DEFENCE DÉFENSE

An Essay to Characterise Models of the Military Decision-Making Processes

by

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Outline

- Introduction
- Discussion on the importance of understanding decision-making models.
- Literature review of academic and military models
- The case for a unified decision making framework
- Implications of the proposed framework
- Conclusions

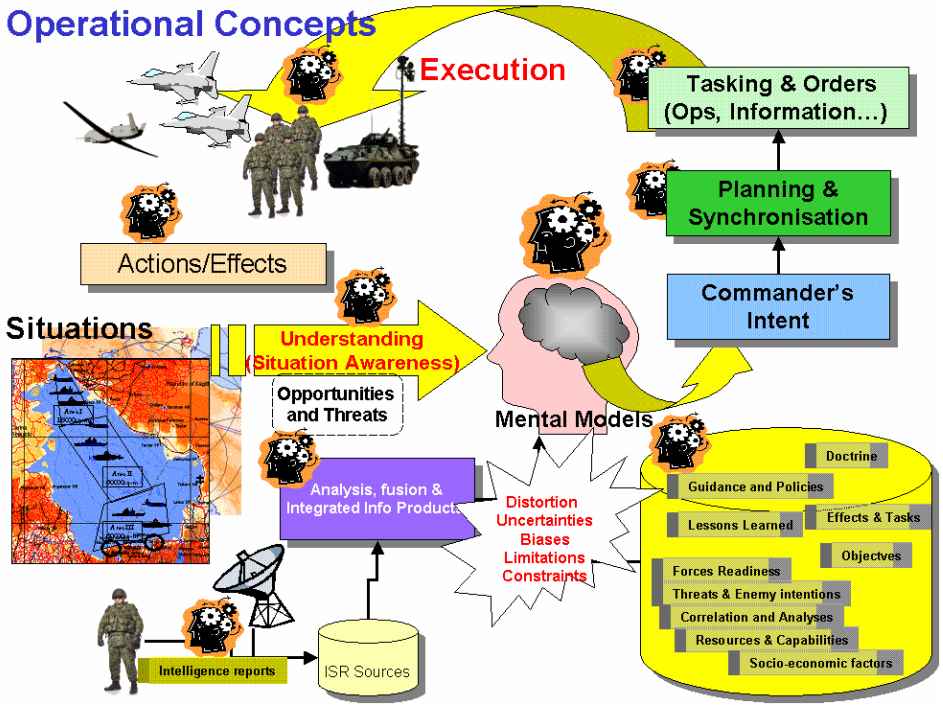
Introduction

- A unified decision-making framework is proposed that attempts to explain why there are multiple decision-models presenting what appear to be conflicting views.
- The objective of such framework is to argue for the importance of multiplicity of modeling perspectives given that decision-making is too complex a matter to be addressed from only one perspective.
- Decision-making models are important tools to understand the principles and dynamics of decision-making and models are therefore seen as a means to achieve understanding.
- Investments in Command and Control systems are good examples of a military effort to support Commanders making better decisions.
- Decision-making models should guide toward understanding some human limitations in making decisions and lead to design solutions to overcome deficiencies and contribute to decision superiority.

Joint Command Decision Support for the 21st Century

JCDS21 Objectives:

- Understand implications of net-centric operations within a JIMP framework
- Design and demonstrate a net-enabled collaborative environment that supports CF decision-making processes within a JIMP framework
- Develop operational and system requirements for related acquisition projects
- Contribute to Public Security by sharing the results of studies and experimentation and collaborating on problems of common interest



Understanding Decision-Making Models

- Decision-making models are abstract representations used by scientific, operational and academic communities to understand the Commander's decision-making process.
- The effects of decisions cut across a wide range of societal, cultural, political, economical, diplomatic and physical domains.
- To support leaders, military organizations are characterized by cross-functional decision and product teams often involving other government and non-government agencies.
- Multiple models exist to represent the decision process, each with a slightly different perspective.
- No single approach will meet all needs, rather each model needs to be carefully considered as proving an understanding of one portion of the Commander's decision cycle.

