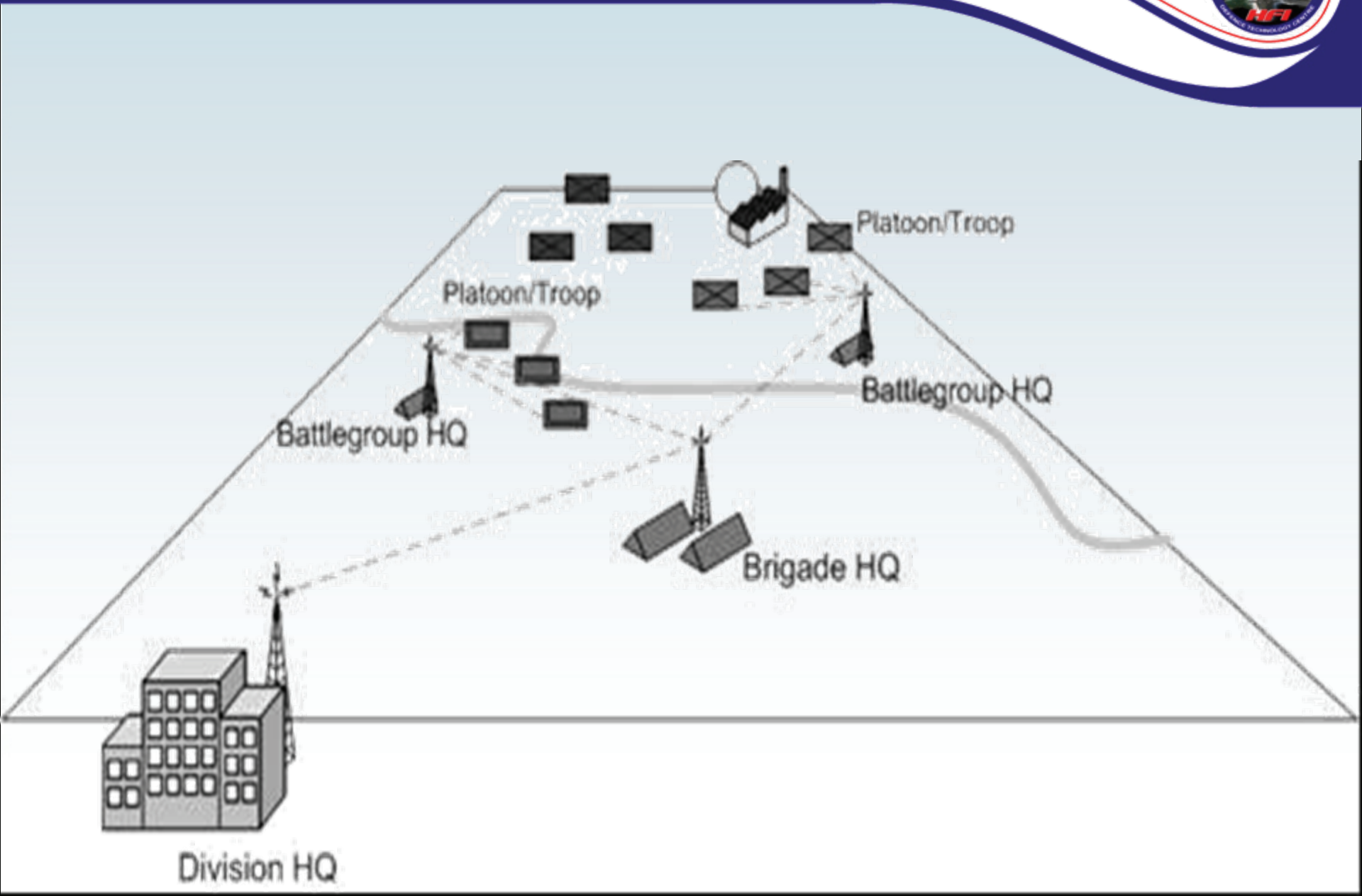
Overview

- Why digitise?
- What is mission planning?
- What needs to be digitised?
- How should it be digitised?

- Participant-observer
- Observation of training in mission planning
- Observation of field trials of mission planning (A & D)

- Presentation of analogue mission planning
- Initial thoughts for digitisation.....

Command hierarchy



Helmuth von Moltke (the Elder)

No plan survives first contact with the enemy

KISS mission planning

- “Simpler plans might allow better implementation and easier modification”
  - Klein and Miller (1999, p. 219)

- “Plans need to be simple, modifiable, flexible, and developed so that they are quickly and easily understood”
  - Riley et al (2006, p. 1143)

Constraints acting on planning

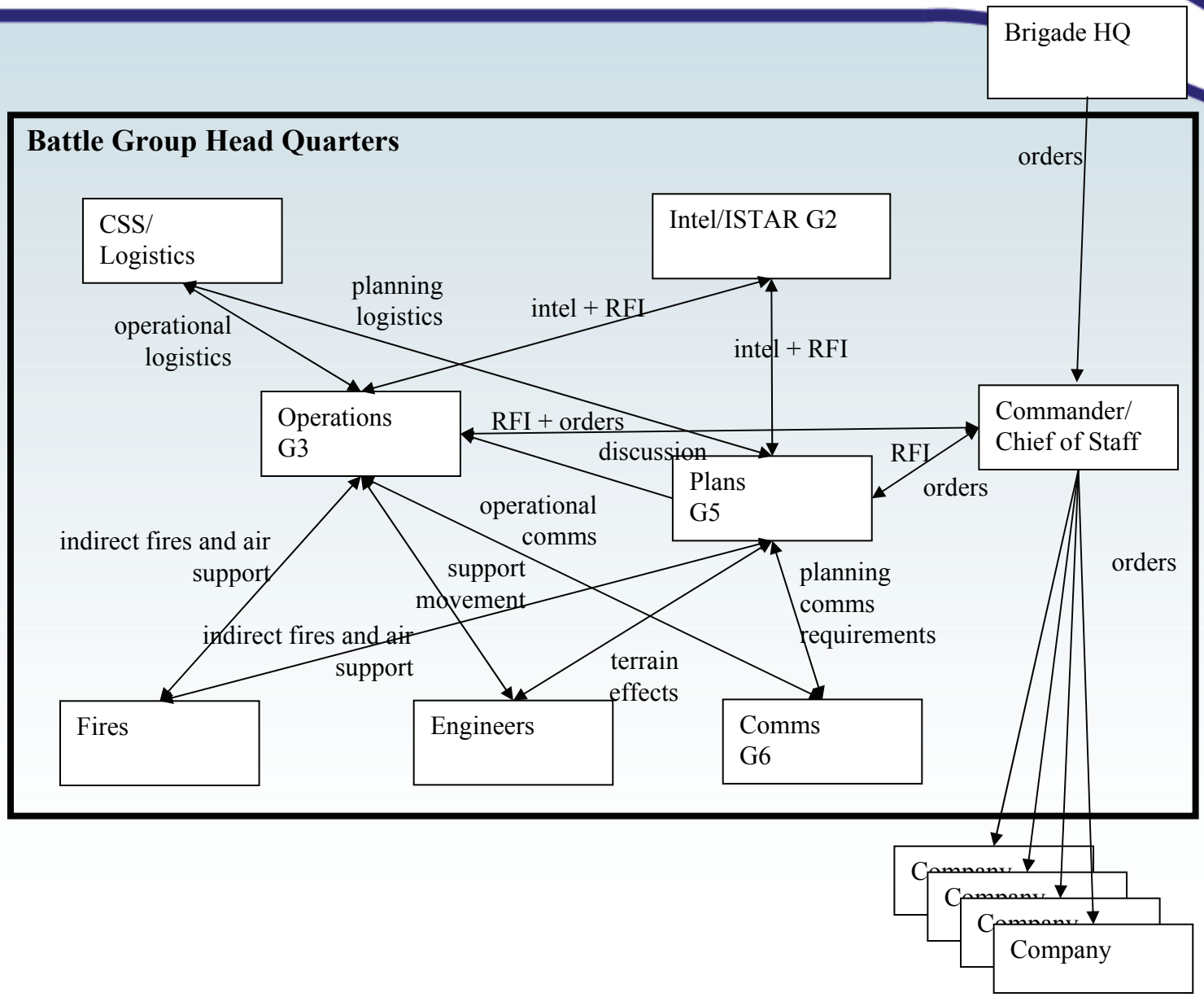
- Time pressure
- Uncertainty of information
- Availability of expertise
- Scarcity of resources
- Changing environment
- Non-compliant enemy
- Mission requirements
- Structure of tasks
- Availability of assets

