CALGUS MARITIME

Re-imagining Acceptance Testing

About Calgus

Geoff Baird
Founder - Director

Calgus is an emerging Defence specialist sub-contractor owned and operated by Defence Veterans providing client-focused solutions for the delivery of small boat products, project management, engineering, safety engineering, test and evaluation. The Calgus team offers vessel management expertise in whole of ship concepts from requirements setting through to delivery and acceptance. Qualifications include:

- Masters of Engineering (Test and Evaluation)
- Combat System Shipboard Test Manager
- Test and Trials Manager for Australia's (RSV Nyunga)
- Test and Evaluation Manger SEA 1778 (Autonomous Systems)
- Integrated Test Engineer Regional Maintenance Centre (Naval Vessels)

How We Test

Testing is a subset of the Systems Engineering process using the Systems Engineering ‘V Model’, through DT&E, AT&E and OT&E.

While there are many derivatises of this method, could there be a better way to procure and test small boats for future acquisition.

Lets explore the art of the possible

Defining Requirements

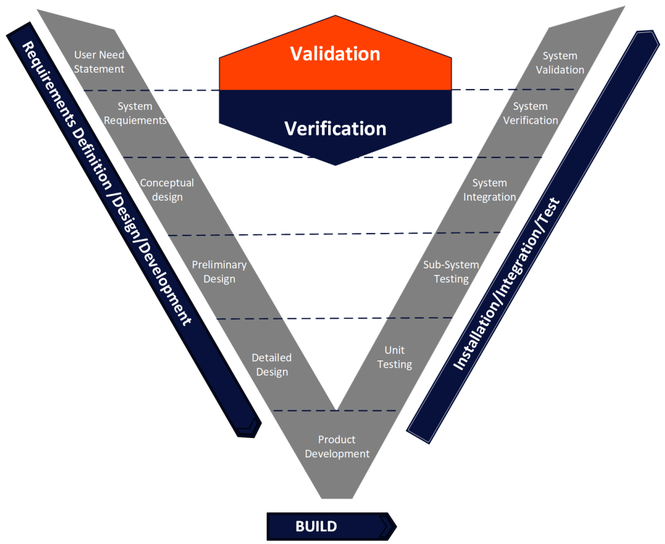
Defining Requirements for a User Needs Statement against operational requirements

Requirement	Clear and concise Addresses the User Needs Statement quantifiable/qualifiable
Prioritisation	Essential – Must be incorporated Desirable – Would like to have it but not defining
Testability	Method of qualification Repeatability
Delivery	Reporting Validation

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



Re-Defining the Systems Engineering Approach

- User needs statements
- Requirements review
- Preliminary Design Review
- Modelling and Simulation – Now System/ Subsystem trade off Eval
- Detailed Design Review
- Test Readiness Review
- Verification Test Conduct
- Validation Test Conduct

System/ Subsystem Trade off Eval

- Expanding initial purchase to multiple vessels
- Empowering builders to make design and configurations changes during evaluation - documented
- Heightened customer interface
- Physical hardware – not just a Glossy
- Streamlined build phase for final deliveries

Test Eval Process

01

Definition

Requirements defined from the user needs statement, Tender initiated

02

Planning

Tender evaluation and selection of multiple companies occurs, System System requirement reviews conducted and agreed.

03

Test Eval

Multiple Vessels/Systems conduct a minor test program to verify ability to meet the user requirements

04

Redefining

Based on the outcomes of the testing and interoperability of subsystems redefine requirements, conduct Final SRR, PDR and DDR

05

Delivery

Complete the build, Test and Acceptance phrases, bringing the Vessel/System/Subsystem into service

Integrating the Petroleum Industry Methodology to Testing

- **1% of Project Cost** – This is associated with defining requirements, requirements reviews and evaluating systems and subsystems
- **9% of the Project Cost** - Build and evaluate potential solutions, understanding if it meets the user needs and requirements
- **90% of the Project Costs –** Completing the build

Redefining how requirements are set

- Requirements determination – In most procurements the person writing the requirements does not test the vessel/System, this leads to theoretical requirements and not always operational requirements – Conducting multi vessel/system evaluation will reduce errors in this process.

- Selection process – Selecting multiple vessels / systems that can have interoperable products will enable the end user to determine what is Essential and what is considered Derisible

- Eval Test Events – Ensure that the evaluation process is clear and concise, identifying the ability for vessels to change systems during the trail conduct that may enhance performance, maybe a seat? Conducting these run off’s will provide the customer with a better understanding on performance, operational capability and compatibility ensuring that selection of the compliant vessel/system is achieved

Trade off - Eval Testing

- Test Events – test events are built around a theoretical vessel, noting most organisations change the vessels for their requirements, in Australia we refer to this as ‘Australianising’ the vessel, hence the issues with how the boat perform
- By conducting Test Eval with multiple suppliers the end user will be able to see how the actual vessel/System performs against the stated tender compliance documents.
- Enabling suppliers to modify products and systems within a vessel during the Test Eval to enhance their solution, without being penalised, enables the end user to see the best available vessel options to meet their requirements
- What If’s and requirements changes during build and test phases are greatly reduced – No blow out in costs

Benefits

- The End User will get the product that serves them and their operational requirements
- Evaluating different products across various conditions allows for a comparative analysis that highlights the strengths and weaknesses of each vessel.
- Onboard testing offers more accurate and nuanced insights than theoretical models and outdated testing methods, as it accounts for real-world conditions and user experience.
- Final requirements definition clearly defined and is Quantifiable/Quantifiable
- Cost and Schedule will be more realistic and achieved
- Reduces the need to rework and potential warranty and latent defects

Final Outcome

- Customer gets what they want
- Builder has a clearer understanding of what they are required to deliver
- Limited Cost or schedule blow outs

Importance of Trade Off Eval

Low blow: Sydney's new ferries won't fit under bridges with passengers on top deck

Commuters will have to move before boats can travel under Camellia Railway Bridge and Gasworks Bridge on Parramatta River

The new River Class ferries (not the boat pictured), purchased from Indonesia, are too high for passengers to be on the top deck when it goes under the Camellia Railway Bridge and Gasworks Bridge on the Parramatta River. Photograph: Martin Ohye

The New South Wales government has confirmed that 10 newly purchased ferries will not be able to safely pass under bridges along the Parramatta River if commuters are sitting on the top decks.

Questions and Comments

Our beliefs

Calgus Core Values

Discriminator

Calgus is a client-focused engineering consultancy company that specialises in new and modified vessel builds, including the delivery of projects, engineering, safety engineering, test and evaluation and vessel management. Delivering expertise in whole of ship life cycle management from contract concept through to delivery and acceptance.
Calgus is passionate about delivering projects and working with clients to ensure that the information sharing of our expertise will enhance the client's personnel and this data will remain with the client through the project lifecycle.
Calgus commitment is to provide only qualified and experienced experts within their related fields, ensuring no substitution of personnel.

Capabilities

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Commitment

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Thank you!

For your attention!