Australian Government
Department of Defence
Defence Science and
Technology Organisation

Critical Analysis Technique for Development of Concept Guidance

Dr Nitin Thakur, Dr Thitima Pitinanondha and
LTCOL Alistair Dickie

Presented by
Mr Anthony Ween

DSTO

Presentation outline

- Introduction
- Concepts for Defence Planning
- Challenges in Concept Development
- Critical Analysis – Methodology
- Concept Guidance Development
- Potential Contribution

Introduction

Strategic Military Planning

- Ends - establishment of military objectives
- Ways - formulation of military strategic concepts to accomplish the objectives
- Means - use of military resources to implement the concepts

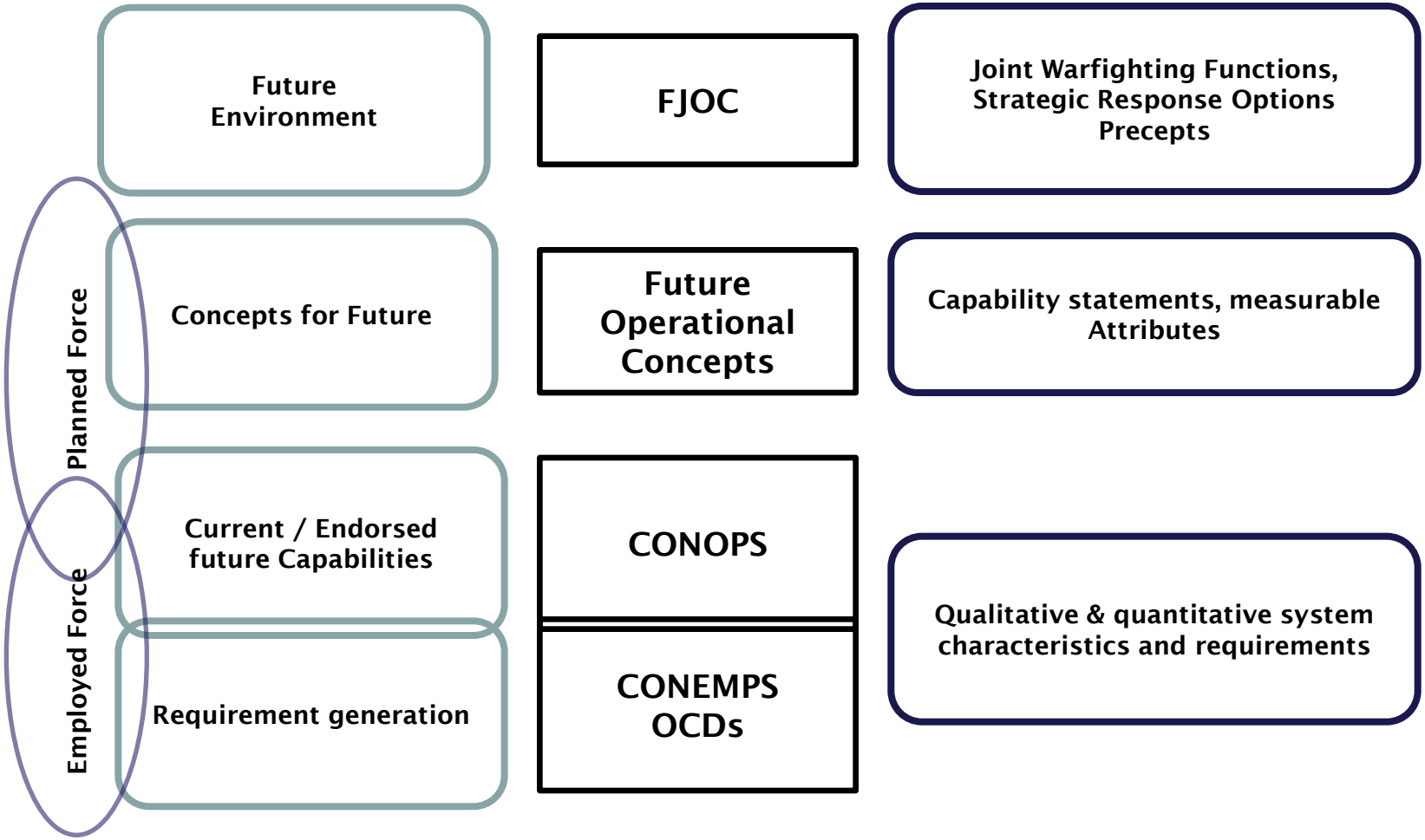
Concepts

- Describe how to use current and approved capabilities (Force-in-being)
- Inform capability development decisions for future capabilities that are not yet approved (Future Force Posture)

Concepts play a crucial role in Force Design as forerunners of

- capability goals (with attributes)
- gaps and risks
- inter-dependencies – for force design activities

Concepts for Defence planning



DSTO

Challenges in concept development

Guidance currently provided by the capstone operating concept is too diffuse and strategic

- for use in specific operational contexts
- for force structure and capability needs analysis

Future operational concepts need to have a direction provided, in terms of where systematic failures could occur and knowledge of critical sub-systems, so that the organisation is aware and prepared (with concepts) to address these criticalities.

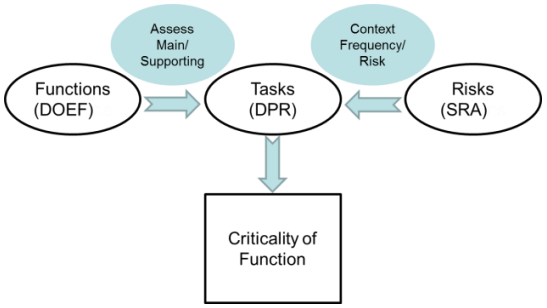
Critical analysis methodology

Failure Mode, Effects and Criticality Analysis (FMECA) methodology originally developed by the U.S. military (1949) and employed as an analytical technique for evaluating failures to determine the reliability of equipment and system.

