MASRWG Conference 2021
Defence MASS Technology Update

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BAE SYSTEMS

Introduction

- Royal Navy **Nemesis**,

- Autonomy & Lethality
  - DARE - Rapid acquisition
  - NavyX - Experimentation

NEMESIS

Bring me problems, not solutions

Conduct curation, discovery, incubation, integration and experimentation activity to deliver spirally developed Minimum Viable Capability

DARE!

MarWorks Information Warfare Innovation

ROYAL NAVY NavyX

SPECAP

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Autonomy Enabled, Data Centric & Digitally Driven

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Introduction

- Autonomous Pacific 24 seaboat (aP24)
- Integrated into the Combat Management System of a Type 23 Frigate
- Investigate delivery of Force Protection and ISR missions
- Focus of this presentation is:
  - Security accreditation process
  - Safety approval process

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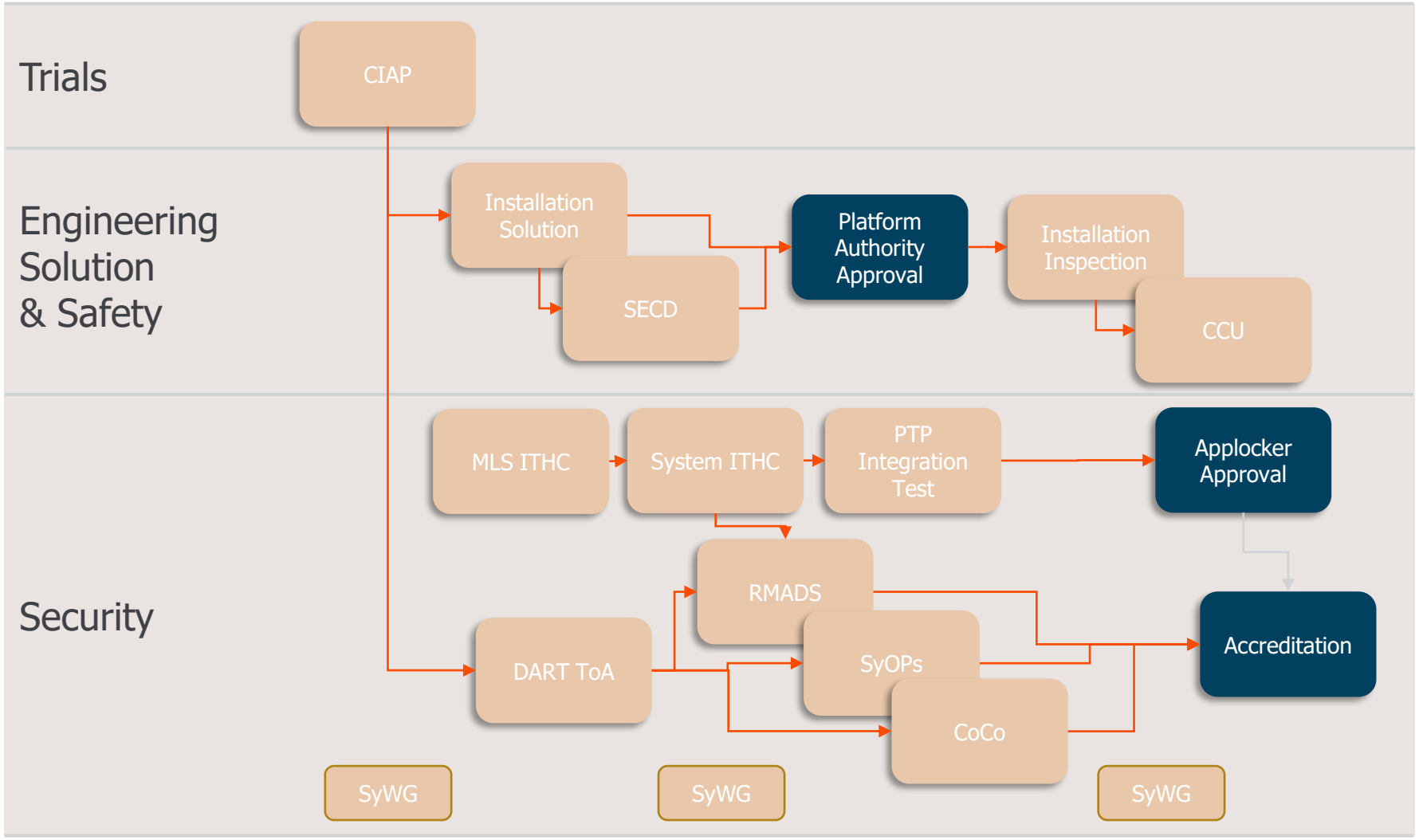
The Approval & Certification Process



