

Acceptance Testing Experience

- ▶ Masters of Engineering (Test and Evaluation) University of South Australia
- ▶ Combat System Shipboard Test Manager delivering for the First of Class ESSM Firing from HMAS Sydney
- ▶ Test and Trials Manager for Australia's New Icebreaker RSV Nyunga developing Test plan and finalising Functional Performance Specification
- ▶ Test and Evaluation manager bringing into service Autonomous Underwater systems, Unmanned Surface Vessels and Support Craft for the Royal Australian Navy



Where We start

So you have won the contract now the easy part commences building the boat,
or so you thought.....

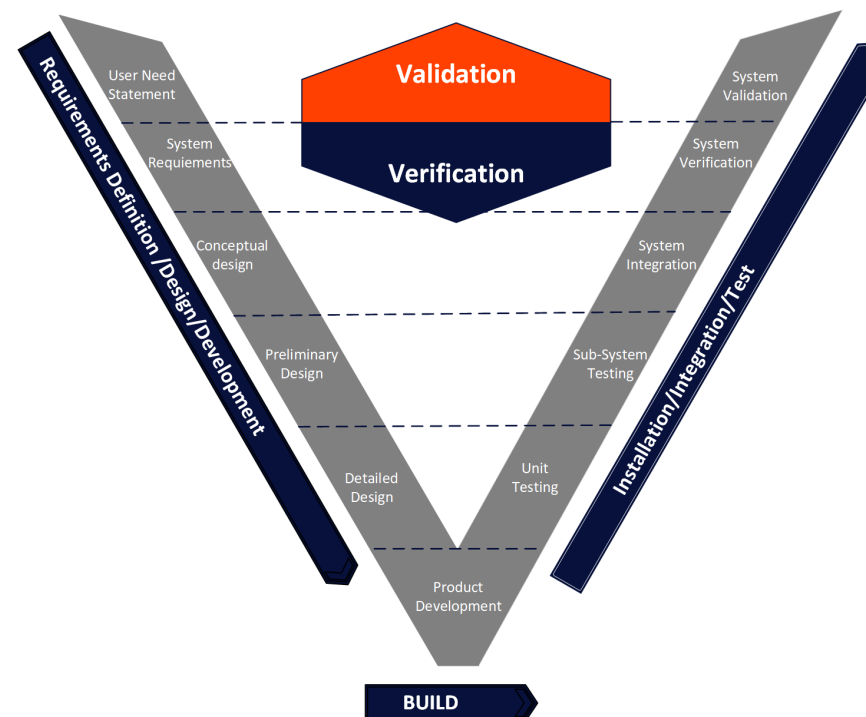
To ensure that you are prepared for what is to come, this presentation will take you through the practical processes that are required to deliver test programs in Australia - that may be applicable to your projects.

The focus of this presentation provide you an understanding of what you are required to deliver and what your customer expectations are.