Mission planning questions

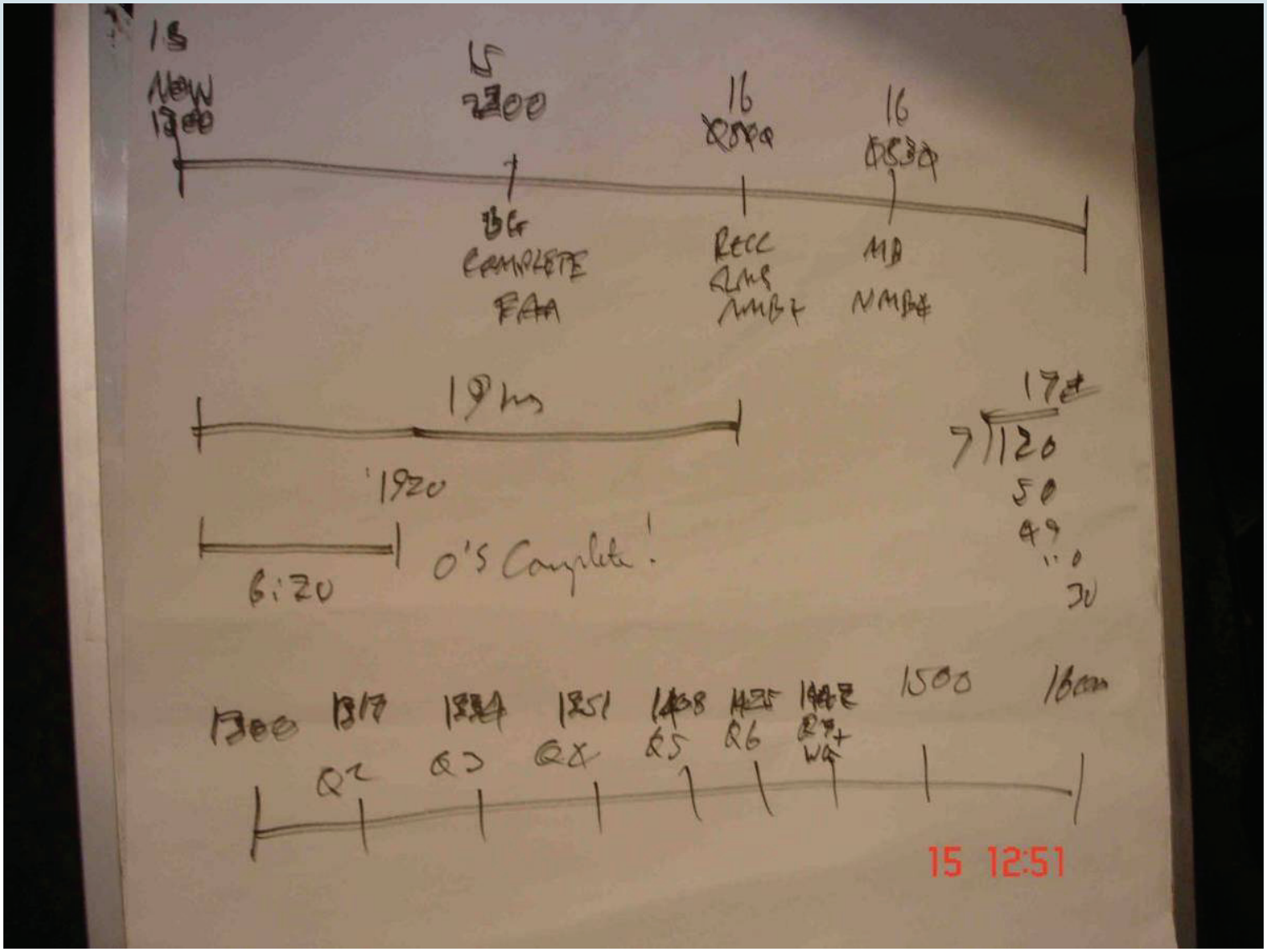
- What is the enemy doing and why?
- What have I been told to do and why?
- What effects do I want to have on the enemy?
- Where can I best accomplish each effect?
- What resources do I need to accomplish each effect?
- When and where do the actions take place in relation to each other?
- What control measures do I need to impose?

