[dstl] The Science Inside

Dstl Land Survivability Research

Brief to Future Land Forces conference

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Ministry of Defence

Next gen integrated survivability suites

Who am I?

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- Land survivability specialist within the Defence Science & Technology Laboratory
  - Specialist in Active Protection Systems
- Technical lead for Dstl projects related to Land APS
- Technical lead for the *Counter Effectors and Sensors* project
  - Funded through the Chief Scientific Advisor
  - Aims to **identify, develop, and prove prioritised survivability technologies for Land vehicles**
    - Analysis conducted across the onion
    - Research focused on pre-strike approaches
    - Exploitation of developments across various areas of the lab
- Masters degree in Physics
  - Experience in underwater acoustics, ship missile defence, energetics, vulnerability analysis, systems engineering, modelling & simulation, vetronics, sensors
  - 17 years and counting in Land survivability

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ARMY

Today's presentation

- Reasons and enablers behind the resurgence back to Armour
  - Meetings the British Army's need
  - Responding to the threat
  - Systems integration across APS, SA, ECM, C-UAS, and lethality
- Key programmes
  - Land Concepts approach to research planning
  - Modular Integrated Protection System
- Key technologies
  - Future sense and effect technologies

Resurgence to Armour

- Times have changed:
  - Extreme pace of threat development
  - Toroidal to hemispherical attack vectors
    - Not just the sides
    - Not just the frontal arc
  - Ubiquitous surveillance
    - UAS & EW
    - Low cost night vision
    - Social media & InfoOps
- The Land Operating Concept 2027 – 2037
  - *Importance of survival and recce-strike*
- Result:
  - Conventional operations require vehicle survivability to deal with the modern threat, **now and tomorrow**

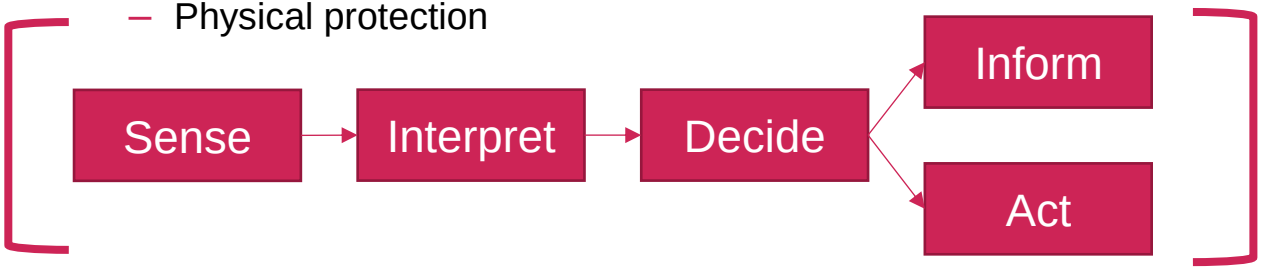
So what?

- Survivability must be:
  - Ahead
  - Flexible
  - Focused
  - Integrated

- How does Dstl support this?
  1. Targeted expert advice
  2. Cross-maturity scoping and preparation
  3. Provide enablers to key functions
     - *Interoperability*
     - *Spiral development*
     - *Digitised situational awareness*
     - *Buddy-buddy & crewed-uncrewed teaming*
     - *Systems integration*
     - *Assessment & development capability inc. M&S*

Integrated Survivability Suites

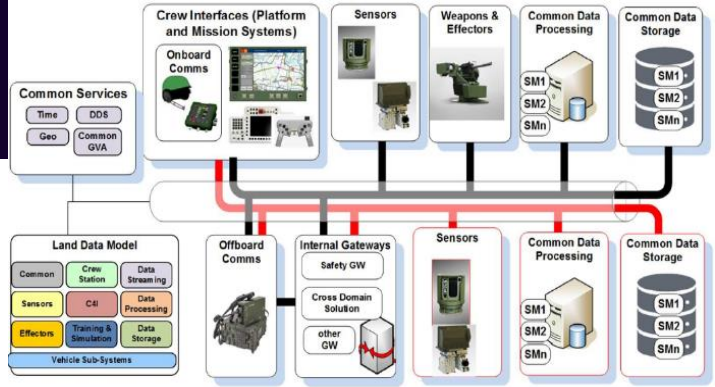
- Armour capability requires a level of physical protection but:
  - You’re not armouring your way out of this
  - Survivability is a systems of systems problem
- Integrated Survivability Suites can achieve:
  - Situational awareness
  - Counter-UAS
  - Electronic surveillance & countermeasures
  - Hard and soft kill APS
  - Enhanced platform lethality
  - Physical protection



MIPS Architecture
STANAG 4822

What is the MIPS architecture?