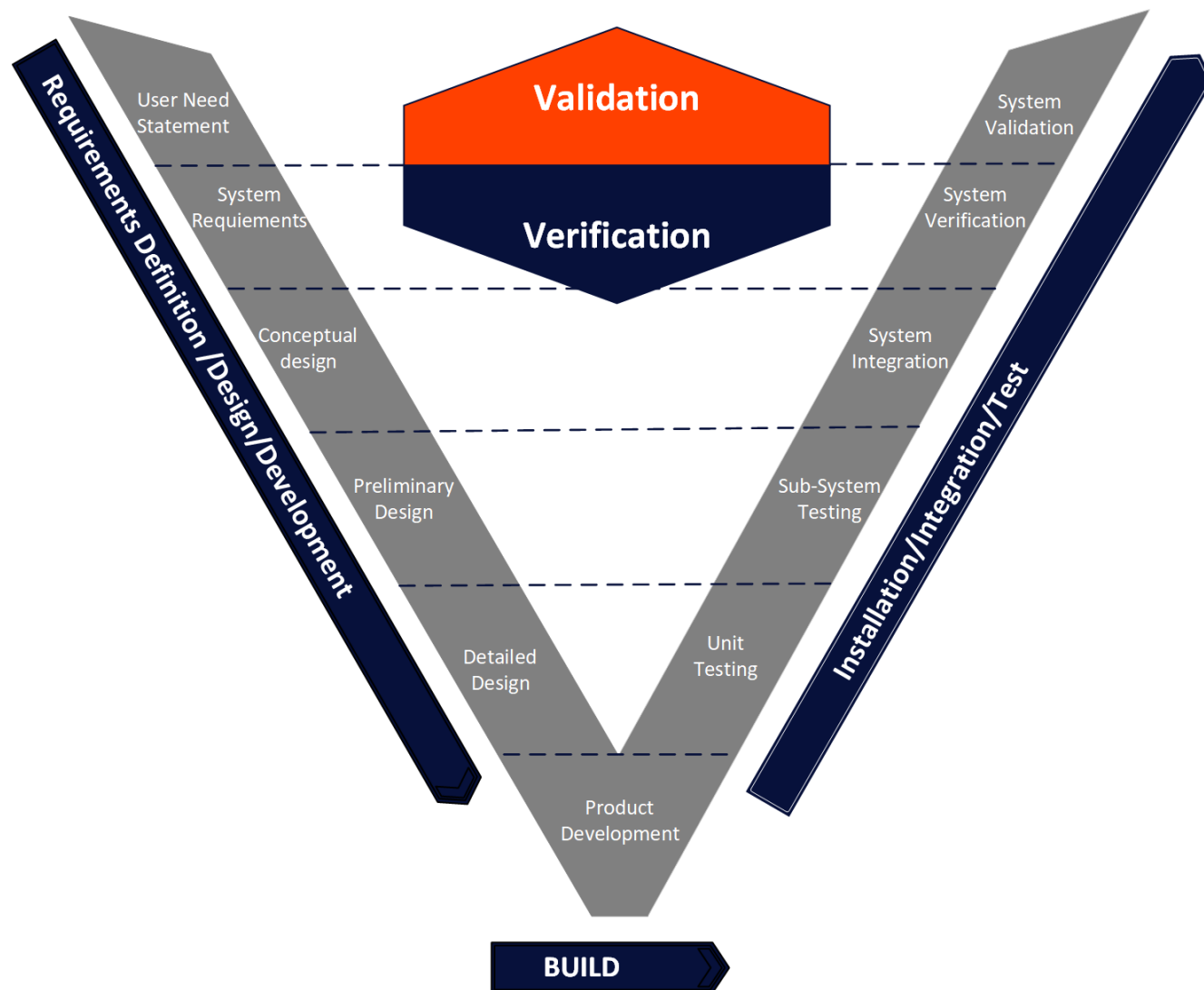
The Systems Engineering V Model

The “V” Model process is a universal approach and is fundamental to delivering a test program, areas that need to be considered:

- User needs statements
- Requirements review
- Preliminary Design Review
- Detailed Design Review
- Test Readiness Review
- Verification Test Conduct
- Validation Test Conduct



The Systems Engineering V Model



Understanding Customer Requirements

- ▶ Reading and reiterating User need Statements...
 - ▶ **Requirement** – The vessel shall be Grey in Colour...
 - ▶ **Your Understanding** - The vessel must be Pewter Grey....
 - ▶ **Customer wants** - Pearl Grey...

Issue resolved at Requirements review prior to purchasing paint or delivering the hull of the vessel with the wrong grey variant.

- ▶ **Requirement** – The vessel shall have a max speed of 50 knots in Sea State 1...
- ▶ **Your Understanding** - The vessel can have inboard or outboard engines to achieve this speed via either propellers or water jets....
- ▶ **Customer wants** - Inboard engines with waterjets ...

Issue resolved at Requirements review before purchasing and designing the vessel around outboard engines

Exploring the Functional performance specification and agreeing on what is meant by each requirement...

How to achieve and how to document the agreements?

Documenting Agreed Customer Requirements

There are many avenues that can be adopted to document the agreed requirements understanding. The most recognised is the Verification Cross Reference Matrix or VCRM.

