A Risk Management Approach for the Acquisition of Defence Capability

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Why does risk management matter?

The Government's investment in defence capability represents one of the largest discretionary items in the Commonwealth's budget.

Defence have over $100 billion worth of military equipment under sustainment, in the process of acquisition, or being planned over the next ten years.

This includes the management of some 230 major projects worth over $20 million each and the sustainment of over 100 Australian Defence Force fleets, platforms and weapon systems.

EXAMPLES OF PROJECT AND THEIR DEVIATION FROM OFF-THE-SHELF
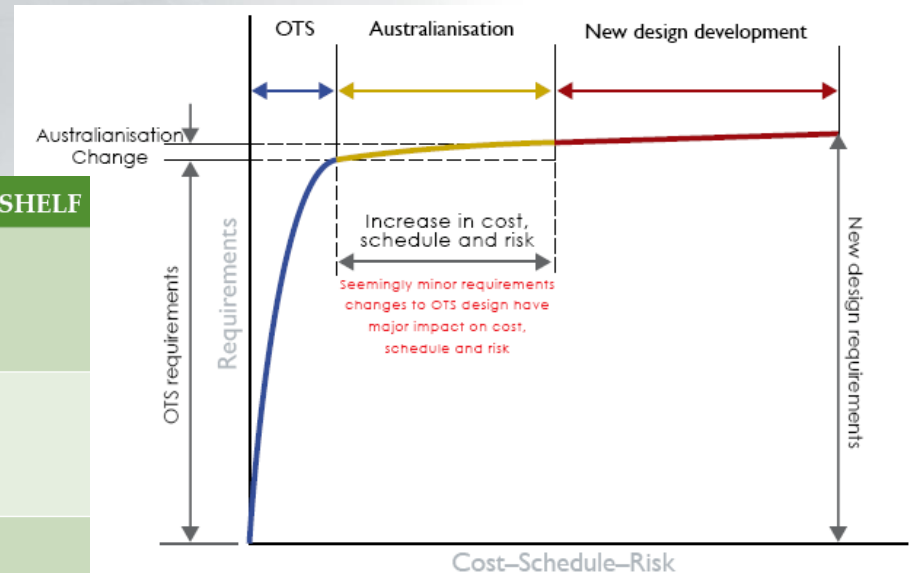
Off-the-shelf
- C-17 heavy airlift aircraft
- Super Hornet fighter aircraft
- Abrams Battle Tanks