- MIPS: Modular Integrated Protection System
  - Enables the ‘spiral development’ of GM survivability capability
- MIPS defines the architecture, interfaces and functions of the APS
  - Applying a safety-critical development of GVA to the APS use case
    - Coherent with future integrated mission systems
  - MIPS is not a single system implementation
    - Re-use of common elements
    - Tailored to the situation
  - MIPS can be applied to existing APS e.g. Trophy, Iron Fist, ADS, MUSS etc.
- MIPS implementation can be scaled to the need
  - Light: limited to platform interface alignment, with minimal internal system changes
  - Heavy: full use of MIPS interfaces and controller



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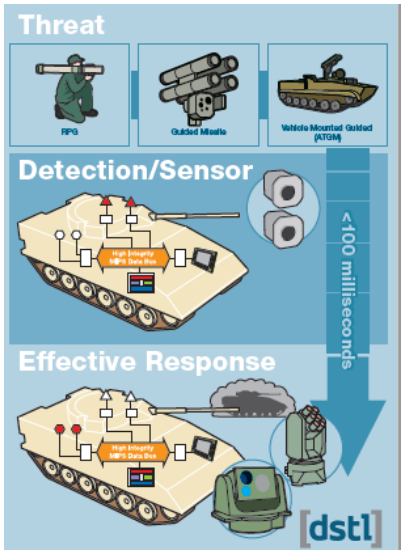

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MIPS Implementation overview

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- MIPS Implementation task, Nov-23 to Mar-26
  - Funding of £16.5M over ~3 years to:
    - Stream 1: Apply a MIPS-compliant architecture to a HK APS
    - Stream 2: Mature the C-sUAS implementation to exploit existing platform lethality (i.e. RWS & CT40)
  - Sensors, effectors and controller have been selected
  - Delivering live fire functional demonstrators
    - RPG shoot-down
    - UAS shoot-down
    - Automated obscuration
    - Threat warning

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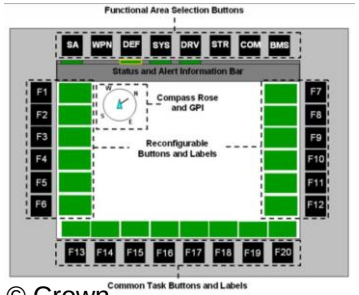

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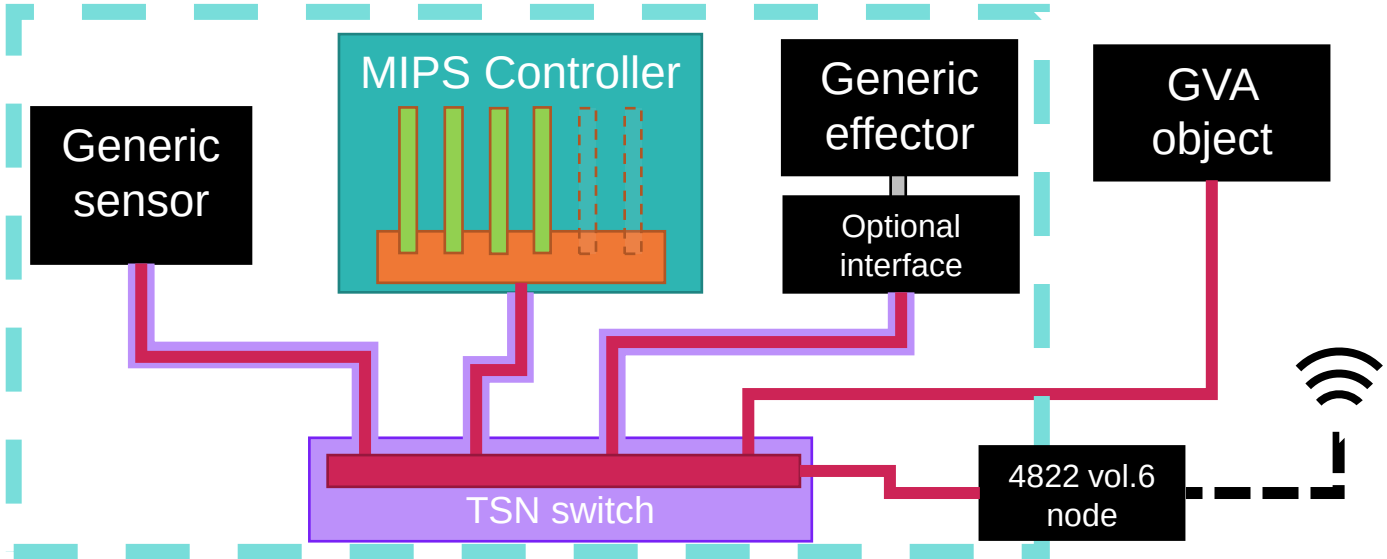
- Tasks
  - Mature the common MIPS controller inc. hardware and software
  - Conduct focused maturation activities on key MIPS technologies
  - Derisk platform interfaces
  - Evidence the resulting systems through simulation and physical trials
  - Uplift MIPS standard to v1.0, aligned with (N)GVA, SAPIENT, CRENIC, and ZODIAC
  - Develop use cases aligned with system concepts