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Security Assurance

- Example security requirements:
  - Def Stan 05-138 - Cyber Security for Defence Suppliers
  - DEFCON 658 - Cyber
  - DEFCON 659A - Security Measures
  - DEFCON 660 - Reportable Official and Official-Sensitive Security Requirements

- Underpinned by contract specific (JSPs) e.g.
  - Risk Management
  - Defence Crypto-security Operating Instructions

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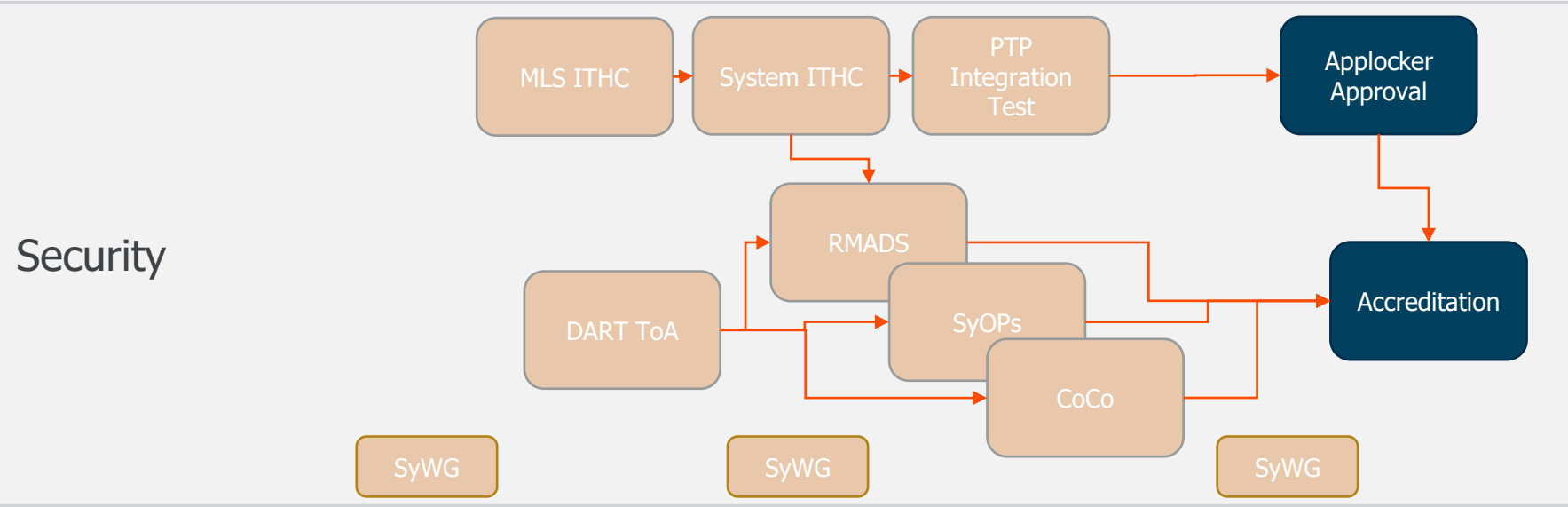
Security Assurance



- Security is managed through the DART process
  - Allocates a MoD Security Accreditor
  - Facilitated by a series of Security Working Groups
- Key deliverables
  - RMADS - Risk Management and Accreditation Document Set
  - SyOPS - Security Operating Procedures
  - CoCo - Code of Connection
- Underpinned by rigorous, independent penetration testing