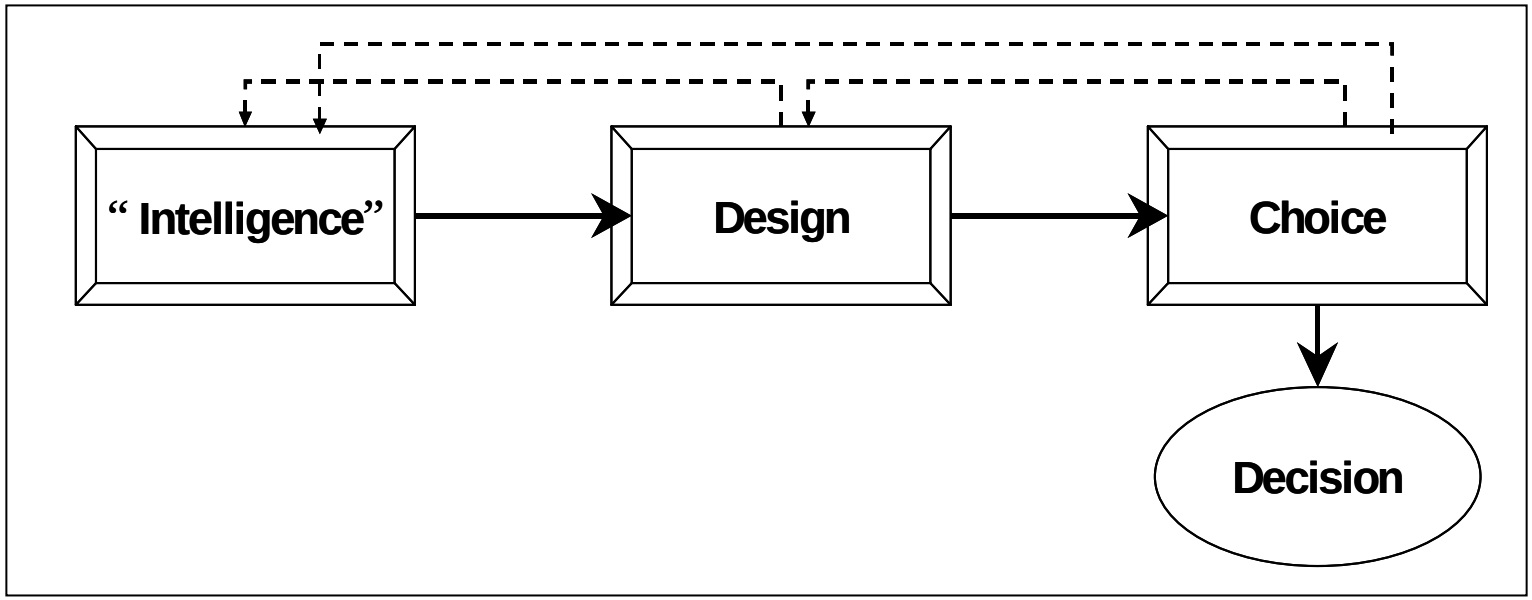
Literature Review

- There are different decision-making models drawn from decision sciences, human factors, cognitive sciences, organisational behaviour, social sciences, etc
- Normative, descriptive, prescriptive or analytical, naturalistic or intuitive, behavioural, social, team and heuristics models are a few examples of attempts to represent and understand decision making.

Academic Models

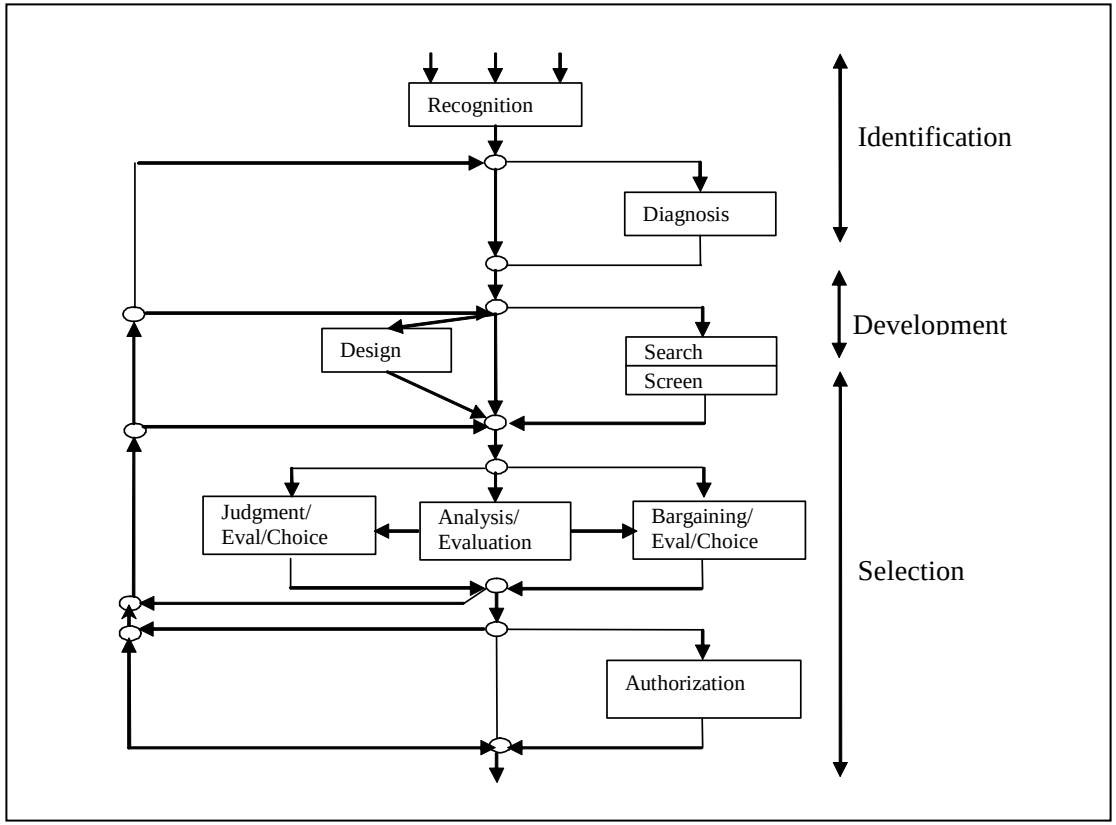
- Descriptive Decision Making Models:
  - Simon
  - Mintzberg
- Naturalistic Decision Making (NDM) Models:
  - Klein
  - Noble
  - Endsley