MIPS within the architectural hierarchy

- MIPS is a **system architecture**
- MIPS exploits:
  - GVA for Land Data Model, power, connectors
  - Land CEMA for processing hardware configuration
  - TSN for dependable networking



MIPS Architecture
STANAG 4822

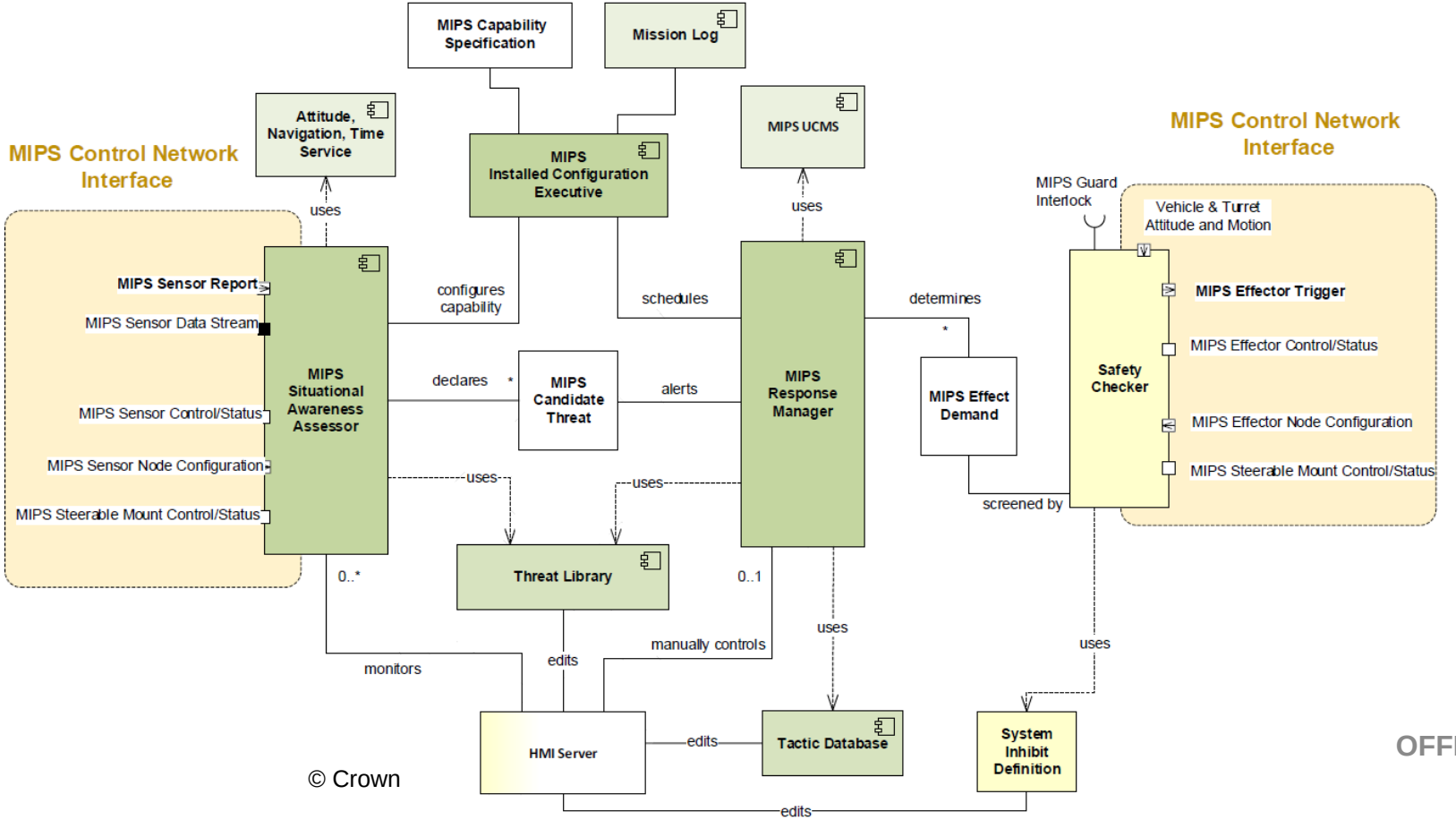
(N)GVA