Off-the-shelf with modifications
- Armed reconnaissance helicopter
- Air-to-air refuelling aircraft
- Australian Light Armoured Vehicle (ASLAV)
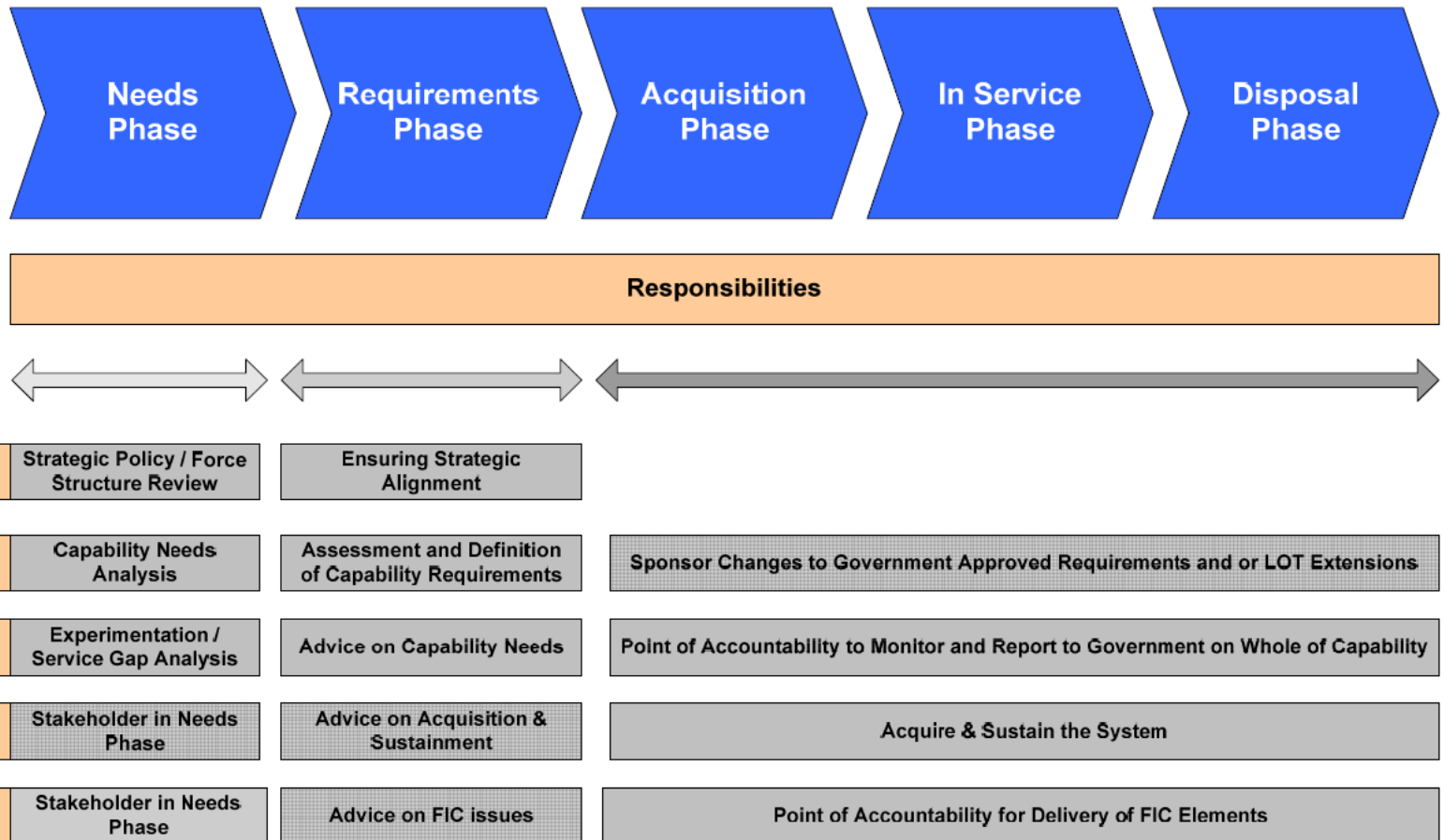
Developmental
- Seasprite
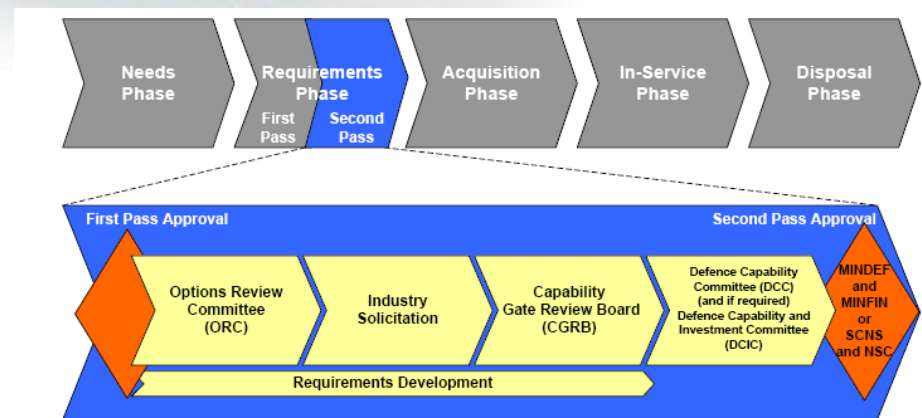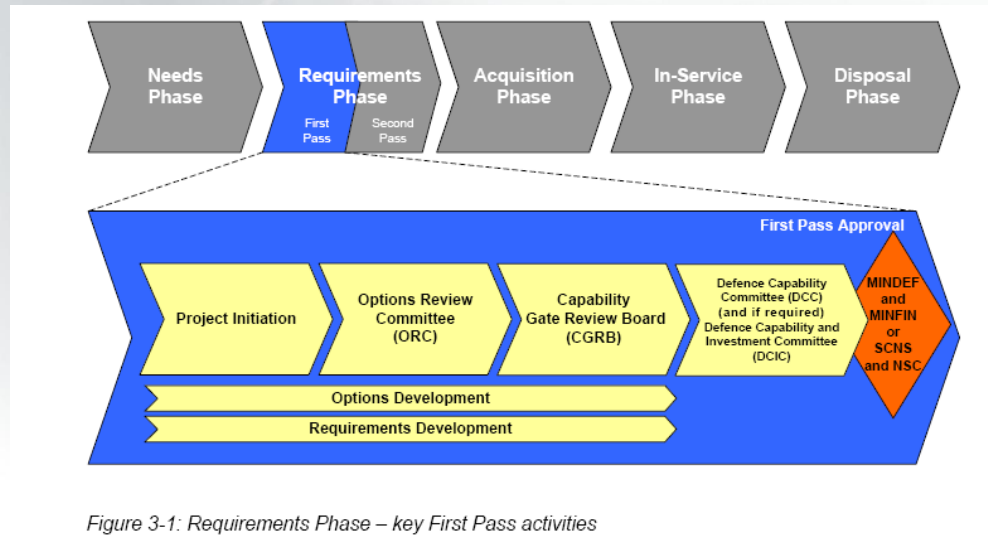- Airborne Early Warning and Control aircraft (AEW&C)
- Collins class submarines