Decision Making Process - Simon



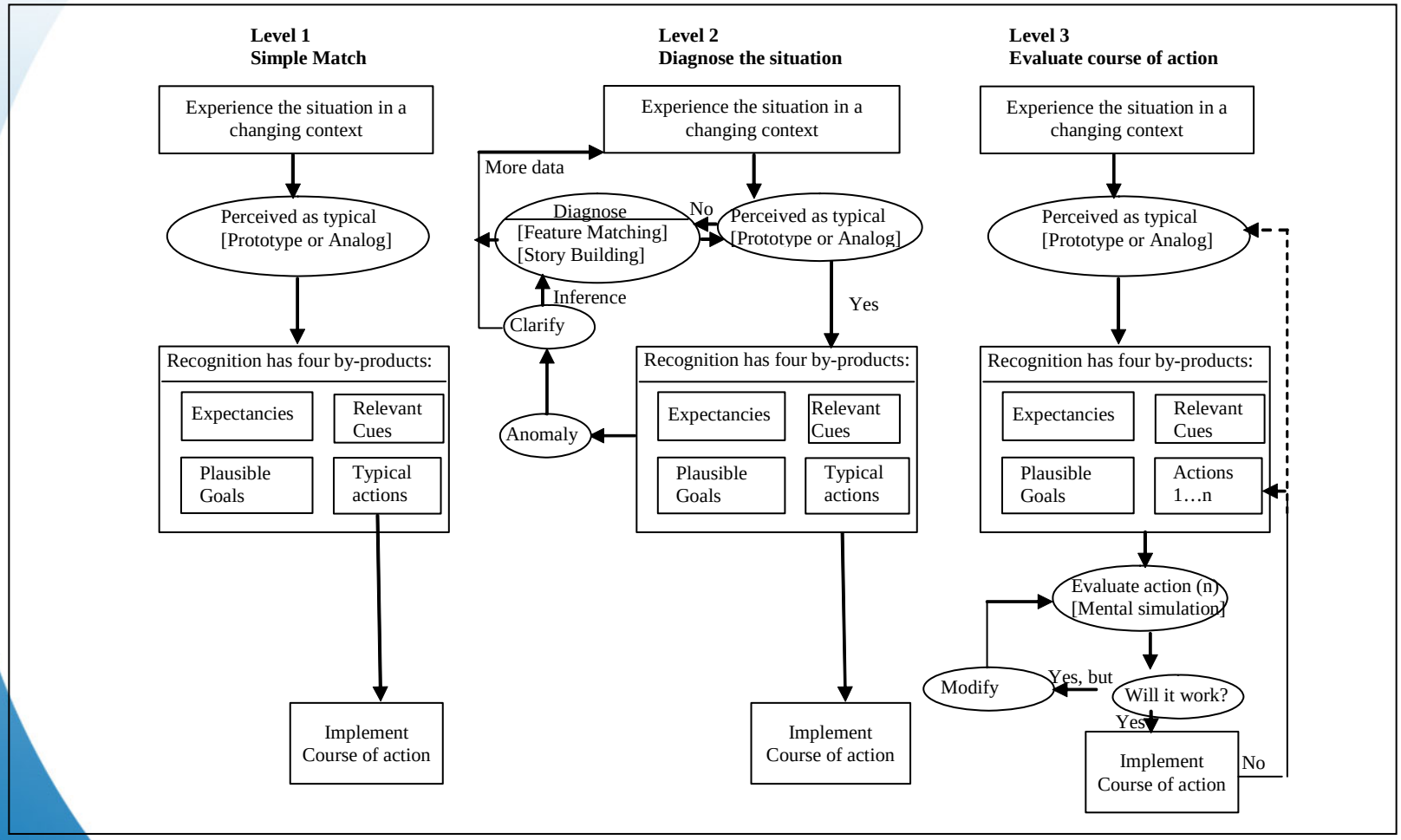
Decision-making Process (Simon, 1960)

Decision Making Process - Mintzberg



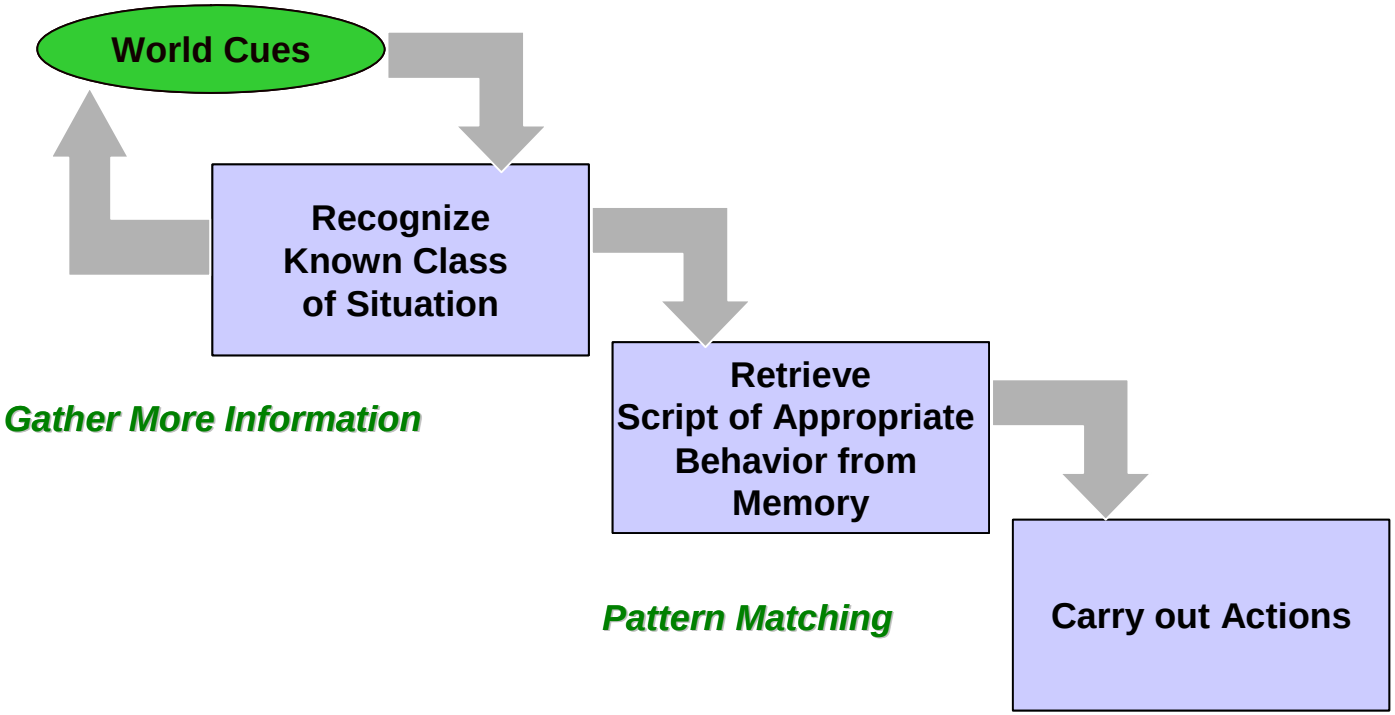
Decision-making Process (Mintzberg et al., 1976)

Klein's Recognition Primed Decision Model



Klein's Recognition-Primed Decision model : RPD model (Klein, 1998)