Mission planning environment

Social organisation



Planning time-line

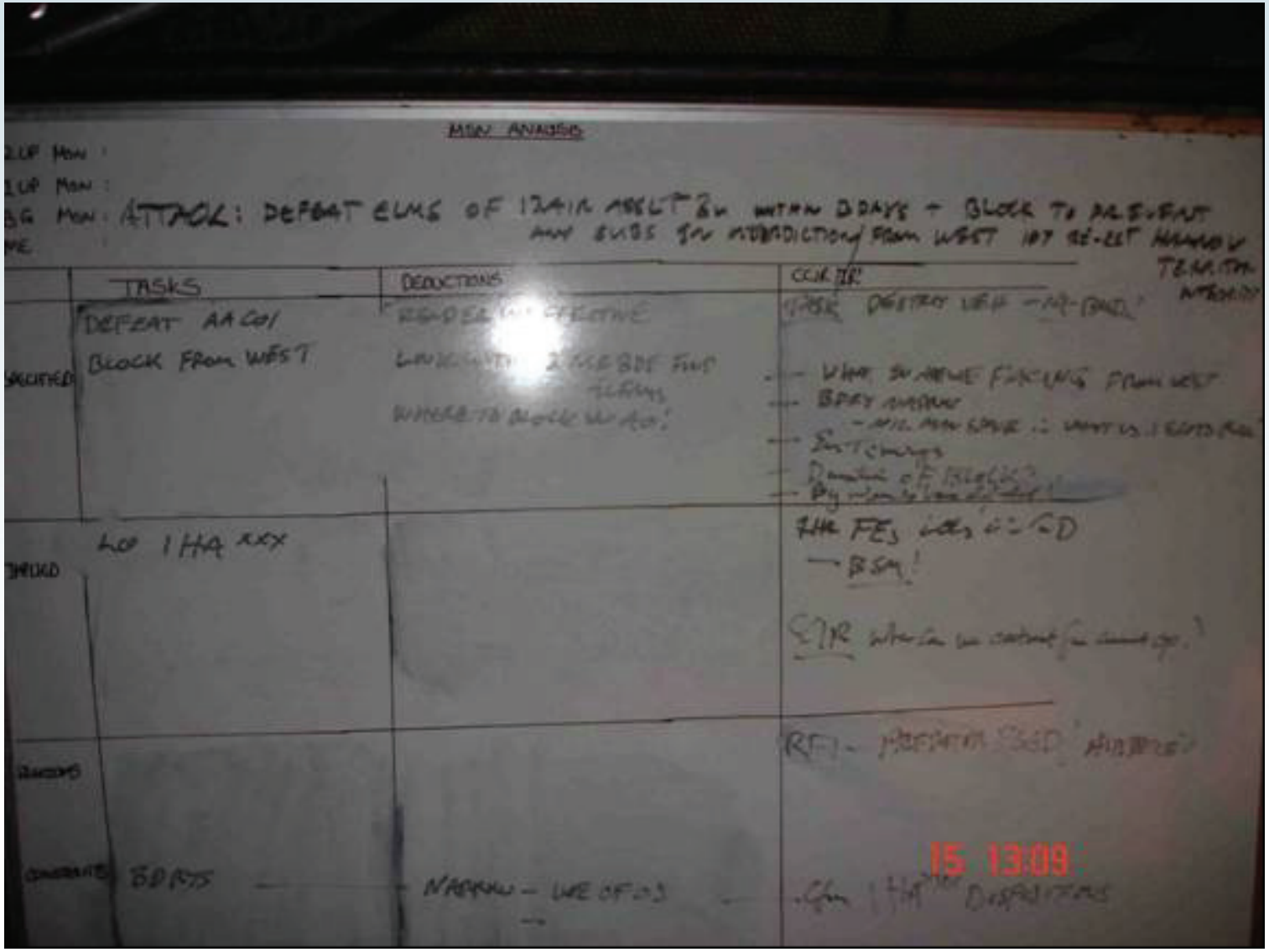


- Battle Group level plan
- Two hours planning time
- 120/7 = 17 minutes per question

What is the enemy doing?

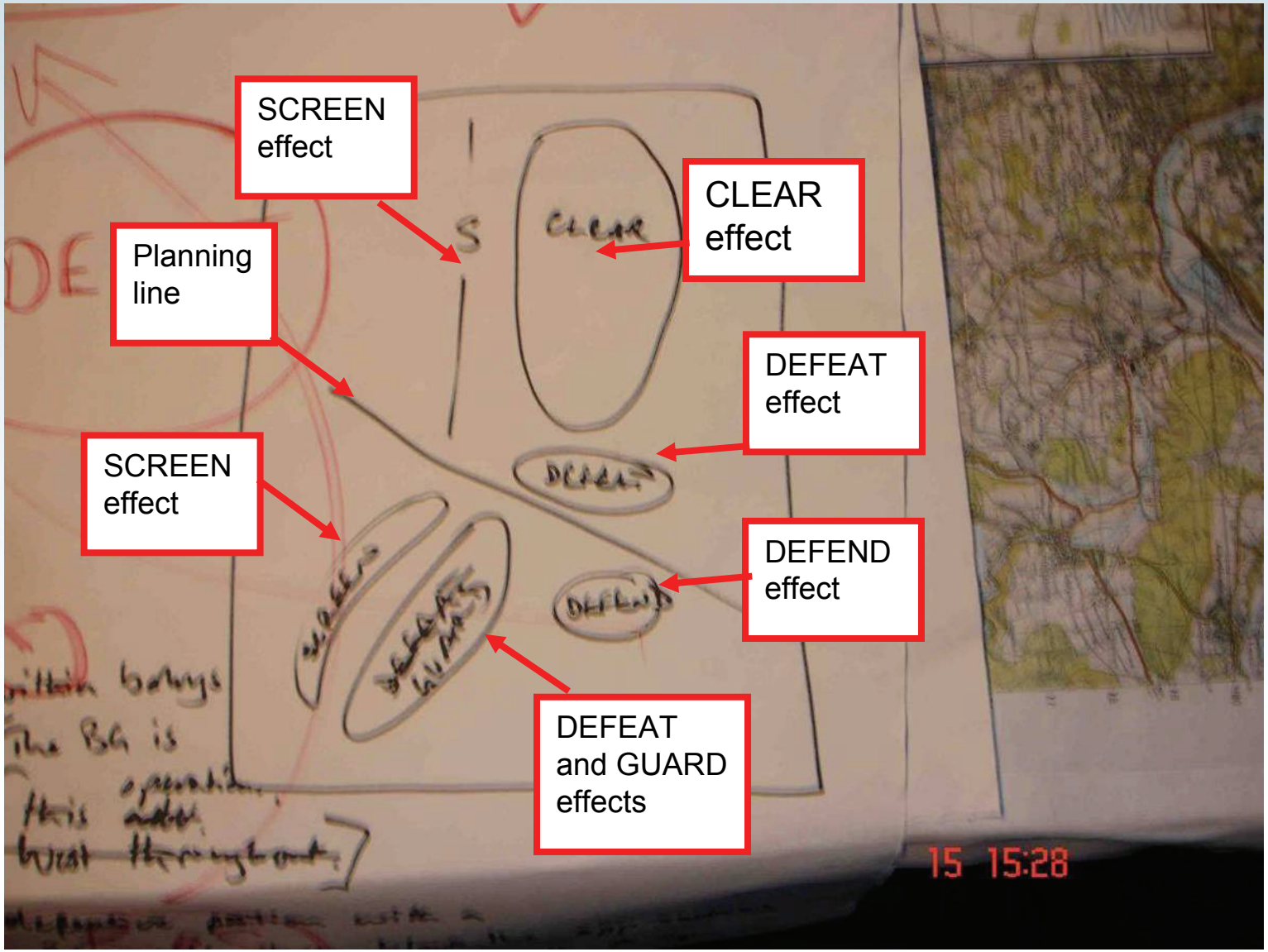
- Enemy location and strength
- Mobility corridors
- Go and slow-go areas
- Known concepts and doctrine

What have I been told what to do?