The Capability Systems Life Cycle

| Needs Phase | Requirements Phase | Acquisition Phase | In Service Phase | Disposal Phase |

Responsibility and risk assignment

| | Needs Phase | Requirements Phase | Acquisition Phase | In Service Phase | Disposal Phase |

Responsibilities

Strategy Executive	Strategic Policy / Force Structure Review	Ensuring Strategic Alignment	
Capability Development Group	Capability Needs Analysis	Assessment and Definition of Capability Requirements	Sponsor Changes to Government Approved Requirements and or LOT Extensions
Capability Manager	Experimentation / Service Gap Analysis	Advice on Capability Needs	Point of Accountability to Monitor and Report to Government on Whole of Capability
Acquisition & Sustainment Agencies	Stakeholder in Needs Phase	Advice on Acquisition & Sustainment	Acquire & Sustain the System
Stakeholder Groups	Stakeholder in Needs Phase	Advice on FIC issues	Point of Accountability for Delivery of FIC Elements

Requirements Phase – Key activities

Figure 3-1: Requirements Phase – key First Pass activities
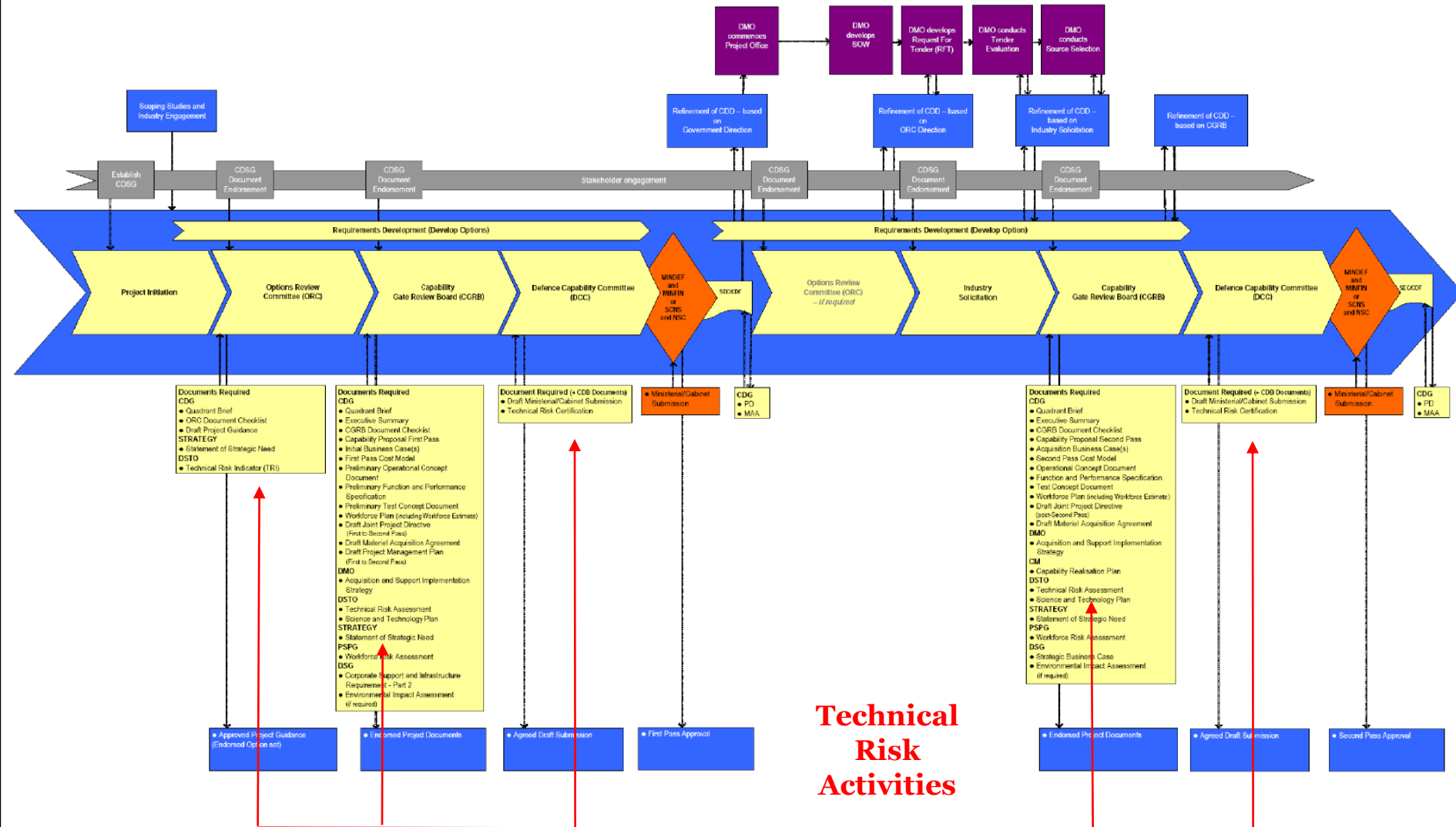