Endsley's Naturalistic Decision Model

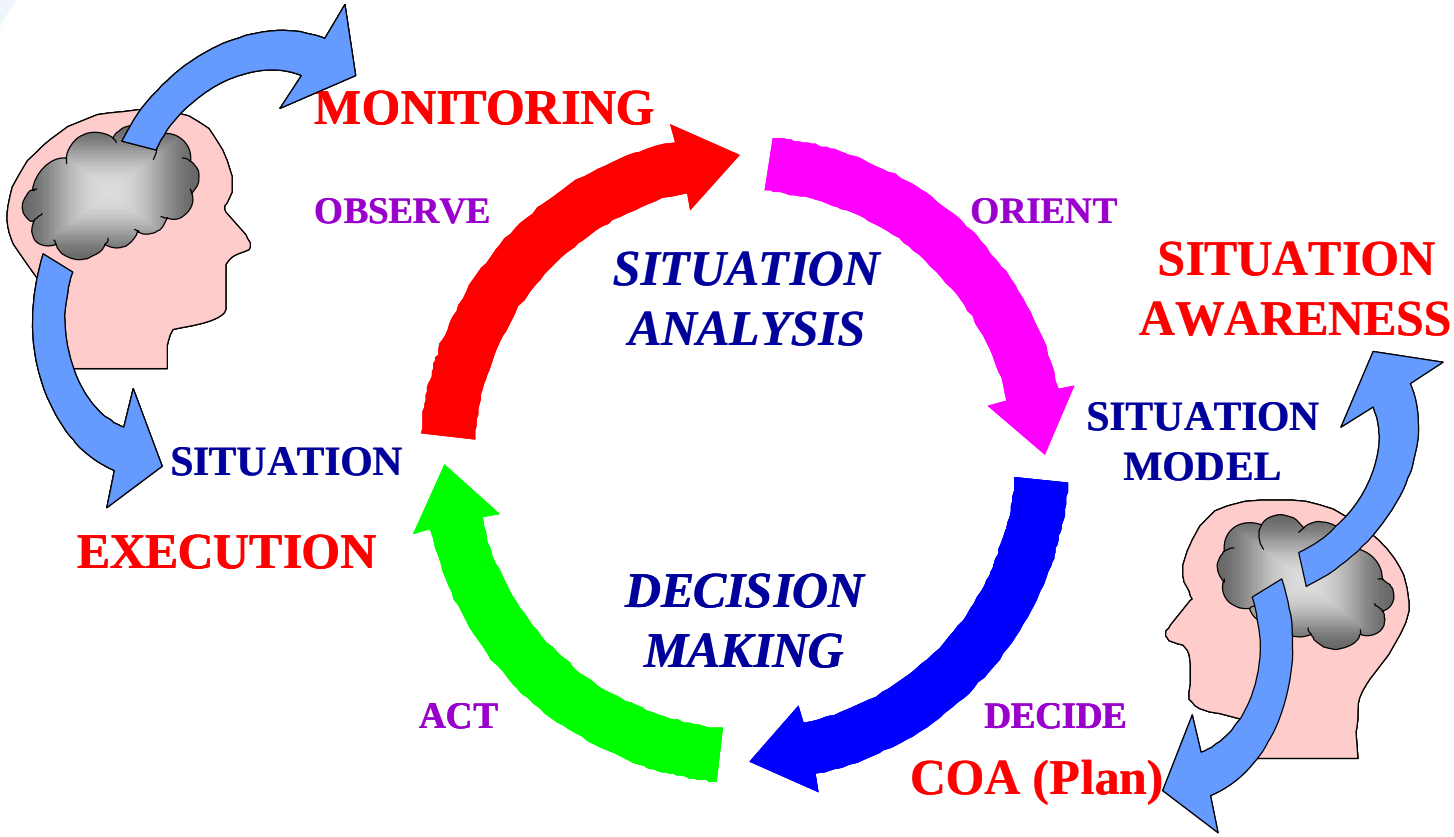


Endsley's Naturalistic Decision Model (Endsley, 1997)

Military Models

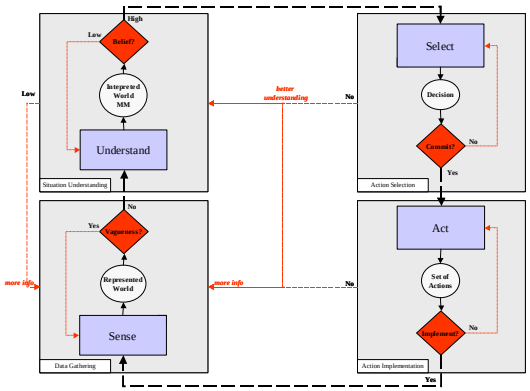
- Observe – Orient – Decide – Act (OODA)
- Extensions to OODA
- Lawson Model
- Headquarters Assessment Tool (HEAT)
- Critique – Evaluate – Compare – Adapt (CECA)
- CF Command Decision Cycle
- CF Decision Making Process
- Effect Based Planning Process

OODA

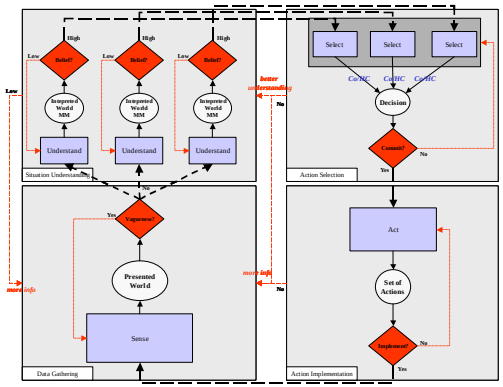


Military Decision-making Process: the OODA Loop Model

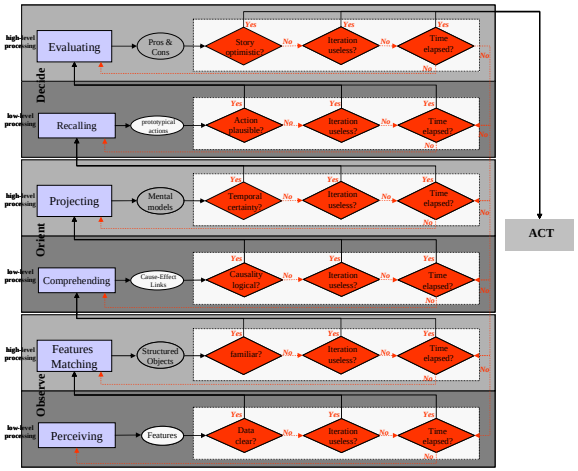
Extensions to OODA



The Modular OODA loop



The Democratic Team OODA model



The Cognitive OODA loop

Breton's OODA Loop Models (Breton, 2005)