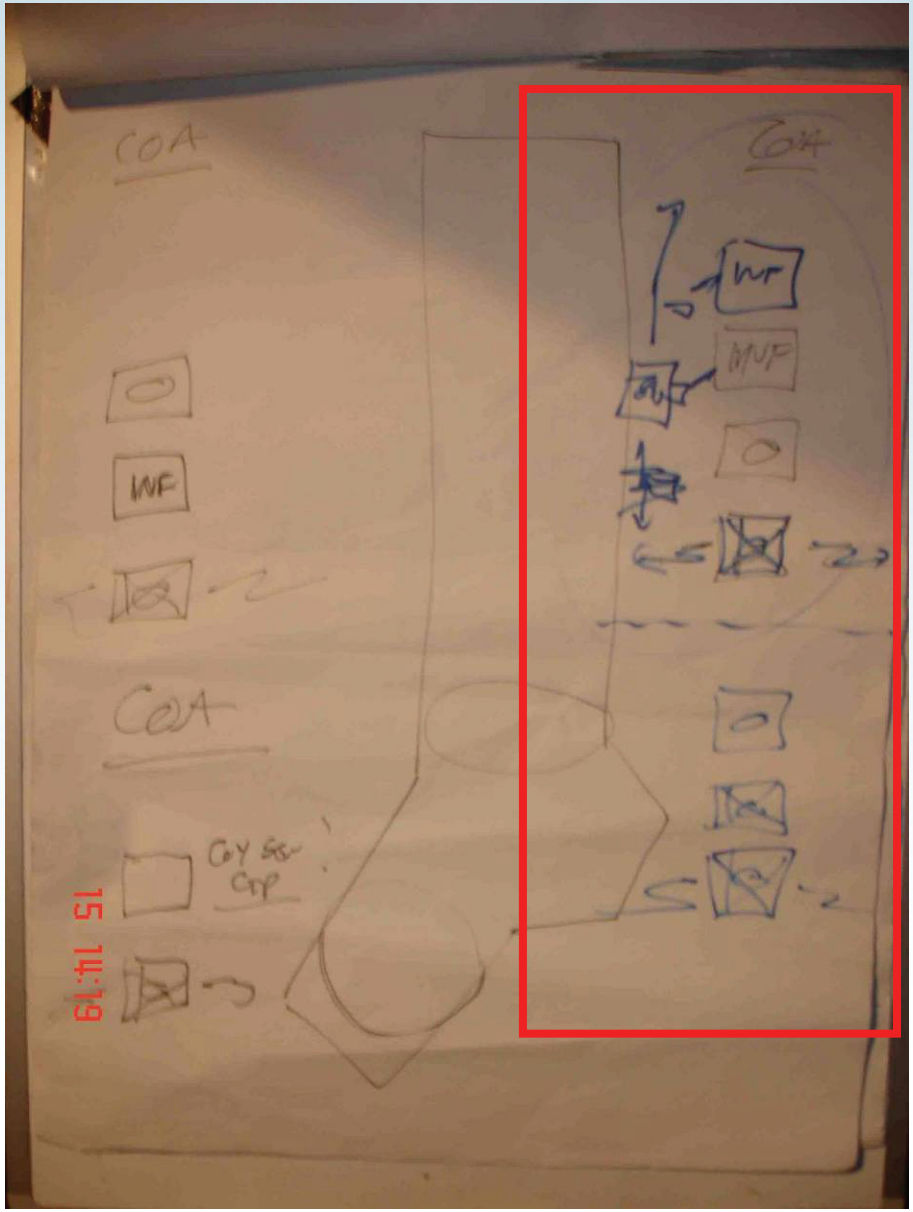
- Interpret orders
- Identify explicit tasks
- Deduce implicit tasks
- Raise CCIRs and RFIs

What effects do I want to have?



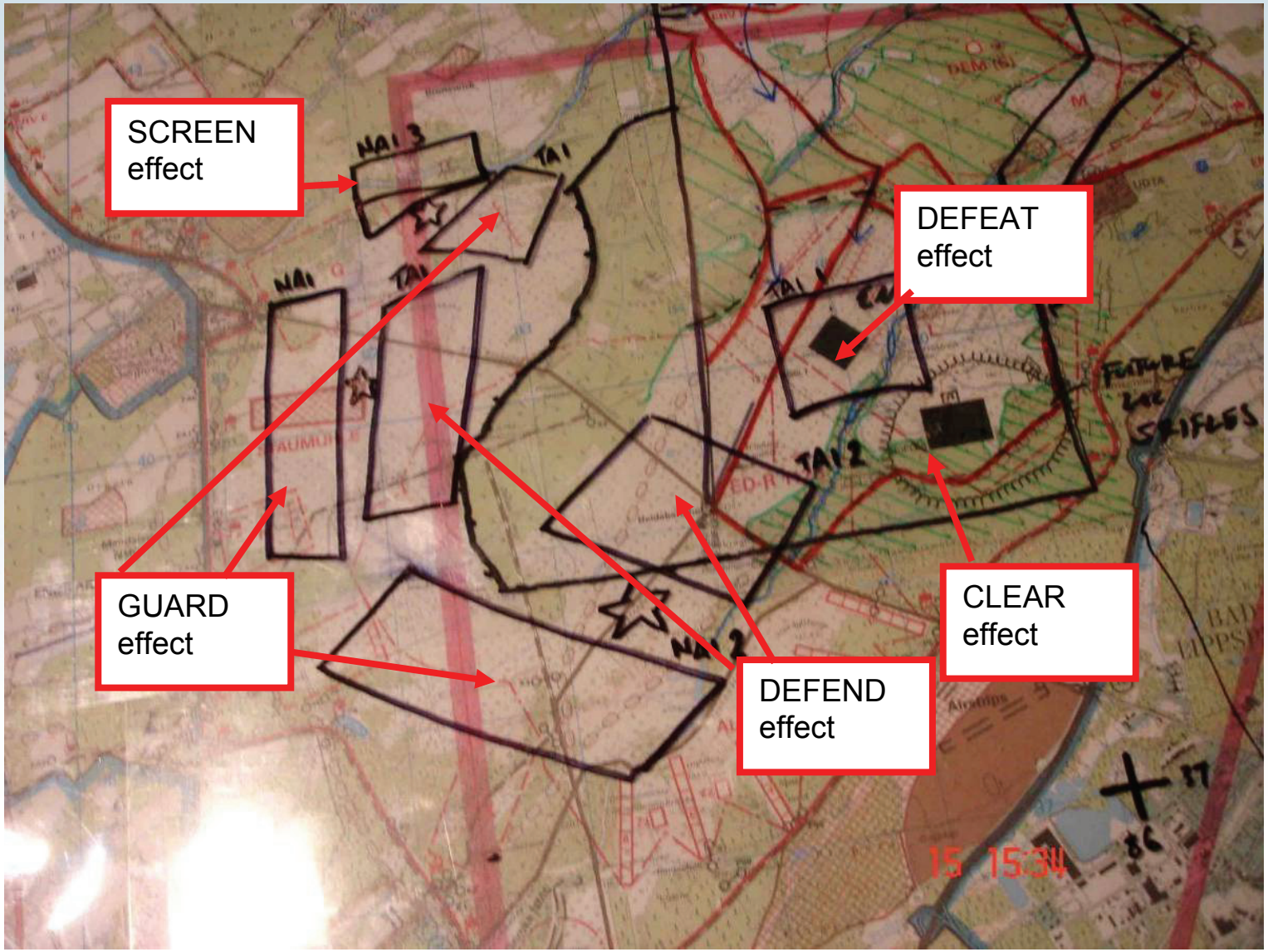
- Understand Threat and mission
- Command direction
- Main effects
- Rough outline

Where can I best accomplish each effect?