Figure 4-1: Requirements Phase—Key Second Pass activities

The Requirements Phase - Documents
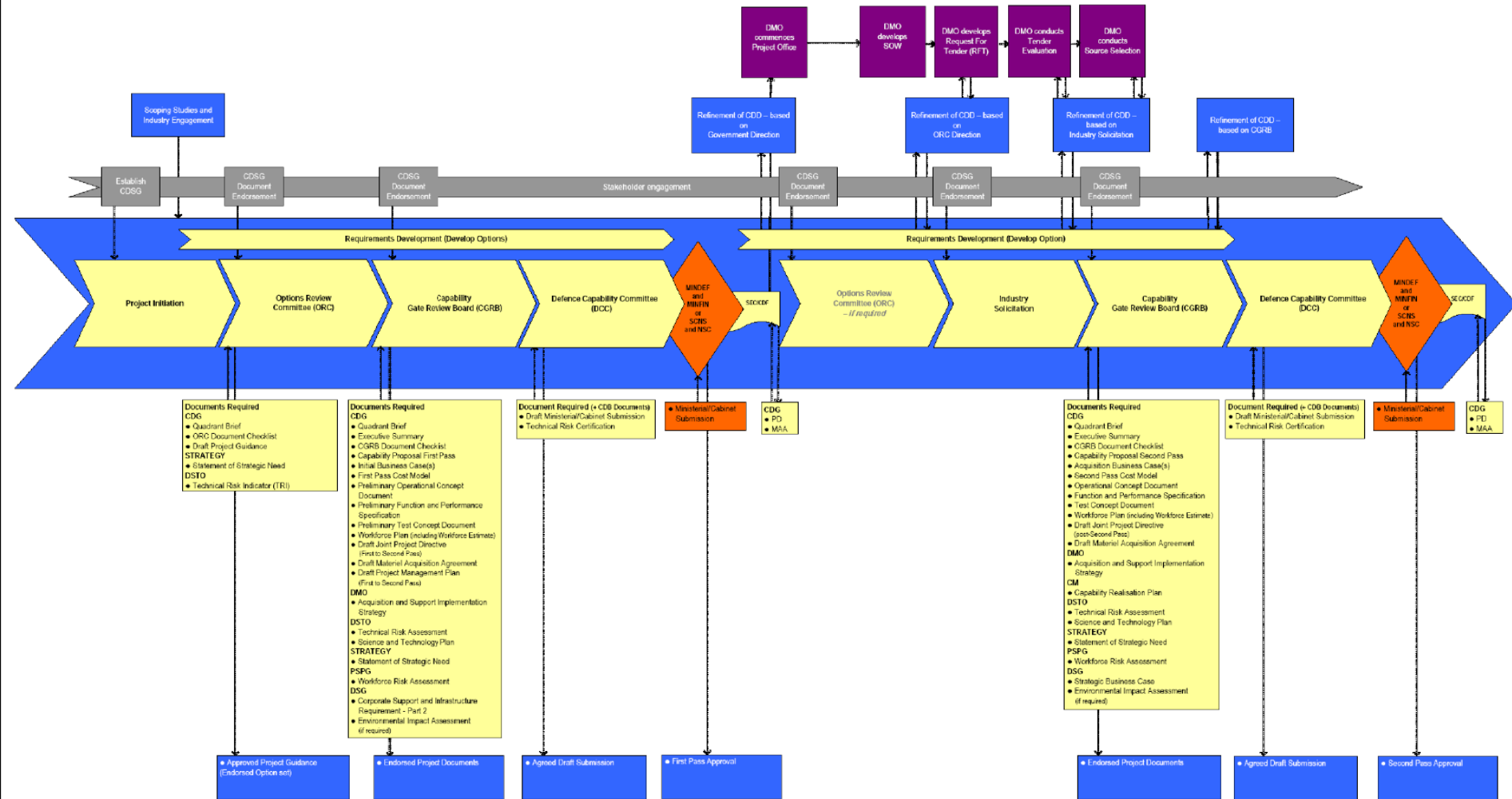
The Requirements Phase - Documents