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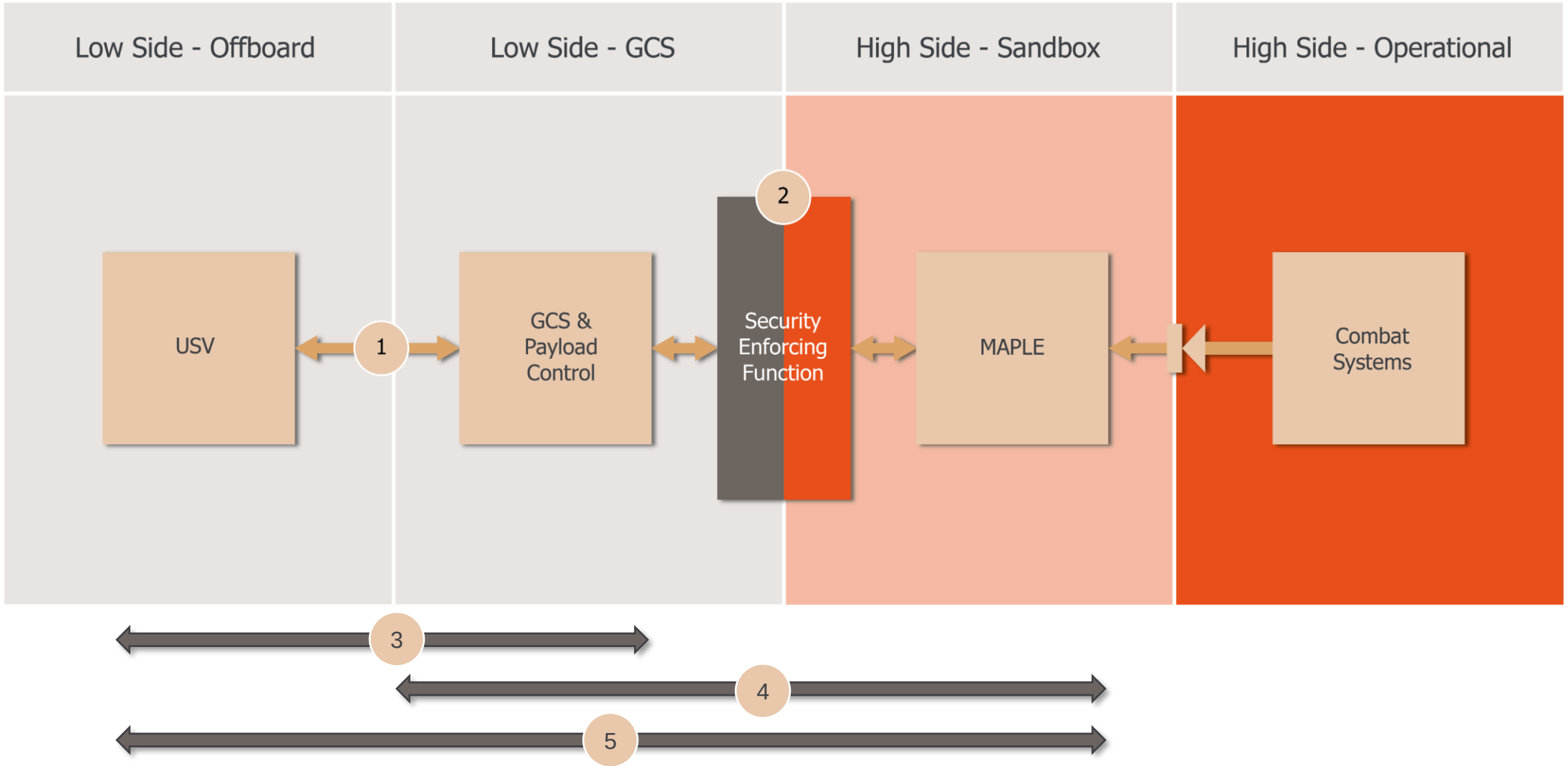
Multi-level security architecture & ITHC / Penetration Testing



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Safety Approach

- Much of the donor vessel design remains unchanged by the unmanned conversion
  - the approach builds on the foundations of the existing Safety Cases and Hazard Logs
  - and from extensive experience of the in-service P24 Mk4

- The USV Safety Case is strengthened by additional activities in accordance with:
  - DSA02-DMR
  - Def-Stan 00-056
  - MASS UK Industry Conduct Principles and Code of Practice
- using well established Hazard Identified & Analysis processes

- Key deliverables are:
  - SECR – Safety & Environmental Case Report
  - SOP – Safe Operating Procedures (incl. RAs)
  - SECD – Security & Environmental Control Document
  - NAG MoD Boat Safety Certificate
  - CCU – Certificate of Clearance for Use

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Safety Approach

- The **Safety Argument** uses the concept of equivalency and claims that the aPAC24 is **as safe as manned**.
- This claim is developed using a Goal Structured Notation (GSN) supported by evidence
- The Top Goal of the GSN argument is stated as "The PAC24 USV System is acceptably safe to use", which is met through a number of sub-goals and strategies.