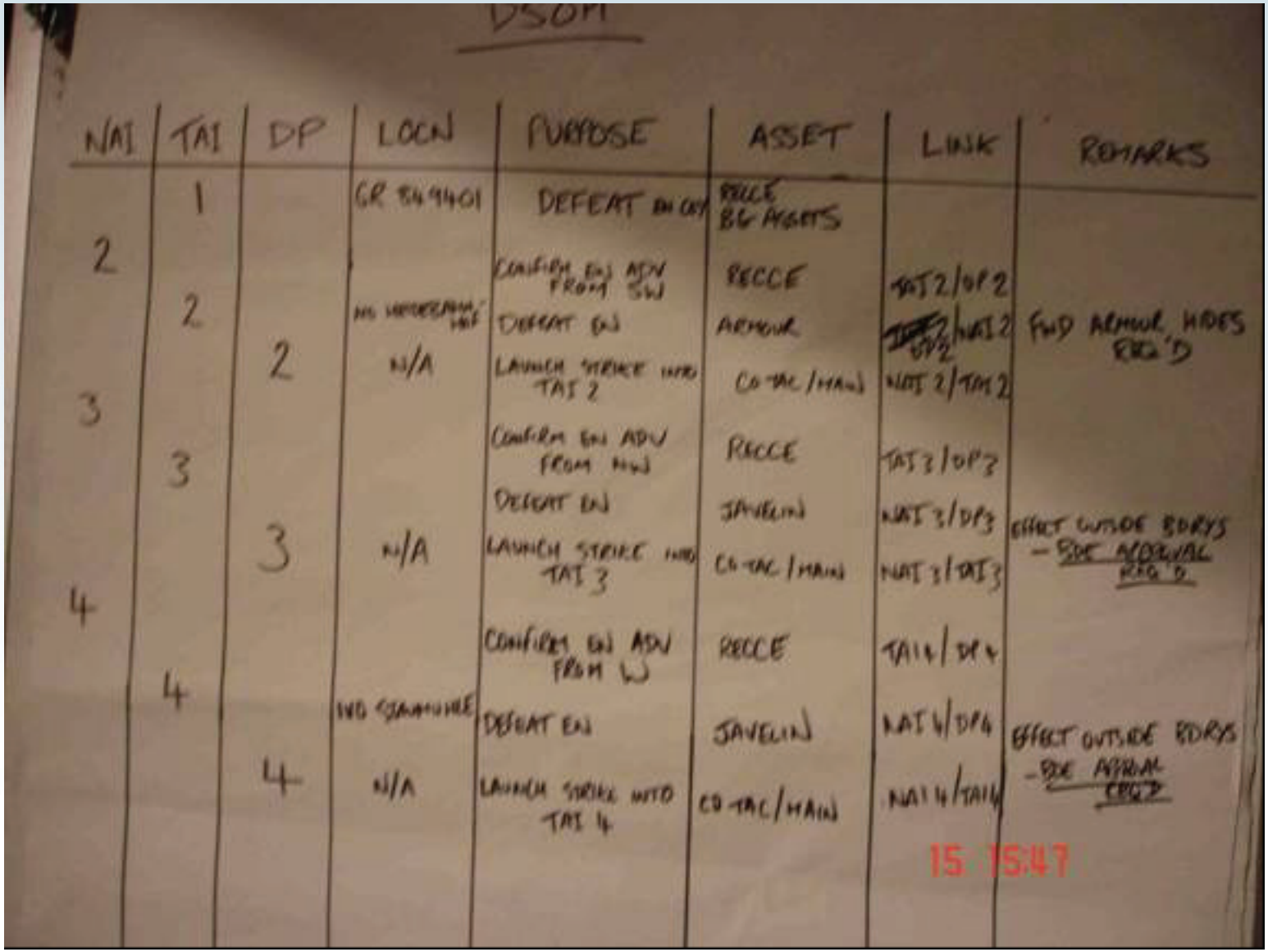
- Turn effects schematic into a COA or a selection of COAs
- Commander chooses COA that best interprets his effects schematic or cherry picks from alternative COAs or modifies COA(s)

Where can I best accomplish each effect?



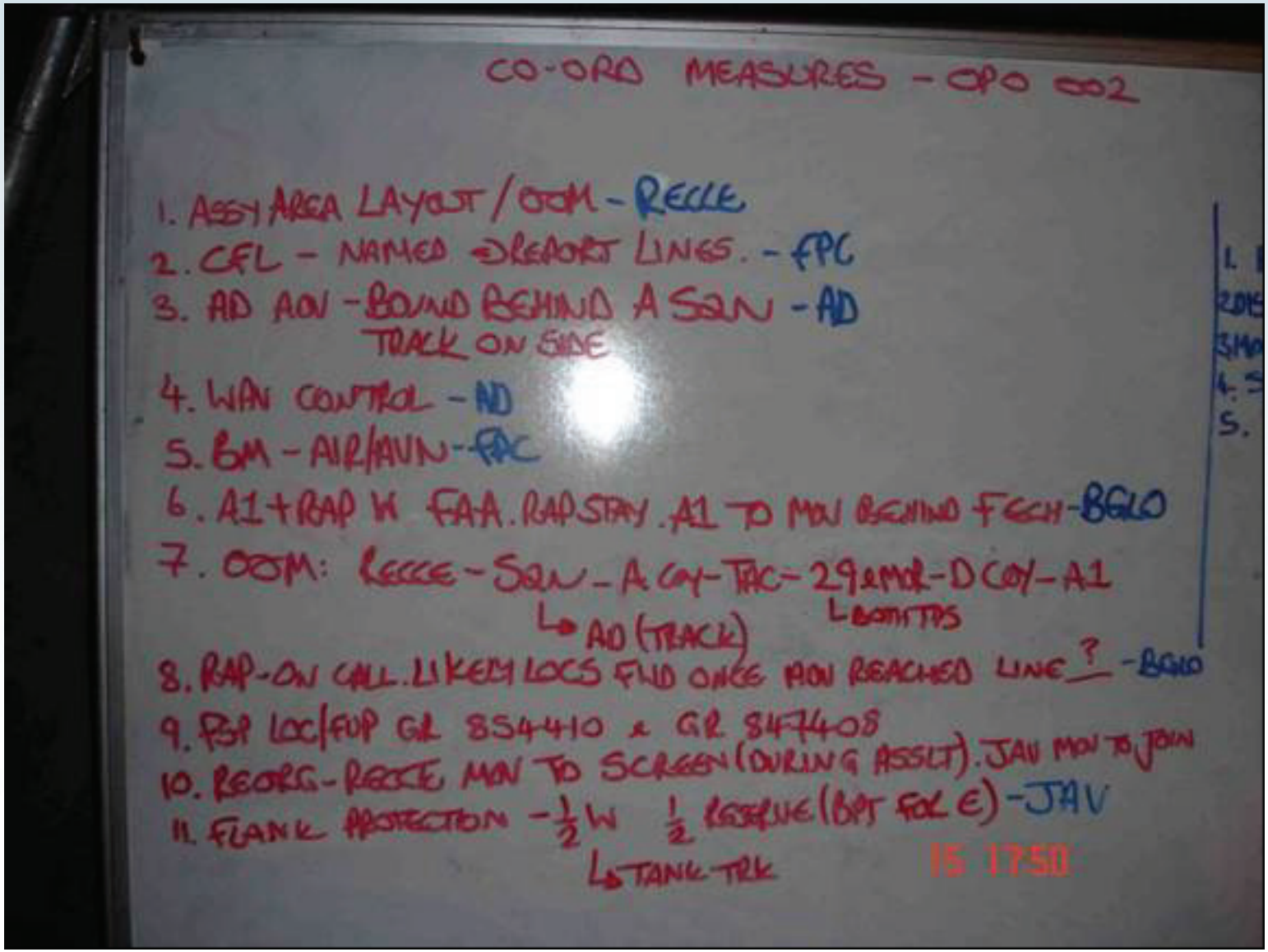
- Chosen COA mapped onto map
- Check relation between NAI, DP and TAI