Purpose of Technical Risk Activities:

- to inform the project and its stakeholders of potential areas of risk so that they can be managed appropriately

- to inform Government of the technical risks for each option when considering capability decisions.

- Technical Risk Assessments address:
  - is the technology feasible?
  - will the technology mature within the required time frame?
  - are there any technical barriers to integrating the capability?
  - is the technology fit for the required purpose?

Technical risk activities:

- **Technical Risk Indicator** provides a high-level identification of the key technical risks and issues associated with the options being considered.

- **Technical Risk Assessment** informs stakeholders of the technical risks and the feasibility of the technology proposed so that appropriate risk treatment strategies can be developed.

- **Technical Risk Certification:** the Chief Defence Scientist is mandated by Government to certify the level of technical risk attached to a project at each Government consideration — primarily First and Second Pass approvals and Real Cost Increases.

Relationship to Decision Support and Project Management requirements – First Pass
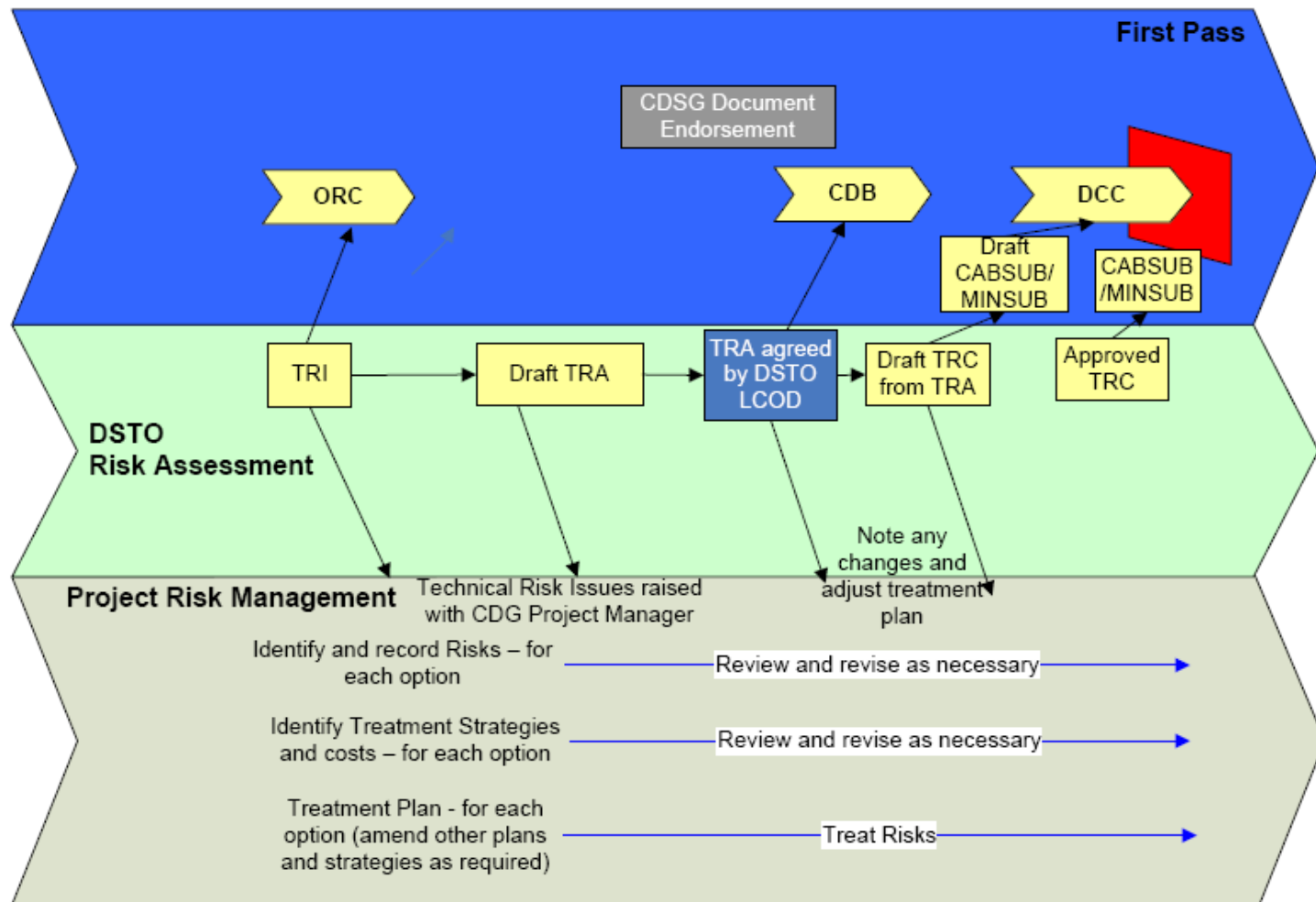