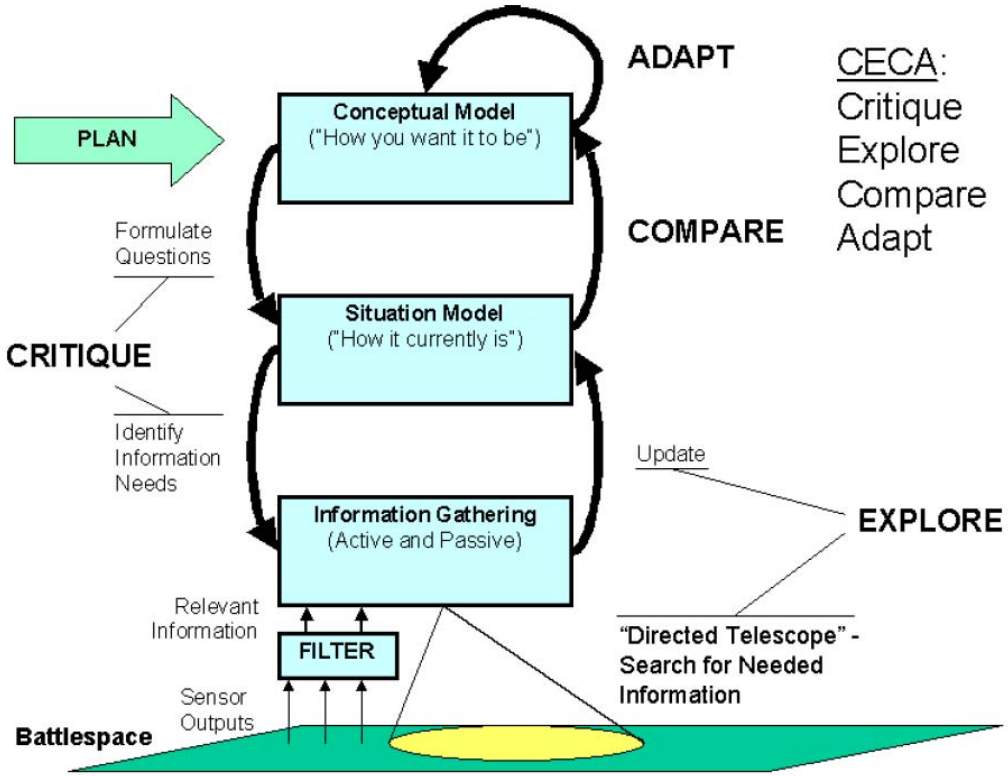
Lawson Model

The Lawson model (Lawson, 1981) describes decision making as a five step process: Sense, Process, Compare, Decide, and Act.

Headquarters Effectiveness Assessment Tool

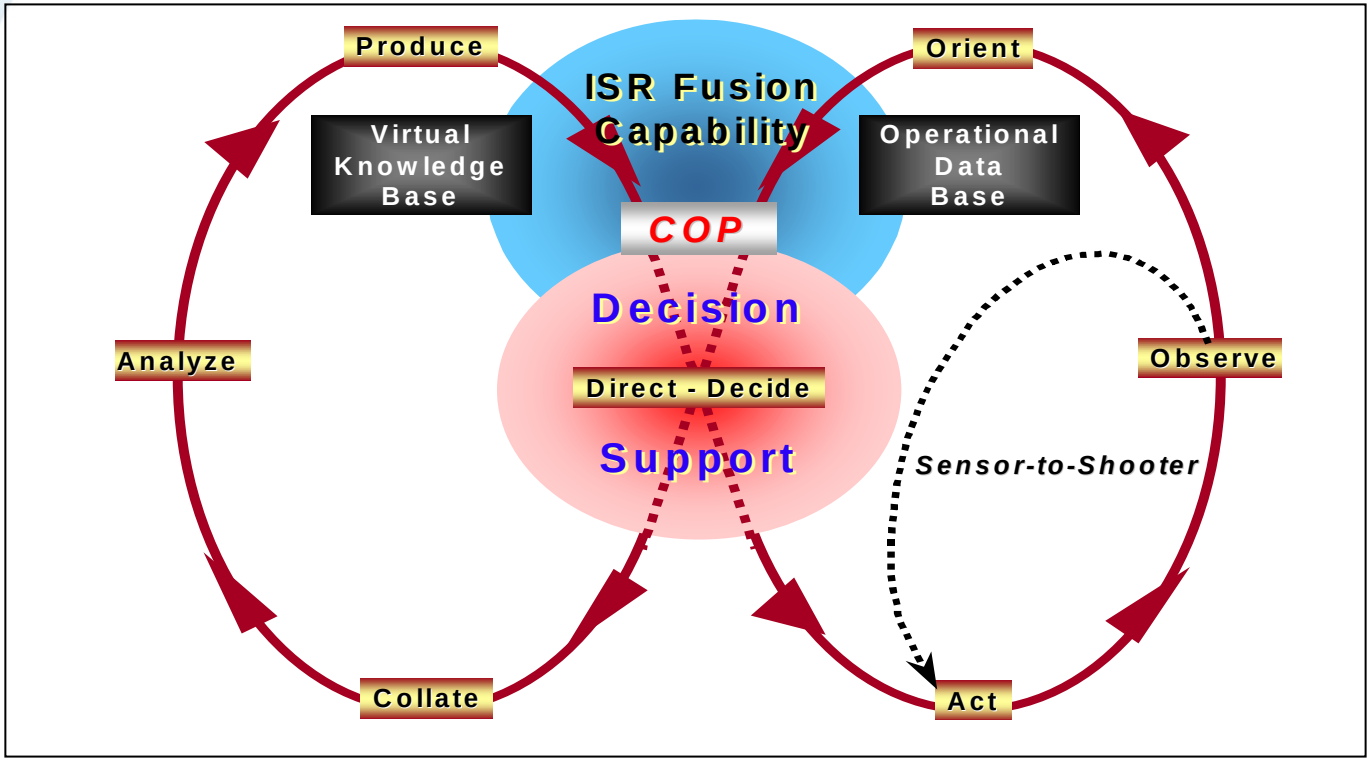
Developed as a generalization of the OODA loop to the activities in a headquarters, it is a tool for the evaluation of headquarters effectiveness and has been used in over 200 exercises and experiments.