What resources do I need?



- Map relations between NAI, TAI and DP
- Identify location, purpose, and asset.

Where and when to actions take place?

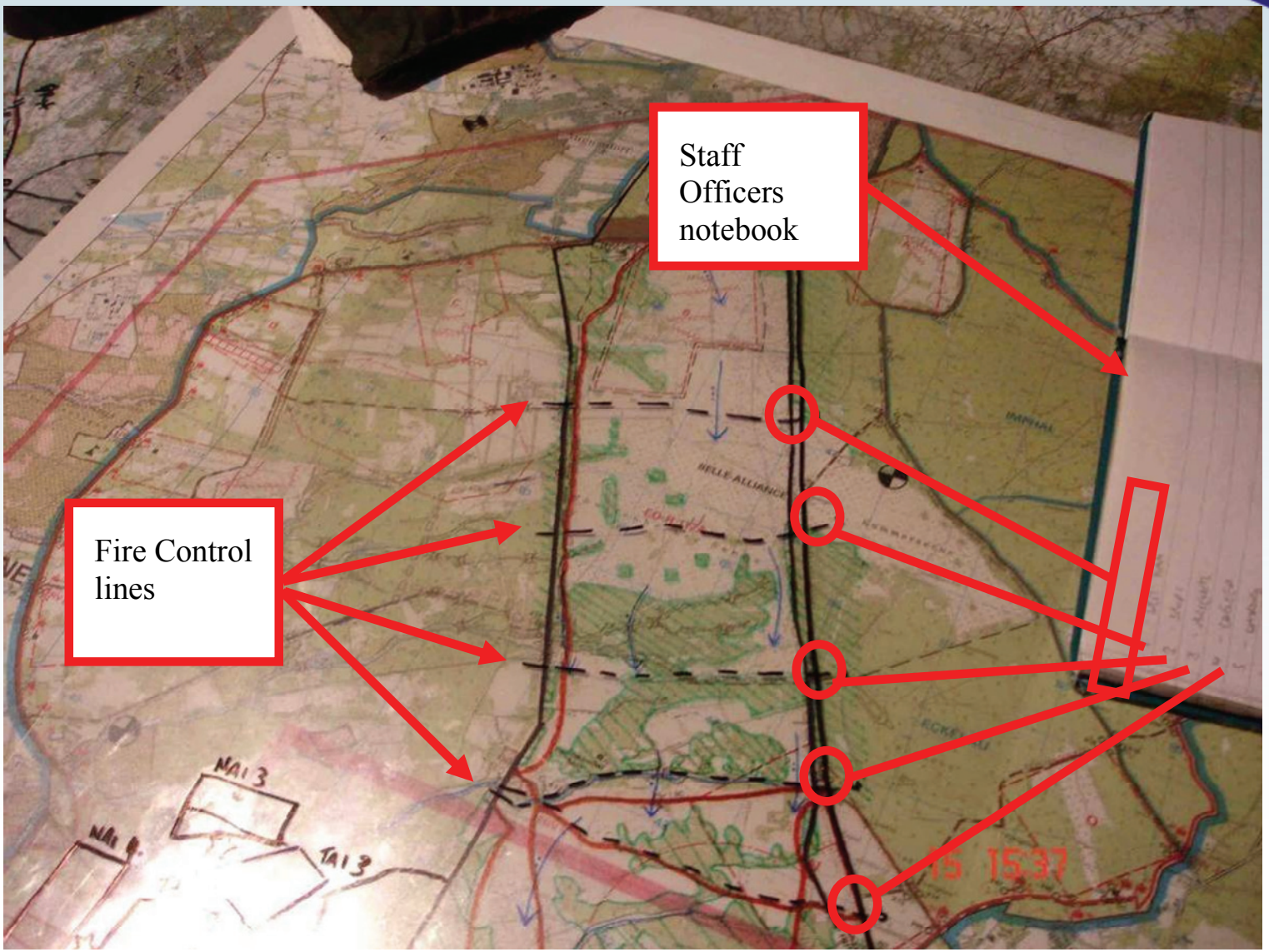


Synchronise actions and co-ordinate assets

Where and when to actions take place?

Check synchronisation via war-game to validate matrix

What control measures?