Figure1: Technical risk activities supporting First Pass Project Approval

Relationship to Decision Support and Project Management requirements – Second Pass
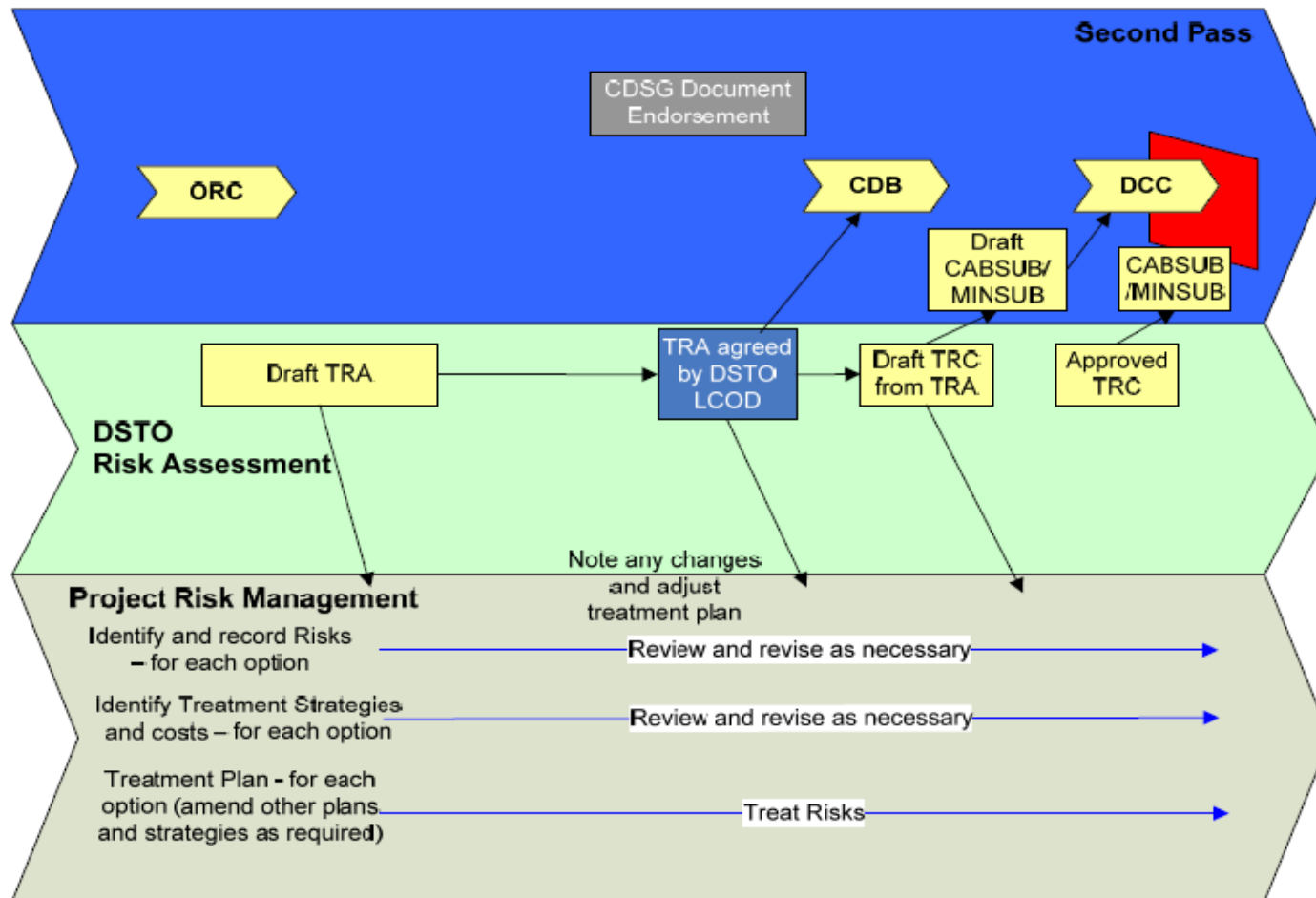