Three basic steps in conducting a FMECA:

- Determining the Probability of Occurrence (O) for each failure mode of the product or system using a scale such as frequent, occasional, or extremely unlikely.
- Determining the Severity (S) of the failure mode of the product or system in terms of potential consequences, using a scale such as catastrophic, critical, or marginal.
- This provides the Criticality assessment of that failure mode which is the mathematical evaluation of the occurrence and severity:

$$\text{Criticality} = (O) \times (S).$$



Concept guidance development

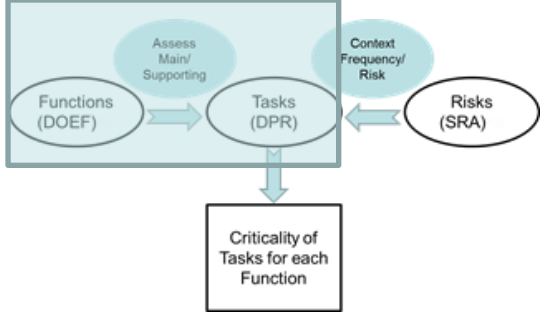
'Failure mode' is adapted in this context as a Defence-relevant risk event that might eventuate, with a probability of occurrence (O).

It is assumed, in this context, that the frequency of response from Defence to this risk event, achieved by using specific functions or tasks, indicates the severity (S) of this risk event.

Criticality of that Defence function or task is then a product of likelihood-impact of the risk and the frequency of occurrence of the function or task.

Using extant endorsed Defence artefacts

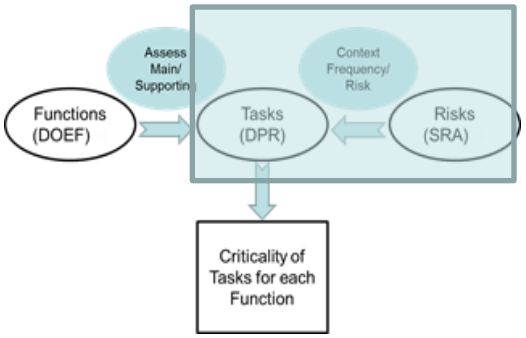
- DOEFs – Defence Operational and Enabler Functions – 18 Lines Of Operations
- DPRs- Defence Preparedness Requirements – 8 High Level Tasks
- SRAs- Strategic and Enterprise Risks



Concept guidance development

How often will each function be used as a main or supporting line of operation for each DPR-based task?

Future Approach 2035	DPR1 Understand and Shape Environment		DPR2 Conduct Joint Combat Operations		DPR3 Conduct Peace and Stability Ops	
	Main	Supporting	Main	Supporting	Main	Supporting
Information Operations	Often	Always	Often	Always	Often	Always
Cyber Operations	Often	Always	Often	Always	Often	Often
Special Operations	Sometimes	Sometimes	Often	Always	Sometimes	Often
Strategic Strike	Never	Never	Often	Always	Sometimes	Sometimes



Concept guidance development

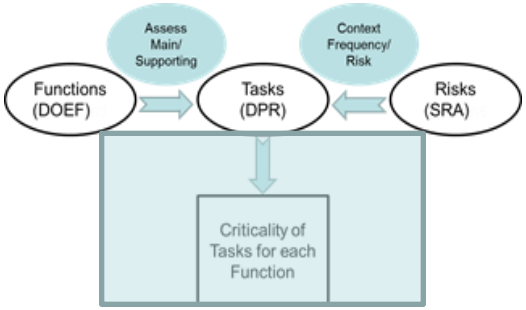
How often would each task be used if a Strategic Risk event develops?

Risk Event	Likelihood	Consequence	Risk	Context Basis	DPR1		DPR2		DPR3	
					Frequency	Criticality	Frequency	Criticality	Frequency	Criticality
Potential Pandemic	Unlikely	Severe	Moderate				Often			
Harrassment	Unlikely	Major	Low				Often			
Regional Conflict	Impossible	Severe	Low				Always	Critical		
Conventional Attack	Impossible	Severe	Low				Always	Critical		

Derived from the Strategic Risk Assessment

An '*Always*' (from previous slide) for Special Operations drives the criticality

DSTO



Concept guidance development

Concern or criticality = Frequency of task x risk associated with that event

Enduring Tasks for each Function + Criticality of Tasks in the Strategic Risk context

= Criticality of Tasks required for each Function

Develop the concept associated with a DOEF by answering - '***How***' will the tasks that are critical to this concept/function be executed to achieve the strategic objectives?

Example

As an example, a brief construct of the concept for Special Operations could look like:

Central Idea for Special Operations: The Joint Force will conduct the Function of Special Operations through the collective effect of Task DPR2 which is crucial in the context of Conventional Attack and/or Regional Conflict (viz. Strategic Risks).

Defining Capability Statements: Special Operations will achieve success by having the ability to infiltrate and exfiltrate from terrain previously untraversable.

Attributes for Special Operations: Special Operations need to be fully integrated with function Joint Fires and Effects, with the measure as achieving a good degree of precision.

Potential contribution

Higher level concepts have not been used in anger, nor are they embedded in the force design process, or articulated practically at the high level.

Force design has used operational planners with current concepts for future force design, highlighting the lack of strategic planners with access to future concepts to test against future environments and strategic risks.

Demonstrate that there are organisational artefacts that can be used to provide robust linkages for logical transparency, and that these linkages can lead to a healthy structured basis for decision audit.

Showcases how concepts can be the forerunners of capability goals by forcing development of capability statements, risks, integration issues for lower layers of capability development and setting of requirements for acquisition.

Questions?