VCRM lists:

- ▶ System Specifications
- ▶ Subsystem Specifications
- ▶ Method of Qualification (MOQ)
- ▶ Test Phase
- ▶ Unique Test Procedure
- ▶ Test Case or Test Summary

The key is to identify these elements early and gain agreement to proceed in the direction documented

GUIDE TO TEST PROCEDURE

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Documenting Agreed Customer Requirements

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- FIGURE 1: IDENTIFICATION/TEST STATUS TAG 16

Early Requirement Sell off

- ▶ Achieving requirements through Design and Analysis
 - ▶ Approx 90% of requirements should be either partially achieved for fully achieved by completion of the Detailed Design Review (DDR)...Or should be
 - ▶ Ensure design documents and reports clearly identify requirements being addressed in report/section/statement
 - ▶ Update and modify VCRM with requirements that were unable to be achieved through Design or Analysis...Can they be achieved or not? Provide a way forward.
 - ▶ Ensure that the VCRM reflects the MOQ and Test Procedure

Acceptance Testing

- ▶ When conducting the test events:
 - ▶ Conduct of dry runs of the test procedure – ensuring that the system under test is ready for sell off, modifying by redlining procedure to ensure a logical flow...the 5 P's
 - ▶ Open and honest Communication with your customer
 - ▶ Understanding and conveying what the expected outcome of the test to your customer
 - ▶ Ensure that the process is transparent
 - ▶ Identify and report Issues... whether the issues are good or bad for the customer, always present a solution to the problem... how to rectify the issue.
 - ▶ Remembering that testing confirms that the various systems being delivered “can do what we say they do and what we agreed” to complete in the requirements.

Post Test Conduct

- ▶ The Physical Test may be complete but the real work starts:
 - ▶ Writing accurate comments and agreed outcomes on the test report
 - ▶ Identifying level of retest required and agreed redlines
 - ▶ Maintaining a test log
 - ▶ Signing the completed test procedure at the time of test...listing all personnel in attendance
 - ▶ Test report clearly identifies Test issues, failed steps/requirements and agreed way forward.
 - ▶ Updating the VCRM
 - ▶ Ensuring Issues are recorded in the project register
 - ▶ Delivering - Scan/file documentations and provide a copy to your customer

Delivering Test outcomes

- ▶ Documentation and Objective Quality Evidence (OQE) – this is how we get paid, understand what deliverables are required to ensure customer acceptance.
 - ▶ Signed Test Report
 - ▶ Test Log
 - ▶ Test Procedure
 - ▶ Updated VCRM
 - ▶ Issues Register - comments
 - ▶ Follow up on defects and design deficiencies identified in Test conduct
 - ▶ Retest requirements and obligations.

Australian Test direction

- ▶ Australia is undergoing an unprecedented growth in Defence Capability
 - ▶ Sovereign Capability focussed
 - ▶ Regeneration of the Acquisition and Sustainment models – NSSG, Plan Galileo, AUKUS etc

- ▶ These changes are in response to recognised shortfalls – as an example the 2015 ANAO report “*The Auditor-General ANAO Report No.9 2015–16 Performance Audit - Test and Evaluation of Major Defence Equipment Acquisitions*” highlighted the of test conduct led to maintenance and performance issues

Table 4.1: HMAS Canberra’s test program results, November 2014

Item	System Integration Tests	Harbour Acceptance Trials	Sea Acceptance Trials
Number of Test Procedures ^A	38	62	38
Number of Test Procedures not commenced ^B	0	2	1
Number of Test Procedures conducted but Test Report not submitted	0	12	11
Number of Test Procedures ongoing ^C	0	29	11
Total number of Approved Test Reports ^D	38	19	15
Percentage of Test Reports approved	100 per cent	31 per cent	39 per cent
Percentage of requirements fully closed ^E		72 per cent	60 per cent

How Australia is changing

- ▶ Australia has commenced changing its approach to Test and Evaluation :
- ▶ 2020 - SOVEREIGN INDUSTRIAL CAPABILITY PRIORITY IMPLEMENTATION PLAN - Test, evaluation, certification and systems assurance was released

A plan for a strong, sustainable and secure industrial capability

This Implementation Plan details the critical industrial capabilities that underpin the *Test, evaluation, certification and systems assurance* Priority. It is supported by the companion Department of Defence Industry Plan, which provides more detail on the industrial base and Government actions listed in this Implementation Plan.