Critique – Evaluate – Compare - Adapt



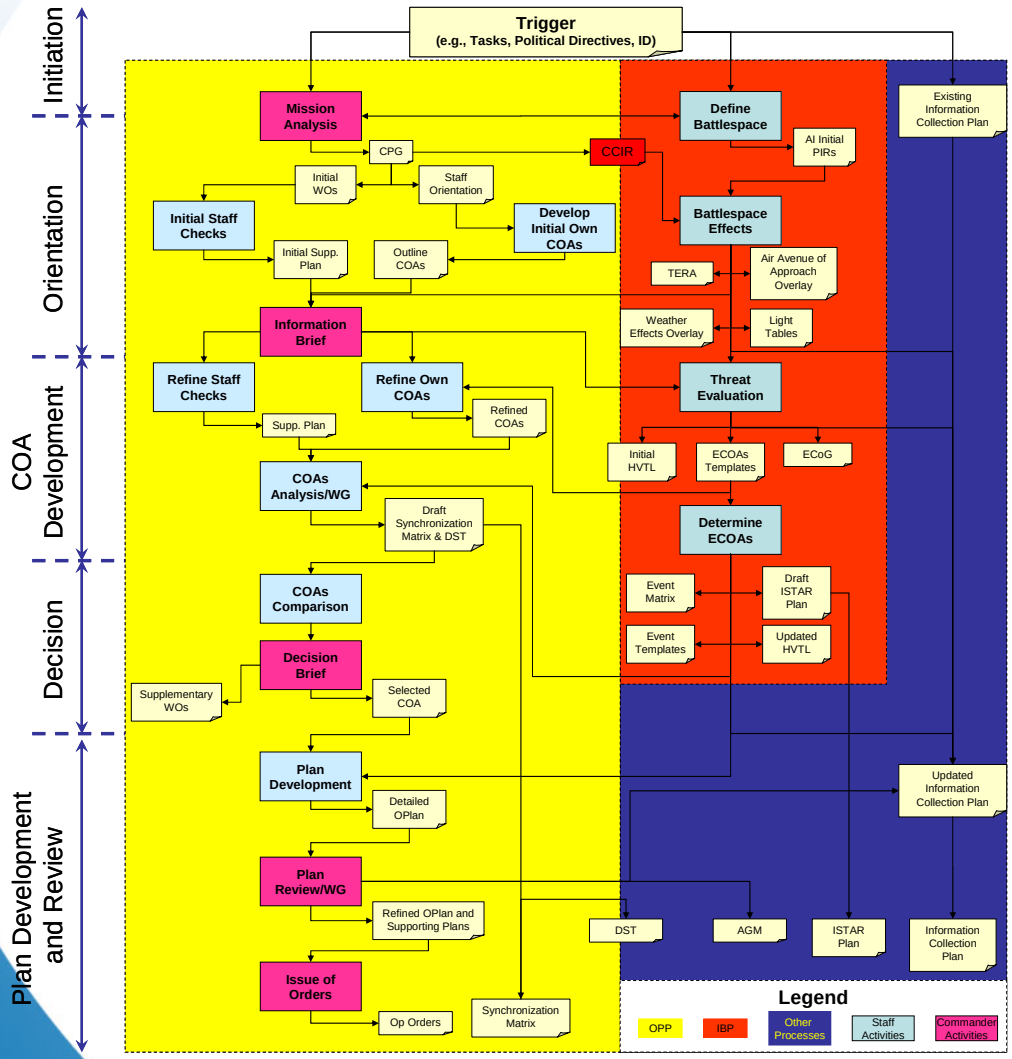
CECA Model (Bryant, 2004)