Figure 2: Technical risk activities supporting Second Pass Project Approval

Use of Technical Risk Assessment

- to understand the origin and level of technical risk

- to check that any identified significant technical risks and issues will be managed via appropriate treatment and resolution activities

- to check that the project strategy and resources are appropriate to the level and type of technical risks and identified issues

- DSTO uses the TRA as a key input into the certification process provided to Government.

Fitness-for-purpose issues

- there has to be uncertainty for a risk to exist.
  - if there is no uncertainty then it is an issue, not a risk.

- issues are effects that have happened or will certainly happen.
  - Technical issues that prevent an option achieving project objectives are termed fitness-for-purpose issues.

- fitness-for-purpose issues do not affect the overall level of technical risk.

Definitions: Technology risk and technical risk

- **Technology risk**: '*the risk that the project will not achieve its objectives due to an underpinning technology not maturing in the required timeframe'*.

- **Technical risk**: *'the risk that the project will not achieve its objectives due to risks which arise in the integration of critical technologies...'*

These definitions have been updated from Moon, T., Smith J., Nicholson J., Fewell, S. and Duus, A. (2004).

TRA Principles, Process and Practice. DSTO-GD-0405.

The use of Technical Readiness Levels

- Technology risks arise from technology immaturity.

- Technical risks arise from systems that may not deliver the performance required

The first step in assessing these risks is evaluating the maturity of the technologies and of the systems.

Readiness Levels provide a standardised means to measuring this maturity.

Technology Readiness Description	Readiness Level
Basic principles of technology observed and reported.	1
Technology concept and/or application formulated.	2
Analytical and laboratory studies to validate analytical predictions.	3
Component and / or basic sub-system technology validated in a laboratory environment.	4
Component and / or basic sub-system technology validated in a relevant environment.	5
System sub-system technology model or prototype demonstration in a relevant environment.	6
System technology prototype demonstration in an operational environment.	7
System technology qualified through test and demonstration.	8
System technology qualified through successful mission operations.	9

Technical Risk Assessment Development

- The TRA process has five stages:
  - **Step 1:** Establish the context of use and the project objectives.
  - **Step 2:** Identify the sub-systems of the capability.
  - **Step 3:** For each sub-system, identify:
    - the key underlying technologies,
    - their maturity,
    - the likelihood that the technology will not mature in the time required by the project,
    - the potential impact on the project's objectives.
  - **Step 4:** Identify:
    - the key technical risk sources in making the sub-systems and system function as an integrated whole,
    - the likelihood that the sub-systems or system will not be integrated in time,
    - the impact on the project's objectives.
  - **Step 5:** With the technology and system level risks identified, make an assessment of the overall level of technical risk to the project.

Proposing risk treatment strategies

- It is the responsibility of the project to develop the risk treatments.
  - the project must consider risks from many sources other than technical risk.

- Accordingly the project must develop risk treatment strategies that best address the range of risk sources and risks.