Identify control measures to help with co-ordination and help prevent fratricide

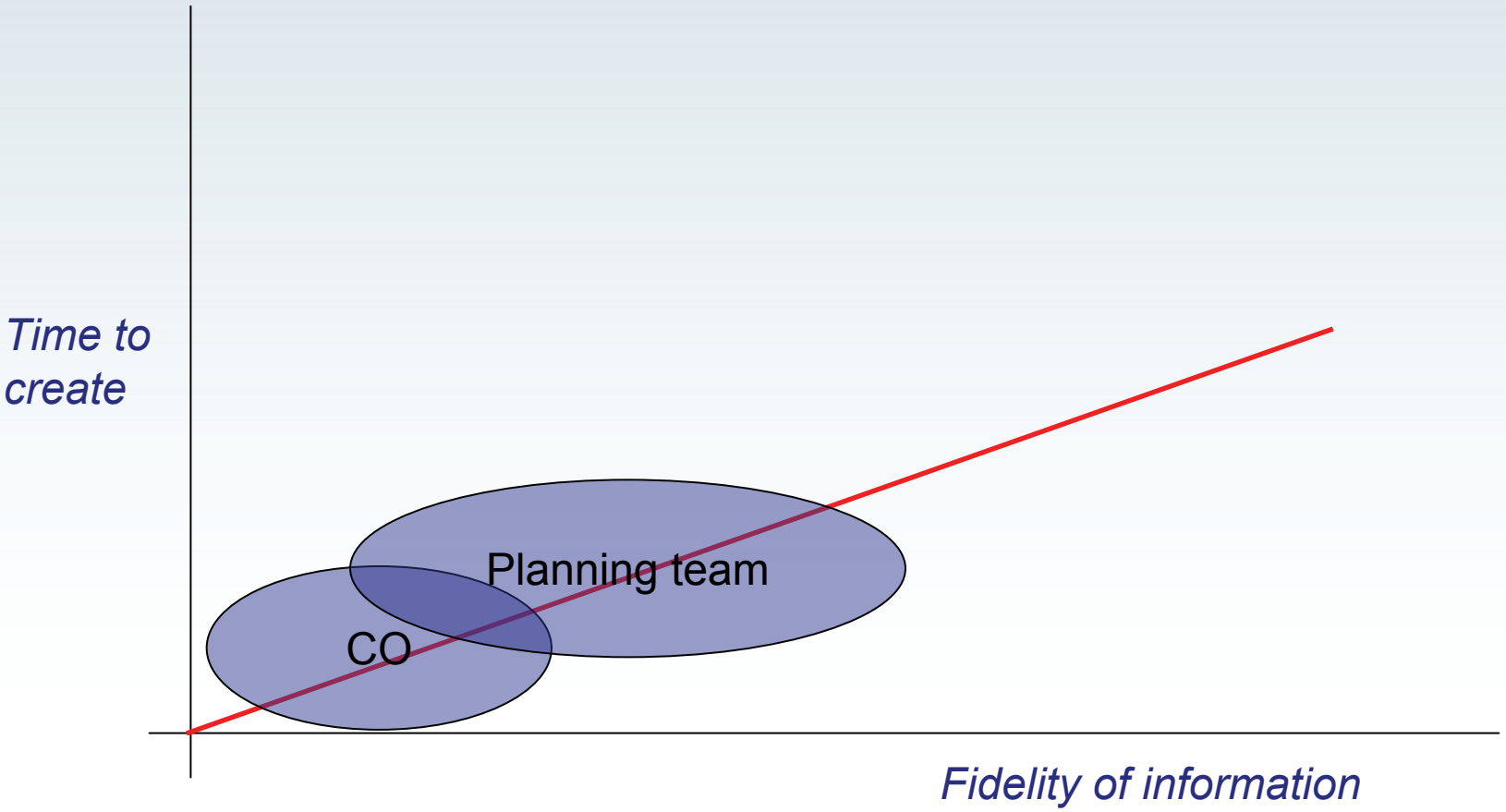
Overview of products and media

Products/Media	Paper	Maps/ Overlays	White board	Flip chart	Staff Note book
Warning order	■				
Planning time line			■		
Q1. BAE/TI		■			
Q2. Mission Analysis			■		
Q2. CCIRs/RFI			■		
Q3. Effects Schematic				■	
Q4. COA				■	
Q4. DSO		■			
Q5. DSOM				■	
Q6. War-game		■			
Q6. Co-ordination			■		
Q7. Fire control		■			■

Task work or team work?

Planning process	Task work or team work?
Q1. What is the enemy doing and why?	Cooperative activity around the table
Q2. What have I been told to do and why?	Isolated intellectual activity followed by collaborative assessment of the CCIRs and RFIs
Q3. What effects do I want to have on the enemy?	Isolated intellectual activity followed by cooperative activity around the table
Q4. Where can I best accomplish each action/effect?	Collaborative activity in which the products shared
Q5. What resources do I need to accomplish each action/effect?	
Q6. Where and when do the actions take place in relation to each other?	
Q7. What control measures do I need to impose?	

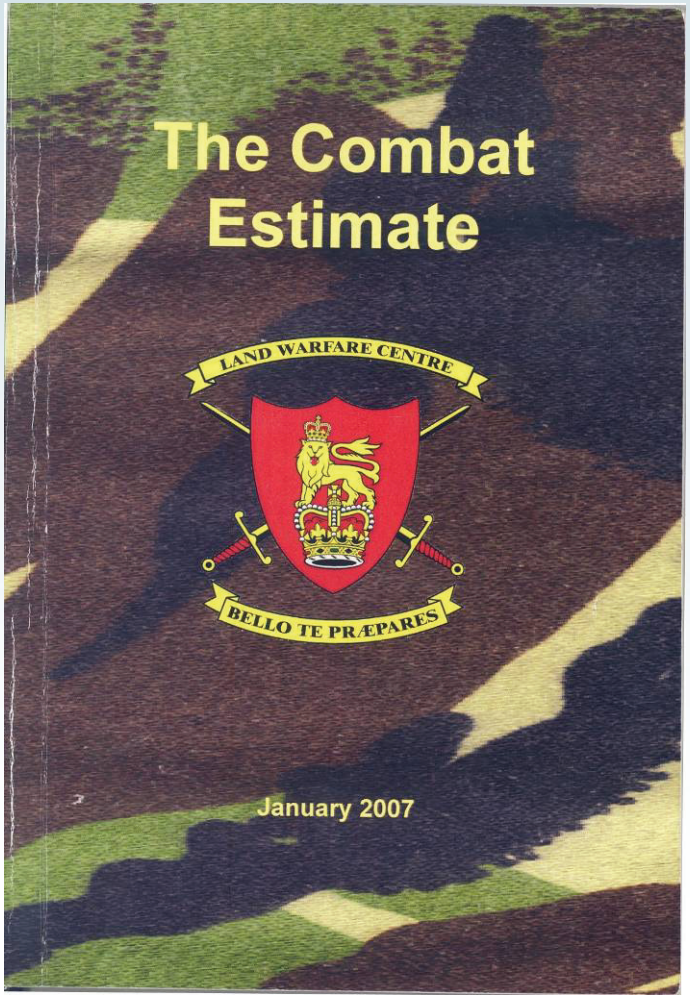
From Lo-Fi to Hi-Fi



Initial thoughts for digitisation..

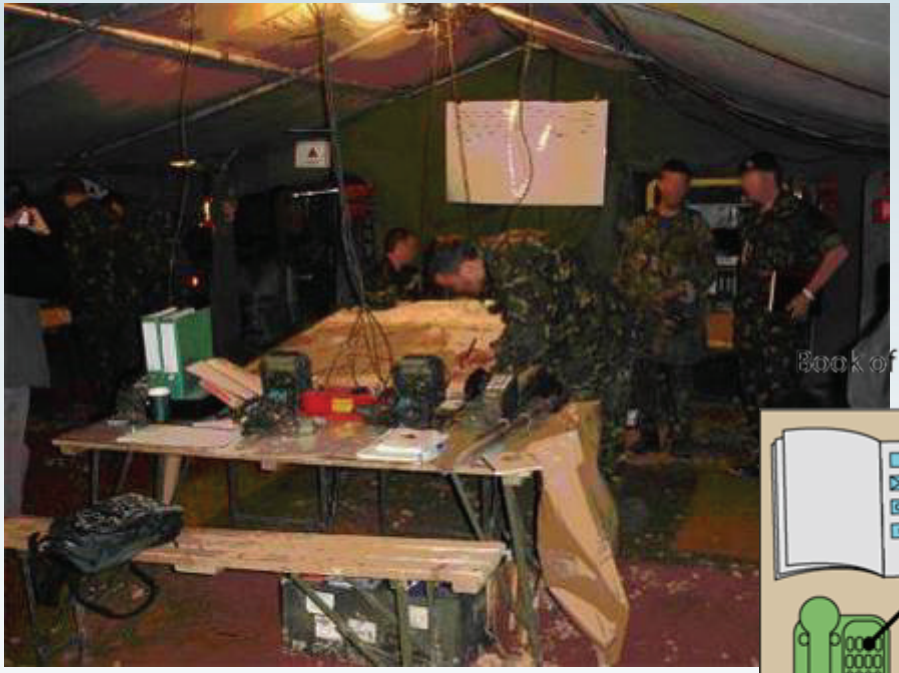
- Keep the planning process ‘public’ and ‘collaborative’
- Keep the planning process ‘elastic’ and ‘creative’
- Focus analysis on the relationship between ‘activities’ and traditional ‘artefacts’
- Support the planning process with design of ‘cognitive artefacts’ (cheat sheets, stickies, ...)
- Use accepted ‘models’ and ‘metaphors’
- Make the computer ‘invisible’
- Make sure that ‘digitisation’ isn’t an additional planning constraint