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Safety Approach

- A "Strength in Depth" approach has been used to provide multiple layers of protection
  - range from SIL certified systems to *man-in-the-loop* procedural controls.
  - sufficiently mitigate any residual operating risk in the context of trials and experimentation.
  - Further low level controls for specific hazards

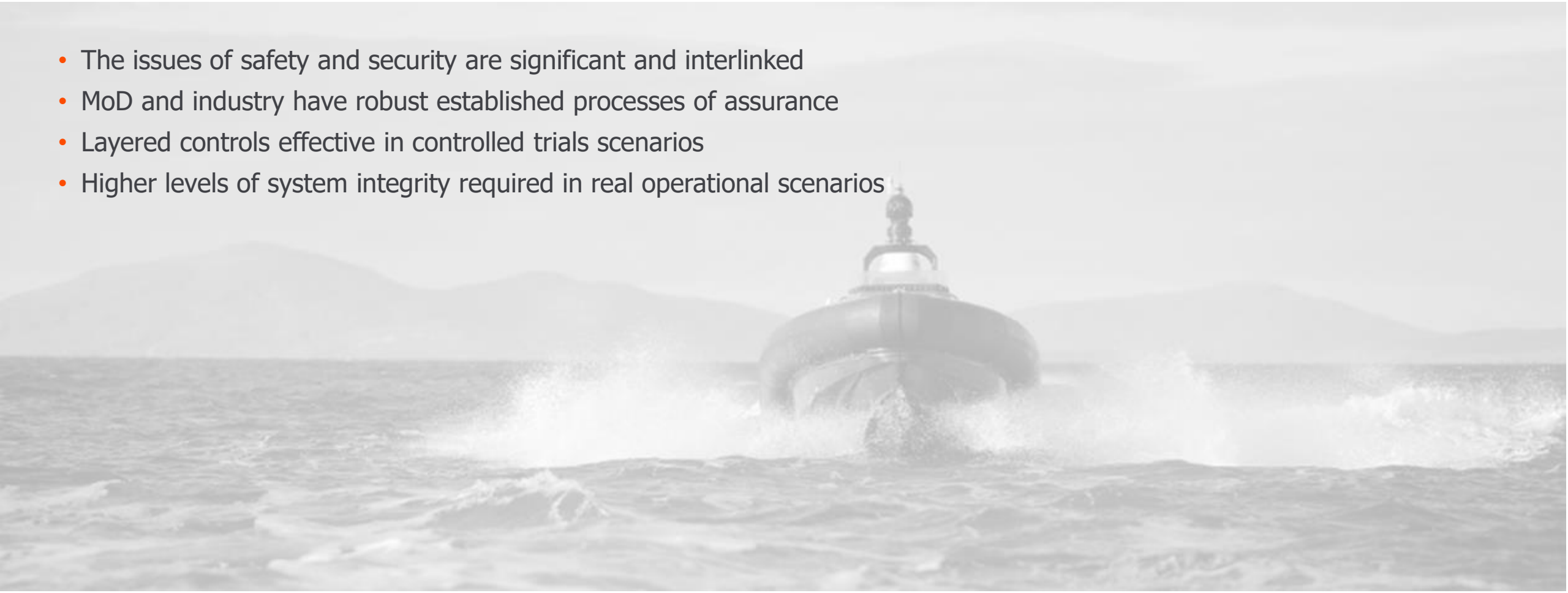
- Layer 1
  System Integrity **Prior knowledge and gradual system testing that provide a level of confidence in system integrity**

- Layer 2
  System Oversight **Provision of alternative / additional situational awareness**

- Layer 3
  Limitations **Operating procedures and limitations**

- Layer 4
  Fall-back **To alter or halt activities, or react to issues**

Summary



- The issues of safety and security are significant and interlinked
- MoD and industry have robust established processes of assurance
- Layered controls effective in controlled trials scenarios
- Higher levels of system integrity required in real operational scenarios

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Thank you

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