DefStan 23-009, STANAG 4754

MIPS control logic

Time Sensitive Networking
IEEE 802.1Q

Land CEMA

Opening the controller logic



Spiral development in action

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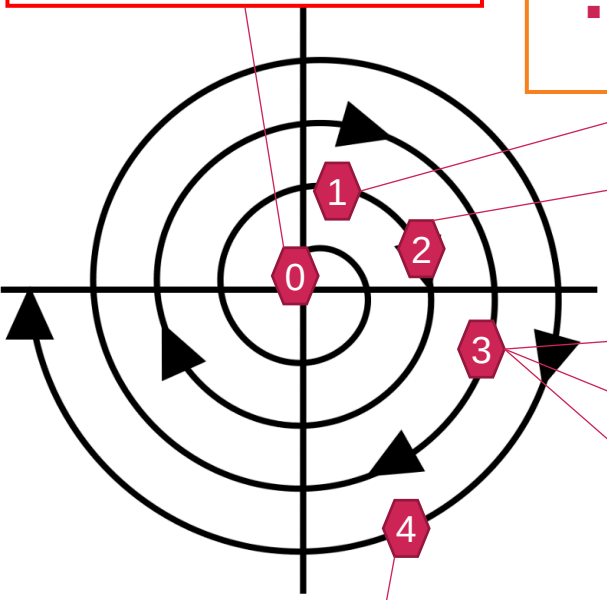
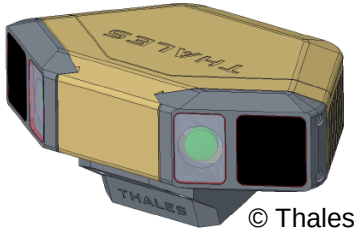
0. Trophy MV
- RPG & ATGM defeat