The Way Forward

- ▶ Australian Defence Force Approached Industry to help map the future of T&E through a consultation process.
- ▶ Sovereign Test and Evaluation CD/RFI/24943/1 25 March 2022

Figure 1 – T&E across the One Defence Capability System¹

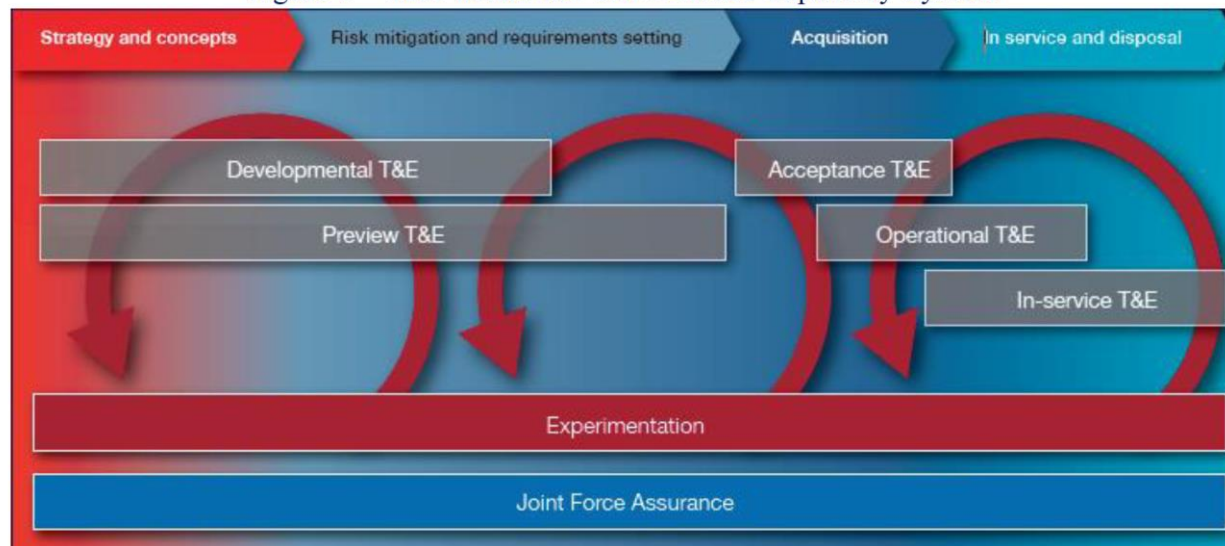
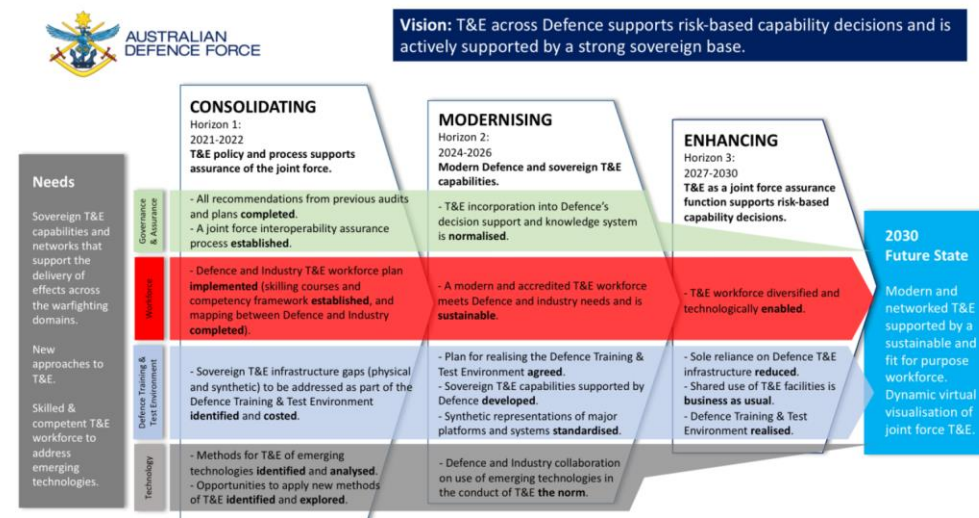
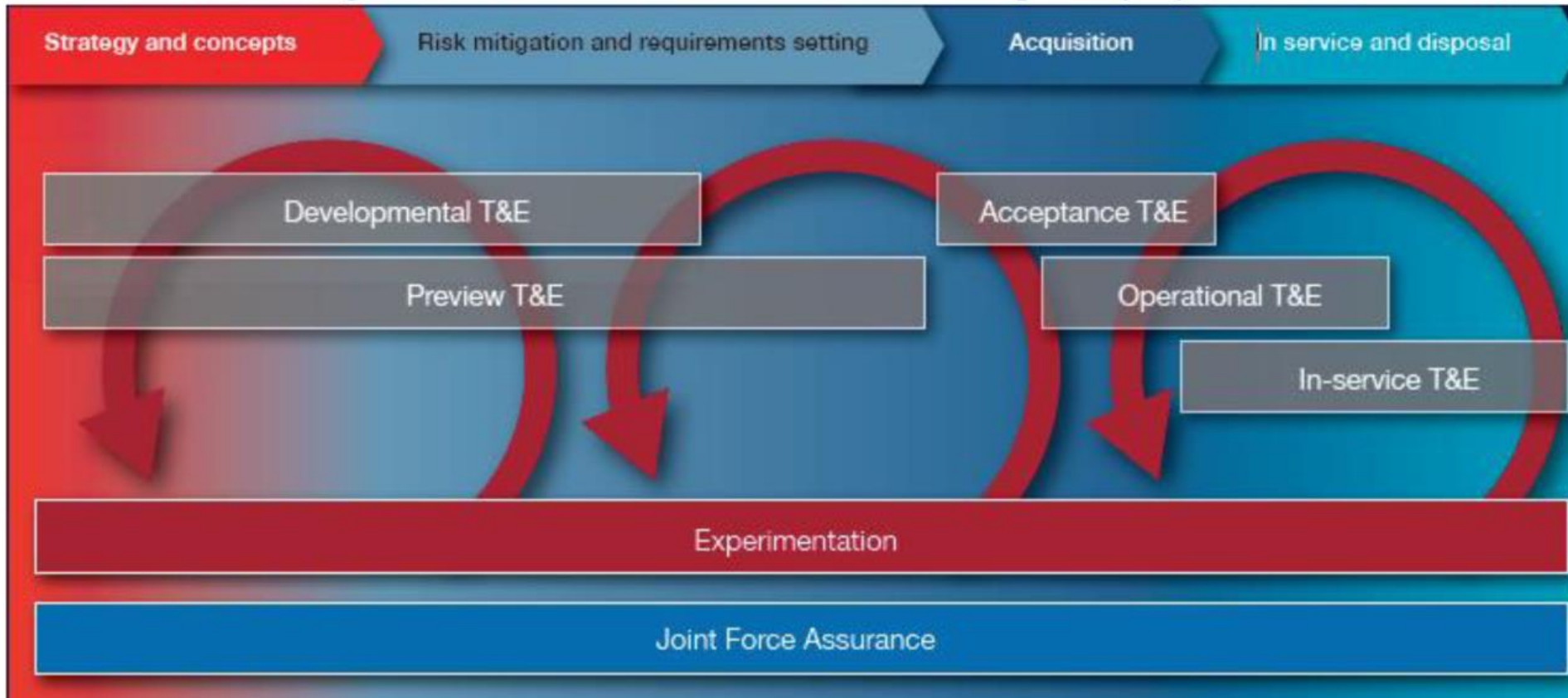