CF Command Decision Cycle



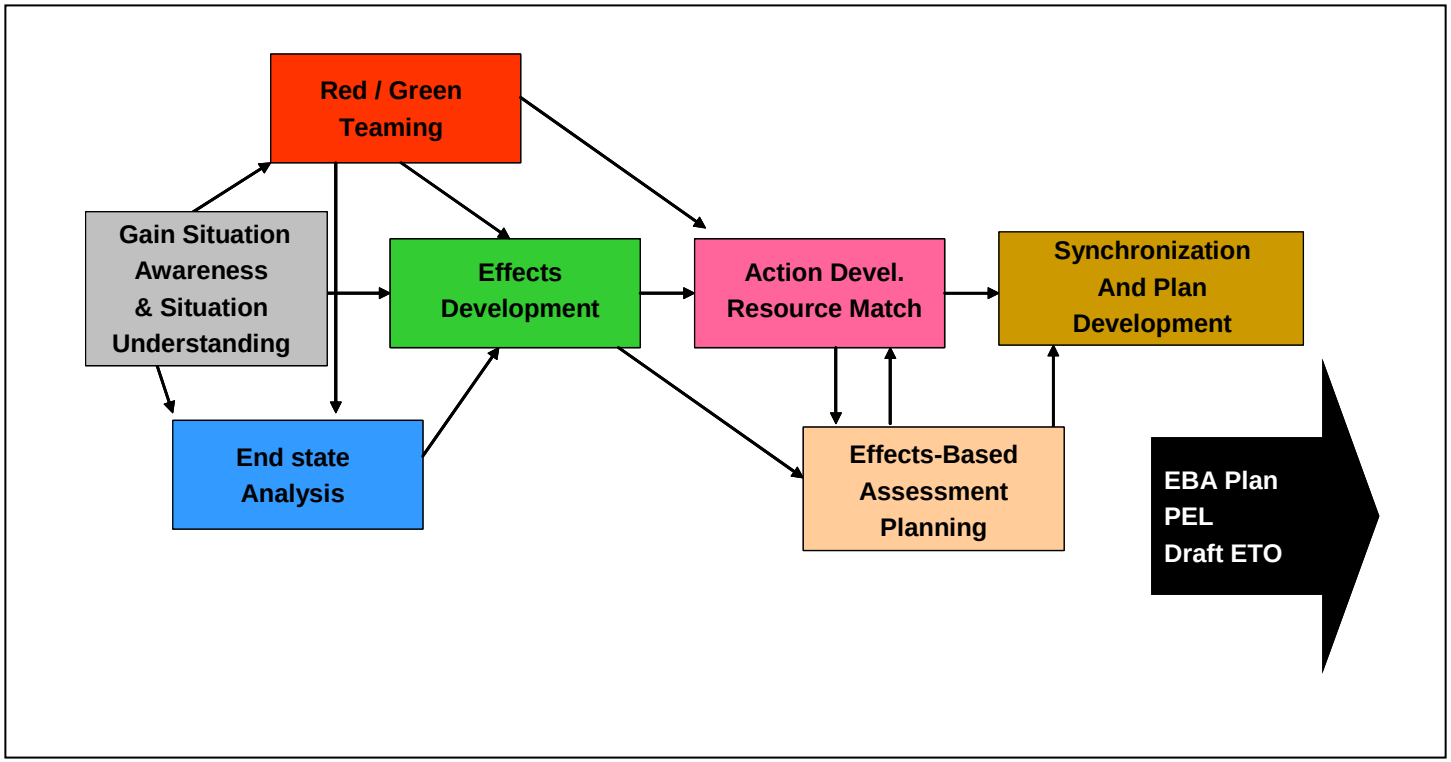
Canadian Forces C4ISR Support to Command Cycle (DGJFD, 2003)

CF Decision Making Process



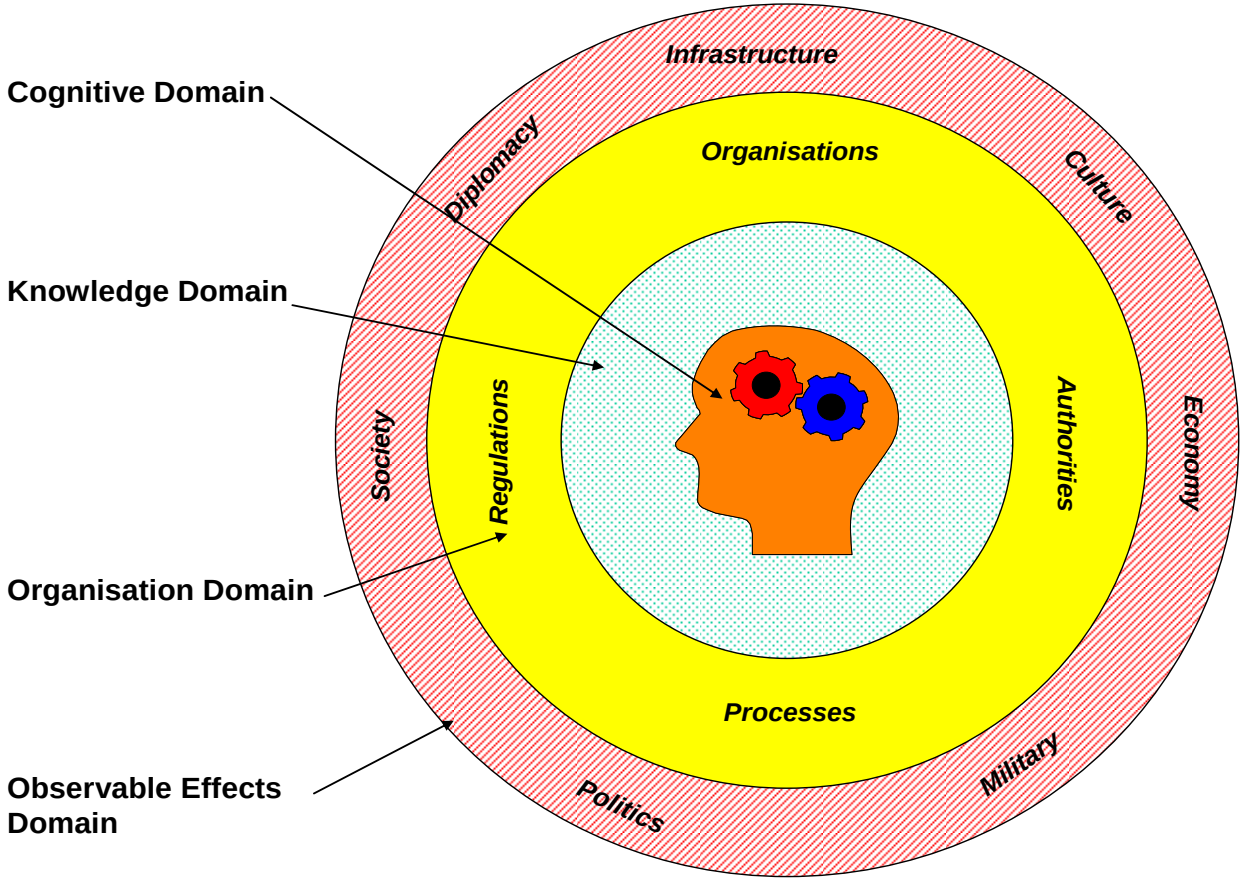
The full integration of both the OPP and the IPB as an extended representation of the CF Command Decision cycle.