1. MIPS Implementation
- MIPS controller
- Integration of hard and soft kill functions

2. Organic C-sUAS using existing platform lethality
- Re-use HK radars for sUAS tracking



3.1 Next Gen EO Sensing



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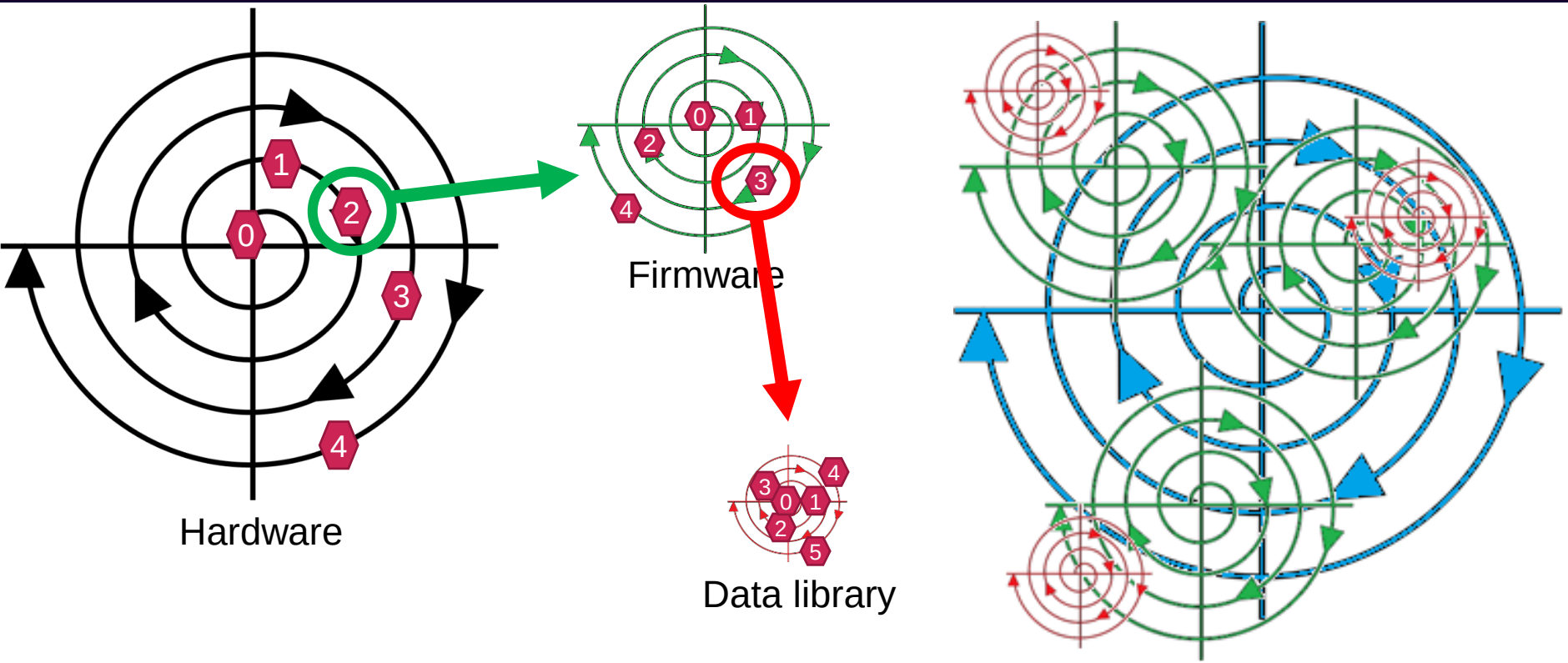
3.2 Next Gen Soft Kill
- Novel effector

3.3 Near-term sense & effect
- e.g. C-UAS

4. Long-term sense & effect
- e.g. KE deflection

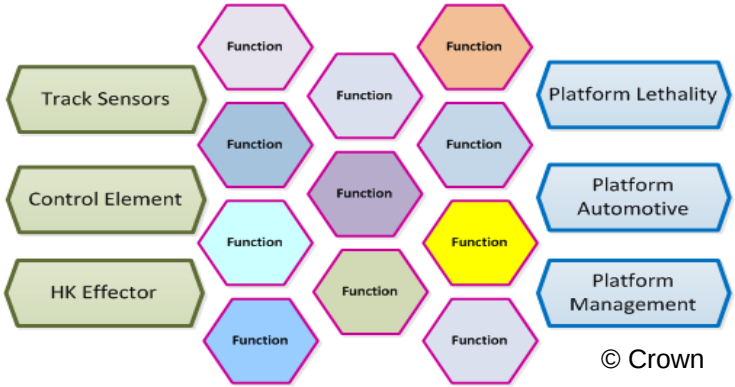
Spiral development opportunities



- MIPS enables development at the hardware, firmware and data levels

Conclusion: Where are we heading?

- Guided by Army strategy and high-level concepts
- Integrated Survivability Suites
  - Sensing
  - Situational awareness
  - Aligned with ECM and EW
  - Providing point defence against
    - UAS & loitering munitions
    - Missiles
    - Rockets
  - Bolstering lethality & mission effectiveness
    - Targeting and cueing
    - Cross-platform by design
  - Enabling armour to focus its role
- MIPS is a Crown-owned open standard being published as **NATO STANAG 4822**



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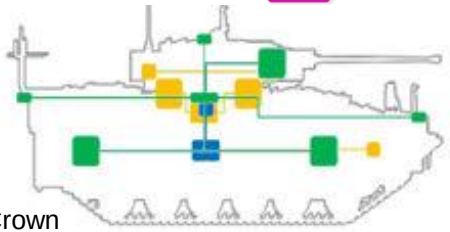

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