- For technical risks, risk treatment strategies:
  - reduce the likelihood of a risk eventuating,
  - reduce the impact if the risk does eventuate, or
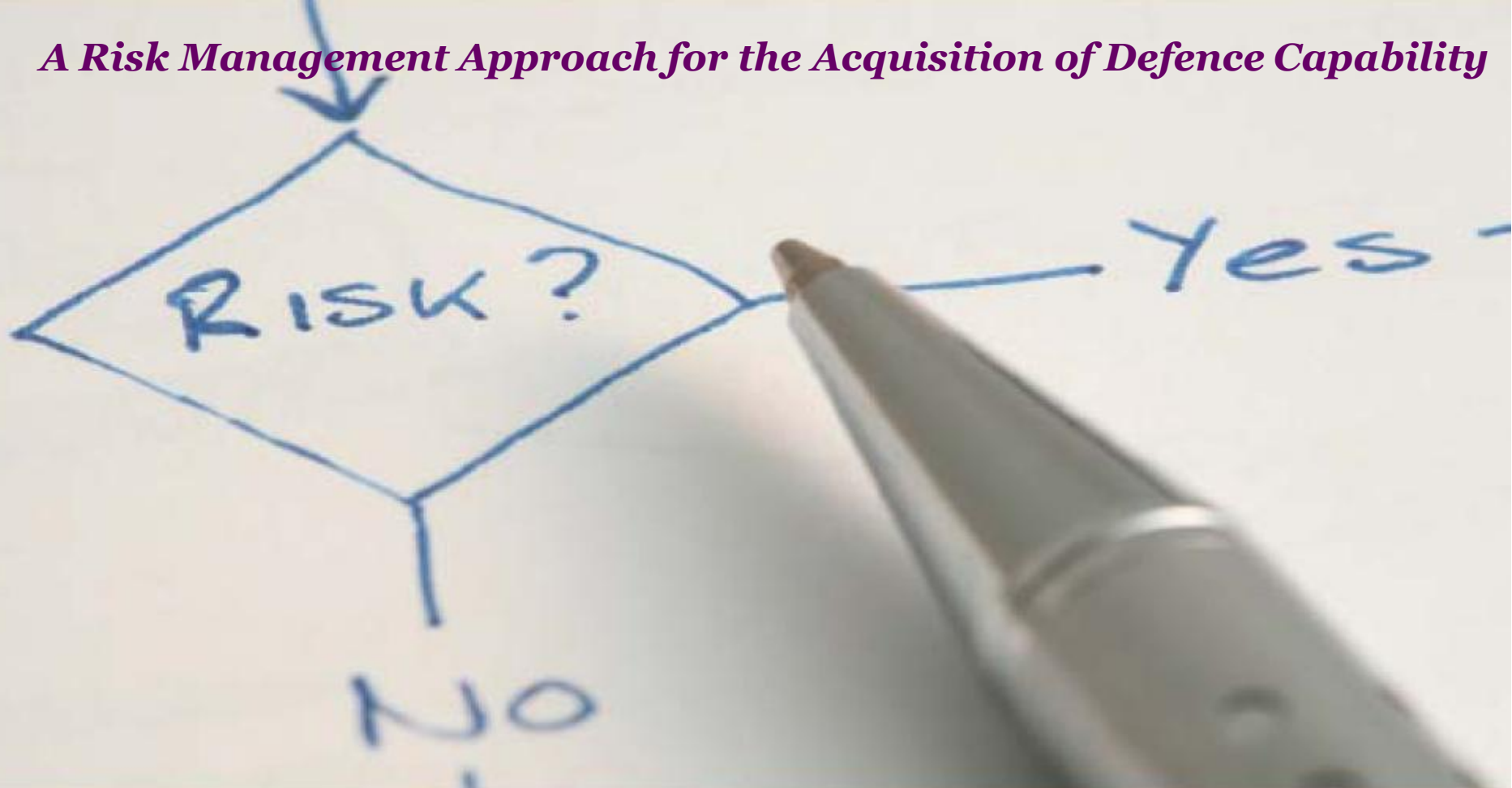 - remove the risk source by proposing a lower-risk technical alternative.

Sub-system	Technologies in each sub-system	TRL	SRL	Integration required	Likelihood of not being integrated in time[1]	Impact on project's objectives[2]	Level of Risk[3]
Guidance System	Battery	9	5	Guidance set to be integrated	Less than likely (30%)	Moderate	MEDIUM
	Guidance set	5					
	etc						
etc							
System							
Missile System			7	Integration with	Less than likely	Major	HIGH

Project AIR 1234 TRA Summary			
Risk Event Title	**Likelihood**	**Impact**	**Risk Level**
Radar performance	Less than likely	Moderate	MEDIUM
Weapon carriage	Less than likely	Moderate	MEDIUM
Certification	More than likely	Minor	HIGH
Corrosion control	Unlikely	Moderate	LOW
Overall Technical Risk Level	**MEDIUM**		

How risk management can minimise acquisition risk

- To ensure a project has a reasonable chance of success, the 'first pass' stage ensures that:

  - a valid set of end-user requirements are defined

  - the requirements are sufficiently stable to enable options to be properly analysed, in regard to *cost, schedule and risk*

  - the cost and schedule estimates are realistic and achievable

  - key supportability issues and requirements have been identified

  - the existing system is defined so that key risks can be evaluated

  - key issues for the implementation of the support system have been identified

  - plans for industry input during the second stage are effective

  - **the schedule and management plans for the second pass stage are sound and achievable within acceptable levels of risk.**

A Risk Management Approach for the Acquisition of Defence Capability

DMO