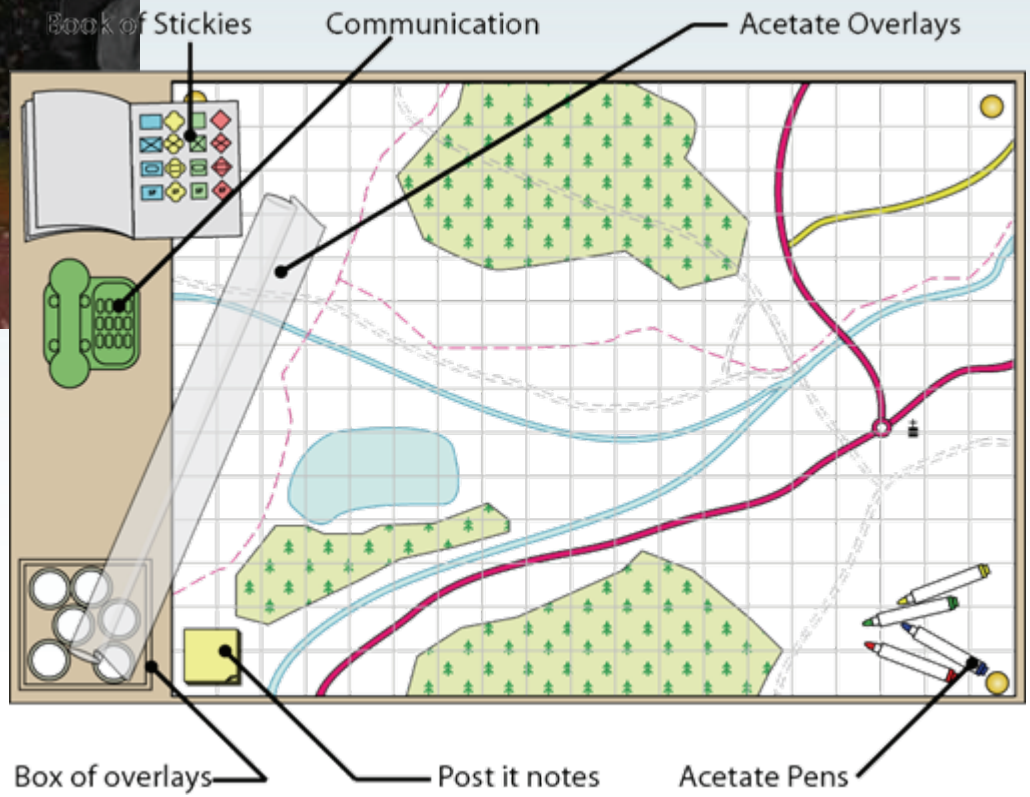
Combat Estimate



- "Answer the 7 questions, but use the tools selectively and creatively. Do not just slavishly follow process" (Combat Estimate, p. 2, 2007)
- "Too frequently information […] disappears into staff officers notebooks. […] large format boards are recommended to prevent information getting lost" (Combat Estimate, p. 6, 2007)

Analogue to Digital System





Where to find out more…

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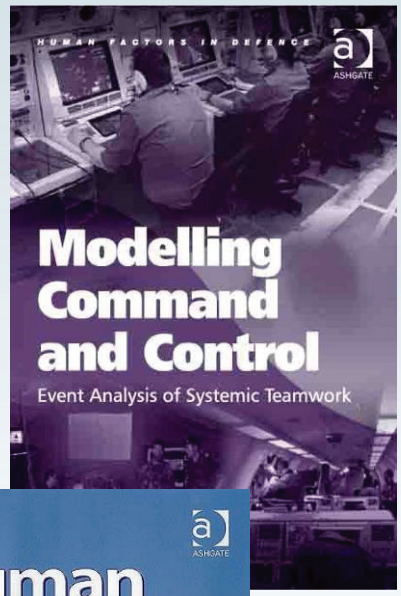

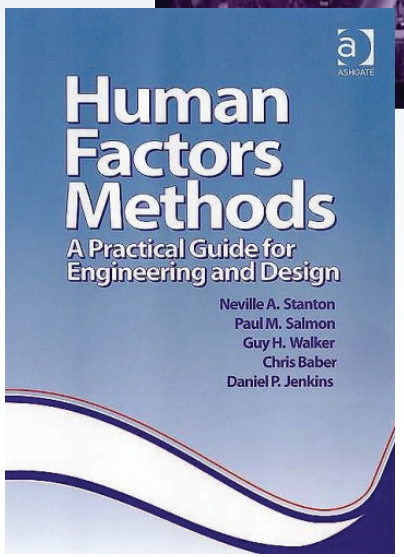

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Digitising Command and Control

'A thorough analysis of the various Human Factors critical to command and control planning and modelling of military missions. These include goal/function analysis, situation awareness, social interactions and cognitive work analysis, among others.' Thomas Sheridan, Professor Emeritus of Engineering and Applied Psychology MIT, and Chief Systems Engineer for Human Factors, Federal Aviation Administration, USA

'This book **demystifies the digitization of military command and control** and reveals that successful systems, as always, require careful attention to the details of users, use, and context. The book is a welcomed and detailed treatment of the limits and successes of current digital planning and management systems for the battlefield.'

Professor David Woods, Department of Integrated Systems Engineering, The Ohio State University, USA

'Computerizing complex undertakings is often promoted as a panacea. To be done properly, system designers and system owners must realise that they are building a socio-technical system, and that **Human Factors therefore must be taken into account from the very start**. Failing to do so will seriously hamper both the efficiency and the safety of the final product, **as amply illustrated by this meticulous evaluation of a complex military system.'** Prof Erik Hollnagel, MINES ParisTech, France

'In taking the reader through the contributions to this work, **the book provides excellent overviews of a range of approaches and methods in practice.** Since the context remains the same throughout, this lends a coherence of explanation, a basis for comparison **and a view on methods integration that is rarely found in the Human Factors literature.'** Prof John Wilson, University of Nottingham, UK

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