Figure 2 – The Defence T&E Strategy



The Way Forward

Figure 1 – T&E across the One Defence Capability System¹

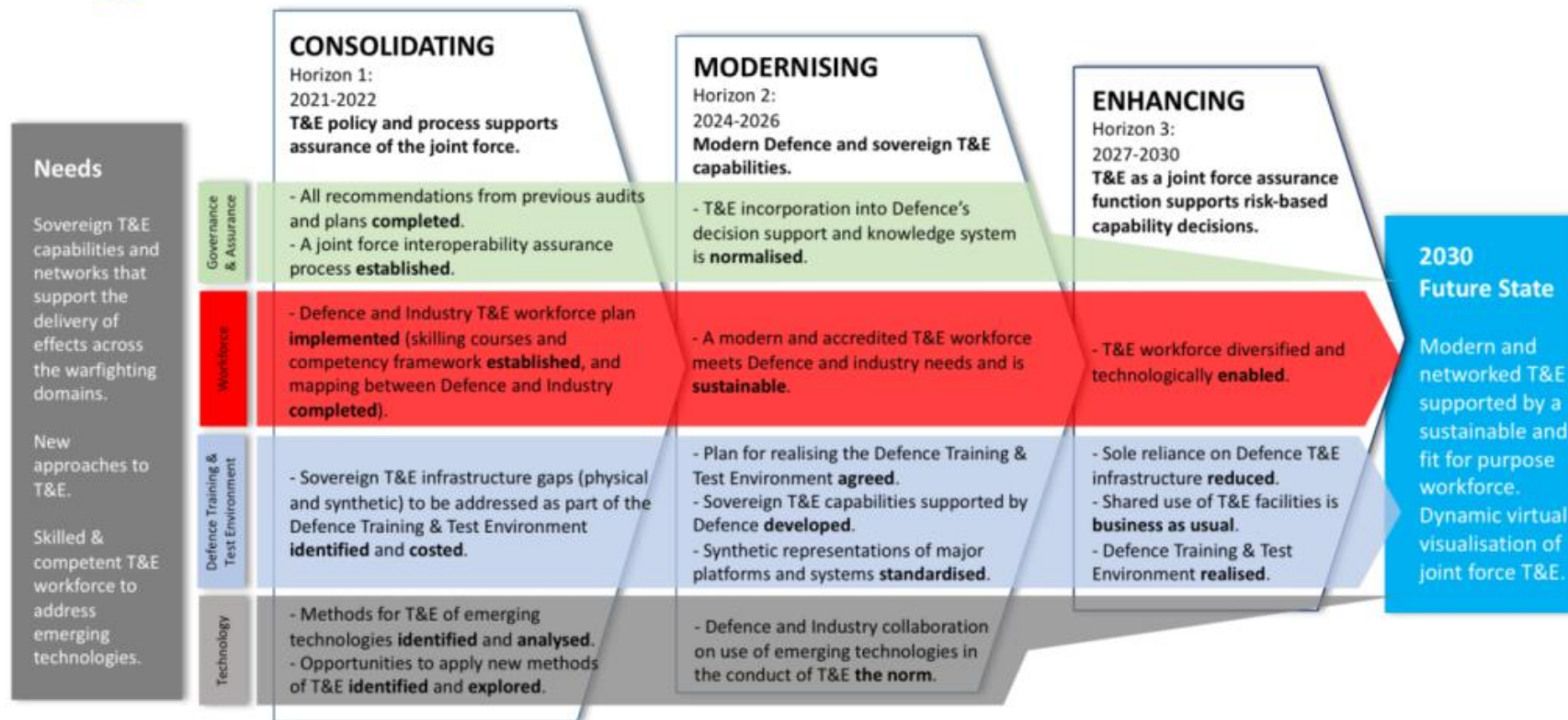


The Way Forward

Figure 2 – The Defence T&E Strategy



Vision: T&E across Defence supports risk-based capability decisions and is actively supported by a strong sovereign base.



Questions