Effect Based Planning Process

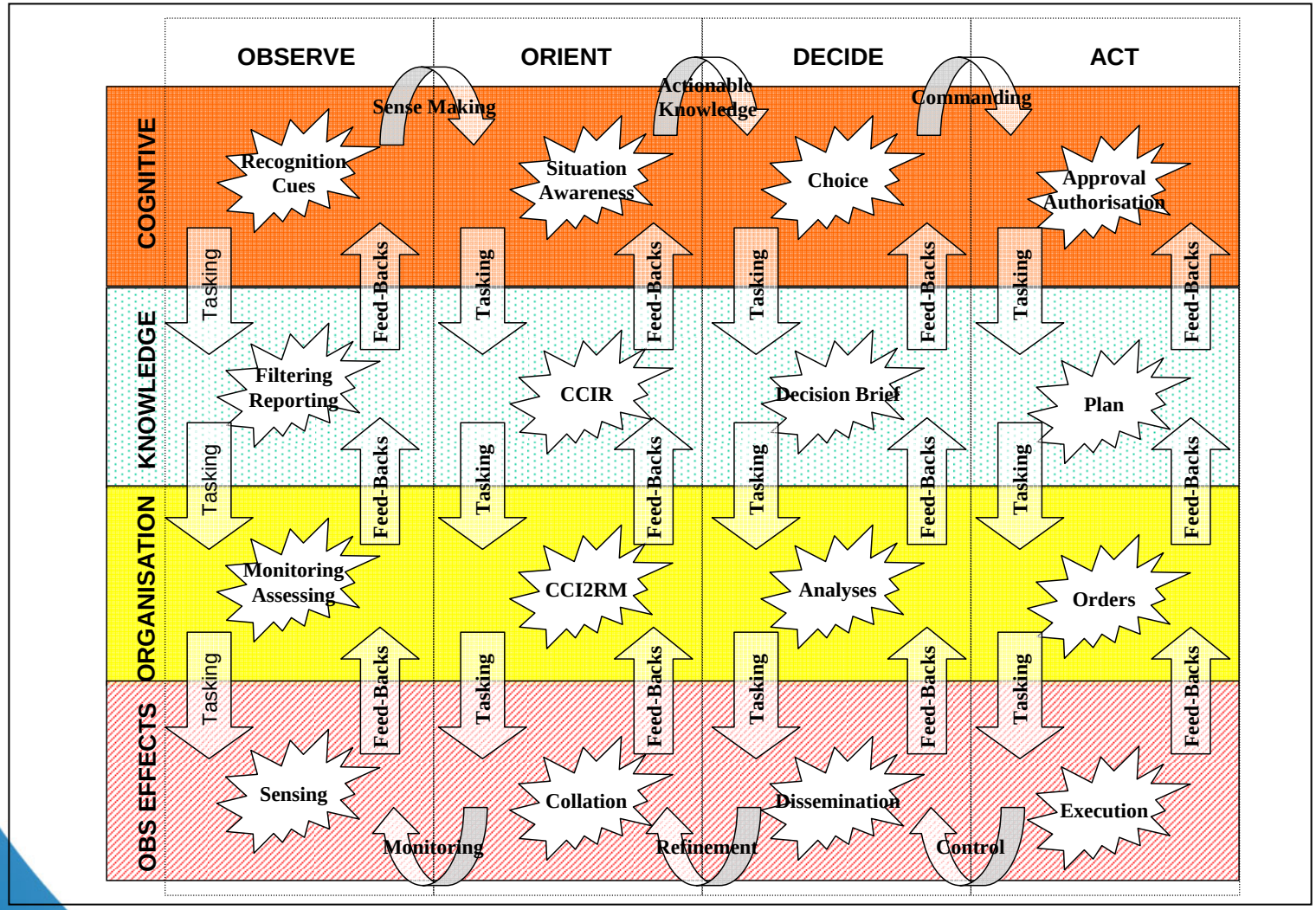


Effect Based Planning Process according to MNE 4 CONOPs Ver 0.65

High level representation of the proposed Unified Decision Making Framework



An Example: Mapping the OPP to the Proposed Framework



Implications of the Proposed Framework

MODEL	DESCRIPTIVE	PRESCRIPTIVE	OTHER	FRAMEWORK			
				COGNITIVE	KNOWLEDGE	ORGANISATION	OBSERVABLE EFFECTS
ACADEMIC MODELS							
Simon's Model (1960)	X			**P**	S		
Mintzberg et al.'s Model (1976)	X			**P**	S		
Klein's Model (1997)	X			**P**	S		
Noble's Model (1989)	X			**P**	S		
Endsley's Model (1995)	X			**P**	S		
Classical Decision Theories Models		X			**P**	S	
Multicriteria Decision Aid Models			X		**P**	S	S
Optimization Models		X			**P**	S	
Social Choice Theories Models		X			**P**	S	S
Participative Models			X		S	**P**	S
MILITARY MODELS							
OODA-Loop	X			**P**	S		
Lawson's Model (1981)	X			**P**	S		
HEAT Model (1980s)	X			**P**	S	S	
Breton's Models (2005)	X			**P**	S		
CECA Model (Bryant, 2003)	X			**P**	S		
CF DGJFD Model (2003)			X	S	**P**	S	
Classical Military Decision-making Model: OPP-IPB		X			S	**P**	S
Effect Based Operations		X			S	S	**P**

(**P –** Primary, S – Secondary)

Table 1. Classifying Decision-making Models

Conclusion

- We have proposed a unified framework based on four distinct but layered domains: cognitive, knowledge, organisation and observable effects.
- The framework does not promote a single view of decision making, but it should encourage cross-fertilization between modeling perspectives and decision focused theories.
- Analysis of the reviewed decision-making models reveals that no model fits all the domains. There is more to gain by starting a constructive discussion among the models rather to put them one against another in competition for the right to the “truth”.
- Finally, we argue for a multi-disciplinary and open approach to study military decision making. We think that this is a necessary, but not sufficient, condition to design genuine decision support solutions for Commanders in order to achieve "decision superiority”.

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